305 – 2005 Palo Verde Ave., Long Beach CA 90815 (562) 494-8782

The Home Workplace:

A Builder's Guide to its Environment, Energy and Economy

V2.03

Daniel R. Perley
President / CEO
Workplace Technologies Corporation
dperley@mtc-stm.ca
www.wtc-us.com

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1. Introduction

1.1 General Introduction

1.1.1 Purpose of this Book

This book puts forward the proposition that the development of the home workplace is of crucial importance to the future of Western economies in general, and those of North America in particular. The emphasis, and many of the examples cited, relate to the Canadian situation but they are in most ways equally relevant to the United States and possibly also to Mexico in the future. The home workplace encompasses 'telecommuting' (wherein those working for a large organization with a conventional office work at home part or all of the time), the 'decentralized workplace' or virtual corporation (wherein an organization is built as a collection of home workplaces, entirely without an office) and also individuals who work from home.

1.1.2 "*Forward to the Land*"- From Scarcity to Surplus

Like many countries, we in Canada and the United States are now facing the challenges of economic re-orientation, the need for better energy management and increasing environmental decay. However we also possess a very special opportunity, one not as readily available to most other Western democracies. Our great expanse of land, once seen as a barrier and a handicap, could now prove to be our greatest advantage. Now that microelectronics technology has made information the raw material of work for most of us, there is no particular need for many of us to migrate to the office each day.

If we can work at home much of the time, then we can choose a location much more distant not only from the office but even from the city itself. At such place, we could - using robotics technology far less sophisticated and costly than that already in use in industry - produce much more of our own food and energy ourselves. Our lower density would also reduce pollution and congestion, but would not deprive us of access to the services and products of a metropolitan area, since with far less commuting there is more time for multi-purpose utility and recreational trips. Nor would the home workplace bring personal isolation or destroy the employer organization, although major changes in organizational culture would be required. While workplace decentralization would assist any liberal democracy, we North Americans are in the ideal position to pioneer it because we have advanced communications technology and a lot of space!

A population which moves 'forward to the land', distributing itself more evenly about the geography, would demand not only a previously unknown level of access to services in rural areas but also locally responsible (and responsive) government. This transformation can be accommodated within the liberal democracy we now enjoy, but will require both technologically enlightened leadership and a severe housecleaning of the ethics and integrity of the political system.

It is suggested in this book that we in Canada and the United States should adopt large-scale publicly planned and led – *but privately implemented* - workplace decentralization as a primary political, economic and technological goal. The organizational and individual benefits of such an approach are then discussed. Much of the book might also apply (at least to some extent) to Europe and other advanced societies as well.

Virtually all of our capitalist economics is founded on the principle of scarcity; it is the basis of our ability to predict individual and group behaviour in rating the relative values of goods and services against each other or the bean of the realm. However this, and our concept of 'utility', are overdue for some basic revision. For example, some things just are not scarce any more or at least they need not be; they have in fact ceased to be actually scarce but have been transformed into a SYNTHETICALLY SCARCE state. We in the industrialized world can very

rapidly produce enough food, clothing, shelter and medicine for everyone on earth, but thousands of persons die of hunger, exposure or disease every day.

We have moved not one inch towards creating a 'dual' or 'bicameral' economy which recognizes the stark fact that we do not need to have scarcity in the 'basics' any more. We can still have officially recognized and sanctioned market scarcity of gold bullion, diamonds or aircraft if we like but we don't need to have scarcity of food any more; surely we have seen enough children starve. Economists have failed miserably to make economics work any better in this respect.

And so we have a situation where finance experts, commodity market traders and their economist friends determine that farmers will do poorly whether the harvest is great or small - a circumstance which lets millions of tons of food rot in the bins. Either way the Third World child will starve.

Socialist and communist economies were for a time able to 'piggyback' onto the technological revolution in the West and to then, by fiat, create dualistic economies with lower prices for food. But this had several problems, as in the case of the former USSR. They were not even able to STEAL technology from the rest of us fast enough to stay current, their system stifled initiative and engendered profound mediocrity. Ultimately it had to be changed.

We here in Canada are absolutely correct in our desire to preserve the capitalist system which, although tempered with our 'mixed economy' model, has served us quite well. But we are also at the tail end of the industrialized pack in seeking to make the jump to economic 'hyperspace', the so-called post-industrial economy. We just haven't a clue what it is. Fortunately for us, neither does anybody else at the moment as even the Japanese are now experiencing confusion in this regard.

1.1.3 Home Workplace and the Environment - *The Theory of E3*

I personally believe that the widespread implementation of the home workplace is the appropriate means and solution for Western civilization to make peace with the environment and to secure long term non-fragile economic growth and prosperity. This would, from the environmental and lifestyle perspectives, have a number of very positive impacts. These include:

-reduction of mega-capital concentrations, mega-energy demand and mega-pollution due to lower population density;

-greater individual economic and physical independence; and

-increased opportunities for community and recreational involvement;

The **Environmental** (reduced density and waste), **Energy** (conservation) and **Economic** (revitalization), or **E3,** impacts of large scale workplace decentralization would be phenomenally beneficial. We would also be much freer to locate where we chose, to move without changing jobs and to change jobs without moving. Also, with less commuting time, we would have more time for recreational and community involvement.

We would require the availability, to home subscribers, of a communications service package able to be custom-tailored. We need, indeed we must have, this kind of offering to the householder in order to make the home workplace fully possible. Hopefully telephone companies and other private sector communications channel providers will fulfil this requirement. If all else fails, it will fall to the state to bring this about.

There are important E3 benefits to the home workplace. We can increase the degree of self-sufficiency at the household or homestead levels in such areas as income generation, energy generation, vehicle fuel production and others. The study of E3 is also called **Trinomics**.

1.1.4 Microeconomics of the Home Workplace

The implementation of the decentralized (home) workplace will become economically viable at, or shortly after, the time of the development of the correct combination of functions performed by using present electronics technology and various other technologies now available. The economic 'crossover point' for a given organization is the point at which all fixed and variable costs attributable to an individual worker are lower when that individual works at home. Most organizations today work primarily with information, which can be worked with just as well from home, once the worker gets used to this mode of work. Individuals would have greater independence to work for more than one firm, to move without changing jobs and to change jobs without moving. This potential depends upon early public sector leadership, to underline the importance of the home workplace, provide the required trunk systems and establish national standards.

The home workplace will not detach the individual from the organization either in the formal or the informal sense. Nor will it create a new isolation. Even the single person living on a homestead 50 miles from the city will have a wider range of recreational and cultural opportunities (and will be able to find them more easily) than he or she would now even if living in a downtown apartment.

Whereas the state has the power to regulate/arrange most things in its purview (except purely private matters) I submit that there are four PRIME INTERMEDIARIES between the state and the individual. These are the bureaucracy, the corporation or enterprise, the co-operative and the political party; all of them will to some extent work to help create for us the home workplace and all of them will to some extent depend upon it. Co-operatives will permit electronic communication and co-operation among home workers on a temporary or permanent basis. The issue, therefore, is for the state to provide the FRAMEWORK which will permit local individuals to determine which vehicle best serves each need.

The technological requirements to support the home workplace include communications resources to tie together the bridging devices which, in turn, link the networks to the specific computing systems in the home. These products and services must be provided in an open and competitive market, not one dominated by a cartel of very large vendors. They must adhere to standards set by government and industry.

1.1.5 Building the Electronic Commonwealth

Once provided this access, the widely replicated combination of the home-based human being, the computer/bridge and the communications medium become an integrated and (both artificially and genuinely) smart network. Simple and difficult questions can be posed to the network of home workplace devices which can, in fact, respond on behalf of their various owners. Who would like a sub-contract to do X? Who wants to have an informal golf tournament next weekend? Who wants to help clean up that vacant lot? The bridging device thus 'networks' the information of the owner; it permits selected bits of the owner's total information to be released onto the network in the form of an apparently animate 'travelling question'. These questions can be received, answered and passed on automatically by the home workstation devices (because they know their owners' propensities) even when the owners are away!

We have failed to see that the real benefit of the information revolution is that it will make information the raw material of work for most people. We can use microelectronics technology to allow many people to work at home even though remaining part of their organizations. This application of existing technology is referred to throughout this book as the 'home workplace', something which has been technologically possible for several years. It would reduce urban concentration, energy consumption and pollution and would promote regional economic equality. More importantly, the home workplace would also (sooner rather than later) promote trade among individuals in information about things, information about services

and ultimately information about information. If we give a man in India a computer, he creates an information product of interest to us and we then pay for it by electronically transferring dollars to him, allowing both of us to benefit. Given our shorter working hours at home, he would help save us from boredom while we help save him from starvation. Also, he would spend some of those dollars to buy goods and services here.

Clearly, the subject matter treated in this book covers an immense territory; it recommends a program of transformation going far beyond the *'information revolution'* as it is now commonly understood. It bespeaks a world where we might not only never go hungry or cold, but also one where we might never again punch a time clock or risk the supervisors admonitions about the company dress code.

1.2 Influences and Perspectives

I have had a real interest in the potential for the electronically fostered home workplace since the late 1970's, based on my rural background, education and work experience. As the only child of rural non-farm parents, I soon learned to substitute communications for transportation (and also to make maximum use of the latter whenever it was available) in keeping in touch with friends and to accomplish other objectives. Having studied public administration and transportation engineering in university, the potential for government to sometimes take the lead (rather than just being reactive) in addressing the application of new technology intrigued me. So did the wider potential for a transportation-communications trade-off. As a participant in Canada's advanced technology industry, working both in small and large firms and in government, I realized the tremendous potential which the new technology offers to the home workplace, and which the home workplace, in turn, offers to all of us.

The writings of Gordon Thompson (of Bell Northern Research in the Ottawa area) and of J.J. Sevan-Shreiber (of the French information technology establishment) influenced me far more than Toffler's ideas about the electronic cottage. They addressed new ways of using technology to assess information, and ascribe value to it, in the context of the larger organization and - indeed - the economy at large. In 1983, I presented a detailed brief on the potentials for the home workplace to the MacDonald Royal Commission which had been set up to study the Canadian economy. I also for several years ran a company which sold and integrated desktop workstation equipment ideally suited to the home workplace. However the 1980's also taught me that just because the basic technology is available that does not mean it will always be wisely applied; and just because it is applied that does not always mean the application will be a success. The changes in the cost and speed of processing information since the 1960's have been so immense that they have only just begun to work their way through the system. Humans have been adapting at a much slower pace than technology has been changing. And organizations have been learning and adapting at a still slower rate than their constituent individuals. While 'telecommuting' is spreading rapidly, it still impacts far more individual professionals and small business people than those working for large corporations or governments. A wider (and more farsighted) vision of the home workplace, one which can be universally held, has yet to emerge.

The periodical *Telecommuting Review* and other publications of the New Jersey based firm of Gil Gordon & Associates have also influenced my thinking in this area, as have some of the publications of the Canadian Workplace Automation Research Centre, a part of the Canadian federal Department of Communications. I owe much to the late Mr. Jim Mackie, formerly of Mitel and Newbridge Networks Corporation, whose constant encouragement - and willingness always to make time to discuss yet another new idea - contributed much to this book.

1.3 Chapter Structure

The book has been structured so as to provide a logical and incremental treatment of home workplace historical context, near term possibilities and longer-term potentials. Chapter 2 backgrounds the current juxtaposition of economics with energy and the environment while Chapter 3 suggests that the home workplace could promote Environmental, Energy and Economic (E3) reconciliation. Chapters 4 and 5 provide, respectively, the economic and the organizational underpinnings of the home workplace while Chapters 6 and 7 discuss why and how home workplace devices might communicate with each other automatically. The use, in the more distant future, of home workplace devices to foster a new form of capitalist economics is treated in Chapter 8 (although by no means comprehensively) which seeks to draw some general conclusions. Chapter 9 offers some current context and practical assistance in getting started with a personal or organizational home workplace project.

In various places throughout this text, I utilize a point-form schematic format so as to organize complex material most efficiently. What is sacrificed in quality of prose will hopefully be recovered in more precise communication of a very large and complex subject. The reader's indulgence is therefore both begged, and appreciated.

2. The Home Workplace as Historical Alternative

2.1 The Home Workplace in Historical Perspective

2.1.1 Historical Starting Point

It is clear that European and North American society has been grounded on a complex of physical and spiritual views such that we have been required to balance our time, concentration and energies between the spiritual and the material realms. Until the 20th century, most people were content to have their basic (and only a FEW other) material needs fulfilled, and sought out their personal and spiritual happiness with whatever small time and attention surpluses they could generate via largely non-material means. They made their own fun. When we have turned our attention to the physical realm we have tended to see it as a gift to us for our (almost) exclusive use, to do with as we please. Various revolutions of thought in Europe between 1400 and 1800 aided and abetted this.

Humankind reached out on two separate axes, one spiritual and one physical. In the physical axis there was the attempt to CONTROL the human and animal/mineral ENVIRONMENT. Whether it came from the Supreme Being, only from our progressive incremental inventiveness or from a combination of the two, humankind developed TECHNOLOGY which we shall define as 'the application of vision to the immediate material (the components or factors), fashioning thereby elements or entities able to influence the wider material (the environment)'. We applied vision to something nearby and thereby were able to use it (or the successor or superset result) to impact the wider environment.

Some of our early technological developments included the creative use of tools, the establishment of long term shelters, organized agriculture, the smelting of ores and the wheel. Later, the printing press, the development of true science and various medical discoveries had a profound effect on how we lived. Electricity, the telegraph, the telephone, the internal combustion engine, the light bulb, the airfoil and the turbine engine all followed, along with the transistor and integrated circuit. Each, in its turn, has increased our leverage and power over each other and the environment. As each new technology was perfected and deployed, the environment into which it intruded was seen by many as just one component of man's existence. Man (and woman) benefitted from the natural beauty, balance, self-renewing capabilities and available raw resources of the environment. However in turn we mauled, modified and fashioned it for our own use, casting back to it whatever we were finished with. Along this HUMAN-ENVIRONMENT axis there was a severe imbalance of trade, with mankind getting the raw resources but the environment getting the raw deal. Put another way, there was a three-tier system. The environment was the bottom tier and technology could be seen as a second tier, sitting on top of the environment. Humans fashioned various technologies which, in turn, supported them at a higher (third) tier.

In the 20th Century, we finally came to see that if the environment should crumble or succumb that the other two tiers will come crashing down as well. We had earlier tended to forget that the environment is the default for our life - it can continue without us but we cannot continue without it. This fundamental non-reciprocity has been copiously ignored through most of recorded human history - and there is no particular reason to believe it was all that well respected in pre-history either, except that pre-bronze age people had a more basic concept of life and the land. They (for example the North American Indians) felt the land was important in terms of their presence upon it and their use of it, whereas the newcomer Europeans emphasized claim, ownership and control.

While various industrial historians do not agree even with each other on the subject, it is my view that the first English industrial revolution (and the steam power that drove it) was a turning point in that its 'quest for power' took us beyond just being able to modify the environment; we became able to over-power it.

Our mines, cities and factories and the resulting pollution soon made this clear. During the 19th century environmental feedback (such as the air, ground and water pollution in and around London and other cities) was seen as nothing more than an 'aberration'. Also, and more importantly, from this point forward it was far more society, the economy and government which had the major impact on the environment, and no longer individuals or small groups. Decision-making about actions at the corporate level used a very simple profit model which basically went like this:

> -can we project a profit;
>
> -can we carry out operations successfully (I have never ceased to be amazed that the French word for 'operations' is 'exploitation'); and
>
> -can we mitigate any interference which may come from individuals, government, the natural elements (weather, animals etc.) or loopback/cohort problems (our operation sullies itself or is sullied by the operations of others)?

Of course, there was never any consideration of environmental impact unless it was loopback. We had to pile the slag just far enough from the mine to allow the mine to continue operations.

2.1.2 Humanity and the Environment

All of the above is 20/20 hindsight and is hardly news. But there is a relevant cause that we don't think about because we don't like to. It is worth noting (and I am not the first to do so) that even most relatively advanced corporations display the input/output response of at best an earthworm or at worst a protozoan. They retreat from unfavourable stimuli but are otherwise difficult to communicate with. In his 1981 paper entitled *Office of the Future Revisited*, Gordon Thompson pointed out that:

> *"Old style businesses processed their environment by eating it. Their sensors were simple things, and in biological terms, their nervous systems resembled the nervous system of an earthworm*."

Generally, new ideas only permeate such organizations when they are hit with the political or economic equivalent of a baseball bat. GM started making better small cars only when North American buyers deserted it in droves. IBM began the move to open systems because even its traditional customers wanted to be less vendor-dependent and because the U.S. Department of Defence forced the issue.

2.1.3 The Enterprise and the Environment

This problem has been made much worse over the past hundred years or so by the financial and accounting communities in such places as the U.S. and Great Britain. They seek to reduce everything within the corporation and also in the environment at large to otherwise unwarranted simplicity for costing and comptrol (barely distinguishable in many organizations from CONTROL), not to mention audit. Mining, forestry, petroleum and utility firms have gone to heroic lengths to convince not just us, but also themselves and their shareholders, that they are truly not threatening the environment even when strip-mining, clear-cutting or spilling millions of gallons of crude oil into the ocean.

On the other hand, the individual is very capable of knowing whether or not he is polluting, and also of recognizing the pollution caused by others. He is NOT capable of fooling himself for very long into thinking that he is not polluting when he really is. What is more, it is extremely difficult to brainwash the individual in this respect, just as you cannot fool a baby into thinking that his diaper is clean when it is dirty. Perhaps focus, or at least perspective, has something to do with relative size. The individual can well look after a garden but not a country; a monolithic dictatorship is only effective if you have a perfectly

enlightened, benevolent, honest and incorruptible dictator who never tires and gives prompt and close attention to all important matters... Conversely, a government or even a large corporation might manage a country but would have trouble managing a garden or caring for a young child. Our social and economic system is as irrelevant to the environment as is a digital watch when you are lost in the woods. An old Native man once told me that many white men perished when lost in the bush because they remained pre-occupied with what time it was. They did not realize that in the bush there is day, transition time (sunrise and sunset) and night and beyond that time is not relevant at all. The organization has its own internal 'system' of social and economic factors which interact with each other and, thereby, largely drive its perceptions. As we have all seen, culture, prejudice and the inane stupidity of petty political rivalries can all serve to warp or curtail these corporate perceptions about the real world.

Beyond their socio-economic power, organizations also possess technology giving them immense leverage upon great numbers of (their own and external) people and upon the environment. They usually have the intended impact on the environment, but the feedback FROM the environment can easily be filtered, muffled, shunted off to the research department or can become the stuff of internal conflicts among rival factions. In other words, it doesn't get responded to. The individual, on the other hand, has needs, a conscience and more acute perceptual machinery which allows him to very rapidly determine that his leaf fire has now become a tree fire or a house fire, his kid is fouling the backyard pool or that the poison ivy is spreading.

Indeed, the approaches of the individual and the giant organization to the environment are so much at variance that there is little wonder they have so often fostered conflict. This conflict has been of three primary types:

-direct competition, such as:

-peasant farmer vs. enclosed sheep farm;

-peasant farmer vs. involuntary kolkhoz (collective farm);

-homeowner vs. freeway;

-environmentalist vs. airport, nuclear powerplant etc.;

-mutual interference, such as:

-fisherman vs. pulp mill;

-hunter vs. rapidly urbanizing municipality;

-Native hunter vs. low flying jet aircraft;

-moral indignity, as in:

-animal lover vs. seal hunt;

-animal lover vs. lab animal-keeping organization; and

-Greenpeace vs. whale slaughter;

Enough has been written recently regarding environmental issues in general, and pollution in particular, to fill a house with books from basement to roof. There is no question that we have a serious problem which could become a fatal one (for all of us) if we don't do something about it. Environmental concern is justified; *environmental panic and 'sky is falling' behaviour are not.*

2.2 The Density Paradox

2.2.1 The Density-Wealth Relationship

We face a terrible challenge which is almost a paradox; how are we to preserve our standard of living, which is so much improved over even a century ago, while returning to a better co-existence with our environment? Strictly speaking, however, a significant percentage (but by no means all) of our pollution problem arises directly or indirectly from the fact that we have increasingly *chosen to concentrate ourselves closely together*. Even in the times of early humankind, if too large a concentration of people remained for too long in one encampment the whole local environment would become fouled. If they hunted too long in one area all food would be gathered, killed or chased away. The environmental feedback would make it imperative for at least part of the group to move on. With the coming of the industrial revolution, our need for mega-concentrations of labour (and large markets for the industrial goods), and the inability of the transportation system to permit this increased level of access to occur, caused people to congregate more and more in towns and villages. These eventually grew to become cities. So awed with our startling progress were we that there was little concern that these new industrial towns blighted the environment and were not very pleasant to live in. The better access to goods and services and the escape from the drudgery, prejudice, ignorance and boom/bust economy of the land were nonetheless powerful inducements. As pointed out above, the industrial organizations themselves were not very concerned about the side-effects either, focussing themselves totally on 'exploitations'.

There is nothing inherently good or bad, desirable or undesirable about any particular mode of habitation, be it rural farm, rural non-farm, village, town, city or mega-metropolitan centre. They each serve their purpose and have their place. The problem is that if one comes to be seen as the panacea and is used to the detriment (or even exclusion) of all others, then we have a major problem. We lose balance. This problem relates to the feedback loop. Most small villages and towns cannot afford to send their sewage or garbage hundreds of miles away and they are therefore forced to live with the consequences if they fail to practise good local stewardship.

On the other hand (because of their much greater landmass and huge revenues) regional municipalities can have multiple dumps or even export their garbage entirely. They can thus studiously avoid the day when they have to face up to poor waste management. People who live in apartment complexes were told in TV commercials that cold milk comes '..fresh from a jug'. Having never actually seen anyone milk a jug, I was a bit incredulous at that particular television commercial.

People brought up in urban areas, despite our landed system of representation, became the absolute majority in Parliament in the 1950's and soon permitted the highly subsidized U.S. interstate highway system to be used by trucking firms and supermarkets to artificially lower food prices in real terms. This devastated the local truck (mixed) farming industries in many parts of Canada, doing us no favour whatsoever. Again, the feedback just didn't get through to decision-makers that a healthy mixed farming operation was better (in both environmental and economic terms) than the dairy, beef or even hay monoculture that many Canadian farmers were then forced to turn to in order to survive. There is nothing wrong with California lettuce when it is out of season here in Canada, but we should surely have been paying the real price for it in terms of true cost of production and distribution. To do otherwise was to fool ourselves environmentally, not to mention economically.

2.2.2 Density and Urban Development

Consider also the example of urban encroachment. Just before my tenth birthday, in 1965, my parents moved to a rural area west of Ottawa, then called March Township, to achieve a rural lifestyle while still working in the city. What we found was a farming community which had left one room schools behind only a couple of years earlier and in which, while it took some time to be accepted, there was a genuine

community spirit. Barely a year later, at the southern extremity of this municipality, came the genesis of the new 'trend town' of Kanata. This well-planned and very attractive upper-middle class community set many new standards for Canadian urban planning and was destined to become, for a brief and shining few years, a centre of advanced technology rivalling the Cambridge Ring and Silicon Valley. However, from the outset, the new residents adopted an arrogant and condescending attitude towards the rural residents, calling them (and even their children) 'farmers' which was considered to imply poverty, sloth and backwardness. Then, as now, nearly 20% of Canada's population is rural non-farm; they are people who live in the country by choice but not in order to operate a farm.

Further, there was a very wide income distribution along our particular concession road, with some of the residents (including some of the farmers) considerably better off than the Buick-driving trendies in the urban area. In political terms the rural political leadership was soon overwhelmed by a 'transition set' of people who claimed to be looking after the interests of both groups while systematically destroying those of the rural group. Eventually, March Township became the 'City of Kanata'. Those of us who protested that we were still rural and that 'City' seemed the opposite of rural were told we were obstructing progress. Open fields were nothing more than areas that had not yet been 'developed'.

Canada is a very big country - so is the United States - and so there is still lots more room left in which to be 'rural'. However, this feeling on the part of developers, real estate agents and municipal politicians (often one and the same group) that rural is simply the absence of urban, that rural is simply undeveloped urban waiting to happen, is a most unfortunate and unproductive mind-set. A similar mind-set was applied to everything 'old' (such as old buildings and old cars) until late in the 1960's when we began to realize that we were destroying our own heritage. We don't have to put garden homes and townhouses on every field and forest just because they are there. And maybe we should take a cue from the approaches adopted recently by the Californians and put houses on the land that is *not* so good for agriculture. So far, we pay much lip service to this but are not very seriously committed to the idea. It is time that the planning process, both governmental and commercial, became much more attuned to the opinions and the less attention-commanding notions of the everyday person, particularly the person who lives in tune with his or her environment.

If there were fewer large urban concentrations we would require far fewer large electrical generating plants, resulting in much lower sulphur dioxide and nitrous oxide emissions. Further, the local green environment can absorb significant amounts of carbon monoxide emissions. <u>It is only with the CONCENTRATION of such emissions from millions of cars and trucks which are themselves concentrated in a small area that the cumulative effect of such emissions overwhelms the local ecosystem</u>. This not only inflicts lasting damage but also causes a carryover into neighbouring areas.

2.2.3 Home Workplace as Density Alternative

In principle, wide-scale adoption of the home workplace (in which most information workers work at home part of the time and some do so most or all of the time) would not immediately stop pollution but it would:

-combine nicely with current environmentalist programs and our domestic efforts to recycle and conserve;

-reduce the requirement for mega-energy inputs to the system, resulting in far fewer large energy generating sites, reducing effluent, air pollution and other waste output;

-provide individuals and families with a healthier (and less stressful) environment and lifestyle; and

-make each of us more immediately aware of the potential or real environmental impacts of our actions or omissions by bringing us closer to nature.

2.2.4 Greens and Grays - The New Political Spectrum

Some will argue that it is technology, and our purported love affair with it, which is the prime evil and threat to the environment and is at the root of our current plight. It is very tempting to see things in this light because it presents a simple model: technology causes environmental harm, so remove or emasculate the technology, replacing it with another or with none at all. Then the problem will go away. We still have the tapes from the old television commercials exhorting us to 'live better electrically', connoting our great infatuation with hardware materials, energy and convenience.

I once purchased a book called *The Third Millennium* by Brian Stableford and David Langford, which attempted to set out a history for the next 1000 years! That is no minor challenge, but it resulted in a very thought- provoking book. It predicted that future 'ideological battles' in politics will be between the 'Greens' (those stressing solely and exclusively the environmental issues) and the 'Grays' (those who believe technological advancement is the engine of human development). They thus argue that the left-right spectrum is, alas, quite obsolete already and has in fact been obsolete for some time.

Greens emerged first. They believe in attacking the symptoms of environmental disruptions or decay through turning inward. They seek to disable, dismantle or even demolish various technologies or at least to 'work around' them. They believe we must learn to survive in spite of the technologies. Few would suggest that recycling is a bad idea (it is a very good one) but it is only a means of 'coping' with technology; it is therefore essentially reactive rather than proactive. Greens are a much milder form of the *back to the land* movement of the 1970's and indeed the more staunch (and more senior) Greens are often the same people. They include the anti-nuclear movement, various other 'anti-' movements, the all-natural advocates an social democrat friend of mine once called the *'Granolas'* and also the peace advocates. Greens are found in all political parties here in Canada but most prominently in the NDP and Liberals. In the U.S. they tend to inhabit the left wing of the Democratic Party. They don't advocate decentralization as such, but do advocate a 'conserver society'.

Grays believe in proactivity. They believe in using more technology to solve technology's problems including the environmental problems. They seek to fortify, fine tune, extend and develop technologies rather to bash, reject or condemn them. Grays would prefer national standard, re-usable and refund-bearing food containers (with snap-on tops) for most foods rather than re-cycling packaging material. In other words, they prefer to fight fire with fire. They in fact are a "*forward to the land*" movement, if a direct comparison must be made. Greens seek to cope with urban blight; Grays seek to obsolete it by vastly reducing the percentage of population actually living in urban areas and hence to reduce the overall relative E3 importance of cities. Greens seek to 'pull back' from offensive technologies while Grays seek to surge past them with superset or replacement technologies.

>>> Consider this: if Greens had been around during the 1930's they would have been horrified at the pollution and waste of the steam locomotive (it was only about 5% efficient - most of the energy went up the smoke stack) and they would have called for its outright abolition while the contemporary Grays would have called for the introduction of more modern, more efficient and cleaner diesel locomotives as the solution.

Grays too exist in all Canadian political parties but are doubtless best represented in the Conservative Party and least often encountered in the Liberals and NDP. Grays exist in both U.S. political parties as well, but almost certainly more of them would be Republicans than Democrats. However a much greater percentage of the potentially active Grays have, over the years, become so disgusted with the entire political system that they have just dropped out of the process. Many engineers, scientists and even many high tech executives known to me don't even bother to vote any more. Greens almost always believe that people (and nature) issues are more important than all other issues. Grays are more apt to believe in a metaphysical balance among the political, economic and technological sectors within a country. This, they trust, will also best take care of man and nature. While European countries and even Canada have had nominally Green parties, the shift to the new political axis is not yet complete. Many

leaders, would-be leaders and ordinary voters are disoriented and are simply orbiting the pivot on which the political spectrum has rotated - like so many seagulls circling for a perch.

Unfortunately, this has been made worse by many mistaken 'Greens' who point with bewilderment at the environment, telling their offspring to turn their backs on the technology which wrought all this harm. They forget that, once focussed on a problem, technology can also undo its own ills. It was, after all, the automobile that stopped New York from drowning in horse excrement and the diesel locomotive that removed much of the worst (steam locomotive coal smoke) pollution from most city skies and walls. They forget that we now have the technology to solve many of our environmental problems.

2.2.5 Technology for a Better Tomorrow

Looking a bit deeper, however, reveals that fundamentally it *is bettering our lives by means of technological advancement* which we have been in love with, not technology itself. After all, computer technology leads us into information-based wealth creation, which is not hardware-intensive, so hardware or hard technology itself is not our hang-up. Further, we cannot just retreat from technology without penalty. It was the many technologies we have developed over the past 500 years that have allowed us to multiply (and survive) so well. If we start abandoning these technologies before they have been functionally surpassed, then we will set in motion a cycle of abandonment which will gain momentum like a roller coaster and *'de-technologize'* us very quickly, making the human condition still worse and not better.

We cannot be nearly as selective as we might think in cutting or ending recourse to a given technology, due to the horrific degree of inter-dependence among the hard and soft sciences and technologies themselves. Few environmentalists want drug companies shut down, but most of these use chemicals and other agents that pollute in their manufacturing plants.

What use then, for example, will be the Cadillac four-door sedan with its oil-begotten asphalt and regular unleaded gasoline, its huge support infrastructure and even the technocracy that spawned it? Yes, it is all too easy to see said Cadillac as needless and conspicuous consumption. But would you really rather walk ten miles to work or one mile home from the supermarket with bags full of groceries, or in the alternative be forced to visit said market three or four times per week?

Some adherents of the Green philosophy might argue that we should abolish the auto entirely. However, this demands a second look. Even where public transit is adequate, it is not very easy to assume the auto out of your life. Further, to have the corridor densities to make even BUS (much less light, intermediate or heavy rail) transit economically viable planners must concentrate us in large groups along these corridors. This concentration, in turn, is the antithesis of good man-environment relationships. Clearly, a compromise between the adamant pro-auto and the adamant anti-auto views, and by extension, pro- and anti- technology views can be reached. The past may seem simple and golden but in the 1950's Canada also lacked penicillin, basic technological amenities like telephones in many homes, rural electrification in some areas, basic social and medical programs, as well as income mobility or empowerment for women, rural and working-class people.

So we don't have to go back very far to realize that retreating from technology would not be not very pleasant. Many of the changes to the above-cited problems were technologically driven. More profoundly, if technology created a problem, then technology can almost always be applied to solve it. This is a much better approach than sticking our heads in the sand and saying that 'technology did it' and if only technology would go away and leave us alone everything would be fine. Throughout most of recorded history, major changes in technology have brought major changes in organizational and individual leverage. In the 20th century, our ability to despoil nature and kill animals (and each other) has reached epic - *indeed almost unfathomable* - proportions.

The answer, in any situation where technology threatens or is perceived to be harmful, is to either:

-change or mitigate the harmful technology so as to make it more benign, or

-create compensative and/or restorative technologies which undo or 'countervail' the impact of the offending one.

This involves changing the technologies which are most closely a part of the man-environment interface or 'axis' plus those which are perpendicular to (but nonetheless act upon and impact) the man-environment axis. Knowing the difference between improving and further despoiling, is tantamount to divining WHICH technologies or technological elements can propel us forward, and which must be abandoned due to lack of promise. However, sometimes it is not that simple; for example, in 1905 was heavier-than-air or lighter-than-air flight the superior and most promising form? Could anyone have been expected to be able to tell? Did (or does) it matter? Perhaps it does not, as it is just possible either would have served us as well. Some science fiction writers have made credible arguments in this regard. The issue - and fact - is that we committed to one of them and persistently followed through.

2.3 The Technology with the Most Leverage

2.3.1 The Home Workplace as Technology Pivot-Point

The widespread implementation of the home workplace is the appropriate means and solution for advanced Western civilization to make peace with the environment, and to secure long-term, non-fragile economic growth and prosperity. This would, from the environmental and lifestyle perspectives, have a number of very positive impacts.

Perhaps the most important impact is the reduction of mega-capital concentrations, mega-energy demand and mega-pollution. Physics and not conventional 'cost-per-unit-produced' economics will dictate the circumstances in which large industrial facilities are needed (you need a large factory to build a Boeing 747 but not to build a computer). Distance to the office will no longer be the crucial factor in deciding where to have one's home.

The concept of density is not very well understood and is in some ways counter-intuitive. Some of us will recall being told as children that all the Matchbox toy cars ever produced would stretch around the world but could never quite visualize it. It also is not easy to relate a map or a Geographic Information System (GIS) to reality, at least not in the strictest sense; I always found myself wondering how wide the road lines on the map would be if they were really to scale.

One million people in a given city can create energy input and food demand which can over-tax a thousand square mile feeder area, leading inexorably towards soil exhaustion and later full environmental breakdown. One million people distributed relatively evenly over that same thousand square miles (about 1.6 acres per family of four on average, leaving aside trunk system and common land requirements) would engender an environmentally balanced situation with much less energy use per person. They could also make some (perhaps up to 25% of) their own required energy on an 'economic' basis on their own properties. It is certain that with even moderate application of new technology we could, with very little drudgery, grow up to 50% of our own food on such homesteads. This would make even a relatively densely populated area (in future, home workplace oriented terms) at least 50% food self-sufficient as compared to a much lower percentage with a conventional city/suburb/farm/forest population such as we now have in eastern North America.

Widespread use of the home workplace would mean that we would travel fewer passenger miles per individual and per family but would devote a higher percentage of those miles actually consumed to utility

and pleasure purposes as opposed to commuting or business travel. While it is very hard to grasp, it is nonetheless true that we would have the same TRAVEL TIME ACCESS to most services and amenities but would actually travel more miles to reach most of them, facing the need (as rural farm and non-farm people have for generations) for rational, multi-purpose trips.

While I for years lived almost 30 miles from downtown Ottawa, my travel time (aside from peak rush hour) to such amenities as an optometrist, a movie theatre, a Mexican restaurant or a bar downtown was only slightly higher (about five minutes more to be precise) than someone who lives in any but the closest suburbs to the urban core. I have higher average speeds on most of the roads and fewer traffic lights. Whether the suburbanite takes his or her car (with many more red lights to sit out even before reaching the freeway than exist for my entire trip) or the bus (with the wait for the bus, the wait for each other bus stop and the walk from the nearest stop, assuming no transfers or other delays), personal progress towards the destination will be slower. Too much time is spent waiting for others to get out of the car's way or else on/off the bus!

When total or block travel TIME, rather than distance, is considered it rapidly becomes apparent that if the population possessed a slightly different mind-set (and mostly owned or at least had access to cars), then locating a good bookstore or hobby shop ten miles outside the city would no longer be seen as folly. We would see a reduced concentration of vehicles in 'corridors' and also a levelling of the traffic flow across the waking hours, thereby extending (by decades) the capacity life of the existing infrastructure while local governments struggle to upgrade it.

A home workplace environment would foster greater individual, economic and physical independence as well as heightened environmental consciousness. We would be much freer in terms of space to move around, income (more ways to earn money, less intervention of taxing governments and much less pestering from those who would provide us financial and professional services) and both more inclined, and better enabled, to help/assist each other, thus relieving at least part of the 'welfare' burden on the state. The fact that we would create many new kinds of wealth would provide us a higher minimum standard of living, would result in higher taxes (on whatever basis) being paid, and would provide much of the funding for environmental clean-up and infrastructure renewal, two pressing needs at this time.

In both relative and absolute terms individual initiative and power would increase and the exercise of corporate/institutional power and excess would be restrained. This would - given even the current level of environmental consciousness - lead to faster movement to clean up the environment both by local initiative and by the actions of large private and public sector organizations. Individuals, as consumers, are already leading (indeed dragging) corporations in this direction.

The provision of wiring and communications services for the home workplace can occur as a 'package deal' from the telephone company or another service provider. Home subscribers will require a communications service package able to be custom-tailored in terms of the following:

-type(voice, data, optical etc.);

-bandwidth and number of channels;

-charging structure (likely based on class of service rather than on amount or distance of traffic)

-number and type of terminations; and

-other related factors.

In earlier times, we needed better roads to permit the Ford Model T and its contemporaries to reach their full potential. They were provided only due to public demand, and due to public willingness to remove

politicians who would not commit themselves to better roads. In those days making political promises to farmers and townspeople meant business: you didn't promise what you couldn't deliver. If the private sector can provide the communications highways that we need and at a price that is reasonable and is not too sensitive to distance, then fine. If not, government will have to step in. Certainly, such service is a necessity to the home workplace and it is also noteworthy that money spent on communications, rather than transportation, does less environmental damage.

Even further communications deregulation will have to have some checks and balances permitting people to unhinge themselves from monopoly service. Otherwise the family that incurred great 'savings' by buying a house 80 miles from the city, when the cost of full home workplace business communications (perhaps split with the employer) was very little, could see its rates triple or quadruple once the communications carrier knew it was fully dependent upon such service to earn its livelihood. Further, the concept of 'business' and 'personal' telephone service is now obsolete. Home workplace equipment will be used by its owners to communicate with other such devices for business purposes, to post electronic 'want-ads', to arrange sailing trips or even to find a new friend.

A national workplace decentralization policy gives rise to the immediate requirement for much better communications infrastructure in small town, village and rural areas. While not strictly necessary for the home workplace, the extension broadband or fibre service to each home in Canada and the United States will have every bit as much impact as did the paving of dirt roads earlier. This class of service permits multiple data and voice 'channels' be handled over a single wire or other conduit. It will give each user access to very flexible and powerful voice and data services. If the telephone companies are prepared to support workplace decentralization, they should be rewarded with public funding of such extension of broadband where it is otherwise uneconomic, particularly in rural areas.

It will cost billions of dollars to provide the communications services required to make the home workplace fully operable and practical. The Canadian people - the end-users - will ultimately have to pay these costs whether solely through user fees, a combination of user fees and taxes, or taxes only. Of course, the wisdom of good government leadership is in knowing the truly significant differences in comparing the above three options - weighing all important factors and selecting the best option. We may indeed have a patchwork approach with one option used in the south and another in the north, for example. There is nothing that says that the same answer is the right one in all times and places; governments or even individuals may be enabled to choose a common carrier from among private firms, co-operatives, a crown corporation or even some government department or agency. In the U.S. context, one would expect a stronger leaning towards a mostly or fully private solution, although the Rural Electrification Administration is an American example of a public sector approach which worked well.

3. The Culture and Ecology of the Home Workplace

3.1 Introduction

If we assume government leadership in the area of the home workplace, public/business response and the requisite changes to the communications infrastructure and service offerings, then we should soon begin to see the resultant benefits. Actual decentralization will certainly begin haltingly, and with small steps. As greater percentages of the workforces of various organizations spend progressively more time at home, relative property values will change; urban and suburban properties will decline and rural ones will rise. Land use will change as well; robotics and other technologies will be used to convert many otherwise unwanted office buildings into smart, vertical warehouses. There will be significant disruption of facility and land usage patterns during the transitional phase.

Household or homestead self-sufficiency, in part or whole, can be broken down into objectives (and, one hopes, results) of a national home workplace policy. These could include:

1 - Income generation

2 - Electricity generation and heating

3 - Food production (vegetables, fungus, seed, dairy, meat and fish)

4 - Vehicle fuel production

5 - Fertilizer production

6 - Finance

7 - Physical Security / Integrity

8 - Waste management.

The context of such self-sufficiency is based upon the fact that the overwhelming majority of workers now work with information and could be enabled to do so from home at least part of the time. While mass-produced robotic and similar equipment would permit highly productive small-scale gardening, some specialization of individual homesteads (particularly in such areas as livestock or aquaculture) would occur. Some homesteaders would devote more time to such husbandry at particular times of the season, or of their careers, than others. Much of this small-scale domestic cultivation and environmental 'impact loop closing' would be accomplished with new technology devices developed here in North America.

In other words, more of the products and outputs of one process can be used as the inputs to another process, right on the homestead property. Consider also the industrial opportunity of developing freestanding but interlockable products, making maximum use of new technology and conforming to national (maybe later even international) standards to facilitate each aspect of the highly advanced, very comfortable but much more environmentally sound lifestyle characterized below! The design, production, distribution and deployment (installation and integration) of such equipment, up to and including modular and computer-intelligent dwellings themselves, is now technically feasible!

The brick and mortar of self-sufficiency in the home workplace would include the following aspects as detailed below. The environmental considerations are prefaced by the >>> symbol. The fact that many

of these aspects include functions beyond the computerized home workstation equipment itself is due to the very broad potential of workplace decentralization to alter how we work and live.

3.2 Income Generation

This is treated more fully in succeeding chapters, but will involve a mix of employments or projects undertaken by one or more 'producers' within the home. Individuals will find it much easier to have a mix of '*employments*' and to gradually evolve their *'portfolio of employments* and projects' from one combination to another over time. There will be much more time for civic, cultural and recreational activities and most people will NOT seek to convert most of the resulting new wealth to goods and services, preferring to stockpile much of it and to use the rest to trade for information products.

Given their age, level of political involvement, health, child rearing responsibilities and other factors, individuals will determine where on the 'unoccupied' to 'fully occupied' continuum they wish to place themselves. The concept of a 'job' being a '0 or 1' proposition (i.e.: you either have one or you don't) will cease to be a factor for most of us; it will be merely an issue of 'how occupied' you are. In other words, most of us will have two or more income sources, and if things get really tough (as in a severe recession) our ability to produce much of our own food and energy (and to forego large goods and services purchases) will permit us to stay in a 'holding pattern' on much less income than now. (We'll treat the issue of how to pay for the homestead and the high tech gadgets later.)

The home workstation computer system enabling the decentralized workplace will have more processing power than many of today's mainframes or large servers. It will have extensive conventional storage and optical storage capabilities and will have the input capabilities of wand, mouse, keyboard, scanner and connection to other computers, and will also perform the functions of printer, photocopier and fax machine. Some firms are already starting to integrate some of these functions into single devices.

>>>There will be much lower human stress, and hence fewer medical problems, reducing the demand for the mega-energy and capital concentrations required for most modern medical treatment. People will suffer fewer pollution-related health and lifestyle impacts, will grow up in a healthier and more wholesome environment and will likely live longer. Certainly, they will enjoy a less rushed and harried existence. There will be no need for information workers to move to change jobs (even for those who prefer 'mono-occupationality'), nor will it be necessary to change one's occupational portfolio very much when a physical move is desired. Because people's minimum cash operating costs will be much lower, even those who we now consider 'marginally employable' will be able to make a better life for themselves and their families. Further, except for financing for the homestead and major required assets, personal debt incurred to acquire other items will be the exception rather than the rule due to much higher incomes in real terms. This, in turn, will remove the aggravation of dealing with the finance and banking community. It will also curtail the by-then nearly obsolete waste of human, transportation and other resources represented by the collection and re-possession businesses. All of these developments will decrease the stress on humans, hopefully also leading to happier family lives.

3.3 Electrical and Heat Generation

Each homestead will require an appropriate combination of solar panels, windmills, water wheel/turbine and thermal generating systems. We have made important advances in all of these fields but there is much improvement to be made, particularly in solar and energy storage system technology. But if we produced a series of 'plug and play' modules which were easily connectable, then a computerized expert system could readily determine the best combination of standard energy generating modules given the site topography, hydrology and intended uses. As much as possible, electrical energy should be the

'standard' energy medium, used to power as many devices as possible; it offers maximum flexibility and transferability as well as minimum transmission loss, especially over very short distances.

>>>If all of the (quasi-rural, quasi-urban) homesteads in a decentralized society produced at least some of their own energy locally - a considerable number might produce all - there would be much less draw on the electrical grid and less concentration of demand into peak hours. Indeed, peak energy use would be reduced somewhat due to a more random distribution of working hours. Each homestead would also be able to sell power into the grid when it was not needed. This would also reduce homestead vulnerability to *line breaks and generating station failures, especially in cold weather. Of course, less coal and/or nuclear generating capacity would be needed per household and there would be fewer mega- industries and mega-urban complexes, so overall demand would fall or else grow very slowly. Further, the re-configuration of the network (sub-stations etc.) required to permit everyone to sell into the network at will would also make much more feasible the establishment of small privately, co-operatively or municipally owned generating stations serving as supplements, or even just as emergency backups to the power generation capability of the large utilities and of homesteads. Also, the aggregate of the 'marginal' energy costs to heat the home workplace rooms of 100 workers (even if some of these rooms were new construction) would be far less than the total energy cost for a 100 worker building; the other parts of the homes are going to be heated anyway.*

Each home workplace room or site not only shares the heat of the host residence but also can be said to have its 'own' share of the land associated with that home. For purposes of argument assume that the home workplace room's respective portion of the homestead land is the same as its percentage of total residence square feet. Perhaps the home office room is 1/10 of the total house square footage, corresponding to 1/10 of the two or five acre lot on which the house is built. This portion of the land, like the rest of the homestead land, somehow contributes to recreation, energy production, food production and/or waste management. The same number of square feet devoted to a worker's space in a large vertical office building does not have an equivalent amount of occupied or surrounding land associated with it If there are 3000 workers (each with a 100 sq. ft. work area) in a multi-storey building with a total roof area of 10,000 sq. ft. then the workspace has only 3.3 sq. feet of land (and roof) space which can be said to correspond to it. However the home workroom's proportionate share of the land could be hundreds or thousands of square feet. <u>The square feet contained in the downtown workspace do not correspond directly to enough square feet of energy-producing, food-producing and waste-absorbing land nearby to meet its needs</u>. Therefore, energy and food (and all other supplies) have to be transported IN to the downtown workspace and waste has to be transported OUT. Which worksite is most likely to be environmentally benign? Which workplace imposes less environmental, energy and economic cost and disruption on the planet? Which is most pleasant – and most private – to occupy?

Employers now consider themselves generous if they provide a small coffee room or a couple of picnic tables for several hundred workers. So, in most cases the office workplace doesn't command much in the way of recreational add-ons. The home workplace has ready access to a kitchen and recreational elements. People put beautiful nature scenes on the walls of their stuffy and cramped inside offices. How much better if they just could look out the window of their rural home at such scenes?

Consider that each working day spent by an individual at a home workplace:

-consumed no fossil fuel to get the worker to the office thus reducing both pollution and congestion as well as needless risk of injury to the worker;

-required no commuting time so even if the same number of hours is worked, there will be more free time before and/or after work;

-requires less trunk-system energy input and capital input for shelter and infrastructural support, thus producing less pollution;

-places the worker at much lower risk of being stampeded by panicking co-workers in the event of fire;

-permits a totally distracted worker to take a much more restful and meaningful rest break (walking by his pond or through her garden) than is possible in an office building; and

-is conducted close to the life support and recreational surroundings best suited to the worker (by his/her own choosing, not as hypothesized by the wizards in the 'Human Resources' department who generously placed a picnic table on the pavement outside the building's back door).

Even without a complex computer model it is possible to readily predict that total business and industrial energy consumption growth will lag even then-current GNP growth, due to the leverage offered by the home workplace.

3. 4 Food Production

Garden variety robots could undertake ploughing, tilling, fertilization, watering, insect removal, scaring off groundhogs or rabbits, pruning and harvesting of crops. The obvious way to achieve this is to establish the garden, wherever possible, as one long narrow strip, extending between the twin rails of what would appear to be a short, very broad gauge railway, with ten to twelve feet between the rails. A frame, with wheel/stub-axle-equipped trucks would serve as the carrier for any of a series of standardized robots. These robots would mount themselves on the frame and then move it to the appropriate crop area and perform their appointed function on that crop.

Changes in the relative pricing of food - and hence in the agricultural economy - will warrant the application of such new technology. Even without the types of potential economic developments described in other chapters, the real price of food will rise dramatically at some time in the next 10-15 years. The cost of green-thumbed robots would tumble as they reached mass production, and these machines would have a rapid payback once installed. The home worker will not have to spend most evenings picking ladybugs off potatoes. Certainly, weeding and some other kinds of care will still be required but most of the other care required by common vegetables could be provided by a unified system. Similar equipment (although much less capital-intensive) could be used to feed, water, and clean the accommodations of poultry, fowl or livestock as well as to control access to/from livestock areas and even diagnose certain diseases. Creation of small- (versus large-) scale dairy robotics capable of conducting milking, milk filtering and analysis and maybe even pasteurisation should be considered. Similarly, robots optimised for aquaculture (presumably on swing booms of some sort) could feed fish while managing their water temperature and oxygen content. For food storage, computer systems can allocate storage space, control temperature and humidity, manage shelf life (telling you which items to withdraw and eat first) and provide spoilage alarms.

All of this is by no means fairyland stuff; we have been busy in recent years applying robots to the much more sophisticated work which large organizations wish to have done. Now it is time to democratize the technology and apply it to work that the rest of us would like to have done.

The same twin rails could serve as a food, fertilizer, soil and gravel transportation system around the property. With by-hand or electric propulsion, small railcars or carts could be used to transport soil, fertilizer, harvested crops or other items around the property. Plant-bed cars could contain soil or fertilizer for use in a green house or fungus house. Further, those used as stall floors for animals could be rolled out from the barn area, have soil added, and could then be then used for cultivation.

>>>This 'pocket farming' approach would greatly reduce the aggregate demand for highly pollutive fertilizers, and would also reduce mega-energy consumption in food production. This is because virtually

all of the energy used for homestead food production would be produced on-site; except for the robots and their movement frame, much of the required energy is low grade. Most of our mono-cultural farms would continue to exist but a much higher percentage of their output would be exported. Far less energy would be used to harvest, transport and warehouse food because more of what we eat would be produced on our own homesteads. There would also be less incidental spillage and much simpler 'micro' rotation of crops in two dimensions (horizontally from one intra-rail in-ground plot to another and vertically between railcar planter boxes and plots). It would also be possible to produce fresh vegetables at home with the application of minimal human time and effort.

As cited earlier, even in conventional economic terms there would be a rapid payback to such domestically deployed capital as and when fully compensatory food prices are paid to conventional mid- and large-scale farmers (i.e.: zero subsidies and full allocation of all direct and indirect costs of production, including pollution and any other resulting disruption). It will also be possible to use low-level heat spinoffs of other domestic activities to help support agricultural or aquacultural activities. There will also be the opportunities for many local and regional specialist businesses in such areas as greenhouse growth of tropical fruit.

>>>There will be an opportunity for each household to optimize its own food and related product/byproduct production plans (finalized with the help of computers) in terms of climate, geography, ability to trade off or sell surpluses, outside work responsibilities of the members and desired lifestyle.

It will be argued that, in the Canadian case, we are less efficient producers even of table vegetables, than are farmers in Florida or California and we should thus leave it to them. However, consider that the TOTAL cost of, for example, the carrot from California (or even Ontario) must include:

-production cost and farmer's profit;

-cost of any subsidies;

-cost of transportation;

-cost of transportation subsidies;

-warehousing cost and wholesaler profit;

-refrigeration cost;

-spoilage cost;

-distribution cost;

-display facility capital and operating cost;

-retail grocer profit; and

-duties and taxes paid on all of the above activities;

Production, transportation, refrigeration, spoilage and display activities direct energy and/or environmental costs. The total cost of home food production, even when expressed only in economic terms, includes an admittedly higher direct production cost (both economics of scale and climate give the California farmer an advantage) but excludes all of the other costs except for storage. Not even the Canadian federal government will dare to try taxing us on vegetables grown in our own gardens! As discussed in the next chapter, we will be armed with a better (in fact, near-perfect) ability to charge back

to the big producer the cost of ALL disruption occasioned by his bigness. When this is done, the total cost of the items listed above will rise dramatically, greatly increasing the total fully allocated cost of the imported carrot. For example, the transport truck's true share of interstate highway costs must be included. And that is only half the story; now consider the energy environmental economics (aka E3 or Trinomics). What was the total energy and environmental cost of the carrot from California versus the one grown by 'Gordie the Garbot', the user-friendly garden robot, including all of the types of costs set out above? It is not that the rural homestead dweller will be watching his cost of carrots like a hawk. He needn't do so because his central computer system will be doing it for him and will tell him if the E3 costs of producing the carrot get out of line. Finally, we must recognize that our ability to trade-off between dollar cost and energy and/or environmental cost of something is subjective and may change over time. Computers handle the manipulation of these relative values much more easily than our intuitive senses.

3.5 Vehicle Fuel Production

Consider an environment in which vehicles for personal uses were divided into three classes as follows.

CLASS A - INTERCITY vehicles would be powered by a turbine engine driving an electric generator making electricity to drive individual electric motors connected to each wheel, based on a principle not unlike that used in current diesel-electric locomotives. They would be 150-180 mph capable and able to burn paraffin, kerosene, ethanol, methanol, methyl alcohol and various other wide cut fuel substitutes. They would operate on conventional roads as well as on dedicated high speed lanes of freeways. They would be competitively manufactured, but to federal form, fit and function specifications. They would have a high cost - at least $50,000 in current real terms - but would have a manufacturer warranted 10 year life if normal maintenance schedules were followed. The high speed lanes would be subject to federal standards and inspection as would the vehicles themselves. This type of car would be used for travel from the homestead to the city as well as between cities. Within large urban areas they would be forced to use on-board storage batteries to operate in pure electric mode, with the turbine shut down. Alternatively, they could have small auxiliary propane motors to trickle charge their batteries while in urban areas. Class A vehicles would be permitted to use all of dedicated and regular freeway lanes, highways/byways, suburban roads and city streets. The only major technology areas needing more work to get us there are high production small turbine blade casting and electric motors. The former are progressing well in the aircraft industry. The latter, if we spent half what Ford, GM and Chrysler have spent in ADVERTISING in the past five years, would likely come within our grasp very quickly.

CLASS B - UTILITY vehicles would be for medium and short haul driving and would have a top speed of 50-70 mph. They would be derived from current vehicle technology, but would be modular with snap-on/snap-off modular body sections for different purposes, and would have conventional spark or combustion ignition (diesel) engines and conventional drivetrains. They would burn ethanol, gasoline, methanol or diesel fuel (or mixtures thereof) or perhaps propane. They would be used to transport people and things from the homestead to the closest town or village or between homesteads. They would not be permitted to enter large urban areas without special permits. Class B vehicles would be permitted in non-dedicated (i.e.: non-Class A) freeway lanes, highways/byways, suburban roads and village streets.

CLASS C - URBAN vehicles would operate only within (or at least near) towns or larger urban centres and would be for short haul commuting, shopping or other travel. They would hold two to four persons, have a top speed of 30-40 mph and would be pure electric. Class C vehicles would be permitted to use non-dedicated freeway lanes, suburban roads and city streets.

Both Class A and Class C vehicles would be plugged in whenever parked at parking meters or home pull-up stands and when in their garages. The homestead would be able to distil a wide cut fuel substitute to power Class A and B vehicles using both purpose-grown plants as well as food production byproducts and waste. Depending on the mix of plants grown, a 2.5 acre site might, for example, permit the occupants to produce 50 gallons of such fuel providing enough for 2 to 4 weeks' worth of driving. A 5

acre site might render 100 gallons, enough for up to two months' worth of driving. A ten acre site, with even moderate husbandry, might render a 1000 gallon output sufficient for most of the year.

Of course the energy cost of producing such fuel at home must be considered. However, even if the energy input cost per gallon is higher than in a large ethanol or petroleum refinery, let's not fall victim to the purely quantitative approach. The large plant requires mega-energy inputs and many other mega-inputs and makes lots of mega-pollutive outputs and it also requires energy to be used to transport and store the fuel it produces. Home fuel production does not. Sometimes even 'energy accounting' has to be viewed with a jaundiced eye.

Again, if the home production of even a tenth or a quarter of annual required fuel consumption is possible with minimal effort, then there is no human time or energy spent transporting such fuel to a gas station where it would otherwise have been purchased. So what if the kids have to spend a few hours a week minding the process? Their allowance can be raised, and it is probably better than having them hanging around shopping malls with nothing to do. Progressive (phased) implementation would be required but the approach is viable.

>>>Class A vehicles would have much lower (turbine) emissions and none at all when running in electric mode, which would theoretically be possible for all except dedicated lane high speed operation. These vehicles would be LARGE (hence also safer) and comfortable and would have long, productive lives. Class B vehicles (the conventional type) would run far fewer miles and mostly in rural areas. This would greatly reduce urban pollution. Existing (Class B) vehicles would be phased out or (more likely) simply taken to, or sold to those who had already moved to, rural areas. For those with no or minimal home fuel production, conversion of conventional internal combustion engines to propane would be an attractive alternative. Class C vehicles would have no emissions and since many car trips are very short they would account for a surprisingly large portion of intra-urban travel. The Class A and Class B vehicles would permit efficient use not only of surplus growing space but also of surplus and waste plant products from small-scale agricultural operations. It need hardly be added that few rural households would need more than one Class A and one Class B vehicle, the latter configured to carry four or five passengers and considerable cargo, almost a scaled-down version of the current 'crew cab' pickup trucks. Infrequent visitors to large centres might simply rent either a Class A vehicle locally to drive there, or else drive their Class B to the suburbs and there swap it (at municipally subsidized minimal cost) for a rental Class C.

3.6 Fertilizer Production

It was stated earlier that the combination of rail-mobile, robot carrying wheeled frames, hopper type cars and planter boxes would permit rotating the land itself as well as rotating the use on top of the land. For example, a given planter/base unit, perhaps with an 8 X 10 ft. floor and a 1.5 foot box wall around it could successively serve as an animal bed, a plant bed(with soil and extra fertilizer added), a compost/distillate bed and finally as a fungus bed. After the fungus growing role it would be run through a high pressure hot water and disinfectant wash and then recycled. Siphoning off excess manure and compostable material, and combining it with the more refined output of a small on-site fertilizer plant (using output too low grade for fuel production), would permit creation of bulk fertilizer for garden and small field use. Crop rotation thus becomes three dimensional, permitting relatively intense cultivation without exhausting the ability of a 2, 5 or 10 acre plot to support such use.

>>>We would experience far less soil exhaustion and erosion and less single crop farming. There would be much less dependence upon commercial fertilizer and thus less pollution flowing into the food chain. Also, climatic perturbances in one part of the country (for example, the prairies) would no longer be able to cause shortages or food price (read market price speculator) scares elsewhere.

3.7 Finance

The only significant constraint to the evolution of the attention-based economic system discussed in more detail later in this book is the need to put some reasonable bounds or limits on human greed. It is not generally known (but is nonetheless true) that Adam Smith deplored greed and, within limits, so also did Thomas Jefferson, James Madison and Benjamin Franklin. Early colonial Virginia was a land of relative plenty in which any healthy freeman could provide more than enough food, clothing and shelter for his family. From this equality of opportunity for prosperity quickly evolved the American ethos of the protection of economic rights and property as a very high priority of the state. In colonial Virginia most men desired to do 'better' but not necessarily to do 'best'.

In fact, until the widespread appearance of the cutthroat tactics of the gold seekers, the few big-time super greedy capitalists of the Fisk/Gould generation, and progressively larger proportions of the generations subsequent, greed for treasure or assets on the part of most people was distinctly limited. It tended not to extend far beyond those things needed for the then-equivalent of a current middle class or upper-middle class lifestyle. Outright, unrestricted greed was confined to a relatively small percentage of the population. Compare the incidence of politicians and top bureaucrats gratuitously helping themselves to public funds even 100 years ago to the case now!

If self-control and clear appreciation of the inevitable consequences of greed can be instilled in the upcoming generation - and at least partially inculcated in the present breadwinner and senior - then the evolution of the home workplace towards a new and highly innovative attention-based economic system which takes information as its basic commodity (as described in Chapter 8) may be commendably rapid. In brief, we may eventually come to believe that as we pay attention, using home workplace equipment, to information created by others that we thereby - *in the very act of paying attention* - create new disposable wealth in the hands of the creator of that information. Such a system could generate much of the needed capital very quickly by simply ascribing wealth-creation to the process of humans using their electronic equipment to pay attention to each other's information products. While not intuitively easy, this concept is no more radical now than was the concept of paper money (backed by goods and services and not gold) a few hundred years ago. Otherwise, we may get to spend the proverbial forty years in the wilderness... while we try to 'cost justify' the new homestead using conventional economics, accounting and finance.

The key to such a new economy is a very simple one. If we are to succeed with the introduction of an attention-based economy on the first (versus the fourth or fifth) attempt and without ruinous hyper-inflation it must be realized by each and every individual that he/she must:

A - convert electronically gained dollars (those not earned by producing conventional goods or services) primarily to food, clothing, shelter and to support other required income earning;

B - convert electronically gained dollars to 'pleasure' or 'luxury' assets only on a limited and very market-sensitive basis;

C - trade electronically gained dollars for information assets at any desired rate;

D - pay sufficient attention to the information products of others so as to maintain for them their 'share' of the balance of trade in such attention; and

E - store unused electronic dollars in the manner that heat can be stored underground or electric potential can be stored in a battery. (In fact, a sound understanding of environmental and energy principles and of the basic laws of physics gives rise to a better appreciation of the absolute need for limits to greed. This is almost the 'metaphysics of economics', if you will.)

For purposes of this discussion, however, assume that we have government-led workplace decentralization in progress but that there is a painfully slow change in human attitudes and behaviours, thus permitting the Attention Economy (AE) to thrive and blossom only for short periods, and then only inside the protective incubator of vertically/horizontally integrated (and geographically isolated) electronic co-operatives. Therefore, assume that the home workplace dwelling must (lamentably) be financed through our current (scarcity-based) economic system. The AE alternative would permit faster and easier financing but likely will not be mature enough in time. In 2014 Canadian dollars, the fully allocated cost for all of the modules and components, including the house unit, spine garden/utility track, garden/greenhouse units, cow unit, pig, unit, fowl/poultry unit, workshop unit, Class A and B vehicles, solar/electric system, fuel still, livestock and seed to equip a new homestead would be approximately $400-500K assuming all items were mass produced and pre-fabricated for easy assembly. Clearly, with a 15% or even a 10% cost of capital this is not a practical amount for the average Canadian or American family, especially one just starting out and likely with a combined income of no higher than $50-80K.

However, failure to move to the home workplace would not be in our collective interest... not at all. If the propositions set out earlier in this chapter are accepted, it is not difficult to argue that nationally planned and led, but privately implemented, workplace decentralization is in the national interest both of Canada and of the United States. Within our capitalist economic system, we have to seek a way to channel the required resources into workplace decentralization. If conventional 'finance' can provide the needed funding that is acceptable: if not, some other approach must be found. Finance, after all, exists a means to an end and not an end in itself. Finance exists to serve governments, corporations and individuals; they don't exist to serve finance.

Unfortunately, reality does not always reflect this and those who would promote the home workplace as a national political, economic and social objective must heed this experience. The flight of mega-capital into and out of industries - with the resulting boom-and-bust psyche, mega-mergers, leveraged takeovers, huge bankruptcies and management obsession with 'this quarter' financial results - benefits no one. The fact that we still, at times, allow shark-like and rapacious industrialists to invade whole industries and then either to suck them dry of funds or else to retreat (usually occasioning massive collapse) at the first sign of trouble is shameful. They are nothing more than modern-day robber barons. The demanding and wholly unforgiving form of capital (aka high finance) they bring makes each such industry the servant of finance, tipping reality upside down. Clearly, in a deregulated economy, the unduly high labour costs of a United or an Eastern Airlines would have been levelled anyway by market forces without recourse to the great capitalist 'personages' of Lorenzo and Trump. Clearly, it is now time for governments, corporations and individuals to ensure that finance serves us, not the other way around. So the only question about the financing is not 'if' but rather 'how'.

Likely the best way to proceed would be a combination or mixed-source type of financing. As described in Chapters 6 and 7, it is technologically possible, even now, for home workplace computers to permit a very large number of lenders to each INDIVIDUALLY make a small loan to a young couple. We now call it crowdsourcing. This could be augmented by credit provided by a co-operative serving the area in which the homestead was located, government guaranteed and/or administered loans as well as private financing from a single source. Banks and the remainder of the financial community would simply not be required; only a lawyer or notary would be needed to validate the freedom of title, the terms of deal and exchange of consideration on closing day.

>>>All financing options are environmentally neutral providing the new homesteaders can pay their way. The above-recommended method has the advantage in the event of serious, ongoing and non-recoverable default (as in over a year or 18 months, not as in fifteen days late three times...) the co-operative or other local organization would likely be the one to recover the property. In such circumstance it would most likely be soon re-occupied and would not languish vacant for months or years after 're-possession'. It is most probable that a mixed financing system would lower the stress on the occupants in the event of economic difficulties, particularly temporary ones. After all, if half of one's

mortgage is owed to a producer co-op to which one belongs, and the other half is distributed among 400 other households then much more tolerance can be afforded the defaulter if there is a valid reason. A homestead co-op, where it is the principal or largest mortgage holder, can in the last resort benefit immediately from re-possession by simply re-allocating the homestead to another member. Knowing that it is safe in this last resort, it can thus offer much more flexibility and tolerance to the troubled occupant than would a bank; after all, the co-op's very raison d'etre is to promote homesteading, not to look good this quarter to some financial analyst on New York's Wall Street or Toronto's Bay Street

Over time, the homesteader gradually gains a majority equity share in the homestead, paying out the various forms of financing in parallel. Government loan guarantees could be administered through the co-op and/or a local level of government. There is nothing wrong with government financing for this type of development, since each couple who marry and move to this environment will demand far less - over their lifetimes - in social services and public infrastructure funding than those who choose to live in a large city. Government direct mortgage funding might well be limited to 25% although guarantees could extend beyond this amount. Forward mortgaging from one generation to the next should be permitted so as to increase disposable income for retirees.

3.8 Physical Security and Law Enforcement

The decentralized community, with its greater inter-residential distances, excellent communications, automated homestead management systems and armed residents is inherently well crime-proofed right from the outset. Since decentralization of the population would also mean that police services would be located farther from most homes, I would advocate the responsible ownership of firearms by rural residents. While there may be justification to deny urban residents firearms, WHILE THEY ARE IN URBAN AREAS, they could always locker them in rural areas for hunting or target shooting. It would seem likely that, on a per-capital basis, current ownership of firearms by farmers (and other rural dwellers) results in far less crime than urban ownership of such weapons.

Rural homestead dwellers have a legitimate requirement for firearms for self-defence in the event of hostile intrusion onto their property (police being just too far away to be of any useful assistance quickly enough), to control whatever pests the garbots miss, and for legitimate target practice and sport hunting in proper season and appropriate territory. Further, if a very significant percentage of the population is rural (and armed) and if - due to technical aids and better overall quality of life - many elderly people remain at such homesteads in at least a partial return to the extended family situation, the risks of injury or death to thieves making domestic break-ins will rise dramatically. Meanwhile, the returns to this form of crime will fall. Good alarms will readily summon well-armed neighbours even when all the residents are absent. Finally, the greater distances over which the ill-begotten loot must be transported, combined with an accurate local vehicle licensing system and lower rural traffic patterns than in cities, will work to make the thief's presence and speedy exit all the more obvious to those in the environs. There is a clear historical precedent and basis for this kind of community self-defence.

At the beginning of the 20th century, most small villages and rural communities in Canada and the U.S. were essentially self-policing and self-protecting, but had very low crime rates. Sadly, the rise of the crime rate in this century has directly paralleled the rise of urbanism. There is no reason to believe that the reverse would not also be true.

>>> Criminals waste transportation and communications resources, they misappropriate, damage and destroy property and they irritate, inconvenience, threaten, injure or kill humans and animals. All of this needless and unwanted activity adversely affects the economy and environment. All activities, be they good, bad or indifferent have at least some impact; criminals have more than their share of negative impacts, but contribute nothing. One of the very few fully justifiable uses of the absolute power of the state made by totalitarian governments is the elimination of the criminal element. Actually, an enlightened 21st century government and society could well decide

to first provide a general amnesty and subsidized transition to highly profitable but legitimate forms of business for former criminals. After that, the stiffest of penalties.

3.9 Waste Management

Since an early age, I have derived countless hours of pleasure from my hobby of collecting pictures of vehicles, most of which were taken from books, magazines and from sales brochures which many other people considered garbage. So what is waste to one is treasure to another. At the homestead level sewage, waste water, organic materials, and paper can all be re-cycled. At the local level glass metals and petro-chemical byproducts can be converted to domestic raw materials or locally saleable products. Waste output (such as product packaging material) can be cut both by re-cycling and by re-using as with standard families of general and special purpose containers. A hierarchy of material usage must be established on each homestead, consistent with the principles of physics and of good home economy.

>>>There will be no need for extensive landfill sites and no major garbage transportation cost/impact issue.

3.10 Life in the Home Workplace

There are those who suggest that a home workplace with both husband and wife working from home, even if they worked for different companies and had significantly different roles, would be a living hell. Having worked at home for more than half my own 30+ year career, I simply cannot concur with these ill-informed suggestions. I have lived in family situations where my spouse did not work, worked at home and worked outside the home. Each situation has its benefits and disbenefits, but when both of us were working at home we never regretted being able to take an hour to go skiing or snowmobiling at three-o-clock in the afternoon, being able to finish off that pesky project late at night or early in the morning or having more time with our children than most of our neighbours. We never regretted being able to arrive at a local community meeting in the evening both refreshed and proactive (rather than being exhausted from dashing home from the city, rushing the kids through dinner and then dashing out again). We certainly never regretted the long and comfortable lunches, the ability to sometimes work outside in the summer or to go for a stroll along the nearby beach after lunch or before dinner. When the work was done, commuting time was precisely zero; we could convert almost instantly to sharing time with the kids, a household task or even a hobby. Careful planning made this lifestyle compatible with even a moderately sized bungalow. Our location gave us all the rural amenities, but was only 35 minutes from downtown Ottawa which offers most urban amenities.

3.11 Conclusion

In the Canadian case, our approximately 32 million population is not adequate to permit Canada to remain a significant economic entity and nation state, even if everything else were going swimmingly, which it most decidedly is not. (Canada is beset with very serious problems stemming from lack of government and business leadership, constitutional atrophy, ethnic and linguistic strife and others.) We must not only get past these problems, but we must also grow in numbers or we will die as a nation state. Using the operational principles set out in this chapter as a guide, we can easily move our population up to the 40-50 million range by the year 2030 or 2040 without crowding and with less total environmental damage that we are incurring now. Rarely will we find it necessary to concentrate one million people in an area as small as 1000 square miles (usually 50,000 to 200,000 would inhabit such an area) but we will have the assurance of knowing that we can do so where necessary. Optimum homestead size will vary according to planned land use, soil type and climate but will likely range from 2 to about 10 acres. Even

1.5 to 2 acres is almost certainly viable using the devices described in this chapter, virtually all of which can be readily developed with current technology.

>>> Thus, it is possible to simultaneously:

-decentralize most information workers;

-boost real disposable income or wealth;

-reduce per-capita and total pollution; and

-increase population.

In the American context, these same principles might be applied to effect a more even distribution of the population across the country's geography, as well as to accommodate higher population growth rates in the sunbelt states. The European context is different but many of the above-cited measures might still be applied, to some extent, in most European nations.

This chapter has dwelt mostly on the symbiosis of an advanced home workplace based lifestyle and the environmental/ecosystem with little concentration on urban industrial energy use or pollution problems, which will not go away even if 60% of the population rapidly decentralizes. Intelligent regulation and/or management of our primary resource and manufacturing industries here in Canada can lower the social cost of their energy use and pollution. The stability and strength of these industries must provide us the bridge to a home workplace society so it is crucially important that they continue to be fostered and protected, even in the midst of such massive change. In the American context, the continuing transition from goods and services industries to information industries will support, and will be supported by, a policy of encouraging the home workplace. California and certain other states are already moving to encourage more use of the home workplace to reduce transportation congestion and pollution. Use of the home workplace as a means to reduce actual urban congestion will come later.

Decentralization of industry itself to smaller centres and facilities will mirror, but lag, general population decentralization by some years, according to market and transportation cost pressures, capital write-off and other factors. Governments can certainly provide the incentives but private sector managers will make the decisions. New plants constructed in smaller centers will definitely be more environmentally friendly. This, combined with stricter environmental regulations will reduce or even remove much of the threat.

Finally, the contents of this chapter can only be objectively digested when one takes at least two steps back from the current, largely 'urban' mind-set. This mind-set is more than a bit mired in the crassness that, until early in the 20th century, tended to be associated first and foremost with the hard core 'big city' of New York and the surrounding New Jersey appendages. It is the very expectation that everyone is basically bad and that everything will eventually be reduced to its basest, lowest and most despicable form. It is the corruption and degradation of thought, concept, will and action represented by the comment - made by the urban wag to the shocked or astonished newcomer country boy - of 'welcome to the big city'. Welcome indeed! That kind of big city we can well do without.

4. Workplace Decentralization - Estimates and Blueprints

4.1 Introduction

4.1.1 Chapter Overview

This chapter directly addresses what workplace decentralization is, how it operates, why it already occurs in certain circumstances and provides a planning framework which can be used at the small workgroup or organizational level. Throughout recent history there have always been some people who worked from their homes; housewives and authors come quickly to mind, as do farmers. However technology gives us the potential for a much greater number of persons to work at home at least part of the time. Many will be enabled to do so all or virtually all of the time should they so choose.

There are many societal and psychological factors associated with such a potentially massive change in work styles, and hence in lifestyles. However contrary to the conventional wisdom, the home workplace does not mean isolation. Working at home will however destroy much of the petty politics which exists within most large organizations.

4.1.2 Source Material

The contents of this and the two subsequent chapters are taken directly from a brief entitled Workplace Decentralization and Canada's Future, which I presented in 1983 to the MacDonald Royal Commission on the Economic Union and Development Prospects for Canada. Only the section on the social aspects of the home workplace is new. I do take the irresistible liberty to comment upon some of my 1983 predictions in the current context.

4.2 A Topology of Technologies

4.2.1 Technological Proactivity and Reactivity

This section endeavours to consider and classify (topologize) different types of technology according to whether they were used by government to bring about change or whether government merely reacted to the changes they caused. During the past two hundred years, we have seen the development of a wide range of communications technologies including the telegraph, telephone, radio and television, as well as satellites and fibre optics. Similar development has occurred in the transportation sector and in many other areas. These technologies, and in fact all technologies, can be categorized (not in and of themselves but according to our behaviour towards them) into two groups: those technologies in which we have led development towards a specific goal, and those technologies which have led us.

4.2.2 The Automobile

The automobile serves as an example of the latter type of technology. All of the major required technological components existed in the 1880-1900 period when diverse experimentation was undertaken. For a brief time we 'led' the technology in that our prime objective was to produce a viable self-propelled road vehicle, but soon thereafter the technology moved out in front even of its proponents, not to mention the rest of the population and the apparatus of the state. Three alternate and, as it

happened, competing powerplant systems emerged: steam, electric and gasoline internal combustion. Until about 1905 the layout of the self-propelled vehicle was nearly identical to that of the carriage, as builders tried to apply the old ways of thinking about vehicles to the new technology. A situation of near perfect competition existed among about 500 manufacturers, although the vehicles remained principally the preserve of the upper-middle and upper classes due to low reliability and high unit costs. Even at this stage the auto outstripped the abilities of regulators and enforcers of all types: it caused disruption of peaceful rural areas and left police no alternative but to themselves adopt the auto as their means of pursuit. In 1908 a more profound event occurred when the Ford Model T went into production, causing America to diverge from the previous approach, and particularly from the development of the auto in Europe. The low cost and durability of the Model T very rapidly democratized the technology. From this point forward the automobile largely regulated and led society (and hence government), rather than vice versa. The result was a forty year struggle by government to keep up by providing roads, parking, user-oriented highway laws and other things required by the automobile. While there have been tremendous gains for society because of the absence of regulation over much of the auto's development, the excesses thus permitted have also been well documented. Clearly, however, various initial attempts at suppressing the technology (Prince Edward Island banned autos entirely) were not going to work and would better have been replaced by leadership sensitive to the technology.

4.2.3 Space Flight

The technology that took us to the moon lies at the other end of the leadership spectrum. In the 1957-1960 period some of the components were available (solid and liquid propellant rockets and launch facilities had been developed in Germany, the U.S.S.R. and the U.S.) but, as with the early auto, the best combination of technological elements was not immediately evident. When President Kennedy established the goal of reaching the moon within ten years the stage was then set for quickly finding the right combination of components - and creating from scratch any that were still missing - to accomplish this task. Indeed, many new technologies were 'hatched' and many others were greatly improved. Micro-circuits and improved propellants were developed only because of a concerted national effort or drive in one direction; the civil spinoffs would come later. A clear plan and development framework resulted in achievement of the ultimate goal of the Apollo program. Similar situations existed during wartime and fostered the development of both the (practical) jet engine and nuclear energy.

4.2.4 Steering Technological Development

While it may not always be possible to set out to 'discover' a given device, it is always possible to seek a solution to a given problem or requirement as well as to 'steer' technological development in a general direction. The absence of such leadership is at the very least dangerous and in some cases crucial; genetic engineering, for example, could well turn out to be a Pandora's box if we are not careful. Many people feel that television technology has led us or at least that we have not known exactly what to do with it. Watching Bart Simpson or even the daily news coverage can lend credence to this concern. Similarly, computers have sped up accounting and word processing activities but have not really caused us to improve the theory behind (and hence the real value of) either. In fact the opposite has occurred in that many of the theories we currently hold have been stretched to the breaking point. For example, an accounting system (no matter how well automated) that treats everything from two pieces of metal joined as a nosecone to a fully completed jetliner simply as 'work in progress' more properly deserves to have been left in a bygone era.

4.3 Present Course of Development

The following represent projections, made in 1983, about the then perceptible direction of the Canadian economy and society. Following each (and marked with >>>) is a commentary on what has actually occurred since then.

4.3.1 Information and Service Industry Workforces

The percentage of Canadian and American workers involved in information and service industries will continue to increase.

>>>Not a very heroic projection coming from a high technology executive, I realize, but perhaps it was good to start with a safe one. Statistics Canada data indicate that this has indeed been the case but they also show that seasonal and chronic unemployment are even more a problem now than in 1983.

4.3.2 Decline in Manufacturing

As manufacturing industries mature, their output will decrease and will remain at a lower level which serves mostly the replacement market.

>>>There is some evidence of this and we know that many markets (i.e.: for home alarm systems, VCR's, televisions, snowmobiles etc.) have approached the saturation level, and therefore growth is at or below the GNP growth rate. Of course the replacement market still exists.

>>> My predictions of 1983 failed to appreciate how radically North America would be de-industrialized by the advent of global trade and the implementation of various free trade agreements.

Further expansion of manufacturing industries in Western economies is constrained by the limited ability of the developing countries to trade with developed countries. Their economies do not generate sufficient hard funds with which to pay for manufactured goods. (Recent development conferences have brought calls for trade rather than aid, and criticisms of the tied aid system which accuse it of failing to establish wealth-creating economic systems.)

>>>While many efforts have been made to help debtor countries they have not progressed well. Starvation, disease and animal pests are more a threat in many of those countries now than in 1983. Nonetheless many of the 'level 2.5' countries - and especially those on the Pacific Rim - have had very rapid growth not fully contemplated in the projection. They have not only sold many things to North America and Western Europe but have also purchased much from us. This has not completely countered, but has blunted, the impact on our industry of the collapsing economies in many Third World countries.

4.3.3 Rising Energy Costs

Rising oil prices and other factors have slowed the real growth of Western economies, the growth of which is tied to hard capital. This growth will continue to be restrained until major structural changes occur.

>>>This projection proved largely incorrect for three reasons:

> *-for most of the 1980's oil prices remained stable or fell, reducing PRIVATE (as opposed to government) incentives to develop conserver technologies and eliciting little public leadership*

in this regard;

-major acceleration of U.S. defence spending superheated their economy and to an extent the Canadian economy as well ; and

-in Canada, a progressively larger portion of GDP was devoted to the 'cancel-each-other-out' activities of the various elements of the finance community which represent a phoney kind of economic growth as they consume wealth by checking on wealth, changing wealth's present storage type (or name) and moving wealth around.

>>> On the other hand we are now very likely either closely approaching, are currently at, or have just passed the point peak oil production so we will see progressive increases in both scarcity and prices.

4.3.4 Increasing Corporate Concentration

In the manufacturing and service sectors the trend towards concentration will continue, barring any disruptive external stimuli.

>>>This has happened in spades not only in the service industries like media or airlines but even the hard industries such as automobiles, drugs or beer. The only plausible sources of major 'external stimuli' seem to be governments, but both the U.S. Republicans and Canadian Conservatives have been content to let industries become as concentrated as they like. Only when bankruptcies began felling major airlines did the U.S. Justice and Transportation departments become active. Ditto for the merchant bankers at the onset of the Great Recession during 2008.

4.3.5 Pending Limits to Consumption

With present and immediately foreseeable technologies, the level of energy consumption of Western consumers, particularly those in North America, simply cannot be maintained indefinitely.

>>>There is no question that this is as true now as then. There is also little question that we are still not really embracing this issue. We just kept on buying big cars and more appliances during the 1980's in a demonstration of the 'bigger-is-better' mentality such as had not been seen since the 1955-1965 period. We do, however, now have a suite of technologies which increase the likelihood of the homestead (as described in Chapter 3) being largely self-sufficient in various types of energy at least in the non-winter months. Consumers have demanded and have responded well to 'green' products but public understanding of the E3 accounting is still at a very fundamental level.

4.3.6 Sharing the Wealth

The present ability of Western governments and economies to create real wealth and to provide a high quality of life for their citizens lags behind high (and rising) expectations. The corollary of this is that the net real wealth transfer through interaction of developed and developing countries will fall increasingly further behind meeting even the basic needs of a large percentage of the world's population. The international development community will falter in its ability to bring sustained benefits to the Third World.

>>>Perhaps the most accurate prediction of the lot! A number of upper-middle class and upper class people prospered in the 1980's; in fact most of them did even better than before. But the white and blue collar middle class and the working class lost ground in terms of real spending power, the homeless multiplied wildly and unemployment continued to dog us, even in the U.S. and Canada. In the rapidly developing countries human exploitation reached new peaks while in the least developed countries

famine and pestilence were widespread. Western countries were doing more in real terms in 1960 for the Third World than they are now, or at least so it appears from the current vantage point. We must bear in mind, however, that in 1960 most Third World countries had economies and capital infrastructures which were running largely on momentum left over from the previous colonial administrations. There was therefore a more fertile ground for aid than in more recent years, particularly since 1970. To verify this one need only read some of the past annual reports of the Canadian International Development Agency (CIDA) or perhaps the U.S. Agency for International Development and then check to see which projects are still functioning; very many of them have been aborted because they were found to be inappropriate to the (increasingly sorry) state of the recipient economies. CIDA-built schools soon were used to store oil barrels, CIDA-supplied locomotives proved totally inappropriate in Africa and Asia, and CIDA spent $100 million of our money to build a monument to someone else's (basically Communist) revolution.

4.3.7 The Balance of Power

The failure of the Strategic Arms Limitation Talks, the instability of the Middle East due to competition for land and oil, the Afghanistan invasion and the Iranian situation have not only revived the Cold War but have launched a new arms race. This will continue the diversion of resources from potential improvement of the quality of life, at least during this decade.

>>> Along with everyone almost else I failed to accurately predict the implosion of the Soviet Block, but was correct in pointing out that very high military budgets in underdeveloped countries continue to contribute to starvation in those same countries.

4.4 Alternative Course of Development - Hypothesized Then and Now

While the above projections might not have been greeted with universal agreement, they did set the stage for consideration of a number of additional ones about the potential for us to use technology to constructively alter our future. Here again, comments with the benefit of 20/20 hindsight are inserted after each.

4.4.1 Adoption of the Home Workplace

The implementation of the decentralized workplace (home workplace) will become economically viable at, or shortly after the time of the development of the correct combination of functions performed by using electronics technology and various other technologies now available. The economic 'crossover point' for a given organization is the point at which all fixed and variable costs attributable to an individual worker are lower when that individual works at home.

>>>U.S., British and other experience shows that there is little doubt the home workplace is already economically viable for many organizations. Subsequent experience has also proven there is nothing wrong with the definition of crossover point as set out above.

>>>Earlier in 1983 I had seen for the first time a device called the Mitel Kontact, which was an integrated desktop workstation with keyboard and screen. It was capable of performing word processing, agenda-keeping, telephone list management with auto-dialling, spreadsheet and other computer-like functions. However it also had a full built-in two line telephone, could host its own conference calls (Bell Canada, as you might imagine, hated the thing) and could send by electronic mail (E-mail) over a telephone line anything it could create (phone list, document etc.) to another of its own kind. In other words, if you and five of your associates each had one at home you also had a fully integrated organization but without an office. If you worked mostly with information, you would still need to get together for some aspects of your work but by no means for all of them. Kontact's maker, unfortunately, placed a relatively low priority

on the product and the national distributor was downright incompetent. I set up a business which sold it with reasonable success for a couple of years until Mitel succumbed to takeover and the new owners killed the product. Kontact was big and bulky but it worked well. It was perhaps the first desktop machine to use 'soft keys' wherein the program changed the on-screen labels telling what keys did if you pressed them; it could do five things at once, which most current desktop computers cannot do. What really killed Kontact was that it was not IBM compatible when everyone thought they were 'supposed' to have an IBM PC; they were often not sure why but they just felt that way. Mitel wouldn't change it because Mitel was pre-occupied with other products.

>>> Today, major system vendors such as Sun and IBM and network equipment vendor Cisco all make very substantial use of the home workplace. However, as discussed in subsequent chapters, most medium and large enterprises have been relatively unsuccessful with their 'telecommuting' programs.

4.4.2 Home Workplace Pivot-Point

When the appropriate combination of functions for each job role becomes available and the economic crossover point is reached, organizations will decentralize without benefit of socio-economic analysis of the potential impacts. The speed and magnitude of this trend will so outstrip the ability of government to regulate or even to provide a general policy framework for development that it will be forced into a reactive mode. Major opportunities for national standardization and for the development of norms respecting 'reasonable behaviour' in the new situation will be lost if government has not taken a lead in home workplace development. Action must therefore be taken at or before the time at which the crossover point is reached.

>>>In the U.S. millions of workers now take full or part time advantage of 'flexiplace', 'flexiwork', 'the decentralized workplace' or whatever one chooses to call it. U.S. state (and recently) federal governments have been themselves running pilots. Results of the pilots vary but some are quite encouraging; overhead costs have been cut and productivity has been enhanced in many cases. The U.S. focus appears to emphasize such areas as reducing congestion and transportation-caused pollution, giving workers more flexibility, addressing legal issues and managing the human resources aspects. All of these are important but, unsurprisingly, it is California which has taken the lead in requiring all state agencies not only to have a telecommuting program but also to be prepared to make even more extensive use of the home workplace in emergency circumstances.

>>>There is little in the American literature, at least not that I have encountered, which points to the use by government of the home workplace (which includes not only 'telecommuting' but also the business organized from scratch and with no hub or office from which to 'telecommute') as a major tool for economic and social development. To this extent, U.S. governments are in a reactive mode. But thus far, the speed and extent of the home workplace trend in the U.S. have been less than predicted by optimists (like me) but still greater than foreseen by the skeptics.

>>>It would appear that only in California and in New England are very many of the home workers actually re-locating as a result of not having to travel to the office each day or most days. In most other places they appear, thus far, to be staying put although the U.S. real estate market has likely acted to discourage non-essential moves for many due to high closing costs, high interest rates and (until 1990) very high prices.

>>>The Canadian federal government Treasury Board established a committee to study the progress of the various U.S. governments and to work with individual departments embarking on their own pilot projects. However the Canadian federal government has taken the position that this is largely a legal and human resources issue. The Canadian committee was comprised largely of people with this type of background and would appear not to be populated with technology experts. The official responsible indicated that there were 'no serious technological issues' and that computer systems specialists were not

needed for the home workplace; I guess he thinks plain old PC's or terminals would do just fine. I would have the temerity to suggest otherwise because, even now, we still do not have a device which can be taken out of a box, plugged in and do all the things which our Canadian Mitel Kontact could do during the 1980's. No one working at home wants to spend their day constantly logging onto and off of a welter of different computer systems; they want to be able to retrieve information, read it, compose documents and send them, keep a personal and/or shared calendar, phone people and do many other things, often more than one at a time. PC's with their Windows operating system do one or at most a few things simultaneously. More profoundly, Local Area Networks (LAN) contain the implicit assumption that the worker will actually be IN THE OFFICE; otherwise the 'LOCAL' in LAN gets blown away!

>>>There is no question that the human resources issues are important but we first have to get the right combination of technologies in a manageable form. If we take for granted the power of the technology without finding and harnessing the right combination of capabilities, we risk being cavalier, or worse, setting the whole process back years. If we do not provide the appropriate combination of functional capabilities, home workers may find their computers and networks are not up to the job of replicating the 'feel' of the office environment at home.

4.4.3 Lack of Government Leadership

Failure of governments to take comprehensive and co-ordinated actions will result both in undue economic disruption as decentralization progresses, and a delay in the realization of the ultimate benefits.

>>>Thus far, the participation of (U.S.) governments has been much more positive and constructive than many (including myself) had dared to hope or predict. Attempts by some labour groups to block the process have been thwarted. The U.S. Internal Revenue Service is, meanwhile, trying hard to find ways to designate even independent home-based workers as employees of one dominant customer or even more than one such customer, presumably to get extra tax not otherwise payable. As home-based contractors get more and more 'customers' however, and look less and less like one-employer employees, this is going to wear pretty thin...

>>> In Ottawa, the vaunted Silicon Valley North, the city government recently promulgated a bylaw which makes it illegal for any home worker to be visited by two or more colleagues or customers. The brief which I prepared in response to this ludicrous bylaw is provided in ANNEX A.

4.4.4 Creating Electronic Commonwealths

With or without government action individuals with home workplace equipment will develop ways to buy, sell or barter goods, services and information with other such individuals and with organizations other than their employer. Because home workplace equipment will make it possible to perform the equivalent of a present day's work in a few hours (due to automation of support tasks, intensity of interaction, lack of physical interruptions and other benefits) individuals will begin 'moonlighting' during other parts of the day or week unless legal or structural barriers are erected by the employer organization. Such barriers will eventually be overcome if erected.

>>>It would appear that not enough people have yet gone far enough down the learning curve of how to make maximum use of the home workplace to begun home work 'moonlighting'. Most employees are grateful for the chance to work at home some of the time, and are not 'stealing' time from their employer nor are they trading off company secrets. Indeed, many may work as much time as at the office, but it will soon be shown that they need not do so in order to produce as much as they did before. In many cases the employees or contractors are buying the computer hardware and software themselves so the employer has little say as to what they do with such equipment when not working for the employer.

>>>So far, home workers fall mostly into the pure employee or pure contractor categories. The gradual 'migration' from a single employer situation to a 'portfolio of occupations' mode has yet to become widely evident. Of course, if less time and effort is spent on work for the former full time employer, less compensation will be received. Because most home-based employees (as opposed to contractors) are not necessarily seeking to reduce their dependence upon one organization, employer reactions to such action have yet to assume a pattern.

4.4.5 The Electronic Highway

There will be irresistible political and economic pressure for universal and low cost access to the medium or media used to link home workplace devices. This will overcome the largest structural barrier to individual flexibility that an employer organization can erect; the private, closed central hub to which all home workers 'telecommute'. The new medium or media will thus, like the telephone system, allow any two or more home workplace units to be coupled together.

>>>Two key factors have impacted how this turned out:

> *-early U.S. telecommunications deregulation helped pave the way for the home workplace by at least convincing Americans that the telephone company was not 'omnipotent' after all; and*
>
> *-we are gradually seeing a more hopeful mix of cable, telco (broadband) and satellite communications technologies provide sufficient bandwidth to the home workplace – now we have to figure out how to use it for something more profound than streaming video or playing games!*

4.4.6 Democratization and Decentralization of Technology

Increasingly, machine intelligence will be resident with the individual and not the organization. Unless a logical and widely accepted code of information portability/restriction is developed, widespread 'information piracy' will develop. In any event the creation, control and use of information within the society will be rapidly democratized.

>>>In the early and mid-1980's this got into full swing with the 'end-user revolt', wherein the end-users of computers got very fed up with waiting two years for the information technology (IT) staff to come and develop a mainframe computer program to solve their business problem. As a result they went out and bought PC's and did it for themselves. Often they got in over their heads, producing undocumented (and thus unfixable) programs, but the organizational populace had discovered the personal computer and more powerful desktop workstations well before very many work-at-home pilots were begun. Non-intelligent terminals will see very limited use as the prime device in an electronic home workstation. Computers are moving rapidly towards standardization in all areas. Viruses and piracy are certainly problems and better computer security will be required as organizations choose to decentralize.

>>> However, this debate between centralists and decentralists continues apace - today the centralists advocate the energy savings of consolidating many small server systems into huge edifices of blade servers at - guess what - the data center while and giving home-based end-users the modern-day equivalent of a dumb terminal. Still other flavours of centralists suggest that the 'computing cloud in the sky' will serve everyone and that all we need to play is a browser. Meanwhile, decentralization advocates (like me) suggest that putting more machine intelligence at the edge of the network - on the home desktops and in the hands of road warriors - will foster the creation of new ideas, concepts and information trades which are undreamed-of by the centralists and will quickly create an electronic commonwealth of all home workers within, and very quickly beyond, the enterprise.

4.4.7 The Home Worker's *Work-Giver*

In German, the word for "employer" is *Arbeitsgeber* (literally "work-giver"). However, it is not only employers who can give work. Indeed, the basis of loyalty to one's employer will undergo drastic changes but will survive in some form. An individual's employer may simply become his or her 'prime market' for information, services, goods or some combination of these.

>>>Small businesses and independent contractors, many of which operate out of homes, have seen it this way all along. The newly home-based employees may not yet understand this but, like the goldfish who suddenly finds himself in a larger bowl, they will expand their domain over time. It is also important that an employer recognize that if an employee who formerly worked eight hours per day now does more work in six hours and also saves two hours commuting, some of the resulting four hour saving may be used to help the employer and some may be used in other ventures. This is quite natural and there is nothing wrong with it; the employer does not gain ownership over more aspects of the employee's life even if it pays for communications channels and the home computer. It is reasonable, however, that the employer be entitled to prevent the employee not only from working for a competitor but also from using employer-supplied resources in ANY moonlighting ventures without permission.

4.4.8 Products of the Home Workplace

The distinctions among/between information, goods and services will become increasingly blurred as more and more individuals obtain home workplace equipment. Information will be treated more and more like capital.

>>>Information is now being treated somewhat more like conventional capital however the predicted blurring has yet to be widely seen. This may just be a question of the timing of the prediction.

4.4.9 The Greatest Leveller

The distinction among professional, white collar and blue collar workers will continue to exist but will be blurred.

>>>This is particularly true in the newer fields such as high technology and biotechnology, but thus far there has been less progress in this respect in the more established fields.

4.4.10 Lifelong Learning

The present trend away from concentration of the majority of education/training into one end of an individual's life will be accelerated. Structural changes in the educational system will parallel those in the workforce at large.

>>>Very visible progress has been made in this regard; more and more people attend training seminars and courses and are even sent back to school by their employer, or take a leave of absence to study. This too, gets them out of the traditional workplace and in many cases results in use of the home workplace to support such learning.

4.4.11 Fully Allocated Costs of Production

The economic underpinnings of manufacturing will change such that more of the total or 'social' costs will be borne by the organization. This is due to the fact that a higher percentage of the costs associated with

transfers of (or changes to) relevant information, hardware and the physical environment due to production, and costs associated with services directly or indirectly required for production will be accurately and successfully charged back to the producing organization. We are already taking these costs into account in a 'front end analysis' when we study the environmental impact of a proposed factory or generating station. In future, not only estimated costs but ACTUAL costs will be able to be measured and charged back to the producer. The emphasis on 'unit cost' (which favours huge concentrations of capital and of workers) will thus diminish, encouraging 'cottage industry' production of a wide range of goods and services (although to a standard organizationally mandated pattern). Eventually, the only items to be produced in large factories will be those which it is physically impossible to produce in smaller facilities due to size and/or process.

>>> We are well on our way. More and more of the costs of pollution are being brought home to the company that caused them, and this even extends to public rejection of packaging or of product content. This is a very healthy development as it is a means whereby our market economy can be a major driver of the required changes. Thus far, except in Los Angeles and in one Colorado city which considered a transportation tax based on land frontage, bringing home the costs of production-caused disruption to the producer has yet to become an established way of doing things. However, increasing congestion, fossil fuel shortages (with resultant price increases) and more creative tax departments will likely jump-start this process in the next few years. I believe the prediction remains a reasonable one.

>>> Also, the advent of 3D printing, in all sorts of materials, is certainly supporting the latter half of the above prediction.

4.4.12 Fast Company

The formation and growth of business organizations will be greatly accelerated as a system of near 'perfect competition' emerges among users of home workplace equipment. The concept of business (and government) organizations as temporary or permanent 'confederations' of enterprising individuals will emerge.

>>>Thus far, most of the home workers are in traditional 'employee works at home part time' or 'home based entrepreneur' modes. It does not appear that we have progressed far enough to see very many confederations or co-operatives emerge. I continue to believe that this will occur as a natural outgrowth of the home workplace as critical mass is reached within zone-sized areas.

4.4.13 A New Form of International Trade

Developing countries will be enabled, in a relatively short time, to produce information/service packages and treat them as capital by selling them or by using them to earn rent. The resultant revenues will permit them to purchase food and other hard goods as well as the services necessary to their development from Western countries on a more equal basis. While certain levels of education or, at least, knowledge are a pre-requisite to this process (one has to be able to produce information someone else will want), the home workplace could provide these countries with a real means of wealth creation. There will, however, be structural limits to the rate at which wealth can be created and these will be related to population. As long as there is a ceiling to the amount of 'capital' one man sitting at a home workplace station can create in one hour, a relationship between 'hard' capital and other types of capital can be maintained. The gap between rich and poor countries could be narrowed by this process.

>>>The huge potential of the above concept remains just that, a huge potential. There has been very little movement in this direction since 1983; J.J. Servan-Shreiber's pedal-powered micro and similar ideas have just not caught on with government decision makers or even within the advanced technology industry itself. Bear in mind too, that this idea addresses selling or giving a person in a Third World

country a workstation (whether solar powered or whatever) and letting him or her create information products which we buy in a conventional exchange. We trade electronic funds for a copy of the information product; we lose those funds and they gain them while they grant us a copy of the product. This precedes and is completely separate from the more radical theory of 'attention economics' dealt with later in this book. We have, however, seen the Internet used to provide some new wealth to the Third World.

4.4.14 The New Growth Area - Information Wealth

The growth of all economies can thus be untied from hard goods/resources. Failure to place effective ceilings on individual 'wealth creation' will result in drastic fluctuations in the relative prices of various hard and information assets over time, however.

>>>Since we have not been letting those poor people most in need, neither in Western countries nor in the Third World, create information products and treat them as capital - or at least we have had no unified program for fostering this - we really cannot yet say to what degree the uncoupling of growth from hard assets can be achieved in practice. We do know however, that drowning ourselves in things like 'financial services' isn't helping at all as many of these cancel each other out. This leaves us not only no better off materially but not even better educated or entertained; an economy based largely on trading information products should at least provide these benefits. The situation is more than a bit discouraging since those few who ARE doing better in real terms than 1980 are still using their funds largely to chase goods and services products rather than information products. It can be countered that expenditures on recorded music and video material have risen much faster than overall consumer discretionary expenditure but they still represent a very small part of our non-essential spending.

4.4.15 Rationalizing Transportation

Due to extremely limited commuting and business travel, the available seat miles offered by public means of transportation will fall and a very high percentage of the seat miles and trips actually demanded will represent pleasure travel. A higher percentage of consumer items will be grown/produced locally, exerting a downward pressure on freight ton miles in the economy despite extensive very low density residential areas. Because many items (such as steel, jet aircraft, engine blocks, chemicals etc.) will continue to be produced in large facilities, freight ton miles will fall by a much smaller amount than passenger miles. The automobile (which accounts for approximately 85% of passenger miles in North America) will be used primarily for pleasure and utility trips. Gross vehicle miles will decline drastically, vehicles will become more flexible and larger (as family units increasingly wish to travel together) and long drives to cultural, recreational, religious or other activities will become commonplace (as is presently the case in California). The demand for automobiles will fall due to lower annual mileage per vehicle and consequent longer vehicle lives. Higher average speeds and less stop/go operation will provide a considerable increase in specific fuel consumption across the fleet. The total demand for petroleum fuels for all modes of transportation will fall with the largest declines being accounted for by the automobile and by the trucking industry.

>>>Despite increasingly horrible congestion, Californians will still drive 50 miles to a particular restaurant, shop or movie. However, they now tend to plan their trips more carefully, monitor navigation systems (and electronic freeway signs) for possible en-route detour suggestions and allow themselves more time to get there. Enemies of the auto have suggested that Los Angeles is now dead-ended, and that since Californians tend to lead the rest of us by about ten years that soon the auto will face extinction everywhere. Nothing could be further from the truth in my view. Consider the fact that the Intelligent Transportation Systems (ITS) – aka Telematics - family of projects and related endeavours, now in progress throughout the U.S., will give highway authorities the ability to obtain information from autos in real time as to their location and intended destination. Information will also be able to be sent to

hundreds of thousands of drivers at once as to what actions they can take to relieve congestion. Ultimately, the car and the freeway will conduct an electronic dialog and this will permit car speeds to be controlled largely by the freeway's computer, thus safely diminishing headways between vehicles so as to dramatically increase road capacity. Nothing which has happened since 1983 convinces me that the automotive future of the home workplace is anything other than as predicted then; we just haven't sent enough people home so as to have gotten there yet. Certainly, we will have to apply much effort to making better turbines, electric motors and vehicle electronics, but there are hundreds of thousands of very smart engineers in the aerospace, defence and electronics industries in the U.S. (and some in Canada too) who are finding less defence business coming their way. Therefore now is the time to move.

4.4.16 Shelter, Comfort and Community

With reduced transportation costs families will devote a larger portion of income to shelter (due also to the fact that more time will be spent at home) resulting in a higher percentage of GNP being devoted to shelter and comfort. Single family units will be emphasized as will satellite residences (small downtown apartments, cottages, ski chalets etc.). Rural properties and those with easy walking access to downtown facilities and services will increase in price while suburban residences and apartments will experience a rapid price decline.

>>>While this trend has yet to take hold, I continue to believe that as workplace decentralization progresses, considerably more people will choose either a rural home within perhaps 100 miles of an urban centre (to which they might commute once weekly) or will return to a rural or village area in their home province, if they earlier moved to a more urban province to seek work. However, if the major tenets of this book are accepted, above and beyond such 'natural' migration to the country, there would also be a nationally mandated program to encourage many more to do so.

>>>This is not to say that the federal government should force people out of cities but it should make very clear (by appropriately mandating each of the county governments as HIGH, MEDIUM or LOW growth) where it is believed it is desirable for growth to occur and not to occur. Providing the hard infrastructure and the service sector is well-established (even in a new county carved out of the bush) there is no particular reason why people will not choose to locate there. In order to attract residents such a county will use co-operatives and/or subsidies to ensure that homestead land (and fully equipped homesteads ready to be occupied) are attractively priced and readily able to be financed.

4.4.17 Brass-and-Woodwinds Hamlet

Families will increasingly choose to locate on the basis of a neighbourhood's qualities (ethnic flavour, common recreational interests, etc.) and even rural families will interact with each other (both electronically and directly) more than is the case today. Decentralization will not bring isolation. Further, ethnic co-location will prove a better means of language protection than repressive legislation.

>>>Whereas workplace decentralization in Canada seriously lags even the mild version now manifest in the U.S., it is too early to tell how many Canadians would, in the actual event, avail themselves of the chance to locate on the basis of the cultural or ethnic attributes of a neighbourhood, if distance to 'the office' was no longer a critical factor. There is, however, absolutely no reason to believe they would not consider such factors. Many new immigrants and even first generation Canadians tend to seek an ethnic (magnet) environment based on their own origins, as evidenced by clearly defined ethnic areas within most major cities.

4.4.18 Forward to the Land!!

The urban/rural ratio of the population will change with a significant cross-section of the population establishing rural non-farm or part time farm properties. Some recreational time will be devoted to domestic food and energy production and energy generation (wind, solar etc.), and all but downtown high density residents will find it economic to produce some of their own food and energy, but all will remain connected to the trunk distribution systems. The value of land and of food relative to all other types of hard/soft assets will increase.

>>> Migration to rural and quasi-rural areas by upper-middle and middle class families has continued but most of these are within 'every day' commuting distance of a town or city. The establishment of 'homesteads' of the type envisioned by the above projection has yet to begin to any significant degree. Chapter 3 paints a much more detailed picture of this so-far unrealized dream. The fact that much of this may have to become a self-fulfilling prophecy (i.e.: government may have to orchestrate and lead it) is in no way bad and in no way discredits the prediction itself. We must first, however, reach a point where enough people are working at home enough of the time in the urban areas so as to become 'decentralizable'. We must also have fully thought out and thoroughly prototyped (no doubt with our share of both successes and failures) all aspects of these new high tech homesteads before generalizing a program to encourage them. In the Canadian context, this calls for a publicly-owned crown corporation.

>>> Set against this are the arguments of the "Peak Oil" advocates who predict that the suburbs and the near-urban rural areas (far commuting suburbs) will be devastated by the coming oil crisis and that we will all be forced to live in downtown walking-communities. I believe that this scenario, although entirely possible, is also imminently avertable and most desirably so. See Chapter 3.

4.4.19 Reduced Physical Interdependence

While economic interdependence of the population will remain at a high level, physical interdependence will be reduced, thereby decreasing the susceptibility to natural and man-made disasters.

>>>We have no way of testing this proposition until a number of pilot projects of the new homesteads have given us some further experience.

4.4.20 One-to-One Correspondence

There will be intensive public pressure for the reduction of barriers to the movement of information, goods, services and people across provincial and international boundaries. Direct correspondence between individuals located in separate countries and without family relationship will increase (this is a logical extension of present student cultural exchange programmes). International and inter-regional understanding will be improved.

>>>Boy did I goof up on this one! You may reply, in my defence, that the prediction concerned the situation existing <u>after</u> many people were settled in their new home workplaces, but we might at least have projected some public movement in this direction. The book duty retaliation which the Conservative government in Ottawa waged against the U.S. Federal Trade Commission, but which hurt Canadians since most books traversing the border come north, brought a public outcry here That is as close as we ever came to fulfilling this prediction. Free trade clearly came too early to Canada and barriers to inter-provincial and inter-regional movement of people and goods within Canada have grown higher, not lower.

4.4.21 Republican Haven?

The role of government will decrease, especially in the area of social services.

>>>No such luck, at least not yet. We simply have not reached a degree of workplace decentralization wherein this can be evaluated. Periodic economic instabilities and recessions since 1983 have each brought renewed government intervention and a veer to the left of the political spectrum; each of the subsequent booms have tended to pull us back to the right again.

4.5 Back to the Future

In the movie *Back to the Future* there is a particularly delightful period piece about the year 1955 which is special to me since that is the year of my birth, but which also put me in mind of something my Uncle Reg had said many years earlier. He said that after his 1955 Chevrolet was built cars stopped getting better - they got longer, lower, wider, more powerful and much more ostentatious, but they didn't really get any better in terms of practicality for a family, energy efficiency or dependability. At about the same time my school bus driver, Mac Snelgrove pointed out to me that until the early 1960's, the village of Carp and its surrounding areas, in the Ottawa Valley where I grew up, was basically self-sufficient in almost all food items and in many other things as well. He decried the steadily increasing dependence of village folk, and even farmers, on the supermarket and the complex long-distance transportation infrastructure required to support it.

Putting these two things together while in university, several points became clear to me:

-in 1955 we had a relatively optimum balance of urban and rural life, a highly perfected agricultural sector, a much higher real price of food and there were many more farmers markets than today;

-with TV commercials talking about *"cold milk fresh from a jug"* it was plain to me that most urban kids in 1975 had a scant connection to the agricultural and infrastructural underpinnings which support everything else - most have no clue how close they could be to freezing in the dark or even to starvation if the North American economic infrastructure were to be hobbled by a sufficiently long electric power emergency and/or petroleum shortage - nor would they have much idea about what to do about it on a personal level;

-in 1955 we had a clear consensus in both Canada and the United States about the need for a strong military and the need for national self-respect;

-while accountants and even MBA's had been around for some time, in 1955 in most small and large businesses critical decisions were still being made by the people who had actually built the companies and not by their financial sectors - for example when the new jet transport aircraft came on the scene, airline CFO's decried the fact that they would cost more than twice as much as propeller airliners and also that many of the recently acquired prop planes were not yet fully depreciated - however, airline CEO's, many of whom were still former pilots, replied that this was simply not a case for cost-benefit analysis, but rather a case for division by zero - *the cost of not acquiring jets (in a price-regulated, service-competitive market) would be going out of business* therefore, the benefits of jets were 'infinite' and the job of the financial community was simply to go figure out how to pay for them - in other words businesses (even huge ones) tended to make decisions considering all of the critical factors, not just financial factors and not just shareholder value - I submit that by and large this led to better decision-making in the corporate sector than we have seen at any time since;

>>> If you had told anyone in 1955 that GM's stock in 2008 would be worth less than in 1950 and that the company (which at that time had a bigger budget than Poland) would be in danger of going out of business they would have given you a blank stare…

-similarly, people did not generally over-extend themselves or make ludicrous personal financial decisions - for example, people bought cars on time but most first-time buyers of TV's paid for them in cash - *if you wanted something you saved up for it*;

-we had the world's strongest manufacturing sector and we were proud of it - anyone who in 1955 seriously suggested that within 50 years we would be buying millions of cars each year from the Japanese would have been laughed at (when my 1950 Chevrolet hobby car was built it was the largest selling car in the world) and anyone who suggested that we would not even be making our own nails and lawn chairs in 2000 would have been thought to be a lunatic - Dina Shore's song *"See the USA in your Chevrolet"* was not only a TV commercial, *it was on the hit parade*;

-while bus, rail and air transportation was available most people lived locally and for them any long distance trip, even a long-distance phone call, was considered a major event;

-there was an overwhelming sense of trust and decency in every city, town, village and hamlet and when somebody told you something, you generally believed it - people trusted each other, nobody locked their car and no kid thought twice about the potential dangers of hitchhiking;

-the sense of justice was clear-cut; for example, virtually every jurisdiction in North America had the death penalty for murder - hooliganism and graffiti were tolerated nowhere - if someone got on a bus and started pounding out the driver (as recently happened in Milwaukee and as shown on CNN) the guys in the first few rows would have jumped up, punched him in the head and thrown him off the bus - *in the CNN video no one on the bus did anything at all to help the driver;*

-there was a profound and abiding belief in the ability of technology to continuously better the lot of humankind and anyone who suggested, as Greens do now, that the best solution was rather to retreat from certain technologies (such as, for example, nuclear) they would have been called names much worse than Luddite - indeed, there was a profound sense of wonder at the pace of change in such areas as automobiles, aircraft, electronics and rocketry - FIGURE 4-1 below well captures this unbounded optimism of the middle and late 1950's;

-the economy was expanding very rapidly and real wages were rising at close to 5% per year, bringing millions more into the middle class every year - the upper-middle class was also expanding, something evidenced not least by the fact that as a percentage of total auto sales medium and high priced cars significantly increased their market shares as the 1950's progressed - everybody wanted a big (or bigger) car, a house, a TV, a boat etc.; and

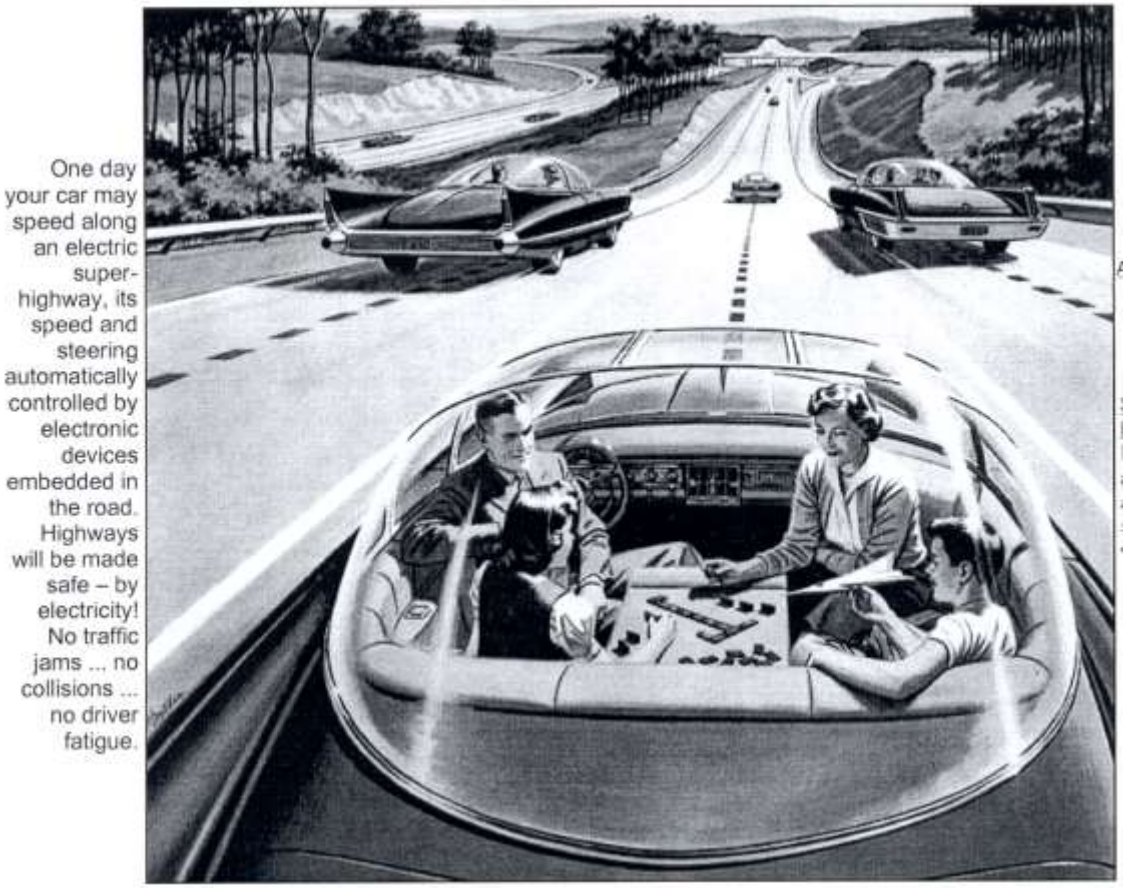
-there was, except in very few places, absolutely no sense that the good economic times, much less the seemingly endless supply of energy, would ever come to an end - *yes Simmons predicted peak oil, but almost no one took him seriously.*

Clearly, the 1950's were not all sweetness and light; in rural Quebec the Catholic priest had huge sway over the entire population of each village, no one dared miss Saturday night mass, young men were kept down on the farm as much as possible and teenage girls who got pregnant were banished to the convent. Throughout the American South racial prejudice continued to be the long-established order of things and designated "colored" lunch counters, waiting rooms and drinking fountains were everywhere. There was also no sense that pollution was bad - indeed, the sight of more smokestacks was generally associated with more progress.

Canada's (or rather Quebec's) *Quiet Revolution* and America's *Just Society* soon followed in an attempt to get people out from under such repressive strictures, but the 1960's likely brought more bad than good in the sense that much of the resulting social unrest created new resentments and problems. Also, the untimely death of President John F. Kennedy left a great, and as-yet unhealed, gash in the collective psyche of America. By the time Jimmy Carter came to power the U.S. found itself in a quagmire in social and economic terms, not to mention the debacle of its retreat from Vietnam.

While the first energy crisis of 1972-74 should have served as wake-up call for Western countries it was unfortunately treated as more of a blip. No major government-led initiative was launched in the United States to bring about reduced dependence on foreign oil. In Canada, diversion of inbound Esso tanker ships to U.S. ports by parent Exxon led the Liberal government of Prime Minister Pierre Trudeau to create Petro Canada as a publicly owned national oil company, but his National Energy Policy (NEP) - and made-in-Canada price policy - was intensely unpopular in oil-rich Alberta and subsequent Conservative governments dumped the NEP and privatized Petro Canada. True too, the private sector in both countries also failed to appreciate the gravity of the problem and little concrete action resulted. As the Western economies incrementally adjusted to successive oil price shocks a sense of complacency returned.

FIGURE 4-1 - LOOKING AT THE FUTURE



One day your car may speed along an electric super-highway, its speed and steering automatically controlled by electronic devices embedded in the road. Highways will be made safe – by electricity! No traffic jams ... no collisions ... no driver fatigue.

Now, in the second decade of the 21st Century, we are facing a multitude of problems at the same time:

-while the scientific evidence of our being the cause of **global warming** remains entirely debatable and far from conclusive, it would appear that such warming is nonetheless occurring and we would do well to go forward on the assumption that we may be at least part of the cause (and to govern ourselves accordingly) rather than to blithely assume that we are not the major cause and learn later, perhaps when it is too late, that we were - *indeed, it is almost always better to be safe rather than sorry*;

-whether Simmons was entirely correct in his 1956 projections about **peak oil** is at this point entirely moot - he certainly was in the ballpark and he did not predict the huge rise in demand from China, India and other Asian nations would be coincident with our arrival at the peak - whether we are just before, at, or just after the peak is less relevant than the fact that oil is now rapidly getting progressively more expensive because demand is outstripping supply;

-we have become **excessively urbanized**, resulting in mega-transportation problems at the regional level in many areas, mega-energy demands and mega-waste problems none of which would be nearly as severe if we were still at our 1955 urban-rural ratio of population distribution; and

-we have fallen into the **finance-dominated** trap of seeing information technology only, or at least primarily, as a way to cut costs by replacing labour with technology - the finance sector bears most of the blame for the fact that *we have not seen information technology as a potentially transformative force or agent in the way that, for example, Henry Ford viewed the automobile.*

>>> *Think about it! If we had used the automobile the way we have used information technology, we would have built mostly trucks because they would save money for business and there would be very few cars on the road and those which did exist - which was the way Europe was heading until the Volkswagen came along - would have been produced almost exclusively for the upper-middle and upper classes. Indeed, the picture of the state favouring mostly trucks is exactly what happened in the Soviet Union.*

4.6 California to the Rescue

One of the bright spots in all of this is that, ever since I first arrived there (in May 1978) it has been clear to me that southern California is very much the place that the rest of America was moving towards in the 1950's but did not quite reach, specifically:

-there is a very strong sense of the **importance of the automobile** and its linkage to both personal freedom and to technological democracy - nobody blocks the freeway in southern California and gets away with it - and there is no place on earth where you are more judged on the basis of your car;

-there remains a **can-do attitude** and strong sense of technological optimism - this may well be the reason why more innovations and new trends begin in socal than anywhere else in the United States; and

-combined with the **long commutes** which people make today, the above two factors make southern California the ideal place to launch a business founded on the primacy of the home workplace .

While the home workplace won't solve all of the world's problems, at least not by itself, it will perhaps do more than any other single measure to achieve, at the city and county level, all of the following at the same time:

-**reduce business operating costs**;

-**reduce number of commuter vehicles** on freeways and arterials;

-**reduce the twice-daily peaks** in transit operations, thereby permitting a given fleet to serve more passengers or a given ridership to be served by a smaller fleet;

-**reduce energy consumption** per day worked for all information workers, both by less frequent use of automobiles and transit, but also by reducing the size of office facilities needed to support a given information worker population - tree-hugging, Volvo-driving, Green-voting, downtown-dwelling earth friends around Ottawa (*Californians… think Santa Monica*…) never cease to be amazed when I am able to quickly prove to them that I drive a 300hp Cadillac but have a lower carbon footprint than they do because I don't drive it so much since I work at home most of the time;

-encourage decentralization of some forms of light industry into **cottage industry**, thus extending workplace decentralization beyond professional and white-collar jobs;

-permit many home workers to **create their own food and energy**;

-**reduce pollution** from gasoline and diesel engines as well as from large-building HVAC systems; and

-**reduce physical vulnerability** of downtown cores to terrorist attack or nuclear strike by reducing the percentage of a county or metropolitan area population which is in the downtown at any given time.

Unfortunately, surrounded as it is by mountains and deserts, southern California offers less opportunity for far-distant commuters to go set up homesteads or hobby farms than do most other North American cities. The converse, is that it has a perfect climate for growing fruits and vegetables - more orange trees and more gardens are something home workers in any suburb could resort to. In most parts of the continent, people who work three days per week at home, one day at a Group Workplace (GWP) and one day at their former office will have a very strong incentive - in terms of quality of family life, housing cost and other factors - to locate their home much farther away from their former workplace.

However, there are two important things to remember about the end-state which is described above:

-my assumption was that before now governments in both countries would wake up to the need for a mass deployment to the home workplace - *thus far none of them have*; and

-it describes the situation which will evolve *after* many workgroups have already been decentralized.

4.7 The Home Workplace Vision

There is in my view no doubt that governments will eventually discover the home workplace, but for the moment it may well fall to the promoters and the early adopters to somehow drag them there, one city and one county at a time.

It is deceptively easy of course (in 1983 or now) to paint a picture of what could or might occur. By definition, any set of hypotheses is to some extent normative or value-laden. The hypotheses can be debated at length and evidence marshalled in support both of validation and invalidation. With a few years of perspective now available, the following general conclusions can be drawn:

-as usual, the U.S. is ahead of Canada, even in an area where Canada has a strong natural advantage of communications technologies and a great surplus of land;

-heightened public energy and environmental consciousness creates a situation in which many of the ideas set out in 1983 will garner more support now;

-governments in the U.S. have been mildly reactive, but much less so than predicted, and have moved to 'build the sidewalks where the people are walking' rather than trying to re-route the people;

-governments in Canada are largely oblivious to this issue - the only federal agency even addressing the WIDER issues of the home workplace is the Treasury Board of the federal government which is also the federal government's IT authority; and

-the POTENTIALS of the home workplace, both its economic and environmental potentials and its potential to be attractive to the Canadian (and American) public, are undiminished (indeed they have increased).

The reader must, from his/her own experience, judge the worth of the 1983 predictions as well as the desirability and likelihood of natural (or fostered) development along the lines of those which are still unfulfilled. However, the undeniable fact is that, taken together, the original propositions set out above open the question of whether or not the decentralized workplace should be adopted as an objective of government policy, rather than as some potential fallout or side effect of the 'automated office'. As stated earlier, technology is at once neutral; it can be used in good, neutral or malevolent ways. It is principally up to us to decide how technology will be used.

4.8 The Home Workplace Elevator Pitch

The following provide a short, digestible argument as to why we should pursue workplace decentralization as a national economic and social objective both in Canada and in the United States.

1. The combination of a workable and cost-effective combination of home workplace devices plus an effective communications system will present business and government with several important incentives to decentralize as rapidly as possible:

-the high cost of capital facilities such as office buildings and the high cost of financing for same;

-the high cost of energy to service large office or factory facilities as well (indirectly) as the cost of energy to transport employees to/from the workplace;

-the rapidly declining cost and increasing speed of computer processing, storage and communications equipment; and

-the potential for increased worker satisfaction, flexibility and productivity in a home workplace setting.

2. There is no evidence to suggest that the present trend towards automation in industry will diminish. Structural displacement of workers will thus continue unless a major change occurs in the economy. While it is true that application of advanced technology frequently creates many new jobs to replace those made obsolete there is still very often a net decrease in employment within a given company or industry. The home workplace, by more easily permitting a MIX OF OCCUPATIONS (providing most of them are information-based), will provide an opportunity for many such 'cast-offs' to become employed, at least part time, with very low employment costs and thus able to seek other employment to 'fill the gaps.' This 'partial re-employment' on a continuous basis is preferable to the current (cyclic) strategy of working for X weeks, drawing maximum unemployment insurance and then working for another X weeks.

3. Impending limitations upon hard industrial growth point to the need for further development of the information and service sectors, particularly in Canada. We are de-industrializing faster than any other Western country due both to exceedingly poor political leadership and relative disadvantages in many industrial areas, not to mention our small domestic market. We have been, misguidedly, developing the wrong service sectors such as very low value part-time jobs at hamburger stands and all jobs in the financial services area. We certainly need to untie growth from pulp, paper, minerals and hydrocarbons, but we need to find new ways to create wealth not necessarily developed elsewhere first and then transplanted here. There is nothing wrong with developing some of our own.

4. For the past ten years, U.S. and some Canadian industry has been re-locating to smaller centres where employees find lower housing costs, a higher quality of life and where plant operating costs too are lower. Large scale workplace decentralization would both benefit, and benefit from, existing 'take industry to the people' programs.

5. The current westward shift of economic locus in Canada provides an important opportunity for major industrial and institutional restructuring. Why not take advantage of it to create a system of economic participation where many of those now in central Canada from the West or the Maritimes can return there while continuing to work for their large Ontario or Quebec employers? After all, these people would then buy their groceries, cars and houses in St. Andrews N.B. or in Pemberton B.C., thereby boosting those local economies.

6. Rising education levels and increased mid-career re-direction potential in white-collar and professional ranks should lessen the effects of dislocation caused by workplace decentralization. While the home workplace, as subsequent chapters will show, will certainly not exclude the blue-collar ranks or even the working poor, pure and partial information workers will be impacted first.

7. Demographic factors, particularly population bulges such as the post-war baby boom, can be more easily accommodated in a society where industry is decentralized and is not based to a great extent on hardware production and/or basic resource extraction but rather far more on USEFUL services and information. A useful service is defined as a service which has an inherent and basic value. Furthermore, the demand does not have to be artificially created or augmented by passing legislation or by otherwise erecting measures which 'herd' or funnel the population towards consumption of the service.

8. Currently, Canada is not self-sufficient even in basic fruits and vegetables. Full decentralization of the workplaces of even white-collar and professional workers could result in a very significant increase in home production of these commodities, especially if it is accompanied by physical decentralization away from urban centres.

9. Low quality housing, crime and other urban problems would be reduced through large scale decentralization, something which would soon also bring about decentralization of many blue-collar functions and, hence, the blue-collar workers themselves. Government (at the federal and local levels) can provide important leadership by establishing small but growable rural communities as well as in brand-new 'inside frontier' areas.

10. In the past, the internal combustion engine, the ability to produce gasoline commercially and (eventually) the technology of mass production combined to create the affordable and (reasonably) reliable automobile. Here was a product which drastically altered society and to which government was subsequently forced to *react*. If, as I strongly believe, the microelectronics revolution will bring about the decentralized workplace and is thus to have an equally great effect on our civilization, government has two options: it may either take stock of and use this technology as a leading edge for development (in the same way the Canadian Pacific Railway was used to develop Canada) or it may simply wait for such development to occur naturally and then scramble to react to the results. Remember that in the mid-1800's railways were still an advanced technology!

5. Home Workplace Technology in the Enterprise

5.1 Introduction

This chapter outlines the concepts of 'Work Flow' and 'Workplace' upon which much of the theory of the home workplace is based. Section 5.2 contains a number of observations on the nature of the modern organization itself; the organization to which the new technology is now being so widely applied. A number of these arise from direct observation of various governmental and private sector organizations and from serious consideration of their present and potential future situations. Some of the observations are derived from the literature of office technology and communications. They are also, to some extent, the result of discussions conducted over a number of years with firms actively involved in the office technology industry. Section 5.3 sets out a number of observations on the nature of work; while these have been somewhat less widely discussed, they form a valid basis for subsequent hypotheses. Section 5.4 briefly treats the technical aspects of the application of micro-technology to the modern office and Section 5.5 contains a number of normative hypotheses (perhaps better called operatives) concerning the processes whereby new technology is actually implemented in the organization. Finally, Section 5.6 contains hypotheses concerning the potential outcome or result of the of the application of the new technology in the manner contemplated, attempting to look at the organization in its post-implementation state.

5.2 The Organization

5.2.1 Measuring Organizational Effectiveness

As the tremendous capabilities provided by microelectronics technology have come to be understood and applied to the modern organization, it has been shockingly clear that conventional methods of measuring individual or unit (workgroup) productivity or efficiency must be supplanted by more advanced methods for the measurement of overall organizational effectiveness. Much work both in the private and public sectors regarding organizational mission statements and goals/objectives has pointed to this need. The creation and application of a durable system of measurements of overall 'organizational effectiveness' has, however, tended to elude those in search of it.

5.2.2 The Organization is the System

As organizations become more and more automated, it will become increasingly obvious that the treatment of activities which form a subset of the organization's total role as 'systems' is inappropriate both from the conceptual and actual computer application perspectives. 'Systems' such as accounting system, management information system , electronic mail system etc. must come to be seen as integral parts of the organization's total operation and not as stand-alone entities, isolated from each other even when running on the same computer. Conceptually, the total organization (or at least a distinct organizational unit) itself IS the system. The rapidly broadening implementation of office technology systems will allow the electronic information handling equipment supporting the organization to be brought into line with this reality. The concept of 'integration' - of making all of the computer hardware, communications and software components into a coherent 'whole' - directly addresses this need from the system perspective. But from the organizational point of view, it is also necessary to tie even these fully integrated computer systems into a more coherent whole. Even two computer systems which are themselves complex integrations of all their components could be incompatible with each other for one or both of these reasons:

-they use different computer languages or programs which not only cannot be moved from one computer to the other but cannot even operate together (for example, one is an IBM mainframe running COBOL and the other is an HP UNIX server running the Oracle database); and

-they are incompatible computer-wise and the programs handle the same kind of information so differently that they cannot work together (for example, one database tracks customers by an abbreviation of their corporate name while the other tracks customers by their postal/zip code);

A simple but valid illustration can be drawn from an automobile dealership. First came accounting and parts inventory control 'systems', each of which ran on its own computer and was completely stand-alone. In many of the larger dealerships these were soon followed by repair shop work order control systems. A number of dealers have added new and used car inventory control systems, customer financing presentation systems and others. Meanwhile, the North American car makers themselves were implementing large-scale timesharing based mainframe systems designed, in part, to support new car ordering and dealer enquiries. Thus, by the end of the 1980's we saw many dealerships with five or more wholly or partially incompatible systems, all using different hardware, operating systems and application programs. There is, of course, a ready market now for systems (and/or services) which will integrate these diverse systems together or simply replace all of them at once. We have learned, often the hard way, that simply throwing more technology at the office or at the organization does not always lead to the desired result.

Consideration of the development of the modern organization, during and since the Industrial Revolution, makes it clear that the office as we know it today is a result of the commercial and governmental environment, the earlier technologies and the information handling requirements of the past. If the office is a result of that which has gone before then it follows, reasonably, that so too are its individual elements and trappings. In bringing new technology to the modern office (or, more correctly, to the modern organization) we must seek to avoid the conceptual barrier which the term 'office automation' may subtly erect for us.

One is reminded of the term 'horseless carriage' which was used to describe the automobile during the early years of its development and which itself, to some extent, formed a conceptual barrier to that development. Specifically, the notion that the early automobile was in fact a carriage without a horse led to the belief that it should, to the greatest degree possible, look and act just like a carriage. While there were numerous dictates of the vehicle's harsh operating environment which had to be respected, this conceptual barrier nonetheless constrained the thinking of the designers. The wheelbase, suspension and the general layout of the vehicle all looked to the carriage for their inspiration. The most significant problem presented by this approach was that the engine was placed where it least offended the carriage-like appearance - under the seat - thereby limiting its size (and hence power) as well as the variety of available means for connecting it to the driving wheel(s). From the outset, the carriage concept constrained the development and even the naming of the object created by the various new technologies.

While the office is the most obvious and most tractable manifestation of the modern organization, the office is not the organization. Nor is the organization the office. While not suggesting that the advent of micro-electronics technology will cause the modern office to disappear, it is the thesis of this book that the new technology can - and will - change the way in which most people live and work and will therefore ultimately change the office itself. The office as we know it today will in the mid-term future only exist where it is really needed, not just because an organization exists and its leaders are afraid it will not be seen as credible unless it has a conventional office. We can no longer permit needless and groundless perceptions (such as the one which holds that an organization without an office does not really exist) to warp our use of hard resources. Since World War Two we have seen thousands of large voluntary

organizations, with many full and part-time participants, function every effectively with little or no conventional office space.

5.2.3 People in Control

The 'organization' will remain an organization of people versus an organization of information, of offices or buildings or of other 'things' simply because people must, and will, remain in control of the information and things.

5.2.4 The Organization as 'Beastie'

Theorists in organizational psychology and organizational dynamics as well as those in disciplines such as management science, public administration and even political science have clearly recognized the fact that any organization is to some degree capable of being personified as an entity or 'beastie' of sorts. However crude, this personification or modelling of the organization enables us to better understand the organization not only in terms of its inputs, processes and outputs but also in terms of its collective goals, aspirations, perceptions and self-image.

5.2.5 Defining the Workplace

The above-cited views of the office and of the organization lead to a definition of the 'workplace' as the point of the coming together of the PERSON, the PLACE (the physical location, the place in the organization chart and - perhaps - the place in the informal organization) and the WORK itself. The workplace is thus the key manifestation of the interface between the individual and the organization. It is also far more than a 'workstation', a term sometime used for a furniture cubicle, a closed office or even a desktop PC or other computer.

If the proposed definition is accepted as reasonable then it follows that it would perhaps be preferable to characterize the application of new technology to the modern organization in terms of 'workplace technology' or 'WPT' rather than in terms of 'office automation' or even 'office technology'. This argument is made in the full knowledge that laptop computer and cell phones, for example, already greatly reduce the attachment of work to 'place', be it office, home, vehicle or anywhere else. The definition can be re-enforced by suggesting that wherever a person, the work and any one, two or three of the above definitions of 'place' come together, there exists then-and-there a 'workplace'.

5.3 Defining the Work

5.3.1 Work Item (WI) Life Cycle

Within any organization, the flow or life history of any type of Work Item (WI) or class of work items progresses through five distinct phases. These are:

-generation or conception;

-definition;

-allocation;

-performance; and

-recording/archiving.

>>> It can be taken as a given that all work is to some extent both qualitative and quantitative.

5.3.2 Technology-Leveraged Worker Contributions

Today, and to an increasing degree in the future, as more micro-electronics and communications technology are applied to the conventional office, the total contribution of a worker will not necessarily be proportional purely to the volume of work items he or she processes. This will be true even at lower levels within a given organization.

5.3.3 Work Item Definition

The WI is defined as a work module or combination of clearly defined tasks (or a set of task dependencies) which form a possibilities tree; a tree through which the worker will branch under the guidance of some logical decision-making system.

5.3.4 Workplace as Convergence Point

We can therefore create a conceptual model in which the work item will be the glue which binds the organization together. The workplace will be the reflection of the coming together of the human, the physical environment and the work items.

5.3.5 Work Item Scoping and Sizing

No work item should be defined in such a way that it is too small to be evaluated by the organization. Work item evaluation will vary over time within a given organization and will, of course, vary among organizations. There are, however, several key ingredients:

-the nature of the demands for work;

-the availability of the raw material, tools and knowledge;

-the timeliness of the (required and actual) performance of the work item; and

-the effectiveness or usefulness of the outputs of work, considered in qualitative and quantitative terms.

5.3.6 Work Items and Super-Skilling

It is by now generally accepted that the application of new technology will in many cases change not only the way in which work is performed but also the work itself. For this reason, earlier publications such as *Women and the Chip* and *In The Chips* had called for a comprehensive program to compensate for supposed 'de-skilling' occasioned by the technologically-induced obsolescence of many types of work. It is clear that the application of microelectronics technology to the modern office will cause substantial disruption in the career paths of many individuals and will bring immediate, and in many cases continuing, requirements for retraining and re-education. However the supposed 'de-skilling' may prove far less a problem than the need to learn new skills and new ways of working.

5.3.7 Technology and Employee Mobility

There is no doubt that the new technology raises serious issues regarding employee mobility within a given organization or within a given occupational category or profession. Secretaries have abandoned their typewriters and have become administrative assistants but they still have a boss and they still provide a range of support services. They have not become the oft-cited techno-peasants however.

5.4 Technology for the Home Workplace

5.4.1 Proactive Technology Management

I believe that to the greatest degree possible the organization should lead its technology base rather than vice versa. A good example of why this approach is preferable is provided by the institutional and industrial training area. During the early 1970's Computer Aided Learning/Computer Based Training system manufacturers were concentrating largely on slide-based systems which presented slides under control of a computer as part of the total course delivery. During the mid-1970's the advent of low cost and relatively reliable video tape systems encouraged many of the larger organizations, such as airlines, with large in-house training programs to invest heavily in computer controlled video tape systems. Many others resisted this trend and remained with slides. At the beginning of the 1980's technology advanced further, producing the optical video disk player which was, in effect, at least a 100,000 slide projector but something which could also present frames movie-style like a VCR. However the large investment not only in slides but in the intermediate technology video-based systems has hindered the speed of implementation of comprehensive multi-media courseware delivery systems, including optical disks. Writing off recently completed courseware for tapes, which may have cost between 40 and 100 instructor hours to develop per deliverable hour of instructional courseware caused the inevitable perturbations.... Any organization which hopes to use technology must accurately forecast (or buy outside forecasts of) the path of the most relevant technologies on an ongoing basis. To do otherwise is like driving your car with your eyes closed.

5.4.2 The Big Benefit

The ultimate benefit of the application of micro-electronics and other advanced technologies to the modern organization is that the organization is provided increased control over matter, time, space and information.

5.4.3 The Optimum Technological Mix

It will be increasingly possible to orient the technologies provided to an individual's workplace to that individual's needs, desires and aspirations within the organization.

>>> Accordingly, major changes will occur to conventional types of intra- and inter-organizational communication.

5.5 Implementing Home Workplace Technologies

5.5.1 Don't Build for the Past

The cardinal rule in the implementation of workplace technology should be that the new technology must not be used to perpetuate the 'office' as it presently exists simply because it is there. We must accept the fact that, over time, the office will grow into something very different from what it is today - perhaps unrecognizably different. At some point in this new century it may even disappear entirely.

5.5.2 Conquering Time and Space

The corollary of the above is that if the organization or unit can conquer the physical barriers of time and space it should be free to dispense with at least some of the conceptual ones.

5.5.3 Customizing the Home Workplace

To the greatest degree possible, we must minimize the impingements of the organization chart on the workplace. This is in fact the opposite of *'de-skilling'*; it is in fact *'super-skilling'*. For example, every effort should be made to minimize the information hierarchy restrictions imposed on those individuals who occupy places within the lower part of the organizational structure subject only to the dictates of security or prudence. It will always be preferable to provide (or at least to leave the door open for future provision of) functions or capabilities which it is not immediately obvious a given worker would require.

>>> This is the direct opposite of the bean-counter-brained solution of trying to give each worker absolutely the minimum they need to do their job in a misguided attempt to cut costs on software licensing. Indeed, experimenting - even playing - with a software package an employee does not normally use may give him or her an idea for something which will aid the business.

5.5.4 Building Knowledge Workers

The greatest benefit from the application of microelectronics technology to the modern organization will not be in cost savings from increased clerical efficiency but rather in the augmentation of the abilities and effectiveness of knowledge workers. We will all become knowledge workers to a greater extent, many of us almost completely.

5.5.5 Rewarding Creative Behaviour

At all levels of the organization, we must naturally seek to reward creative behaviour with scope for still further creativity, increased time 'off' (or at least in an activity preferred by the worker) and with a greater overall variety of work.

5.5.6 Balance the Benefits

We must seek to balance the benefits of the new technology among several channels. The technology can allow the creation of a greater variety of types of work within any organization. It could also allow the performance of more work of a given type per period of time. It could thus, in a very short time, lead to a situation where fewer hours of work would be required per day by each individual within the organization. On the other hand, upon discovering that the new technology makes a given worker twice as productive,

the organization could elect to demand twice as much work and not allow any of the benefits to be distributed in the other 'benefit channels', such as offering a greater variety of work or fewer hours per day. This will rightfully engender employee resentment and ultimately rebellion. Such an approach by employers would be analogous to that taken by the 'Iron Masters' and other heartless capitalists at the dawn of the Industrial Revolution, when the worker was made to serve the machine rather than the other way around.

5.5.7 Banning Boredom

The goal of reducing time spent on boring, repetitive or mechanical activities serves both the organization and the employee. It offers the organization the possibility of getting greater creativity on the part of every employee, faster and more accurate performance of routine tasks and lower unit cost per task as well as greater employee flexibility and satisfaction. It offers the employee more interesting work, a greater variety of work with less boredom and less predictability in the day-to-day performance of the job.

>>> After all, computers and other machines do repetitive, boring work much better than we do and we do creative work much better than they do.

5.5.8 Bidding for the Work

It has been suggested that in some organizations it may be possible to define modules of work to be done and then to invite individual or joint bids involving time and other resources on the part of the employees (at one or a number of levels) for the performance of such work. One British commentator has gone so far as to suggest that employees at various levels be permitted to create unsolicited proposals for innovative work items which could be evaluated by management and others; an electronic suggestion box with a potential do-it-yourself follow-up.

>>> Airline pilots and some other professional groups already routinely do this but the concept is almost unknown within most large enterprises.

5.5.9 The Project as Work Item

Within many classes of work it may be possible to either treat a whole project as a work item or to break it down into many component work items as required.

5.5.10 Separating Person and Position

It may become increasingly necessary to separate the person from the position - even more than we do now. This is consistent with the workplace concept outlined above and would also have the desirable side-effect of discouraging the building and defence of informal internal elites or petty political empires.

5.5.11 Guidelines over Rules

Job or position guidelines will become far more prevalent and less restrictive than current 'terms of reference' or 'job descriptions'.

5.5.12 Making Optimum Use of Technology

In describing the workplace and its functions we must resist the temptation to use new technology simply because it is there. Nonetheless, it is clear that most organizations are currently suffocating in a quicksand of information and that systems technology (which has heretofore contributed mightily to this problem) can be of assistance in this regard. Conventional dataflow analysis, as conducted previously by systems analysts, may be of definite assistance in determining where information bottlenecks occur. For example, if the dataflow is so high that a PBX switched network cannot handle it, then perhaps there is too much data going from Person A to Person B. This might reflect overly great concentrations of hard and soft capital and perhaps also over-centralization within the organization. If, on the other hand, it is held that such information flows are legitimate and must continue, then there is a prima facie case for the use of a higher bandwidth communications channel.

5.5.13 Leveraging the Shared Workspace

Another area where serious forethought and consideration is required is that of graphics. Being able to draw on a shared workspace (one shared by two or more workplaces in real time in the same way those in a room can share a whiteboard) may prove far more important than being able to make fancy coloured graphs and charts for 'show and tell'. Currently we tend to use graphs and charts because they assist us to quickly impart a lot of information to an audience which is quite far behind us in its knowledge of a given subject; we exploit the fact that a picture is worth a thousand words. Many equipment providers are convinced that an ultimate benefits of 'office technology' systems will be to allow organizations to fulfil a great requirement which they now supposedly have to share large amounts of information in graphical form. We must avoid the temptation of falling into a trap wherein graphics simply beget more graphics for their own sake, or we will become merely a society of pretty picture makers. Current shared workspace solutions such as Go-to-Meeting are in my view unexciting and do not fulfil this requirement.

5.5.14 Inventing Co-Creation

The technology can be used to develop creative new ways of working together. This will involve everyone through administrative assistant, line worker, supervisor, professional and executive. We are already finding that concepts such as the file and document are being stretched to the breaking point. The new darling of the systems gurus is 'object orientation'; they now describe programs, databases, graphics and other interfaces as being object-oriented. This is a little like describing the conventional office as being 'thing-oriented'. Although it is inadequate, we now use the term 'compound document' to describe an entity including one or more of text, data, graphics, voice annotation, animation, stored photo image and others. However, when it is considered that different individuals, at different places and at different times could all be adding to, modifying or deriving new versions of this compound document, the concept becomes difficult to work with. We need some new concepts.

5.5.15 Inventing Co-Everything

There will be an increasing need for the development of the ability for an organization to 'co-search' and to involve itself in a number of 'co-processes' such as co-evaluation, co-intuition and co-decision. These go far beyond our current concept of co-operation.

5.5.16 Dumping the Petty Politicians

Every small, medium and large enterprise, it seems, along with most government departments has its informal organization - its share of lifer wags and petty politicians whose chief aim in life (at least in their

work life) seems to be to play games and subvert the processes of the formal organization. The technology of the home workplace may finally separate us from the potential for petty politics inherent in interpersonal communication - and from the wizardry of graphics – fostering and furthering the actual process of making ideas stand on their own merit. This will conclusively separate the medium and the message. This means that the 'young Turk' with good ideas will no longer be shut down by the reigning petty political elite or faction which thinks he or she has not been around long enough to suggest such radical changes, and thus uses facial expressions or body language to sabotage his presentation. The very same suggestions made over electronic mail, and well-backed- up, cannot be pooh-poohed the way even a brilliant idea can by hecklers who have no intention of truly assessing the idea, and who condemn it with their informal body language merely because the presenter comes from outside their faction. Indeed an electronically transmitted idea has the wondrous advantage that it can be reviewed and accepted by a senior executive before the petty players even find out about it.

>>> The creation and evaluation of new ideas and new information will thus become the province of a far greater number of individuals within any organization, not just the top-level managers or thinkers, the research and development unit, the 'boss's pet', the 'in-crowd' or even outside consultants. This leads us to the conclusion that, within every organization, idea assessment will become increasingly crucial. We must, therefore, progress from an author's economy to a reader's economy.

In other words, as one Canadian communication researcher has pointed out, we must pamper the recipient of the idea or information. The means of transmission and presentation of the idea or information must be appropriate not only to its complexity but also to the situation and role of the recipient. Sometimes graphics will be great; at other times a simple paragraph with voice annotation may be better. (Yes, I will admit that I am unlikely to be accused of pampering the reader but this book tries to cover an awful lot of territory.)

5.6 After the Big Change

5.6.1 The Organization as a Confederation of Enterprising Individuals

Ultimately - not tomorrow but within the working lives of most of us - the organization will come to be seen very much as a confederation of enterprising individuals, some more enterprising than others, but all to at least some degree so. If it is to remain cohesive and viable the organization must, therefore, have a sense of itself at the workplace level.

5.6.2 Position as a Dynamic

The 'position' will become merely the snapshot of the 'now' of a dynamically changing basket of employee functions which are defined/changed by the individual, by his/her cohorts, by the overall organization (in how it works day-to-day) and by management (through mission statements, mandating and specific empowerment for specific objectives).

5.6.3 Work Organizes Itself

The way in which organizations handle various types of work will change drastically as the implementation of the new technology progresses. The implementation - not the technology itself but merely the implementation - remains at a very immature and tentative stage in many ways. Organizational theorists may continue to debate whether this will promote better organizational consensus, 'concertation' or other amicable processes. It may become possible for us to let work become

organized in more natural or intuitive ways than before. Bernard Mueller-Thym said: *"We organize for non-work; work organizes itself."*

5.6.4 Attention Economics

In 1983 I predicted that by 1990 it would be patently necessary to develop a theory of attention economics for use within the organization, obviously a precursor to one which could be more widely used. By 'attention economics' I mean the study of the economics of the individual unit of information or the individual idea, of who views it (as well as how and why), of what they do with it subsequently and/or what it does for them and of how they individually and/or collectively ascribe or assign value to it. Does a piece of information increase in value as more people consider it and interact both with it and its creator? The underlying concept is that information becomes progressively more valuable as more people view it and use it while each being aware that they - and others - are paying attention to and interacting with it together, even though they are physically separate. They thereby become a more self-aware community of interest. The information unit's life history is thus a reflection not only of its creator and any subsequent refiners but also of the other members of the organization who became involved with it. Chapter 7 treats this in more detail.

5.6.5 Home Workplace Technology Insight

A clear understanding of how home workplace technology impacts any given type of organization and of how that type of organization, in turn, impacts the technology would prove a decisive advantage in future Canadian and American efforts to export workplace technology expertise, software and even computers and communications hardware.

>>> The great gnomes of Human Resources (HR) who seem to have taken control of most enterprise 'telecommuting' initiatives - by simply issuing an HR policy on the subject and then assuming that giving home workers laptops and remote access servers would be sufficient - have completely missed the point. A home workplace deployment must be a BALANCE of four key factors:

-workflow;

-human factors;

-technology; and

-logistics.

>>> Concentrating just on HR matters (and assuming that because it involves employees that this is all is required) is about as intelligent as trying to build a one-legged chair.

>>> A laptop computer or a tablet is NOT a home workstation; rather it compromises almost everything to make itself (conveniently) portable whereas a home workstation has the luxury of not having to be moved around and also of consuming much more (3D) real-estate than can a cubicle-bound PC back at the office.

There are a host of technologies which are important to planning and implementing home workplace deployments, not least of which are:

-shared workspace;

-computer-telephony integration (CTI);

-telepresence;

-video conferencing;

-secure data communications;

-integration of conventional, cable and VoIP phones on the home desktop;

-integration of mobile equipment (cells, tablets and laptops) as peripherals to home workstations;

-application pipelining and refronting;

-OpenSource software (to cover functions office workers don't need and for which the enterprise is reluctant to buy commercial software or develop new in-house application software);

-virtual servers and virtual desktops;

-multiple large display screens; and

-robust operating systems.

>>> The latter is a very serious consideration because Microsoft operating systems are, in general, not as robust or reliable as the communications services which are provided by telephone companies, cable companies and satellites. The Windows-based home workstation thus becomes the weakest link in a chain where communications is as critical to the home worker as is improved hearing to a blind man. One CTI product vendor - who sold stand-alone products over both MacOS and Windows - had to discontinue the latter products when it became clear that the huge majority of end-user support calls were due to problems and instabilities in Windows itself, not with their product. In a large enterprise such a weak link can also become a major drag on IT support services.

5.7 The Human Face of Organization

5.7.1 Cries of Doom

In the early 1980's there were many persons who stated that the home workplace simply would not be viable for large numbers of workers because it would bring organizational anomie, social isolation, personal loneliness and ultimately total personal and organizational disorientation. It was suggested that we would not be able to adapt to this new work style very well and that there would also be a return to 'piecework' exploitation of otherwise hourly workers. It was widely suggested (and apparently widely believed) that the problem of ever getting to the home workplace was simply not a technological one but a social one.

>>> I can concur with part of the above. The problem is not principally a technological one, although recent bandwidth and other advances permit us to do far more at home - more easily - than was the case in the early 1980's, if only we apply the technology to this precise objective. Having worked at home at least part of the time since the 1980's, I am in a position to say conclusively that the benefits far outweigh the disbenifits even from the social side, and certainly from the professional and economic perspectives. The problem is that most people do not yet realize how practical, and socially workable, the home workplace actually is.

5.7.2 Office Social Relationships

Let's start by considering the types of 'social' relationships which may arise in the conventional office environment:

-FORMAL ORGANIZATIONAL relationships related to taking direction from and reporting progress to one's immediate superior as well as requesting assistance or co-operation from, and providing the same to, one's peers and also directing and receiving reports from subordinates;

-COLLEGIAL relationships with line peers as well as with contacts in cohort or even competitive organizations or units;

-PROFESSIONAL/OCCUPATIONAL relationships with those representing associations, professional institutes, bargaining units etc.;

-FUNCTIONAL relationships with those people with whom one is working on a task, project or program and which are not overshadowed by a relationship falling under another category of this list;

-SPATIAL relationships with those whose office workstations are located very close to one's own;

-INFORMAL ORGANIZATION relationships with individuals in one's own department or unit with whom there has been sufficient contact to have established either a positive, a neutral or a negative relationship;

FRIENDSHIP relationship with individuals with whom one has either a past friendship or at least common interests;

SITUATIONAL relationship such as between individuals who might (for example) carpool together;

ROMANTIC relationship with individual(s) encountered in the work environment; and

HISTORICAL relationships with any party who formerly fell into one or more of the above categories.

It is known that interaction among workers via many of these channels, whether at a meeting, over a beer, while carpooling or whatever, has highly synergistic and positive effects. By sharing information and views the workers inspire, re-enforce and otherwise assist each other quite outside the formalized training or support systems of the organization. Formal organization relationships are required for any organization to exist and function as are functional, collegial and professional/occupational ones. All of these exist within well-defined bounds, and leave considerable traces in terms of scheduled meetings, correspondence, maintenance of contact lists and similar efforts. All of these transfer well to the home workplace, providing at least some direct human contact is maintained.

Friendship, situational or historical relationships help knit the workers together into a more interrelated and cohesive whole and generally have positive or neutral effects. Where these less formal relationships exist, they are not likely to be adversely impacted by the home workplace because those with friendship or historic ties will get together on the basis of those ties regardless of where they live or how often they either are or are not in the office at the same time. The same will be true for any situational relationships not generated by the office itself and which thus remain.

Spatial relationships are usually neutral or negative; you either have no trouble or else you HAVE trouble with your physical neighbours in the office. Only in apprenticeship situations are spatially generated

relationships beneficial and then only when both parties are supposed to be engaged in much the same function. In a conventional office environment spatial relationships are unavoidable however in an organization making major use of the home workplace they disappear or at least become scarcely relevant.

>>> Conversely, cubicles tend to bring out the worst in people, both in impinging on each other's meagre 3D territories by doing such distracting things as playing music they know their neighbours will not like, to tapping on cubicle walls or having incessant personal phone conversations or in-person gossip sessions with co-workers when they are actually supposed to be working

>>> I have never, ever met (or even heard of) a home worker who missed the social life of the cubicle.

Romantic relationships do not belong in the office environment and can result in actions which distract, disrupt or harass other employees if too openly pursued.

>>> The home workplace will at least remove them from general view and gossip.

It is the informal organization relationships which will most suffer from the implementation of the home workplace and this is at once both a good and a bad thing. We know that personalities forced to share a space may often not share the same interests, goals or sufficient rapport to make their working together pleasant. However, while much individual and organizational learning occurs within the formal organizational, professional or occupational and collegial relationships there is absolutely no doubt that much learning - and particularly much organizational memory - is supported by and occurs within the informal organization.

>>> The trick, of course, is to decentralize incrementally and in such a way that people become gradually more comfortable with working at home progressively more of the time. Those who would foster a good home workplace environment must also seek to preserve and protect those aspects of the informal organization which are important to the health of the overall enterprise. They must also reduce or even eliminate those aspects of the informal organization which discomfort, upset or threaten even a few of the workers and which thus detract from the organization's overall good functioning.

Changing the technology architecture won't in and of itself change human nature, but it is worth considering that *'office politics'* are just that - the silly play-games of the office. For the past hundred years or so, to make anything other than a tiny organization function well, it has been necessary to closet within the office a group of workers which, in terms of personal interests and sociability of its members with each other, is randomly collected. They were by and large chosen on the basis of other (work-related) criteria. Given the immense complexities of human relationships, except in exceptional circumstances such as new, rapidly expanding or extremely well-led organizations, it is unreasonable to suspect that they will all get along perfectly or for that matter even well. If they all turn out to be great friends and if the more vice-laden of the above-cited types do not emerge it is more of a fluke than anything else. Most conventional organizations suffer from some ill effects of the petty political life of the informal organization; in some the level of petty politics is almost unbearable.

>>> Railway track gang members or sailors who didn't like each other would occasionally slug it out, however such cathargic behaviour has never been permitted in the office. Therefore, the ***office workers for a century have been stuck with the semi-official dictate and fiction that they WERE all going to be pleasant to each other because they all liked each other....***

You can, however, legislate neither human nature nor amicability. While not an organizational psychologist, I submit that this confinement and semi-official dictate of amicability itself created the complex environment of mores and behavioural expectations we now call *'office society'* and which, in its more negative manifestations, is known as *'office politics'* or *'petty politics'*.

So the home workplace can permit us to:

-structure and make more efficient our formal, functional, collegial and our professional and occupational contacts with our co-workers;

-continue our functional relationships with all co-workers and also continue our friendships with co-workers where desired ;

-continue and re-enforce the positive aspects of the informal organization by sharing experiences and learning widely by voice contact, voice/video contact, voice mail and electronic mail, along with shared workspace and other newer technologies;

-continue to have face-to-face meetings when we need to see both those we like and those we don't like; and

-greatly minimize the other times we have to see or deal in ANY way with those we don't like.

An obvious corollary is that since we will save much commuting time AND do our day's work in fewer hours than it takes at the office (we remove most of the time used tripping over each other and for in-building migration as well as many of the unwanted distractions) we will HAVE MUCH MORE DISCRETIONARY TIME. We can choose to spend that time on professional development, visiting with friends from the office (in their homes, ours or elsewhere), visiting with other friends or else in family or other activities.

5.7.3 Managing Home Workers

Those who argue that even many kinds of information work cannot be performed in a home workplace are simply not considering the fact that to a great extent *'work organizes itself'*. This also implies that even conventional work *'finds a way of getting itself done'*; how much more so the *smart work item* as discussed in subsequent chapters? The key things we have to do to be successful in working at home are as set out below.

1. Managers have to delegate work to subordinates, empower them to do it (provide mandate, resources and enough time) and then LEAVE THEM ALONE. People who need constant supervision can be supervised by electronic alarm clocks or progress reporters built into the work item itself which will only bother them and the manager if the work item is not progressing towards completion on schedule.

2. Employees have to embrace the new freedoms with much more self-discipline; those who are easily distracted need to have a room dedicated to the home workplace, where distractions are not permitted to intrude, even if this means a padded door. Employees, before being sent home, should be required to rate themselves in a comprehensive psychological profile which includes degree of distractibility, degree of need for (meaningful and work-related) social interaction and similar factors.

3. Employees have to learn to 'store up' the various things which truly require meetings for specially arranged (or common) meeting days.

4. Employees have to be very aggressive in using voice and data communications to stay in touch with each other and not shy about re-asking a question if the earlier answer proved confusing or inapplicable.

5. Employees have to share informal as well as formal information, re-enforcing and encouraging each other just as they do now at the office.

6. Employees have to recognize that even in an organization which is largely decentralized it is quite natural that some of them will feel the need for fairly frequent work at the office (perhaps one day per week or even more), some will be ambivalent (perhaps attending a half day staff meeting every two weeks and otherwise meeting colleagues at the office or even their homes on an as-required basis) and some will prefer to be at home virtually all of the time except when an office visit is absolutely required.

7. Employees must recognize that they have to let the organization into their home (and dedicate their time and energy to it) but they by no means have to let their peers or even their boss into their home if they choose not to. Supervisors can supervise and managers can manage without such access. After all how many times does your boss come into your own cubicle or closed office now? Usually you go to his or you meet in a third location. Of course, employees will have to go to the office when called in for a meeting but organizations will tend not to expect each other to be able to get any given group of employees together (in an office as opposed to electronically) unless significant notice is given in advance. Contrary expectations will be seen in future as just as unreasonable as a request that only male salespersons be sent to a given customer.

8. Employees will have to either pay the employer a reasonable allowance for any company supplies they use for their own purposes or keep two separate sources of supply of such things as printer cartridges, paper and pens etc. Wise employers will save everyone much trouble and hassle by permitting employees reasonable personal access to such resources in lieu of paying the employee rent for part of his home. Employers will retain supplier firms capable of making small home deliveries when employees require supplies. Most employers will likely provide some or all of the electronic equipment, however many workers may soon prefer the independence potential of having their own machine.

It will take all of us a few months or even years to adapt to the home workplace, but we didn't become accustomed to the conventional office (much less the automobile, telephone or the computer) overnight either. Some people will find that a home workplace will clash - in the short term at least - with their family situation. In the longer term, kids who grow up with a mommy (and maybe a daddy too) who expects to be left alone to concentrate on work for periods of two to three hours at once won't find this a problem. After all, that same parent will be there to make lunch for them and won't come home wearied from ninety minutes of fighting rush hour traffic. When that parent does travel, the kids will likely have a much better chance of going along than they do now.

However, at the moment, the 'discipline' of competition and of the 'bottom line' is making more and more businesses extract more and more free time from their middle and senior-level people. The high technology industry had become notorious for its sixty and seventy hour weeks well before the overworked 'Yuppie' decade of the 1980's. Companies that don't care how hard they push their people and what impact this has on their families are NOT good corporate citizens and if the bean counters say that is the only way the firm can stay in business, then either new bean counters are needed or the firm should shut down. Family matters are much more important to most people than the business world will formally acknowledge. We will reach a point early in this century - *if current trends continue* - when government intervention to prevent corporate abuse of white-collar, professional and managerial workers (and executives) will be required.

While we spent much of the 1980's and 1990's hankering to be like the Japanese, a very close look at their society, their lifestyles and their family situations would almost certainly leave few North Americans wishing to trade places. It is important that people work together and work hard; it is also important that they work smart, both in terms of the kind of work they do AND in terms of E3 issues. And there is no more E3-wise way to run an organization than to decentralize it as much as is operationally practical. The home workplace will not detach the individual from the organization either in the formal or the informal sense. Nor will it create a new isolation.

6. QX - The Home Workplace's Electronic Door-Knocker

6.1 Introduction

It remains a very real challenge for us to try to visualize or understand how someone sitting at home can, during their increased amounts of free time, create wealth while sitting at their computerized workstation. Since the network of home workplaces operated by millions of individuals will serve as a sort of common market for goods and services (as conventionally understood), as well as for various types of information, this chapter will concentrate on how the individual can utilize his (or her) home workplace to sell a product or service (of a craft or artisan nature) which he proposes to make available on the open market. We shall assume that his creation of this quality product or service (whether it be a new kind of dandelion wine, a hog management system, a custom rocking chair or whatever) is clearly differentiated from its mass production cousin and thus not in most cases directly competitive with it. Alternatively, the provider may be offering to cut grass, to do other outside work, fix your car, write a poem or to perform some other task in exchange for a product, service or cash.

>>> While most of it was written in the 1980's, long before Craig's List was invented, this chapter reaches far beyond the marketing opportunities which the Internet offers you today.

The chapter will seek to demonstrate the mechanics of one way in which the existence of a large number of home workplaces within a given economy could serve to stimulate household-to-household trade in goods and services of all kinds, resulting not only in individual gains from trade (for no two individuals will transact without it) but also in a much greater flow of goods and services within the economy. It is recognized, however, that many of these transactions may not show up in conventional GNP measures as they could well be based upon barter. Chapter 8 deals with the creation and trading of purely information products.

6.2 Infrastructure Issues

Imagining the mechanics of the home workplace requires that we digest a number of generalizations about the problems and possibilities of our technological and corporate infrastructure. These are as set out below.

6.2.1 Ubiquitous Networking

It is necessary to have at least one, ideally more than one, ubiquitous communications network which allows the organization wishing to decentralize its workplaces (and hence its employees themselves) to link any two or more of these workplaces together, under any conditions and for any period of time no matter what their location or function.

>>> While most readers will immediately conclude that I am referring to the Internet, this is not the case. The origins of major parts of this book are in 1983 and at that time the Internet had not yet been invented. (Working on emergency management projects during those years, I had occasion to visit Washington DC many times and even met Representative Al Gore who was at that time chair of a Congressional emergency management sub-committee and not even he was talking about the Internet at that time…so maybe he didn't invent it after all…) Rather, the text refers to the Public Switched Telephone Network (PSTN) also sometimes called Plain Old Telephone Service (POTS) which is a network not only offering higher reliability than most computer systems - and most data communications networks - but also the one which retains the ability to link more people and places than any other network.

>>> Modern enterprises in North America will of course want to provide full Internet access to their home workers and the growing bandwidth available to most home workers will encourage use of the widest range of applications and services - including VoIP - but home workers will increasingly reach out and branch much farther beyond their own organizations than is the case today. I believe that when they do so the first (often automated) contact between their home workplace equipment and that of a new business prospect or contact (perhaps in an overseas country) will be via direct communications over the PSTN. Just as a small rope s used to pull in the huge rope which moors a giant ocean liner, that initial (low- bandwidth) connection will, in turn, lead the two systems to negotiate the finding and opening of a parallel channel with more bandwidth if they mutually determine that it is required. However, in many cases it will not be required.

Organizations which rushed to 'network' or 'integrate' PC, minicomputer and IBM or similar mainframe equipment by means of Local Area Networks (LAN's) will be in for a rude shock when they later choose to decentralize: they will have to change (or at least evolve) their whole network topology again. In fact, within many organizations even the information technology unit will argue against decentralization for just this reason. This will once again create the ironic situation wherein (as with the arrival of the PC) the end-users have to beat the IT shop over the head to get access to what the technology can now provide. (It will be recalled by some that, as with Prince Edward Island, which initially banned the auto entirely, many IT shops tried to ban PC's entirely until they could 'control the implementation', resulting in open user revolts and even the establishment of PC support groups within user organizations.) Bigendian and centralist IBM still exerts very significant influence over the IT units within some organizations and may view the prospect of large-scale workplace decentralization as just one more assault on the supremacy of the (IBM) mainframe. Nor has IBM ever been very comfortable with telephony; their purchase of Rolm was an unmitigated disaster in my view.

Designers and builders of modular home workstations will use existing and emerging technologies to minimize the actual data transfer over telephone lines. They will also allow two workplaces connected by telephone to, where necessary, 'capture' and switch to a higher bandwidth channel and to permit distant workplaces to share and co-manipulate information related to a work item.

High speed computer-controlled dialling at the home workstation, treating the file system of the home workstation as an extension of that of a mid-range multi-user computer at the central hub, and remote administration (from the hub) of home workstations by computer specialists, will permit the home worker to concentrate on the work, not on trying to manage the computer. This means, for example, that the home worker won't have to make back-up copies of his files as this will happen automatically. Also, when he changes something in a file, if a copy also exists at the hub it too will be changed automatically.

The way in which telecommunications services and channels are made available in Canada will hopefully cater to and serve the home workplace and telephone companies will not seek to use rates to first lure the worker far from the city and then bilk him with rapid increases later. Much of the service charges paid will be for bandwidth and for switching. After all, these are what really cost the common carrier money because long distance line haul is relatively cheap to provide and the long-distance business is now no longer very lucrative for high-overhead, conventional - often stuffy - telcos.

6.2.2 Intolerance of Road-Blockers

Individuals and organizations will become increasingly intolerant of service providers (particularly professionals) who themselves first create a problem and then use it to force consumption of their own particular service as the solution to that problem. Particularly in such areas of taxation law, accounting and travel counselling services the onus will be increasingly placed upon the providing professional to convince the consumer that the service is really needed at all. For example, a bank which forces the holder of a U.S. dollar denominated travellers cheque to cash it first into Canadian dollars and then converts it back into U.S. cash, charging him a fee for each of the two conversions will bring upon itself

increasing public outrage. (This actually happened to an American friend visiting me here in Canada. He protested bitterly and I backed him up, grossly embarrassing the teller and her manager and eventually forcing the banker to back down.) Here the customer is being forced to consume two financial services he does not need or want! Individuals will become increasingly sensitive to individual job or service functions which they perceive as being part of Paired Occupations of Zero Economic Sum (POZES). POZES are, quite simply, jobs whose products, services or effects cancel each other out and thus do not directly contribute *anything* to the overall wealth (not to mention progress) of the country. POZES merely keep their incumbents busily occupied performing the unneeded services, and thinking up new names for the services and new ways to ensure that the public remains forced to consume them. As a future alternative, interactive computer programs could assist even the least educated member of the public to navigate his or her way through a complex transaction such as finding and buying a home. Notaries may still seal the deal but this will be perfunctory. The government will likely give us our 'smart' tax form in machine readable form; you can then let the tax form take in all your data from your electronic chequebook and other sources and then fill itself out! Individuals and corporations will in future resort to legal and political means (up to and including California style ballot propositions, even here in Canada) to avoid being forced to consume unwanted and unneeded financial and legal services against their will.

6.2.3 Artifacts That Think

Computers will become much smarter and will be able in many cases to program themselves once they have been told in plain English or French what it is they are to do. The computer will echo back to the user its conception (in text or flowchart form) of what it thinks it has been told to do. With minor modification, this can be cleared and the computer will then generate its own program for carrying out this set of tasks. This will not only permit the computer itself to take some part in the conceptualization of the program (although the user must be clear on what he wants to do), but will remove the need for most of the programming skills we are today so ardently training our young people for. It will, unfortunately for many, relegate to the realm of POZES the role of computer educator (who orients the programmer to the complicated computer) and computer programmer (who brings the function of the complicated computer to the service of the user). We will have finally reached the stage, at sometime within the next 10 to 15 years, wherein (like the Ford Model T) the technology serves us more than we have to serve it. While this has been long true at the organizational level it has not been true at the personal level. Most people who own a home computer have little idea of what it can do nor can they make it do EXACTLY what they would like. If someone else hasn't written the precise program they need then they are out of luck! Even if they accidentally erase a key system file, they can struggle for days before giving up and calling for help.

6.3 The Quest for Market Automation

6.3.1 This Little Pig

"This little pig went to market,
This little pig stayed at home,
This little pig had roast beef,
This little pig had none,
And this little pig cried;
Wee-wee-wee-wee-wee,
I can't find my way home."

(Nursery Rhyme)

For the first time in recorded history we may well find ourselves with the uncanny ability to go to market, stay home and have roast beef all at the same time! Those individuals lucky enough to be among the vanguard of the home workers will already be at home when they set out to earn some extra money 'on the side' by whatever means. Once they have determined that they do indeed have a product or service of value to offer to others, they will be in a position to let their computerized home workstations do the 'marketing' for them. What is more, they may not even have to remain attentive while this is happening so they will be able to have roast beef, read or sit by the pool.

Before you conclude that I must surely have taken leave of my senses, ask yourself this simple question: what is unemployment? Unemployment is that miserable state of being without work, you will doubtless reply. Because it is unavailable or, more precisely, because one cannot find it. And it is not just 'work' either; it is work that someone else wants to have done, that they can evaluate (so they can tell when you have done it) and that they are willing to pay for at a rate you are willing to accept. And it is work which either is close enough to home for commuting and/or which can be done at home.

6.3.2 QX in Action - Selective Polling

Take the hypothetical example of Joe, a construction worker employed by a general contractor who also makes fine furniture as a hobby. Joe used to sell his furniture to friends and neighbours when lower construction activity left him without work during the winter off-season. But an influx of expatriate urbanites to his community has surrounded him with strangers with a greater loyalty to their city jobs and their children's leisure activities than to any kind of economic interaction with long-time local residents such as he. During a layoff period, Joe's wife Sally proposes that he remodel part of their farmhouse as a home work area, since Sally's architectural firm has decentralized. Joe obliges gladly, and after the makeover is done, Sally asks an inspired question: what would he do if he knew that each time she pressed a button on her new home computer workstation she could guarantee the sale of a piece of his custom furniture to other employees (of her and other firms) who are heading out to live in the country? Joe drops a hammer on his foot in disbelief! However, after Sally explains how travelling 'electronic questions' launched by a home computer can migrate to many other such systems, he goes back to his workshop to make a rocking chair or an architect's drawing table.

Actually, Sally knows that most architects (whether working in home or office studios), like most other professionals, now have telephone-capable micro-computer equipment and a standard smart home workstation device connecting these to the telephone system. Further, since many architectural students are being forced out of their on-campus studios due to space shortages and program funding cuts they too are being encouraged to work from home, through standard home workstations prescribed by the universities. This means that she can use her equipment to selectively poll an audience of those who might be most interested in what Joe can offer. The model of the marketing process offered here is simplified in terms of the mechanics of the communications process but offers an understandable window into what is an altogether workable process, using current technology and with even the most trifling co-operation of the telephone company. This model has already been field-proven using equipment manufactured several years ago and voice quality lines in RURAL areas.

Addressing the computer in plain English, she causes it to compose what is essentially a 'door knocker' or 'door-to-door salesman' program designed to move from one home workplace to another by means of the telephone network. We will call the program a 'Quest' program; more precisely we will call it Q at X or Q(X) or simply QX which indicates that it is a standard program of type Q (question) regarding subject X (here, architect's table(s) for sale). She used voice input and/or a touch-sensitive screen to complete the program, with virtually no use of the keyboard. Her home workstation, and its accompanying standard bridge device connecting it to the telephone system, together contain a nationally accepted standard set of modularized instruction sets or 'routines' or code blocks, each of which performs one or a small number of functions. Her equipment is also connected to the Internet by a cable, broadband or satellite channel.

The 'program' which the computer composes for Sally will thus take maximum advantage of these pre-prepared program modules; this minimizes the overall amount of information actually transmitted between workplaces. Sally's computer assumes that any destination computer will have access to the same standard set of program 'building blocks', so it does not include in the program the actual programming instructions contained in the necessary program blocks but only the NAME or NUMBER of each such block. The receiving computer will use this information to construct and execute the program for itself. Therefore, Sally's program contains only the unique information (which is otherwise unavailable to the other computer) such as what is for sale, who is offering it, how much it costs and how it may be obtained. The program also includes the numbers of the standard program blocks the other computer will need to fetch, assemble, compile and execute present this unique information to itself and/or its owner for consideration.

Sally must now determine the destination set (the list of members of a class of individuals and firms) to which the travelling salesman programs are to be sent. There may be available an electronically sortable telephone book (as was developed earlier in France and to which our telephone companies could make much money selling us access) allowing her to quickly isolate the required list. Even without such access there exist present-day means of buying or generating such lists. From the list provided to it (however obtained) the computer will now determine the destination for the first Q(X) which can be written as Q(X,1) or, more correctly - since we are only considering asking one question and are not planning on changing it as we go along - as QX(1). Later, the list will be used to provide a value for the general description QX(N) where N is the numeric of the place in the list of destination D(N).

Because we are working with a small (finite) list, the strategy will be to send the program to the destination computer (Sally's will be called the origin), allow it to reconstruct the QX, and process the offer by executing the resulting program. The destination computer will then decide whether it (or, more correctly, its owner) wishes to have what Sally is selling, and then send a response back before becoming pre-occupied with anything else. For purposes of illustration we will assume that Sally's computer, and those of all the destination work stations (which we will call destination hosts), take precisely one second to dial a ten digit telephone number (area code plus seven digits for the local number) and to establish a firm connection with another computer, and one second to transmit a QX program. Actual time to accomplish these things could be slightly more or, in some cases, far less, but that is not the point here.

The use of a single second is reasonable not only because it is convenient for this example, but also because it is by no means beyond the bounds of belief given present digital telephone switching technology. Data transmission time is a direct function of data rate - the higher the rate the less time is required to transmit the program information to the other computer. In preparing to make its first transmission the system will now determine the length of 'U', the transmission gap for the outgoing QX. Each destination host may only reply to the origin AFTER the transmission gap time has elapsed; otherwise its reply would find a busy signal since other QX's would still be departing the origin. For any size of transmission, the transmission gap equals the number of QX's to be transmitted multiplied by two seconds. Here U=2 because we are only sending one QX for now.

We are now ready to begin transmission which we know will be occurring over conventional telephone wire permitting one way transmission at a given time. The use of the first two seconds is represented by an 'O' for the 'Output' action of establishing a connection and configuring for transmission followed by QX(1) for the actual transmission of the QX during the next second. This can be written as O/QX(1). Assuming that nothing was happening on the telephone line at time=0 then we have just used up two seconds.

All of Second 1 was used by the first destination host computer (Host 1) in joining the line (answering) and all of the subsequent second was used in receiving and storing QX(1). Host 1 also starts a clock running at the beginning of second #1 so that it can be counting along with the origin host which we will call Host 0. For Host 1, the activities of the first two seconds can be written as 'I' for 'Input' (configuring for input) and then QX(1) or, simply, I/QX(1). Host 1 now assembles a complete and executable program

from what it has received from Sally's computer. It accomplishes this by fetching the appropriate blocks of program code (those called for by Sally's QX) drawn from the national standard set of small programs (of which it possesses a copy) and inter-mixing them with the QX's contents as required. Included in the QX's contents will be the value of U, a value which will be stored separately and noted for future use.

Since Host 1's processor may have other work to do, it will want to know immediately when a response is expected. It will calculate the second in which to respond (counting from zero as established by Host 0) by adding to U a processing buffer which we will call 'B'. B will be added only if U is less than 4.00 seconds and B will usually be two seconds or less, topping up the total 'gap' between receipt and response to a minimum of 4 seconds. Here, U+B=4, so B=2. If a response is to be made, then re-transmission therefore can (and must) commence at the start of Second #5.

Using various information about its owner's interests and propensities, Host 1 is able to determine whether or not he/she would likely be interested in what is being offered. Past actions and decisions as well as specific settings of 'Yes' or 'No' as to interest in various items (this is discussed in Chapter 8) would assist the computerized servant to determine its master's desires. The system will reach a decision as to whether its owner is or might be interested in what is offered (in this case the table) and will thus determine its course of action. Four seconds after the first second of the original arrival sequence at Host 1 (here, Second #5), Host 1 will either:

> (a) send back an interest/enquiry message to the origin host in the two second format O/R where 'R' is the response; or
>
> (b) signify non-interest in the simplest way possible by returning the QX to the originator in the two second format O/QX(1).

In the former case Host 1 should find the origin computer's telephone line available for dial-up but, if for any reason, this proves not to be the case it will keep on trying until it has established a connection and transmitted the information; such persistence is warranted due to the probable interest of its owner in what is being offered. In the latter case, however, since Host 1 is not really interested in continuing the dialog with the origin computer, it will only try once to accomplish a connection; if it does not achieve one on the first attempt, it will merely give up and erase all of QX(1) and the working copies of the interspersed program elements it had assembled earlier to flesh out the QX.

Assuming that Host 1 did not want what was being offered, Host 0 will be occupied during seconds 5 and 6 with what from its perspective is I/QX(1) as above defined. Again, this assumes that Host 0 (or, more correctly, its telephone line) was not otherwise busy at the end of Second 4.

Host 0 now checks to see if the total existing or planned supply of the product available for sale or the planned amount of the service to be made available has all been allocated (i.e.: sold). Has all of it been spoken for so far? In this case it is obvious that QX(1) is almost certainly the first message to return. The supply of the resource to be sold is not exhausted. Since there is still something to sell, a simple pyramid approach is used to make and number two new QX's. This is true even if another had gone out in the time since QX(1) was transmitted, QX(1) should still be the first to return. At this stage the system is working on a first in, first out basis.

Let us assume that another QX was not sent in Seconds 3 and 4; thus QX(1) would be erased and would be replaced by QX(2) and QX(3). Although the system should be able to perform this operation in a few millionths of a second, we will assume that it takes a whole second. Whether or not it actually takes a whole second, at the beginning of Second 8 the communications channel is opened for the following activity O/QX(2)/O/QX(3). This represents the dispatching of two new product sales programs to two more destination hosts, the telephone number for which have been drawn from the list composed earlier. Note that here U=4, not 2, since four seconds of line time were involved in the initiating action and that much time must pass before responses can be entertained by the origin.

Host 2 receives I/QX(2) but it does not add a buffer because U is not less than 4. Host 2's receipt or 'zero' second was Second #8 as measured from the beginning of table marketing activities by Host 0. Host 2 is therefore immediately aware of the fact that it must begin re-transmission at the beginning of Second #12; otherwise, it will behave exactly the same way as did Host 1 in receiving, assembling, executing and responding to the QX. Host 3 receives QX(3) starting in Second #10, so it will therefore begin its own re-transmission at the beginning of Second #14. If Hosts 2 and 3 both return 'No' messages to the origin processor it will then dispatch four new QX(N) where N represents a number, here between 4 and 7.

Note that nothing was happening during Seconds 12 to 15 except for possible replies from Hosts 2 and 3. Transmission to the next four hosts will thus occur between Seconds 16 to 23 inclusive. Host 4 replies during Seconds 24 and 25, answering 'No'. Host 5 replies with O/R during Seconds 26 and 27 and this is received as I/R at the origin host. Hosts 6 and 7 each reply 'No', one after the other during the period of Seconds 28 to 31 inclusive.

The origin processor now has six rejections and one lead, but no sale. Because a lead is not a sale, and in order to protect itself in the event that it does not develop into one, the origin processor now creates further output by replacing QX(4), QX(6) and QX(7) with QX(N), where N=8..13, and transmits them. However, as a special measure, the system adds a further four seconds to U so as to allow for possible dickering with the obviously somewhat interested Host 5. The origin host now sends a price, here Y, to Host 5 in the transmission O/Y during Seconds 44 and 45 which is received at Host 5 as I/Y. Host 5 reviews any additional information about the offering, which may also have been provided as part of Y by the origin processor, and then decides if the price is a fair one and whether a tentative purchase should be made.

Deciding that the thing is a good deal, Host 5 outputs a token amount of money (probably one dollar in electronic currency) in the form O/$ where $ represents the currency transfer. This occurs during Seconds 46 and 47 and is of course received at the origin as I/$. The origin host now transmits O/T to Host 5 where 'T' is the title to the table being offered; this occurs during Seconds 48 and 49. It will be noted that this transmission uses up two seconds beyond those allocated for the dickering process. By not allocating more line time for potential dickering, the origin host earlier took the calculated risk that valuable incoming information from other hosts might be lost, corrupted or delayed should dickering be prolonged. This is a real risk and represents part of the trade-off inherent in determining the original marketing strategy.

It can be countered, however, that if any other host was really interested, it would keep on trying. Further, the dickering period with Host 5 was extended because the origin processor and Host 5 are closing in on a deal! Actually, in this case, Host 8 (which was supposed to be getting back to the origin host during Seconds 48 and 49) is not at all interested and merely attempts to return QX(8) to the origin host. But since it gets a 'busy' signal during the beginning of Second 48 it gives up and erases QX(8) outright.

In dealing with the 'check in' of returning QX's there are essentially three scenarios as follows:

CASE	RETURN COMPLETED	SALES STATUS	QX(N) SURVIVAL
A	YES	UNSOLD	DUPLICATES SENT
B	YES	SOLD	ERASED AT ORIGIN
C	NO	SOLD/UNSOLD	ERASED AT DESTINATION

For each and every QX(N) the block handling time at Host 0 is at least four seconds (two for O/QX(N) and two for I/QX(N)) assuming no interest or sale. The theoretical maximum of the destinations which can be polled during one uninterrupted hour of line time using this method of marketing is therefore 3600/4 which

equals 900. This assumes that no voice or other data use is made of the connecting line during such an hour and further assumes that we remain in the polling mode (i.e.: we do not start dickering...). If we are having serious trouble selling the commodity or service, or if for other reasons (such as being away or pre-occupied) we decided to leave the use of the telephone line solely to the computer system, it would be possible, to poll an estimated 21,600 destination hosts with in a contiguous 24 hour period.

Even with a batting average about half that experienced by conventional junk mail, we will almost certainly have sold the product well within this period. Unlike junk mail, however, it should be noted that QX's only bug the servant computer, not the human master, unless the computer decides that either it should indicate interest to the origin (and its master) or it actually purchases what is offered. Human inhabitants of the household are oblivious to the arrival of such items and when they (or the home workstation) want telephone line access they will merely seize what is, after all, their own line.

The only area of potential technical difficulty, but one certainly within our grasp if the will is there, is for the home workstation's processor to be able to signal the telephone company's Central Office (CO) that it does not wish to receive any incoming QX traffic in the next X seconds as it (or its owner) will shortly make a call. The simplest way to do this is to have the human issue a totally unambiguous and unique voice command to the system such as 'Clear line for call'. Even if it was in mid-dicker, it would extricate itself by agreeing with the destination host to reengage at some future time. Given the short 'cycle time' of QX's as presented above, clearing even the busiest line would take only a few seconds.

6.3.3 QX in Action - Random or Pyramid Polling

There is an alternative method of marketing by QX which is somewhat less complex and which requires less tie-up of the line and processor resources of the origin workplace. This method is to send out a QX which will not check back with the origin at all unless the destination host wants to dicker or purchase. Note that whereas Method A contemplates both the simple return of QX's and no response at all as indications of non-interest, the same response processing logic can be employed for both methods. This permits different sales campaigns, with differing polling strategies, to be conducted simultaneously by one workplace computer system.

QX's would be generated by the origin host for a finite period of time, and each QX would require two seconds to depart the origin system. This is the same O/QX(N) dealt with under Method A. Each QX(N) would take two seconds to arrive at its destination host and a minimum of two further seconds to clear that host, assuming it was dealt with promptly and that the actual processing time was insignificant. In clearing the destination host, the QX could either be passed on to another potential buyer, or else an expression of interest could be passed back to the originator if there was intent to dicker on the part of the destination host. At destination Host N the input/output transaction would be I/QX(N)/O/QX(Z) where the host simply passed the QX onwards and 'Z' is the address of the subsequent destination. Alternatively, the destination host could express interest back to the origin, in which case the activity map would be I/QX(N)/O/R where R also keys the address of the origin host. Either way, total cycle time at Host N is four seconds.

Where this type of polling is used, the originating computer would include information in the QX which the Host N would use to randomly generate a new telephone number destination (Z) for the QX. This could involve the entire ten digit number (except, of course, that the fourth digit could not be a 0); could involve just the seven digit local number (keeping the QX in the same area code for those wishing to sell their services only in their own zone) or could involve just the last four digits (for those wishing a purely local sale within their own telephone exchange). Another possible method which the origin could specify would be a pure (or algorithmic) telephone book lookup such as "pass to party who appears next (or some number of places following) your owner's name in the white pages of the electronic telephone book". If it is assumed that everyone has electronic phone book access, then it will not take Host N very long to find the next intended recipient's phone number). The destination host is obviously not expected to do any

serious processing since processing time entails an opportunity cost in that other processing may have to wait. Given the fact that this assumes much higher monthly telephone service charges but elimination of long distance rates, the only penalty or inconvenience an incoming QX can impose on Host N is to tie it up with a complex way of finding the next destination. It would be unreasonable to ask Host N, for example, to search for more architects in the yellow pages nor should it be asked to cope with a list of future destinations transmitted with the QX (in any event this would take up far too much transmission time).

With a 4 second cycle time we can see that during a 24 hour period a single QX could - in purest theory - visit a total of (60 X 60 X 24)/4 = 21,600 hosts. This assumes that our origin host created only one QX and then sent it travelling for a total of 24 contiguous hours (i.e.: each recipient host duly passed it on). It also assumes that when each destination host passed the QX onward it did not launch any new ones (i.e.: duplicates were not created along the way). If the originating host were, on the other hand, to create QX's non-stop for a solid 24 hour plus two second period, then the first such QX, if it were created in the final two seconds before midnight (the last two seconds of the PREVIOUS day), would visit 21,600 hosts during the present day. If created at exactly 2400 HRS. minus two seconds on the PRESENT day, the last QX created would not yet be through its first destination host when the grandfather clock struck twelve.

Thus, the approximate number of hosts visited throughout the day by all of the QX's thus created would be defined by the area of the right triangle (one with a single square corner) with a base of 21,600 and a vertical side of 43,200 units. The figure 43,200 represents the number of QX's generated at the origin host during the 24 hour period (recall that it only takes two seconds, not four, to perform the O/QX(N) operation.) In total, theoretically at least, the wandering QX's would collectively have visited 466,560,000 individual destination hosts. Total QX transmissions (calls) made within the telephone system would also equal 466,560,000. Even if no more QX's were generated at all at the origin once the 24 hour period had elapsed, the total visits made by all surviving QX's (assuming they all survived) during the subsequent 24 hour period would be the area of a rectangle with the sides defined as above, involving a further 933,120,000 hosts.

There is a famous cartoon in which two little boys are leaning over the railing of a freeway bridge and looking at the cars below while one says to the other: "Gee, if there were six passengers in all the six passenger cars I bet that would be more people than there is!" Assuming an adequate international telephone number translation protocol, which would allow us to access phones whose total coding for direct dial comprises more or less than ten digits, and to allow them to access us, this is not impossible. The fact that such a network could contain almost a billion subscribers is a far less relevant point than the two set out below:

> (a) in all likelihood it will only be necessary to poll a tiny fraction of even the first day's number to sell (or to buy, if one looks at it from the other side of the market) virtually any commodity or service; and
>
> (b) the random nature of the dialling by the destination hosts will result in multiple (versus single) polling of many destination hosts who are subsequent QX recipients, thus reducing the number of workplaces which the QX will visit but causing some repeat visits.

If just a few of the destination hosts were kind enough to send out two or three QX's where they had received one, then the billion could well triple or climb towards infinity. There are limits and constraints, however, and these are discussed below.

When a destination host is interested in whatever is being offered by the QX it will send an O/R message back to the origin host which is received there as I/R. The two systems are then in a position to dicker and possibly to strike a deal. Once the supply of the offered service or commodity has been exhausted the origin host will simply erase all incoming expressions of interest.

Because destination hosts will have other work to do they will only try once to send a QX on to the new telephone number destination they have generated on its behalf; if this number is busy or otherwise unavailable the QX will be out of luck and it will be erased on the spot. Owners of destination hosts may also decide to set their computers to systematically erase all incoming QX's older than a certain threshold, from a certain class of origins (or even individual origin), or offering a certain class or goods or services definitely not of interest. In all such cases the QX would not survive and thus would not be passed on. Also, if a destination host tries in vain to transmit an O/R message to the origin it may give up, concluding that the origin has already sold what was available.

6.3.4 Avoiding Network Saturation

Despite the huge number of QX's which any one workplace can theoretically generate, the network will not collapse from overload because there are a number of very potent constraints on QX generation and survival:

(a) generation of QX's ties up processor time and, more importantly, input/output or telephone line time (when you are sending out QX's you cannot be receiving anyone else's QX's which may be of interest to you);

(b) only random or commonly accepted logic (such as mere alphabetic lookup in the electronic telephone book) methods for generation of the next destination will be tolerated by processors receiving the QX (other logic may be ignored);

(c) destination hosts will in all probability give the QX only one chance to 'escape' onward to another potential customer, erasing it if the onward channel cannot be opened immediately;

(d) travelling QX's will be totally reliant upon their present host to generate the new number for their next destination - if for any reason the host is unwilling or unable to do this the QX will become 'marooned' there;

(e) a hostile host could generate an unfriendly or even a non-existent number or could simply erase the captive QX;

(f) most hosts would erase incoming QX's above a certain pre-set age as determined by their owners; and

(g) even interested hosts might erase a QX if the O/R response to its origin was not answered promptly.

There is an even more profound issue that must be dealt with here. Suppose XYZ Ltd. designs and builds the device which adds onto a PC, ties it to a telephone jack, and permits all of this to happen from the home workplace and sells it to customer ABC Inc. who uses it to help many of its people work at home. In such circumstances, QX's would be not so much 'buy' or 'sell' requests but 'work items' as described in Chapter 5 and ANNEX B. Work items would 'work their way' through the organization as would pure E-mail type messages, instructions and other traffic. Assuming that these workplaces only dialled similarly equipped workplaces the answering device would be the expected device; it would classify the call as either a QX or a voice call, passing voice calls to its user and perhaps permitting the caller to leave a voice message if the user was absent. It would process a QX generally as discussed above, although with more complex algorithms for various types of work items.

If XYZ is the only maker of these devices, or if all makers follow the same standards as XYZ, then if company DEF also buys the device for its employees the decentralized workers of ABC, DEF and XYZ can all interact by means of QX's both for business and non-business purposes. However if any of these users accidentally or intentionally causes their device to send a QX to the voice-only telephone of a non-user, to a line connected to the non-user's auto-answer modem or to the non-user's FAX machine then problems will result.

During a large national deployment of Mitel Kontact workstations overseen by our firm in the mid-1980's we encountered both intentional and unintentional attempts to use them to send E-mail to what subsequently turned out to be voice-only numbers. The person lifting the telephone receiver would not even hear a modem whine and would thus suspect either a prank caller, a telephone system malfunction or an impolite wrong number dialler. The problem was that Kontact was very persistent and if it did not receive the familiar feedback of one of its siblings it would try again and again. In the middle of the night this was enough to drive even Mr. Rogers to distraction, especially if the recipient was not computer literate and could not surmise what was happening.

It would seem mandatory that the higher class of service which a home workplace user (or a user of similar equipment in a conventional office environment) would purchase from the telephone company would include:

(a) where available, provision for a reasonably high data rate but over a voice quality line; indeed one in most cases already in use as the residence voice line;

(b) access to North American long distance services on a step function or block basis with a much Lower unit cost than presently - thus the user could treat all of North America as a local calling area;

(c) special registration of the line at the CO level as a full home workplace (and thus QX-capable) line (this means the customer promises the telephone company that unless he notifies it otherwise, as in case of breakdown, he will connect and at all times keep connected to the telephone jack a device capable of sorting incoming calls into voice, conventional incoming data (modem to modem dialup) and QX calls and the telephone company may thus forward QX calls to his number, be they from within his organization or for anywhere else); and

(d) since his line is known to the telephone company as being QX-capable, it will be prepared to receive a special signal sent (in a North American standard format) before or after the number being called, informing that this is a QX type call (such calls will be routed ONLY to the other QX-capable lines, this requires additional digital logic but can be implemented in electro-mechanical, analog or digital type telephone exchanges relatively easily).

Much the same technology which is now used to block or trace calls can be used at the CO level to block QX calls from being connected to non-QX lines. If the QX call originates and terminates within one CO's exchange this is quite straightforward, as the call can either be blocked as it comes in (i.e.: by consulting a lookup table of numbers on that exchange which are QX-capable) or as it is switched (the special signal can be trapped by the non QX-equipped line and blocking logic can then be invoked.) Where the originating and terminating CO's were different, the originating CO would presumably pass the call on in good faith to the terminating CO where the same blocking logic would be invoked. This latter approach is, however, not perfect since many un-completable calls could still tie up the network. There must be sanctions (penalty charges or whatever) levied against QX-capable lines which consistently generate un-deliverable QX calls.

One does not have to be a communications engineer to understand that such an approach - given current technology - certainly *can* be applied to our present telephone system architecture. If telephone companies plead that they cannot do this (or cannot easily do it) one should look a bit deeper; the reasons may well be business-oriented and have nothing whatsoever to do with technical matters! Clearly, however, rapid deployment of QX-capable equipment could vastly multiply the overall traffic load. Even the very short QX calls will impose the same switching load as present voice, data or fax calls and there will be many more of them. Most QX calls will likely only have to reach a few hundred or thousand QX-capable destinations, not millions, to achieve their intended results. Nonetheless, it is likely the switching capacity of the telephone companies would have to be rapidly increased. Fortunately, new

digital technology allows them to respond relatively quickly to such changes, especially when a government-led initiative towards the home workplace gives them ample warning that it is coming. They can, then, hardly plead ignorance or technical incompetence.

Thus, the universe of potential 'pollees' in North America will by no means be the universe of trunk line telephones, but rather, a small but growing subset of same: those requesting the premium QX service. It is in the interest of the telephone companies to move forward and take the lead in this area (more precisely, government should now motivate them to do so) or else they will be forced into (you guessed it) reactive mode. It is recognized that there are significant implications for the telephone companies once demand for QX service becomes substantial.

As with an electric utility, the installed network traffic handling capacity must exceed the expected peak demand. This means telephone companies must significantly increase the installed capacity of older exchange switching stations; otherwise QX's could bring about the collapse of the telephone system. They should also develop norms and standards, and implement trials and pilot projects with the appropriate logic to 'get the bugs out' of the means of handling QX's before they become prevalent.

7. General Access Information Networker - Putting the QX to Work

7.1 Introduction

This chapter discusses the construction and operation of networks of home workplaces in terms of how key home workplace equipment would function and what it would actually do. The treatment is primarily functional, rather than technical, so as to make clear to the widest audience the potentials and possibilities. The exception is a brief discussion of open system interconnection and a discussion of the required incremental functionality of equipment intended for use by full time (versus part time or casual) home workers.

The development of the equipment, standards, software and arrangements discussed here represents what is perhaps the foremost political, economic and technical challenge and opportunity to be faced in this decade.

7.2 Anatomy of the Home Workplace

7.2.1 Generic Home Workplace Components

We earlier defined the workplace as the coming together of the human, the mandate and the location/resources. This discussion concentrates primarily on the resources, which can be categorized into the following three groups:

-the COMMUNICATIONS resources such as telephone, cable and satellite networks and terminations plus the hardware/software necessary to utilize them;

-the BRIDGING resources which tie the communications and processing resources together such as the standards, protocols, agreed formats, arrangements and hardware/software necessary to accomplish the physical and logical links; and

-the PROCESSING resources including CPU's, storage systems, local interface systems, printers, scanners and other hardware and software necessary to the creation and modification of information and the execution of standard or custom logic.

In the simplest example, the communication resource could be a telephone line, the link could be a modem and the processing resource could be a non-intelligent (in the industry, called a 'dumb') terminal. To progress slightly, replace the terminal with a PC; now the home worker can do true processing but contact with the 'hub' is generally only possible under the strict supervision of the human. Or, as we did a number of years ago, replace the original set-up with a Mitel Kontact (which was a full-function integrated Computer Telephony Integration (CTI) workstation); now the user can send E-mail messages, agendas, telephone lists and many other things to his co-workers even when he is doing something else, but only if he has a Kontact. Alas, Kontact has been consigned to the scrap heap, but new products will come along providing an assurance that the long-lost branch of the technology tree called *CTI workstations* will soon enjoy a resurgence.

7.2.2 Constraints

Obviously, all of these alternatives have their limitations. Some of the key ones are as follows:

-home workers required sufficient (and channel redundant) communications bandwidth; and

-the home-based equipment must bridge telco broadband to the other communications channels such as cable and satcom.

Further, we must consider that in order for the type of scenarios described in the past few chapters to be permitted to unfold, virtually ALL homes must eventually have some type of home workplace device, at least to the extent of permitting them to participate in the QX market.

7.2.3 Importance of Open Systems

It should also be added that experience thus far in the 'conventional' computer industry has taught us (the hard way) that standards are important to preclude vendor dominance and ensure that we do not build islands of incompatibility. There is no point going in this direction if we evolve three competing standards. All that will happen then is that we will neutralize our lead and the Americans, not to mention the Japanese and the Europeans, will surge past us. Does this sound familiar? So we have to get there first and establish a de-facto standard but also one which relates to the rapidly broadening drive towards open (vendor-independent) computing systems.

7.2.4 Classes of QX Originators

Finally, we must recognize that there are at least three classes of QX originators, most often from the home workplace:

-the person who participates in the economic commonwealth of using QX's to participate in the North American (eventually world) market for goods, services and information and who may not even own a PC or more powerful home computer workstation at all;

-the person who actually works at home some of the time and therefore has a computer at least as powerful as a current-day Windows-based PC; and

-the person who works at home much or all of the time and therefore has a computer able to run a more powerful operating system such as MacOS, UNIX or Linux, the latter two being open standards based operating systems.

7.2.5 Requirement for Form-Fit-Function Standards

It is necessary to develop a family of standards and form, fit and function (F3) specifications - and then to allow vendors to develop families of products - which can operate with each other and can be combined in building-block fashion. F3 specifications set out what a certain device does, how it connects to other devices, what it expects from them and passes to them; they thus say something about its general size and demeanour. They do not, however, rig the market for one vendor because anyone meeting the F3 specification can sell into the market. This is very important. A man named Selden once claimed he and only he had invented the automobile, and that no one should be allowed to build one but him, or at least not without paying him a royalty. Recall that railways and telephone companies fought to preserve their monopolies.

>>> There is no doubt that we have much technology to throw at the home workplace. The challenge is not of having the technology, but of knowing which technology to use and how indeed to use it. Let us consider the three home workplace technical components discussed above in a bit more detail.

7.3 Communications

7.3.1 POTS for a While Yet

As cited earlier, like it or not we are stuck with the telephone system for the short term; this does not mean that we cannot make co-equal use of the Internet (over broadband, cable, wireless, satellite or whatever) wherever it is available, but whether it is a cell phone or a landline phone, the telephone network draws together the most people. Cars may eventually fly (and someone from a hundred years ago would be most impressed with a freeway), but the earliest cars at first had to use the same mud-rutted roads and paths as the contemporary buggies and wagons. Increasingly, however, two home workplace devices will simply use a short interactive session, or else the passage of a QX over the telephone network as a 'token' passed by the one to the other and indicating a desire for a higher bandwidth communication. They will then simultaneously switch to a channel with more capacity if the telephone system is unable to offer sufficient bandwidth for whatever they want to do.

7.3.2 Standards Development

During the past 20 years the Europeans, followed at some distance by we North Americans, have developed a welter of standards to make communications and computing more open. At this point, it is necessary to diverge into a discussion of those standards to understand their significance.

As computer and data communications systems developed (between 1960 and 1980) a number of competitive vendors became well established in the marketplace. Each of these developed its own processors and communications technologies with their related low level languages and protocols, which in turn gave rise to varying operating systems and high level languages. An operating system controls how a computer conducts itself and oversees the process which interprets instructions (called a program) written in a high level programming language (such as FORTRAN, BASIC, C or COBOL) into the zeros and ones which the particular computer can understand.

Bear in mind that all digital computers, in their innermost sanctums, store information only as positive or negative, up or down, yes or no. The numeric representation of such stored (or storable) information recognizes only '0' and '1' and is called 'binary'. All storage of information - and execution of instructions - by digital computers is based on the binary system of encoding numbers using only zeroes and ones. What they have going for them is that computers are wondrously speedy; they can store billions of pieces of information in this way and can execute millions of instructions in a single second.

This was all very nice but every vendor handled things differently. These differences, plus additional real or perceived value added by each of the vendors, tended to make commitment to one vendor's products - or even commitment to one product line or architecture within a given vendor's overall offering - a very long-term proposition. As more and more investment was made in training and operating experience, as well as in actual system software modifications, the development of application software and in more terminals, printers and other peripherals, it became very difficult for a user organization even to CONSIDER changing products or vendors. In general, vendors encouraged this trend as it established them as virtually the sole source of supply for a given customer, often leading to typical monopolist behaviour of poor service, high prices and vendor-dictated contractual terms. One vendor made a practice of having its representatives actually base themselves inside the customer organization,

supposedly as a technical assist; a little like inviting a door-to-door salesman to come and move in with you.

Only the very largest corporate and government customers - who clearly had the resources to make a wholesale switch if they perceived their vendor as unreasonable or greedy - were able to gain sufficient leverage to negotiate mutually favourable arrangements. And even these organizations frequently had to pay very high operating system license fees on an ongoing basis, despite the very low marginal cost for the vendor to support and upgrade an installed and stable operating system. Vendors did introduce new technologies and generally provided upward compatibility - letting the old programs run on the newer, bigger and better versions of their machines - within (but not among) their various product lines. Systems conforming to the above description eventually became known as 'closed' systems because installations of such systems were, in general, closed to the hardware, software and communications products of other vendors. Conversely, systems which are closed tend to trap or 'lock in' the customer to the vendor and product line concerned.

This is known in the computing industry as 'vendor lock-in' and it is most unpleasant. To put it in lay terms suppose Chev, Buick and Cadillac all burned a different type of fuel and when you bought one you also received a still that let you produce only that particular kind of fuel. Then they stopped giving out the distillation equipment. If you had a Chev, you could buy a newer Chev but if you bought a Ford or even a Buick you were in big trouble. No gas, no go! Meanwhile a bunch of petroleum engineers say they are going to 'standardize' fuel and set up some associations and committees to do just this. GM, Chrysler and Ford send many reps to the committees, but these experts want to discuss the molecular structure of fuel until the cows come home and vote against each other on key issues, sometimes even when they come from the same company. So the grand process of standardization moves ahead, but very slowly. Meanwhile, you still have your old Chevy. Your choices are simple: wait for the process to finish (or get close enough that you are prepared to risk inconvenience or minor engine damage) or else buy another Chev!

There were of course advantages to remaining with a given computer vendor and product line - familiarity and confidence in a known level of service being two of the key ones. Certainly, a large 'plug-compatible' market (wherein other companies made equipment able to work with such computers)evolved for IBM and DEC, the two largest vendors. But dogging the footsteps of such giant corporations was an expensive and high risk venture - the builders of such plug-in equipment were forced to offer better performance and/or lower prices and were often perceived as offering inferior service and support. They thus tended to garner only a fractional or marginal market share, and did not threaten the dominance of the vendors with whose products they sought to inter-connect.

7.3.3 Open Communications Standards

In the U.S. defence/aerospace industrial sector, where very extensive use is made of computer resources at all stages of product design, manufacturing, deployment and support, there was increasing irritance with crushing dependence upon a single vendor, particularly when one such vendor controlled 60-70 percent of the overall computing goods and services market. This was inconsistent not only with the competitive nature of government acquisition (which stressed price competition), but also with how these firms did business.

For example, a firm developing a new aircraft would have many competitive sources from which to select avionics and engines and even such sundry items as windows and toilets. The best combination of price and (specified) performance, where backed by a reputable supplier, would be selected. Inter-operability was also a key factor in the aviation field. A given aircraft might be certified with several engines, a given engine would be used on many aircraft, and even two engines or aircraft from competitive builders would have many common and industry-standard parts. They would also be built to common engineering

standards. Such was patently not the case in the commercial computer industry and even among the firms building equipment for scientific, engineering and technical computing.

For a number of years a solution was sought to this problem. Over time, university and other research work led inexorably to the conclusion that 'open' systems were indeed possible and practical, and that the only major barriers to such systems were the welter of conflicting approaches and 'standards' already erected for commercial reasons by the computer makers. These manufacturers, in the main, had no serious interest in standardization, as this could remove their self-created monopoly positions with their captive customers. An open system, as defined by the Institute of Electrical and Electronics Engineering (IEEE), is:

> *"A system that implements sufficient open specifications for interfaces, services and supporting formats to enable properly engineered applications software:*
>
> *-to be ported across a wide range of systems (with minimal changes);*
>
> *-to inter-operate with other applications on local and remote systems, and*
>
> *-to interact with users in a style which facilitates user portability ".*

An 'open specification' is seen as one which is maintained by an open public consensus process and which can adapt so as to take in new technology over time. Put simply, open systems can more easily communicate with each other and permit computer programs, data and computer users to be moved easily from one vendor's system to another.

All of the following impact the degree of openness of a computer system:

-the selection of a processor and the development and customization of the instruction set;

-the selection and customization of the operating system including its interface with the user and applications as well as the actual services it provides to the user, the administrator, the application and the communications environment;

-the selection and manner of implementation of software and hardware communications facilities, standards and protocols;

-the choice of high level languages, database packages and office automation packages which will be supported on the processor;

-the degree to which information on all of the above items is made available to acquisition authorities, system administrators, independent application software developers, end-users and competitive hardware vendors;

-the consistency with which customizable elements of the hardware, system software and communications facilities are modified;

-the consistency with which end-user shells and scripts are customized; and

-the consistency with which application development efforts follow the operating system interface definition and user interface definition, as well as the application development method, documentation and life cycle management standards, procedures or doctrines.

It will be seen that the first five of the above factors are under the sole or predominant control of the hardware vendor whereas the final three fall into the province of the user organization and of independent

software vendors. It is thus crucial to have a clear approach as to 'how to accomplish things' in an open system environment agreed upon, and faithfully followed, by both the vendor and user communities.

The hyper-complexity of inducing computers to communicate with each other even *within* companies and countries, much less among them, was meanwhile causing the evolution of a new set of communications standards and approaches, broadly labelled the Open System Interconnection (OSI) approach. This was an initiative of the International Standards Organization (ISO), based in Geneva, Switzerland, which co-ordinates the activities of many national standards bodies working in very many fields. The ISO began to focus on the desperate need for standardization in the computer field. Standards would allow diverse computers to not only be connected together but to actually communicate and work together (to 'inter-operate'), would promote the distribution of application software programs (to bring them close to the users by having the same program run on small computers that formally ran only on large ones), and would make computers and communications networks easier to manage.

A seven-layer model of computer communications, over a network, was created as follows:

-PHYSICAL layer handles the encoding of data into signals able to be sent over mechanical, electrical, radio channel and/or fibre transmission media;

-DATA LINK layer synchronizes transmission and detects/corrects errors;

-NETWORK layer establishes, maintains and ends communications between two nodes (and their respective computers) by establishing a logical path;

-TRANSPORT layer gives the user or application the handles' needed to control the functions of the previous three layers;

-SESSION layer oversees the dialogue between the computing systems such that each computer sends information when the other is expecting it;

-PRESENTATION layer converts data for presentation to the recipient computer in a form it will understand; and

-APPLICATION layer provides specific services which compliment efforts by the applications or end-users to transfer files or to access each other's databases.

Taken together, these seven layers provide a framework or model for 'slotting in' individual communications facilities and services provided by a computer, a communications node (which itself may be a form of computer) or by a private or public network. The model is vendor-independent, letting even two proprietary and otherwise incompatible computers at least communicate with each other. It can do even more when these computers are themselves both running open operating systems as defined above.

While OSI was developed with the active support of many Western governments, it did not ultimately fulfil its intended leading role as a universal communications protocol for connecting open (and other) systems for several reasons:

-the development process was long and very tortuous;

-while very logical and flexible, it was both exceedingly complex and also subject to potentially contradictory interpretations and implementations; and

-the far simpler, more egalitarian TCP/IP protocol stack was very quickly brought to prominence by

the rise of the Internet while many OSI committees continued to bicker over the fine details.

>>> OSI has been adopted for various military applications as well as by the Advanced Train Control System (ATCS) / Positive Train Control (PTC) project's communications specification which went forward to (very limited) implementation on the railroads. It has not, however, become anything like as ubiquitous as TCP/IP.

>>>There are a number of reasons why OSI might still be a superior protocol to employ for peer-to-peer communication among home workplace devices - using any communications channel, including the PSTN - but whereas such devices will also use the Internet, where available, the ability to run over TCP/IP will also need to be built in.

7.3.4 Making Telephony Safe for QX

This may seem like stating the obvious, but if home workplace equipment is not at least able to use OSI (or alternatively TCP/IP) standards to communicate with similar equipment back at the office, and in other homes, then the battle is lost before it gets started; all we will do is build an electronic *Tower of Babel* on a much grander scale than before. As pointed out in previous chapters, the homeowner or homesteader must be able to buy a package of communications capabilities and services - at a market-determined and fair price - enabling him to participate fully in the electronic commonwealth (within and/or among organizations). This 'QX Service', as we'll call it until the telephone company thinks up a trendy-sounding marketing name, *must* be made available as an add-on to the current voice line running into your home.

>>> A big part of 'QX Service' is related to primary factors:

> *-proper device addressing - effectively providing an official "White Pages" directory listing that the subscriber's line is connected to a device which will send and receive QX messages; and*
>
> *-the fact that a PSTN-connected home workplace device will make far more calls (per day or month) than a voice-only user, but the average call will be of extremely short duration.*

The alternative is not simply tenable. Time after time, Bell Canada technicians (and even executives) insisted that the Mitel Kontact CTI workstation needed a 'computer data quality line' for which they hoped to charge several times more than a voice line. There was also no such service in many rural areas, such as my own. The Kontact - and indeed most computer equipment - will work reasonably well over voice grade circuits providing one does not try to transmit a very large volume of data and is prepared to work with relatively slow speeds. You see, if we allow the telephone company to tell us that these home workplace devices are 'special' and *need* their very own dedicated high speed data lines, widespread public use of such equipment for trading and home workplace purposes will take many years longer to get started.

>>> This issue, however, is diminishing somewhat in importance because most urban addresses in North America, and an increasing number of rural ones, now have higher-grade broadband or cable data communications services which support high-speed Internet access. Home workplace equipment, while it still must be able to employ the PSTN, will certainly make use of higher-speed TCP/IP networking where it is available to both peers. However, whenever we seek to reach beyond North America, the ability to use the PSTN with elan remains critical and will do so for some time to come.

So QX service, as characterized earlier, is merely a small superset of regular voice telephone service. Bear in mind, however, that while the home workplace does not strictly *require* the high speed and flexibility of broadband or cable it can certainly make very good use of it. As more and more home workers demand better service, the telephone company - likely with government support - will need to provide it.

There is, however, one exception to this fairly rudimentary *initial* communications services requirement, and that is the filtering equipment. When a home workplace device sends out a QX it must include an agreed (initially an analog) signal which will attract the attention of special filter equipment at the terminating Central Office (CO) - which may or may not be the same as the originating CO. The filter equipment would 'capture' the call and would verify that it was a properly formatted QX being compliant to all rules and standards, *and* that the destination phone number which had been dialled was indeed that of a legal QX-service subscriber. Both the government (in protecting non-QX users) and the telephone company (in safeguarding its own reputation and sanity) have the right and duty to ensure these facilities are in place *before* the home QX-capable equipment and QX-service extensions on voice lines go into service. Otherwise, many voice-only users will be harassed constantly, to the point of unplugging their phones, by errantly addressed QX's.

>>> Before the telcos are convinced (by popular demand) to put this service in place, QX originators and recipients will most likely be confined to the following two realms:

-sending QX's over the PSTN, but only to the telephone numbers of peer systems of which they have foreknowledge so they are absolutely sure a QX-capable device will answer; and

-employing the Internet as a medium for transmission of QX's by using IP addresses

7.4 Bridging

7.4.1 Picking the Optimum Bridging Technologies

We now know that a computer hardware 'generation' in terms of technology is between 18 and 36 months; in that time what is 'new and improved' becomes old and dated. In four or five years what you buy now is very obsolete and beyond that it is a candidate for cast-off to the garbage or maybe even a museum. Since 1965 we have become at least 1,000,000 times better at storing and processing information and we continue to quickly get better. If we were to embed or tie the bridging function into the processing hardware which will keep evolving and changing, then each time a serious obsolescence of the processing equipment occurs we will also have to re-build (and likely re-standardize) the bridge system as well. This will provide a bonanza for companies seeking to have their product become the ONLY serious contender in the new generation because each generational turnover becomes a new opportunity for potential vendor lock-in. The surest way to prevent this is to use OSI or TCP/IP communications and place the protocols, logic and even the hardware of the bridging device in the public domain. Once a secret (trade secret or any other kind of secret) has been let out it is hard to stuff it back into the box, bottle or whatever. Of course, the down side of this approach is that it will tie the bridging function to what soon becomes very behind-the-power-curve technology. However, consider the following:

-despite recent advances, car tires have advanced nowhere near as fast as the cars themselves;

-even our most modern trains are stopped with an air brake system perfected in the 19th century;

-as cited elsewhere, the first commercially successful application of turbine engines to passenger aircraft used propellers (turboprops) not a pure jet arrangement; and

-every telephone in your home or office meets most of the same standards and performs almost exactly the same function of those of the late 1950's and early 1960's.

Despite the terrible technological drag and limitation which such a decision will induce (between now and approximately 2005 when the next generation of such bridging devices might reasonably be expected to emerge) there are legion benefits. No monopolist can take over and impose vendor lock-in. The most efficient producers of the devices will define the market price. Enhancements can be offered in deluxe or extended models which are merely 'supersets' of the basic functionality without corrupting the standard. (The only concern with such 'superset' implementations is that it must be the standards body, not individual vendors, who define what the supersets will contain; otherwise each vendor will define a different superset and the extended versions will be incompatible with each other insofar as each one's respective extended functionalities are concerned.) By 'anchoring' not only the basic functionality but also the standards at a specific level reasonable certainty can be gained.

While the telephone companies and other communications service providers will not likely be the prime suppliers of such equipment (now that we have finally separated the 'way' and the 'means' in communications), they will have a clear and solid expectation of what to build for and can plan for, perhaps a fifteen year horizon. They thus will not see their multi-billion dollar line haul and switching investments obsoleted by the next whiz kid who invents a new device or protocol. There will be a clear and common expectation as to how home workplace equipment will get in touch with other such equipment, known to be valid for a number of years. This will provide the stability and confidence needed to attract producers of ALL the products and services required to support the home workplace.

There is little doubt that, eventually, the bridging devices will grow so hopelessly obsolete that they become the chief bottleneck constraining the system, but they will still be working. Forward compatible solutions will be developed which keep all of the old functionality and also offer new capabilities as well.

7.4.2 Bridging Device Functions

So what does the bridging device actually have to do, other than provide a physical link between the communications system and the main home computer? First and foremost, it has to provide the means whereby QX's can navigate their way through the system or at least 'seem' to do so. Recall that even the 'smart' work item has only inherent or passive smarts because it gets its actual intelligence (or processing) from the workplace computer equipment it visits. It does not travel as a smart work item: it travels as information which, having been assembled and acted upon at each workplace visited, can be seen to have behaved - throughout this progression - as though it actually had possessed intelligence all the while. The bridge device must thus 'give smarts' to the arriving QX in the same way that we might animate or robotize an anatomical dummy. The device puts the QX through its paces and thereby determines its relevance (if any) to the device's owner.

Perhaps the best way to view the bridging device is in the manner of a servant of old who was the keeper of his master's gate. The servant knew what the master liked to buy and sell, knew what he would pay, and could question strangers to determine who should and should not be let in. He also knew his master's PROPENSITIES; in other words he had an understanding of what his master was likely to do in various circumstances. Thus, the servant had a good conceptual and practical 'model' of his master's mind; perhaps the master liked suckling pig and would always want to buy young pigs if the price was less than X, but he also hated mutton. The servant might therefore buy five piglets in one day but not fifty or five hundred.

The device must also give everyone equal access to the network and thus to the generation and receipt of QX's both inside one's prime employer organization and outside it. That is, it must provide GENERAL ACCESS. Once provided this access, the widely replicated combination of the home-based human being, the computer/bridge and the communications medium become an integrated and (both artificially and genuinely) smart network. Simple and difficult questions can be posed, in QX form, to the network. Where the questions are easy (e.g.: who wants to go sailing in Kingston next weekend?) the bridging devices themselves, perhaps after brief consultation with the more extensive main home computers

where these exist, can provide the answers in accordance with their owners' known plans and/or propensities. Where the questions are more difficult (e.g.: should we start a new ratepayer association to get rid of our current crop of municipal politicians?), the bridge devices can in all likelihood do little more than serve up the QX for consideration by their owners, or at least by more sophisticated and powerful computers used as the main home processors.

The bridging device thus 'networks' the information of the owner. It permits selected bits of the owner's total information to be released onto the network as a QX. Conversely, from the owner's perspective, the bridge device provides access to an information network to which everyone else also has access, permitting receipt of QX's. The bridging device - regardless of whether the owner's main computer has the power of a small micro or a mainframe computer in today's terms - is thus an INFORMATION NETWORKER. To make the access even wider - even more general - let us assume that the owner has no computer at all and thus wishes to give QX's only the most rudimentary processing. The bridge device could be connected directly to a standard telephone jack into an A/B switch, or 'Y' junction video input to a television monitor, shared with the VCR. It could also be directly connected to a computer-type display screen.

Finally, for some considerable time after QX's begin zinging their way through our telephone system, live voice calls will continue to outnumber them. Even later, when QX's are the huge majority, voice calls will continue to exist and must be fully catered to - and on a priority basis. The servant never refused to open the gate for the master because he was too busy negotiating for piglets! We have already said that it will be necessary to permit GAINERs to dial only those other telephone subscribers who have the QX level of service and hence themselves have GAINERs. Ultimately, this is best accomplished at the CO as part of the QX level of service. However all this does is to prevent GAINERs from calling non-GAINER users. It doesn't prevent (nor should it) voice, FAX or even conventional data calls reaching the GAINER owner's telephone line.

The GAINER must, however, be the first piece of home equipment reached by an incoming telephone call; among other things this means that the GAINER must be connected between the trunk telephone system terminal and the in-house wiring. Then, the GAINER can answer an incoming call BEFORE any voice telephones in the home even ring. If the call is from another GAINER it can be dealt with by the GAINER itself. If it is a FAX call it can be passed to a FAX where this exists. If it is a conventional computer data call it can be piped through to the main computer, where this exists. If it is none of the above then it must (by process of elimination) be a voice call. In such case the GAINER should generate a simple voice response to the caller such as: "Smith residence, now ringing internally" while generating its own ring to all phones on the house circuit. If no one answers after a user-selectable number of rings, the call can be passed to a conventional or digital voice telephone answering device.

We now can collect, from the above, the key elements for the bridging device.

1. It can be called a General Access Information Networker or GAINER for short.

2. The network of GAINER devices and home workplace (QX service) capable communications (at least the current telephone network) forms a General Access Information Network.

3. The GAINER would utilize OSI or TCP/IP communications to maximize compatibility, its F3 specification would be in the public domain and it would run the UNIX operating system both to permit it to have strong links with future open system computers, as they proliferate and to prevent takeover by one vendor.

4. There would be two versions of GAINER:

-the **Mk. 1** system designed to connect to the telephone and TV monitor and intended for homes without a serious home worker, but with key links to optional optical storage devices and printers; and

-the **Mk. 2** system designed to do everything the Mk. 1 does as well as to connect to simple or powerful main home computers, a wider range of peripherals and to contain additional logic, over and above the public set, specific to the organization(s) of the serious home worker.

5. Mk. 1 and Mk. 2 versions would be 100% compatible at the public level and Mk. 1 versions would be field-upgradable to the Mk. 2 standard by the addition of simple user-installable components.

6. GAINER and conventional telephone equipment can co-exist providing that the telephone company can prevent GAINERs from making QX calls to non-GAINER equipped (i.e.: non QX service subscriber) lines and providing GAINERs can classify incoming calls as QX, FAX, conventional data or voice and treat them accordingly, without undue delay to voice callers.

7.4.3 QX Generic Types and Subjects

There are two ways of categorizing a QX. One is its message GENERIC or type: what kind of QX is it, as identified from a standard set of types, and what is it seeking to do? The second means of categorization is the detail or SUBJECT matter of the QX as identified from a standard set.

Here is a pro-forma set of generic message types which could be used for the basic set common to all GAINER models:

A ASSOCIATE offer to associate (basis/purpose/time)
B BUY offer to buy X units of Y at unit price Z
C COMMUNITY communicate concern/inform of event/activity
D DECLARE make personal or legal declaration
E ENTERTAIN offer/seek recreational opportunity
F FETCH obtain specific information from other system
G GROUP pass message specific to group
H HOUSEHOLD identify worker, household, family, home
I INTEREST offer/seek special interest information
J LEGAL pass legal/regulatory information/concern
K CONFIRM request/provide confirmation of other QX
L LEARN offer/seek learning opportunity
M MEDICAL offer/seek medical information or advice
N NETWORK assist in the networking of a specific group
O ORGANIZE organize a group or activity
P PERSONAL offer/seek relationship - pass personal info
Q QUESTION ask question to other users
R RESPOND reply to question
S SELL offer to sell X units of Y at unit price Z
T TRADE offer to trade or exchange X for Y
U UNDERTAKE offer/agree to provide and/or do something
V SURVEY seek information, feedback or consensus
W WORK ITEM offer/seek/assign work item
X EMERGENCY declare emergency situation / seek assistance
Y SPARE may be used for organization-specific item
Z SPARE may be used for organization-specific item.

It will be necessary to develop first for North America, and later for wider use, a full agreed and standardized listing of subjects for QX's. The easiest way to do this is to review all non-residence telephone information in the telephone company white and yellow pages as well as the directories or service listings of the four current levels of government (local, county, state/province and federal). Abstracting these, we can easily list the majority of the types of information, goods and services we are interested in when we deal with each other now face to face, by telephone or by mail. A few additional items are needed to make the list coherent and complete and these relate to the operation of the GAIN itself. Once this list is standardized within the overall GAIN framework it too becomes public property and available without cost.

7.4.4 QX Processing

Upon first acquiring a GAINER, the owner would 'train' or 'orient' it to his specific propensities by setting his 'RECEIVE' parameters for each of the generic and subject categories above as one of the following:

ADL - Accept/Deal. I will accept QX's in this category and will normally (providing any conditions then set down on my behalf by the main computer are met) wish my GAINER to take the following qualified and quantified actions upon receipt of such QX's... Here, the owner is saying, for example, I will buy the first two pumpkins offered in October each year providing they are local, cost no more than $5 each and can be delivered by October 20 or I will attend any event organized by John Smith. The GAINER is being given, in effect, a license to buy things or make other commitments on behalf of its owner.

ADK - Accept/Dicker. I will accept QX's in this category and expect the GAINER to evoke from the originating GAINER a promise to sell (X units at $Y each) for me to review. Here, the GAINER is being told to strike the best deal it can and offer it up to its owner for approval.

ACE - Accept/Enquire. I will accept QX's in this category but don't want the GAINER to do anything initially other than express general interest and seek more information from the origin.

ACC - Accept (OPEN). I will accept QX's in this category but don't want my GAINER to do anything else except display them or pass them to the main computer as the case may be.

REJ - Reject (CLOSED). I don't want the GAINER to accept any QX's in this category; as soon as the GAINER reaches the part of the incoming QX which identifies it as one of this type, procedure is to hang up and erase the QX.

REX - Reject/Explain. Not only do I not want to get this type of QX but I also want the GAINER to send a 'Don't send us any more of these!' message to the origin (depending upon the QX polling method selected by the origin this may or may not be effective).

RXX - Reject/Block. Same as REX but the GAINER is to also inform the origin and the common carrier that any future QX's of this (or even any) type from this origin are not wanted. This is analogous to voice call blocking now available in some areas. Both telephone company CO and local GAINER logic can be employed to help enforce this as no matter how many GAINERs a QX has passed through it still contains data identifying its origin and as soon as this is reached the CO and/or GAINER can end the connection.

For example, a new owner (who was happily married) might set his GAINER to RXX all items related to 'SEX-HETRO' and/or 'SEX-HOMO'. He might not be interested in receiving anything to do with sports or firearms or might wish to block out a whole generic such as BUY, SELL or TRADE thereby taking himself out of the 'commercial' market entirely. Or, he could instruct his GAINER to issue tentative purchases of all new books on Greek history but no more than two per month or $100 per month whichever occurs first. It may be desirable to permit the BUY, SELL and TRADE (BST) categories to be individually set for each subject or at least for each subject which represents an information, good or service commodity normally found in the commercial market.

Time thresholds (rejecting QX's of older than a given age) for each QX subject would be pre-set to a default value but would be variable by the owner; he may wish to see older messages about cars but not vegetables. Finally, automatic blocking would always occur where a given QX had already been received and dealt with by the GAINER per the owner's instructions.

In addition to being consistent with the OSI communications approach, the QX data message format would consist of at least the following:

-identification of origin GAINER (owner name, telephone, postal/zip code);

-generic and subject as defined above;

-assembly/processing/forwarding instructions (tells receiving home workplace main processor – if it is permitted to get that far - which standard processing routines to call in order to present the QX to its owner and also tells GAINER how it is to be passed on to other GAINERs); and

-unique information (usually text but could also be digitally stored static or dynamic graphics or video, digitally stored music or any other form of information able to be presented at the home workplace... in our earlier example this would be the information on the custom rocking chair's characteristics, price and availability).

Note that not all incoming QX's get to be processed by the main computer in the home. The GAINER is the gatekeeper and it will routinely receive and destroy QX's which exceed the age threshold or are otherwise not desired by the owner. For those which require anything beyond the type of processing for which a GAINER is designed, the GAINER will pass the QX to the main processor (where such exists) while holding a copy itself.

7.4.5 QX Addressing

Insofar as outgoing QX transmission strategies are concerned, to extend slightly the approach discussed earlier, the following could be the rudimentary set from which an owner (or GAINER) composing a QX could choose:

SELECTED - user selects lists and/or individual names from lists

EXTENDED - recipients are each asked to pass QX to two others

CONDITIONAL - recipients asked to pass QX on only if uninterested

AREA - recipient asked to increment XXX only in a fully qualified telephone number such as (XXX)423-1124 such that holder of this exact same number within each area code will eventually receive the QX, if enabled to receive it (i.e. if he is a telco QX service subscriber)

EXCHANGE - recipient asked to increment XXX in a fully qualified telephone number (613)XXX-1124 such that holder of this exact suffix number in each exchange (CO) within, here, the 613 area code will eventually receive the QX, again assuming only that they are QX subscribers;

LOCAL - recipient asked to increment XXX in a fully qualified telephone number (613)828-XXXX such that each subscriber within this local exchange will eventually receive the QX, where they are a QX service subscriber.

Similar approaches exist for the telephone architectures found in other countries.

Incrementation does not have to be purely linear. The GAINER will be able to apply formulae to telephone numbers and round off the results to create new ones on a non-linear basis. Indeed, if the composers of QX's

do not resort to a variety of innovative incrementation schemes, those with telephone numbers ending in very low numbers will soon start rejecting many more QX's than the rest of us.

7.4.6 Incremental Functions of Mk 2 GAINER

The Mk. 2 GAINER must do everything the Mk. 1 unit can plus much more. Whether installed in a conventional office (at the user's desk) or in the home workplace, the device:

-serves as an intelligent bridge or portal between the switched telephone network and/or PBX extension and the personal computer or workstation thus creating a 'workplace' which is essentially time and space independent;

-manages the flow of 'work items' among workplaces within the organization; work items actually 'migrate' among workplaces according to pre-determined propensities and routing strategies given to them when they are created AND according to the propensities set by each GAINER's owner;

-manages the personal computer or workstation's resources so as to maximize workplace communications flexibility and capacity;

-serves as a key bridge between the organization's and the individual's needs and propensities; it thus welds some aspects of the 'informal' organization into the systems domain of the organization, giving the organization a 'sense of itself' at the workplace level;

-permits the PC or workstation user his/her choice of database, spreadsheet and word processing software and is NOT dependent upon any specific software package except choice of Windows, MacOS, UNIX or Linux;

-recognizes organizational, citizen and personal preference propensities of the worker as related to the network; and

-is low in cost and simple to use, also serving as an answering machine and voice store/forward system.

The Mk. 1 GAINER permits owner propensity declaration as well as collective consciousness-raising through continual passing of QX's from one home to another. The Mk. 2 GAINER does this too, but also more tightly ties its owner into the information traffic happenings of the organization(s) to which he belongs. Just as we perform a superset of our 'citizen' functions when we act as part of an organization, so too the Mk. 2 GAINER performs a superset of the Mk. 1 functions.

If we assume that the OSI or TCP/IP based communications which extended from the GAIN to the GAINER also extend from the GAINER to the main home computer - and that the home computer is an open system, running the UNIX or Linux operating system just like the GAINER - then these two devices can be tightly interconnected and can develop a symbiotic relationship. In many cases, the GAINER will receive an authorized request to send information to another worker. It will in such instance - just as a human would - take charge of and issue instructions to the main computer, causing the information to be passed to the GAINER. There, it will be encompassed in a QX header and trailer and will be sent on its way to the requesting GAINER.

However at other times, such as at a pre-alarmed time, the main computer would seize control of the GAINER - just as a human would - causing it to log into a large remote computer as a conventional terminal and download data to the home computer, or else to send a QX to another system. This is easily accomplished (by putting a truncated copy of the GAINER's software on the main computer), and would not cause the GAINER and computer to fight like cat and dog as they would both be trying to meet

the same objectives. Not only could the GAINER access the operating system of the main computer but it could be 'trained' to invoke and send fully qualified and executable commands to any software package (e.g.: spreadsheet, database etc.) which might be running on that system.

The GAINER must be connected in series between the keyboard and the main processor of the home computer. It can thus issue commands to the system which the system will think came from the keyboard. Further, the system requires a 'backdoor' connection to the GAINER bypassing this link. Thus they can each, as and when required, control the other. When the user wished to interact directly with the GAINER (i.e.: to change its QX handling instructions) he/she would do so via the keyboard and monitor of the main system, effectively locking out its processor and using it as though it were a dumb terminal. More sophisticated users will employ screen windowing on the main system and/or a separate low-cost monochrome screen for the GAINER. While windowing permits incoming QX's (of sufficient priority) to interrupt (but not disrupt) work even on a single screen, the second screen will be most appreciated when two remote individuals are comparing versions of a document they are co-editing.

While it would take many words to relate everything Mk. 2 GAINERs could conceivably do, they could certainly:

-bid on work packages which matched their owners' propensities;

-arrange multi-party physical meetings or teleconferences;

-permit two or more workers to edit the same document at the same time; and

-support the flow of smart work items through the organization.

Mk. 2 GAINERs would be able to support an optional second telephone line which, until broadband is provided, may well be required in many circumstances. This will permit the user to have a voice conversation on one line while data is being transmitted on the other. BROADBAND provides two prime channels and a third 'signalling' channel as well. Twin lines (or at least channels) permit GAINERs A, B and C to be linked, with each having a link to each of the others. Thus three people can edit a document and their respective displays are simultaneously updated as they each make changes, and all without sharing a central 'host' computer.

7.5 Processing

Even owners of Mk. 1 GAINERs may wish to purchase modules which permit the GAINER and a simple home computer such as a PC or Mac to interact with each other, much as a Mk. 2 GAINER and a more sophisticated computer would. Note however that not only the GAINER but also any computer expected to inter-operate with the GAINER must be plugged in and operational at all times; QX's will travel at all hours.

7.5.1 Home Workstation Requirements

While the GAINER itself will possess not an insignificant amount of intelligence, it is likely that the first generation basic home workplace computer with which the GAINER is interconnected will contain:

-a powerful main processor capable of running a powerful operation system, potentially Windows but in many cases MacOS, Linux or UNIX will be seen as viable alternatives;

-a separate graphics and display processor;

-a built-in soft telephone capability able to co-operate with the GAINER;

-connections not only for a desktop screen and keyboard for the principal user but also for two to five remote terminals for other household users or for access by the principal user when in other rooms - this will broaden its function to that of 'home central computer' being used also for tracking domestic expenses, keeping phone lists and dialling the phone, the kids' homework etc.; and

-connections for all manner of peripherals such as printers, plotters, scanners and others (these are in addition to the basic connections for such devices which the Mk. 2 GAINER itself will have).

There is nothing in the above requirements which is not now either on the market or which cannot be readily derived from current products at low risk and cost. Note also that provision of a Mk. 2 GAINER and this type of workstation (perhaps in a less costly and comprehensive form) to a conventional office worker makes him or her a full participant in a decentralizable network even though they remain at the office. Thus, from the organization's point of view, it matters not whether an individual chooses to work mostly at home, mostly at the office or something in between.

7.6 GAINER User Roles

The following paragraphs identify and describe the five most important roles, one or more of which each most user of GAINERs will fulfill and in which the product should support them.

7.6.1 Organizational Role

This is relevant to any organization where a home-based worker would spend at least some of his time dealing with internal people, and process, WITHIN the organization. In its most pejorative sense, this is a form of ‘bureaucratic involvement’ inasmuch as it is inward facing and does not face customers, peers/partners or suppliers. These contacts may range from totally productive to totally puerile.

>>> This role ties me in to the remainder of the organization(s) for which, or within which, I work to earn my living.

>>> It is virtually certain that small and medium sized organizations will want GAINER to come with a generic set of QXs to support the totally generic things which happen inside almost all organizations. True too, medium and larger organization will want to define new types of QX's and/or variants of standard types to meet just their needs. The key determinants of this are expected to be:

-line of business, including prevailing metadata and data standards and protocols in that industry;

-organizational component (or role) of the workgroups using GAINERs;

-unique business processes to the specific company; and

-legal or regulatory constraints

>>> We obviously need to make the variation of existing QX types and the creation of new ones as easy as possible for non-technical users to accomplish.

7.6.2 Business / Commercial Role

This is relevant to any situation where a home-based user - as an individual on his own private behalf, as a participant in a small business or as an employee (or confederate) of a larger business - is engaged in reaching out to the larger economy in a business or commercial sense. In almost all such cases this will touch a customer, peer/partner and/or supplier and may be by means of a QX seeking to buy, sell or trade an item which is some combination of information, service or goods. For example, a painter may agree to paint a house in exchange for the trade of an old car while an admin assistant working for a small business may seek bids for a large printing order.

>>> This role is outward-facing and allows me to use my GAINER to participate in 'electronic commerce'. It permits me to run a small business or to act like a small business person on behalf of a larger business entity whenever that is required.

7.6.3 Institutional Role

This may involve academic, professional, avocational, political, community or other roles which require the individual to participate in one or more ways in an organized temporary or permanent entity which does not exist purely for commercial gain nor purely for recreational purposes. This role involves seeking out, accepting and following through on participation opportunities. This may involve organizing a citizen committee, serving on a working group for a professional association, working as a Wolf Cub leader etc.

>>> This role allows me to reach out and be a part of physical and diasporatic communities outside my business role.

7.6.4 Personal Role

This involves what Americans call *'life, liberty and the pursuit of happiness'* and spans personal interests, hobbies and general-interest learning, creation and maintenance of personal, friendship and family connections. While this role also involves seeking out, accepting and following through on participation opportunities, it is distinguished from the institutional role because such participation does not necessarily boost the 'common weal' and can indeed be purely pedestrian, even flippant or selfish in nature. While there may be a 'commercial' aspect, it is differentiated from the business role inasmuch as the conclusion of the desired commerce is most likely not time-sensitive and in almost all cases is not essential to one's continued economic survival. Examples would be joining a bird watching society or seeking to buy a specific type of locomotive on the used model railroad equipment market.

>>> This role allows me to have fun and to stay in touch with my family and friends.

7.6.5 Domestic Role

While it may also involve the commercial aspects of buying, trading and selling (which are covered above) this role primarily includes other functions to support the home and family. It involves the planning and the day-to-day 'operational management' of the home or homestead. For convenience, I am suggesting that this be divided into the following realms for further study:

> -family activity planning and scheduling – this over maps the previous two roles but is the process of detecting and enunciating family scheduling conflicts before they occur – this means GAINER needs to capable of capturing standing activity patterns - and new one-time appointments – in various ways, including voice input;

-shopping list and itinerary / run-sheet generation – this is a 4D scheduling problem which may cause more family disputes than any other and which GAINER's familiarity with family scheduling can assist to resolve - the modern family is an ill-run corporation and most family psychologists and educators (ranging from Dr. James Dobson to Elaine Mazlish) will state categorically that everyone is just too busy and too stressed to communicate properly;

-integrated incoming message / item status organization and display – this function would display incoming voice messages, QXs, E-Mails and faxes in an integrated manner.

-domestic management – controlling intelligent devices throughout the house and homestead by use of X.10 or a similar communications protocol; and

-mobile integration – ultimately, a cell-based or car-based GAINER peripheral application could allow access to the home GAINER to check messages, change agendas or make other changes from anywhere.

>>> *This role allows me to better organize and manage my family, household and homestead.*

7.7 The Principle of the Reasonable GAINER

7.7.1 Maxims Impacting Propensity Declarations and QX Processing

The following maxims about how we, based on our liberal democratic state and British Common Law heritage, respond in various situations will give rise to important design criteria for GAINERs.

>>> *It is recognized that these may evolve somewhat as GAINERs eventually are placed in use far beyond what we call Western civilization.*

1. Owner Is Reasonable and Logical

The owner will not jump to capricious conclusions based on no or minimal evidence and will be open to being convinced of things. The owner largely conforms to the British Common Law's 'Principle of the Reasonable Man', a model used for centuries by courts to try to determine what would have constituted acceptable behaviour in various circumstances placed under the microscope of the judiciary.

>>> *GAINERs are by definition logical – they cannot escape from being logical since they are driven by functional logic. In most things, GAINERs will accord the 'benefit of the doubt' to arriving QXs except in circumstances where (with respect to subject, origin, timing and/or other defined issues) they are expressly instructed otherwise by their owners.*

2. Owner is Curious

The owner has a natural and child-like curiosity about the world and the higher the owner's propensity setting (along the continuum of RXX to ADL) is for the subject domain or specified subject of an arriving QX, the more likely his GAINER will assume will be his interest in same.

>>> *Stock GAINERs will have a thesaurus-like imputation and relational ability (courtesy of an underlying RDBMS), but this will be built on by:*

-continuing propensity declarations (both explicit and implicit) by the owner; and

-aftermarket software which makes GAINERs better at this.

3. Owner is Honest and Fair

GAINERs will not be intended to be mischievous, devious or deceitful. There is no question that a user can make his GAINER act this way, just as he can turn a gentle breed of dog vicious by mistreating it.

>>> Because friends and friendly acquaintances will be able to accord each other reasonable levels of trust, their respective GAINERs will be in an implicit position to exchange information about unpleasant experiences with the GAINERs of others. This is no different from the fact that bad news (about a person in the community, a car dealer or whomever) tends to travel at least as fast as good news, often faster.

>>> Thus, those who turn their GAINERs into deceitful cheating machines will ultimately run their GAINERs afoul of the wider community and ultimately the law.

>>> Turning to the law of contract, it is almost certain that GAINER transactions will be easier to defend in court than EDI or ebXML transactions since there is at least the following in most cases:

-origin GAINER sends a QX of type SELL to one or more receiving GAINERs; and

-receiving GAINER replies with a BUY or a request for more information.

>>> The key components of a legal contract are all present including capacity, intent, exchange of consideration and also a QX trail, hence evidence.

4. Owner Plays Multiple Roles

The owner will likely have all of the following roles:

-organizational;

-business / commercial;

-institutional;

-personal; and

-domestic.

>>> Differing roles connote differing propensities, varying types of QX's, trust management regimes and so on.

5. Owner Has Personal Interests

Everyone, even the most boring person, has personal interests, leanings and propensities.

>>> Initially, the owner will be strongly encouraged to explicitly set propensity levels higher than ACC (i.e. either ACI, ADK or ADL) for those subjects in which he has a personal interest.

>>> Beyond this point, there are two more ways the GAINER will implicitly learn more about its owner's propensities:

-it will make 'intelligent guesses' based on its thesaurus-like understanding of the ontology of the world, when QX's arrive which are not within the owner's declared interest levels but which seem to it to be close – the owner's subsequent disposition of these QX's will permit it to add new propensities; and

-by monitoring how received QX's on all other subjects are dispatched.

>>> The user will be able to instruct the GAINER to learn using either of the following strategies:

-whenever a propensity is implicitly learned, seek confirmation that it should be stored permanently; or

-whenever a propensity is implicitly learned, automatically store it unless the owner expressly instructs otherwise.

6. Owner Respects, Trusts and Complies with Officialdom

The owner is a law-abiding citizen who will comply with official directions, regulations and laws which he believes are duly authorized by the appropriate governmental body.

>>> Thus, if the GAINER is managing domestic systems including sprinklers, it will automatically abide by an incoming QX from the city saying that they can only be used between 1900-2100 HRS each day.

>>> Of course, if the city instead (accidentally) sent out a QX asking everyone's GAINER to turn on all the lights in their house and this caused a surge and crashed a private utility's power grid then the city would almost certainly be legally responsible for any resulting damage.

>>> This does not save me from being tricked by a person dressed as a police offer who tries to direct traffic in such a way as to actually cause an accident.

>>> This makes very important the issue of verification of the true identity of the origin GAINER and in some cases this may be important enough that the receiving GAINER will also need to consult an independent registry authority or seek a confirmation from the address of the origin GAINER.

7. Owner Will Proactively Protect Himself

The owner will not knowingly expose his GAINER, PC, house or family to preventable, controllable or mitigatable dangers and will take reasonably prudent steps in this regard.

>>> GAINERS will be designed to employ the Russian maxim of 'trust but verify' and they will be perfectly at liberty to do so. If a QX claiming to be a request for a meeting at the police station arrives, the GAINER can certainly seek confirmation from a known police GAINER before telling its owner that he is expected downtown.

8. Owner's Home is His Castle.

All incoming QX's are received, processed, responded to and stored entirely at the pleasure of the receiving GAINER which acts as the exclusive AGENT of its owner.

>>> QX's are processed in a functional / logical way and because QMXL will be both a metadata language and a form of procedural language. Therefore, there is in most cases no valid reason for a QX to contain any other type of machine-executable code, self-extracting macro, bean, applet or anything else executable except within its ATTACHMENT areas, which can be relatively easily quarantined. In other words, the only executable logic contained within the SUBJECT-SPECIFICATION area would be

written in QMXL and if an incoming QX was found to have any other non-compiled source code or a compiled and executable object stored there (or indeed anywhere else but the ATTACHMENT areas) it would immediately be declared hostile and zapped by the receiving GAINER.

>>> While by no means full and sufficient security, this implicit assumption that any 'executable payload' always comes at the end also gives another advantage. If an incoming QX is in the process of being received and if the SUBJECT and/or ORIGIN-GAINER-ADDRESS and/or ORIGINATOR-NAME are known to be undesired or hostile, the GAINER can terminate receipt of the remainder of the QX. This is the case for all of the transmission channels discussed above.

9. Owner will Learn from Experience

While we humans have a marvelous and highly flexible associative memory, GAINERs will be much faster (albeit clumsier) at associative memory than we are. For example, a GAINER may learn from experience that virtually all incoming QX's from GAINERs within a given E-Mail or Web domain are of no interest at all to the user (i.e. they are the GAINER world equivalent of junk mail) it may seek its owner's permission to automatically zap all incoming QX's from that domain.

10. Owner Deserves Privacy

GAINERs should share with each other their propensity and contact information for a subject domain or specific subject areas only to the highest mutual level of trust as declared by their respective owners.

*>>> Permitting a process of **kennenlernen**, wherein friendly GAINERs 'learn to know and understand' each other's propensities is a process which is solely at the behest of their respective owners. For example, Dan and Andrew may set up their GAINERs so that they can learn of each other's QX experience (including propensities and contacts) in a whole host of domains related to their common interests in the field of technology management. However Dan may not permit Andrew's GAINER to access Dan's propensity and contact data relative to data on transportation vehicles of all types or the classic car hobby, while Andrew may similarly exclude Dan from everything his GAINER does with respect to the gliding club.*

7.8 GAINER Business Value

7.8.1 Linking GAINER to Business Objectives

The Open Systems Experience

I represented the Government of Canada at the founding of the User Alliance for Open Systems (UAOS), a group with government, industry and institutional members which conclusively linked open systems to business objectives in the mind of top management in a way which no bean-counter could ever undo. Early members included Shell, BP, Dupont, Boeing, GM and many other large user organizations. The technology vendors were not invited.

In my view the UAOS did almost as much as the unification of UNIX to spread open systems far and wide and I drew on the work my colleagues and I did in the UAOS in my first book entitled *Migrating to Open Systems: Taming the Tiger* which was published by McGraw-Hill.

>>> Lesson learned: we have to find ways to link home workplace to business objectives. Once we do that it will be much easier for us to link GAINER to home workplace, and hence also to business objectives.

The basic arguments in favour of the home workplace, from a general and business-specific perspective, are found in Part 3 of this book. Therefore, we now have to link GAINER to the home workplace.

In the simplest sense, GAINER will help home workers to:

-communicate as effectively as possible by telephone;

-keep track of what each other are doing; and

-gain an even better sense – at their own workplace – of what the whole organization is doing than they do now – *this is about the organization having a sense of itself at the workplace level.*

But above and beyond this, GAINER will also help them be creative and develop new ideas on a far less constrained basis than is the case today in even the flattest organizations.

7.8.2 Using GAINER to Unleash Creative Forces

Being Creative: Unconstrained Idea / Initiative Exploration and Development

In today's competitive environment, all organizations need to make best use of all available information about themselves, their products/services, their suppliers, customers and competitors. That information does indeed reside (somewhere) within the organization, but the issue – as Mitel used to put it – is one of getting the right information, in the right form to the right person at the right time.

In this book I write in some detail about the organization needing *to 'gain a sense of itself at the workplace level'*. Various views of this are possible.

"Kennlernen"

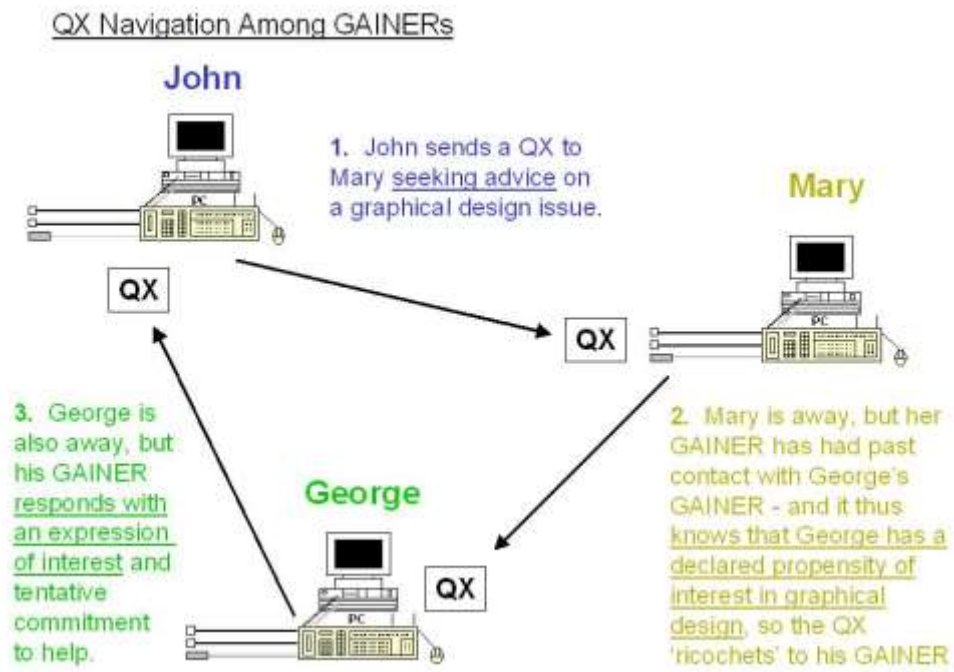
This is the German word for the process of *'learning by getting to know'* a term by which I have earlier described the process of the GAINERs of individuals with common interests learning progressively more – over time - about the fine points of each other's interests such that, for example, a well-established club such as the Bytown Rail Society would be able to send a QX to just the right sub-group which is interested in a slide-showing night, a fan trip to photograph trains or a trip to model railroading convention and not to the other members. This is not a case of mailing list maintenance but rather of 'real-time checking-up' since a member who only liked railfanning last year may have discovered model railroading last week!

In the business context, this means creating informal 'neural networks' of who knows and cares about what.

>>> For example, Jack knows that his peers Sally and John are having the same problems as he is with the Shipping Department because he heard them talking about it at the company golf day. The very next day he launched an QX query about this to both of them and to a few other people he trusts. Of course, it did not actually go to the Shipping Department. Over time, by means solely of QXs, he launches progressively wider queries until he is able to build – and then all of a sudden formally associate (and thus organize) within the company - a very large and vocal constituency which is not only openly hostile to the Shipping Department's consistently poor performance, but which also has a mountain of evidentiary type documentation to prove its point to the executive committee and to the President. This is something which the VP Admin may not see coming and against which he will have little defence; he will just have to fix the Shipping Department. Period!

FIGURE 7-1 shows a similar situation in which someone with graphics capabilities is sought by QX.

FIGURE 7-1 - USING QX TO SOLICIT HELP FROM CO-WORKERS



"die selvstverkenende Organization"

This German phrase translates roughly as the *'self-proactively-learning organization*'. This is the organization which proactively learns about itself every day and in almost every conceivable way. By and with GAINER.

We have been trying for almost a decade now to inculcate information management (IM), to create 'data stewards' who will own, husband and farm data and to find ways to make it available to everyone. First we tried using live production systems and they tended to melt under welters of queries once we put friendly front-ends (like Crystal Reports) on databases like Oracle. Then we created fully independent, parallel and free-standing data warehouses which would keep taking 'snapshots' of the production data and which could then let everyone else beat away on the data warehouse until their heart's content. This rapidly became very expensive to implement and even harder to support. Then we decided that we therefore needed smaller data warehouses, the so-called 'data-marts'; problem is that every time many people hear that moniker they tend to think *of K-Mart and its infamous "K-Mart quality"… not to mention its lousy service and pesky blue light specials*. I think the term data-mart both cheapened the whole data warehouse concept and was a partial, and relatively early, admission of defeat by the data warehousers.

Then came the CRM, SCM, HRM, and other 'resource manager' software packages of huge size from IBM, Oracle, SAP, Baan and Software AG all of which tried to force ALL business processes into their mould. *No problem, you just buy our $5M software package and $50M worth of consulting, integration and support packages. Right!* One of my earlier business partners has related in gory detail how he has seen many of these initiatives falling flat on their butts.

Now we have 'Business Intelligence' which is the heir-apparent (at least on the lecture circuit) to the CRM et. al. failures in one sense this strikes me as just as much an oxymoron as the name of one of the railroad trade journals: *Progressive Railroading*. Some have said the same of the term 'Military Intelligence'. We also have Zachman with his matrix of 36 IM models, a *wonder approach* on which the

Government of Canada is spent millions, but which is so *IM-pie-in-the-sky* that few people I associate with believe it will ever get feet on the ground. Add in XML and even ebXML and we certainly do know how to physically describe and tag data – as metadata – and to create metadata hierarchies. Beyond that, though, we tend to fall off the log.

>>> I believe that the reason all of the above have been failing is that no one has the time to be – or wants to be – a data steward, much less a librarian, a repositorian or a snitch. We need to just let people do their regular jobs and find a way for the data stewardship to happen automatically. Since data only is useful when it is both correlated and communicated, that should give GAINER a natural advantage.

>>> We should bear in mind that in their Kontact video, Mitel pointed out that what all the people in these offices are really doing is trying to communicate – the right information in the right way at the right place and at the right time.

While operational reporting-type data is of course very important to most businesses, as I will show below, it is 'other' data which sometimes becomes almost as important.

>>> More important than knowing that Train #44 is late almost every Tuesday may be the fact that it is usually in the charge of Engineer Jones and also the fact that someone has observed that on Monday nights, during his routine layover, he doesn't usually sleep in his bed at the Railroad YMCA… When relevant 'other' information gets successfully correlated with business, operational and/or technical information things usually change - immediately. When someone makes this connection, and acts on it, Engineer Jones gets warned in writing that failing to be in his railroad-provided bed for at least seven hours during a layover is a violation of the union agreement, company operating rules and federal railroad regulations. This adds business value by showing that the railroad did its job proactively rather than waiting (as VIA and CN actually did at Hinton Alberta) until two trains run head-on into each other because both men on the head-end of each train were sleeping and then doing a re-assessment of both operational practices – and culture – in the aftermath.

>>> In the GAINER world, this can happen simply because someone launched an QX query, just seeking out anything unusual about the circumstances of Train #44 on Tuesdays and someone else's GAINER had five successive vacant bed reports about Engineer Jones, who was called for that train, from the manager at the railroad YMCA. That person's GAINER passed back the information to the originator without its owner even being aware of the transaction. The originator may have had to read through 35 responses to his QX, but then he put 2+2 together and said: "'Aha – there is the source of the problem, so now I know how to fix it."

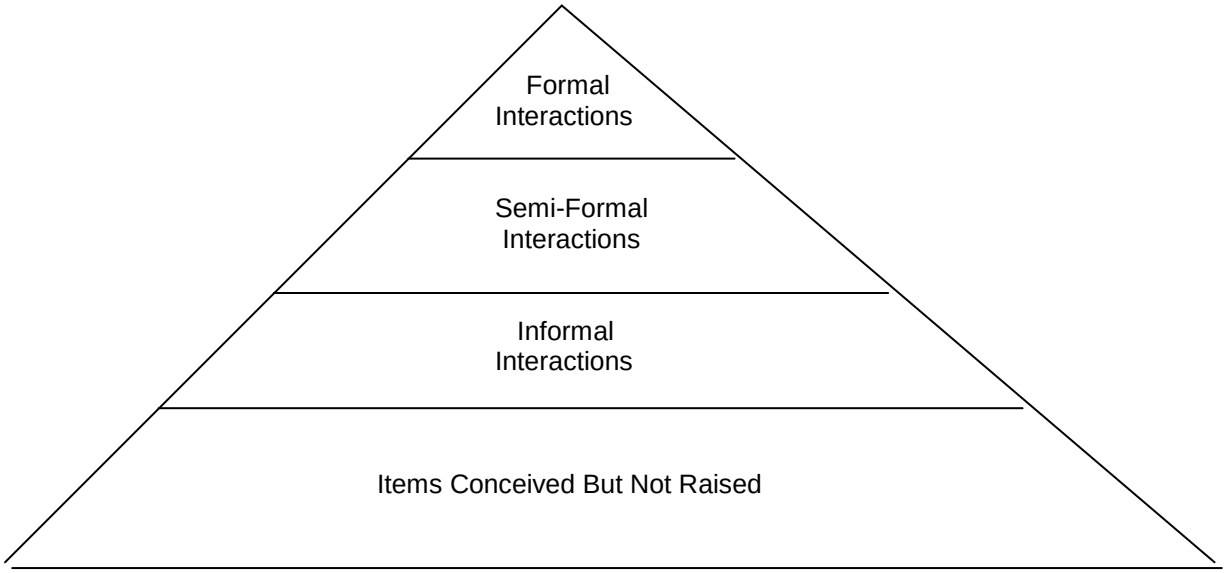
>>>This is not a matter of sneaks, spies or Big Brother. Rather, it is the fact that the organization owns all of the information resulting from my work, and from all my transactions with co-workers, suppliers and customers anyway. This is not my personal information – this is business information which belongs to my employer. If a fellow employee can harvest and use the information – so long as the use is not conspiratory or pejorative – and if that has the potential to benefit everyone inside the organization and all other stakeholders who are connected with it – then that is for the common good, the common weal and ultimately benefits the commonwealth of enterprising individuals that the organization will become.

>>> While I may not choose to expose everything I have ever done business-wise to everyone in the organization, I should naturally be expected to have fairly high degrees of mutual trust with all of my co-workers and total trust of my superiors. In many cases they have totally legitimate reasons to be accessing my business information.

But above and beyond the issue of learning information which lets us fix things, there is the more proactive and constructive world of making positive new connections, finding the new synergies which help any business improve its products and services. For example, maybe salesmen in several regions are being asked for a product which is not yet available and they need to compare notes first since none

of them are brave enough to take on – singly – the hegmonious SOB who runs Product Development. But if I launched an QX to the whole sales force about the idea, the results might surprise me. More importantly, they might be of profound interest to my boss, his boss, the President and hence – ultimately – the VP Product Development. This lets us do what we do at internal sales force conferences much more easily, consistently and frequently. In any conventional organization, above and beyond the formal structure, there is a 'considerational hierarchy' evident in the pattern of what is conceived, suggested, explored, considered and decided. This hierarchy might best be portrayed as below in FIGURE 7-2.

FIGURE 7-2 – CONSIDERATION HIERARCHY



Let's consider each of these in turn.

Formal Interactions

These types of interactions include formal business processes (including many conventional paper forms which are now beginning to be captured in E-Form format), use of approval or inspection systems, scheduled meetings, periodic reports, formal memoranda and so on. Many of these provide the opportunity to bring forth new ideas or suggestions, or to seek out input on something.

>>> However, in the conventional organization there are several problems with 'prospecting' for help in meeting a challenge, exploring a new idea or in 'test-flying' a new idea of one's own. Let's consider the situation within a highly politicized organization, since they are the most difficult kind in which to work.

1. Incidentality

In many cases, except possibly for that of a suggestion box (which in many organizations is a nothing more than a method used – mostly by HR – to let people *believe* they are having input) test flying new ideas, or seeking help with them, is viewed as almost purely incidental to the formal process or document at hand. For example, a monthly report form may have a space for 'OTHER ITEMS' and this is largely how such input may in fact be treated … as 'other', or even as obiter. Even a member of a management committee, if its agenda is heavy, may have trouble getting his new idea put forward and seriously considered in a meeting other than via the 'OTHER BUSINESS' part of the meeting. Indeed, formal organizations – except where top management expressly encourages a culture to the contrary – are not generally well equipped to deal, verbally or in writing, with the concept of 'other'.

>>> For example, during 1957 the internal management consulting group of the New York Central (NYC) Railroad developed a 250-page report on what was wrong with passenger service on the railroad. NYC was in fact atypical of most U.S. rail carriers in that it derived the majority of its revenues from passenger service. The report stated that trains were late, often dirty, train crews were rude, car interiors and seats were sometimes approaching the end of their lives and so on. In the 'Other Issues' section at the very back there were just five paragraphs about the encroaching threats of the jet airliner and the interstate highway system. They were thus not very effective at raising important 'other' type issues which were quite far outside the (100+ yr) experience of corporate memory – railroads, even as late as 1955, still did not take seriously these two threats to their dominance of intercity passenger service, but that did not make the threats any less real. Based on this report, the NYC Board of Directors ordered 700 new passenger cars from Pullman-Budd at a cost of about $100K per unit – this disastrous $70M investment subsequently bankrupted the entire railroad, forcing it into a merger with the culturally opposite Pennsylvania Railroad, and later *resulting in the Penn-Central collapse during 1968. Thus, the Board of Directors was sent precisely the wrong message about what was wrong. What they really needed to do was get out of the long-haul passenger business, develop cruise trains, trains that carried autos along with their owners, trains that carried shopping centers to small towns and other specialty services. Only a few railroads were thus able to adapt to the huge changes going on around them.*

Organizations have a tendency to be intracentric when it comes to information and culture and today it often takes an IMMENSE external stimulus to get things which fall into the 'other' category to be given their full due of attention, even where they are startlingly relevant and timely.

Canadian communications thinker and writer, and my mentor, Gordon Thompson once wrote that major corporations display stimulus-response behaviour roughly equivalent to that of an amoeba or protozoa or maybe even an earthworm; they basically just avoid huge pain sources.

Because many of the good concepts and ideas which people in an organization will – from time to time - come up with (as well as the ideas which really are 'turkeys') fall into the 'other' category there are limited channels available for getting such ideas into the mainstream.

2. The Informal Organization

True too, there is also the informal organization, always ready to play 'silly' with anything new or different. This is the domain of the famous 'dinosaur brains', the petty politicians who revel in their silly games. If Jack the (relatively junior) Assistant VP wants to bring up his great new idea quite late in the executive committee meeting, but the other VPs are bored and want to get back to their offices, they will probably make facial expressions, shuffle papers, make rude noises and use body language in order to show their disdain for him and his idea, often even before he has a fair chance to explain it. This reaction of course, is based more on *who* the idea is coming from (since if the President raises a new idea this late in the meeting they are bound to be more attentive…) than it is based on any assessment of the quality or merit of the idea.

>>> In general organizations which favour a ferment of new ideas – and reward those who put them forward regardless of the outcome – do better than those which do not. The railroads which embraced new ideas between 1945 and 1960 did not all survive, but they did far better than those which did not.

>>> Conventional wisdom has held that the biggest two informal objections to the home workplace are as follows:

> *-employees are afraid they will miss out on the scuttlebutt at work by being away from the social life of the coffee machine or water cooler; and*
>
> *-managers (particularly relatively junior managers and supervisory level folks) are afraid that people will not be working if they cannot see them.*

>>> GAINERs can help home workers to overcome – and indeed triumph – over the fact that they no longer share the social life of the coffee machine or water cooler.

Semi-Formal Interactions

If the frontal approach did not work there has always been an alternative. Historically, the Jacks of the world have always had the available remedy of seeking a private meeting with the President, because if he liked the great new idea he would not only say so, but the matter would end up higher on the agenda of the following meeting, at which time the other VPs would be compelled to pay more close attention.

>>> The downside, of course, is that even if Jack can get this meeting with the President, it uses up a form of 'poker chips' because if two or three of these new ideas fail to impress the big boss, he will then conclude that Jack is really trying to be innovative and is full of off-the-wall suggestions, but they are never of much use. That will then lower the credibility platform from which Jack can suggest any future ideas. Eventually, he will be ignored by everyone whenever he tries to voice his new ideas.

A less intrusive way – in modern times – for Jack to put the idea across is to simply send the boss a short E-Mail outlining the issue and his suggestion. This does not require an appointment, may not tip off the President's admin assistant (who may rank very high in the informal organization and may use this position to do Jack and his idea much harm or damage before he ever gets in front of the boss…) and in any event requires far less time and trouble for the boss to evaluate on the first pass. If he likes what he reads, he can then send Jack a friendly response, ask him to look in to it further and tell the admin to schedule a meeting for next week so he can report his further findings. If not he can just zap the E-Mail.

Of course, both of these methods have the advantage – at least in a highly politicized organization – that the other VPs won't find out about it until after the idea has been floated. They are therefore totally unable to criticize the idea (or Jack) until the boss has already formed his own opinion. True too, in highly political organizations the VPs are often sycophants so they will of course nod sagely and agree totally if the boss now says he loves the idea. If Jack does not report directly to the big boss then he may also get in trouble for bypassing his own boss unless he sends him a cc, but this can be timed for when the President is in, but Jack's boss is off on vacation and may not be constantly checking his E-Mail.

>>> So even these semi-formal methods involve some staking of poker chips, but the chips are of a less serious kind and fewer of them end up on the table in most cases.

These transactions far outnumber the formal ones, but they also have proportionately less weight.

Informal Interactions

If Jack is not feeling brave enough for on-the-sly, but very traceable, private meetings or E-Mails he can still try to corner the boss at some social function and bounce the idea off him. While – in the highly politicized organization - the petty politicians will tend to throng the boss at such events there are always opportunities – and for men urinals rank at the top of this list. All Jack has to do is drink enough water and/or beer so that he can urinate on demand and then (unobtrusively) follow the boss to the washroom and just 'happen' to turn up there at the precise right moment. Even the most sycophantic VPs and executive assistants are bound to be foiled by this tactic. *Of course, the downside, is that boss may have had four beers already and may not have been totally focussed on Jack's discourse or his promise to follow up on Monday morning with an E-Mail.*

Most organizations have still more of these types of interactions – over coffee, at the water cooler, on shuttle busses, in elevators and so on but most of them come to naught either because they are not taken seriously, they are not documented and hence forgotten or for both reasons. True too, they have even

less weight than the semi-formal transactions. Again, they almost certainly out-number the semi-formal interactions.

Items Conceived But Not Raised

Here lies the real sleeper. The many ideas Jack had, but which he was either afraid to present or for which presentation he could find no seemingly appropriate venue.
Maybe Jack is a total crackpot and 95% of his ideas are not helpful. However, crackpots sometimes also tend to be prolific and the odds of nature are that five of every 100 ideas which he has really will be worth considering. But if Jack has often tried and failed at the above three avenues, he will become discouraged and also less likely to raise further new ideas with anyone but his closest confidants. They will likely ignore him or else may appropriate any good ideas as their own.

Of course, as diagrammed above, this is undoubtedly *by far* the largest population among the four types of ideas or concepts discussed here and this is the area where GAINER really shines. That is because **the use of GAINERs, not only to deploy workgroups to the home workplace, but also for those remaining at the office, will create a situation where ideas, hunches, theories, suggestions and concepts can be far more readily (and unobtrusively) 'test-flown'.**

I believe that GAINERs will permit everyone throughout the organization – at all levels – to make many more tentative explorations than has ever been the case in past, by collecting information (essentially 'thought traces') from other GAINERs on what similar ideas have been explored by other employees in the past. This not only helps the newcomer avoid asking as many 'dumb questions', it also creates a climate where people are more willing to explore. It avoids following up the same dead-ends over and over. A GAINER-equipped organization is thus a smarter organization because it is better at learning *from, through and about* itself.

7.8.3 GAINER Business Value By Function

Computer-Telephony Integration (CTI)

1. Unified List Management

If several different contact managers exist across the organization, but GAINERs can shadow all of them, then we are in a position where the GAINER's directory system becomes a unified way of storing contact and one which is universally shareable within – and beyond – the organization. This saves time copying or transposing contact data from one contact manager to CSV or an E-Mail, sending it to someone else and having them re-enter it into their own contact manager. MS-Exchange helps a bit with this, but many organizations (such as Boeing) have both MS and Lotus groupware in service. This transposition process takes 60-90 seconds, but let's be conservative and say one minute. If I manually exchange an average of only one (internal or external) contact per day with my co-workers, GAINER offers a saving of one minute per day and 250 minutes per year, given a 250-day work year. Of course some people, such as those in sales, marketing and purchasing would likely exchange far more than five contacts per day.

>>> This amounts to an annual savings of 4.16 hours. If I am an average information worker who is aid $60,000 per year with a 15% benefit package, my total direct compensation cost per hour is $69,000 / 2000 = $34.50 which we will here round off to $35. ***Thus, savings for this function alone are thus at least 4 hours X $35 = $140/yr.***

2. Dialing time Savings

It takes me 40-60 seconds to boot my contact manager (Maximizer), look up a number and then to manually dial it. If Maximizer is already running and I can just maximize it, I will take 10-15 seconds to accomplish this task of finding the number, but I will still have to dial manually since dialling rotes with most contact managers are a farce, as I have already demonstrated with Maximizer. Average total time to lift the receiver, say the name and start dialling is about five seconds. This saves me at least ten seconds on every call I make. The same would be true for GAINER, although it might be slightly quicker due to a more powerful processor.

>>> I don't have any data on how many calls home workers make, but we do know from experience that in each and every work category the number of calls made per day goes up substantially when someone works at home. If a person made ten calls per day at the office they are likely to make at least 15-20 at home. Naturally, the work category, specific work being done at the moment and personal preferences will have an impact – some people will prefer E-Mails and QXs whenever they can use them while others will crave more live contact.

>>> I think it is more than reasonable to suggest that the 'average' home-based information worker would make at least ten calls per day when at home and that at least five of them would be people whose number he already has memorized so he would be inclined to just dial from memory – so in any event GAINER would offer no saving in this regard. However for the other five calls, the ones he has to look up, if he can avoid spending even the ten seconds looking up the number that is 50-60 seconds per day saved – This amounts to about another 250 minutes per year, but let's round down to 240 minutes or four hours per year. ***Just for the voice-dial feature, we thus save an additional 4 hours X $35 = $140/yr.***

>>> Thus, the above two categories alone ***– savings just for telephone contact management and voice telephony dialing – amount to $280 per year****.*

>>> Skeptics will argue that much of this time saving will be frittered away by home-based users twiddling their thumbs, daydreaming or browsing the Internet. The contra-argument is that of course home work styles are different than office work styles, but the good news is that home workers tend to have longer, more intense, work periods (without breaks) than those at the office. If the home worker puts even HALF of the saved time to good use he will almost certainly accomplish more during that time than he would have if he employed the same number of saved minutes at the office. So, there is still a useful saving even if it is not as high as estimated here. There is no scientific way, however, to get to a more accurate estimate at this time.

>>> Of course work style, role and personal differences will also impact actual savings in the field.

3. Call Logging

Call logging is very valuable from the point of view of knowing one's personal work history and of course for types of work where clients are billed for calls or at least need to be reminded that the calls occurred. However, other software can provide this feature, usually software tied in to the specific type of work being done. Such software will likely be acquired anyway for its other features so there may or may not be a hard cost saving or time saving associated with call logging, but it certainly provides the worker with a very convenient feature.

>>> One thing we have not addressed in the GAINER functional specification is whether GAINERs should, by default (or by user selection) log calls in basically the same way as they log QX traces.

>>> Accordingly, ***no cost saving was counted here****, even though there is surely a benefit.*

4. Conference Feature

The Bell Canada conference feature costs approximately $3/month plus, I believe, a usage charge. However, it can be used where we have only one line and with GAINER in most cases two lines will be required, so to do conference calling we are simply leveraging off the fact that we will already have a second line.

>>> Although it is unclear what portion of the second line cost we should allocate to each of fax, QXs, GAINcalls and voice conference calls it is clear that:

-Bell conference calling alone can cost up to $36/yr, something we don't need with GAINER;

-having a fax capability would require a second line anyway, usually costing $40-50/month for a total cost of $500-600/yr;

-GAINcalls add significant value since they allow us to create a 'virtual private telephone network' with the added functionality of knowing who is calling and what they want, and thus how to prioritize the call; and

-we also avoid the cost of a fax board or stand-alone fax which are in the $30-50 range and $100-200 range respectively.

>>> It is thus probably fair to state that we get 'free' with a two-line GAINER a conference calling feature which saves us $30-36 per year, but we are still stuck with the second line cost. Of course, some organizations will avoid this cost, but they will thus voice-handicap their home workers unless they have a strong VOIP capability. There is little point setting up a home workplace arrangement which hops on one foot – if you are going to reap the hard and soft savings from home workplace, not funding what is needed at home will only cause the whole deployment to backfire or fail.

>>> To be both conservative and non-controversial, I am ***electing not to count this saving*** *at all due to the difficulty of dealing with concomitance and allocation issues. We do know, however, that it exists.*

VoIP

While having VOIP can save a substantial amount of money for the company, and this requires VOIP-capable phone sets, the savings GAINER provides at the home worker's desktop are of two specific types:

-avoidance of the cost of a VOIP-type phone; and

-the ability to conference PSTN and VOIP calls.

>>> I am assuming an average ***cost saving of $50 through avoidance of having to buy a VOIP handset*** *for the home-worker.*

>>> Thus far, I don't have enough data to make a reasonable estimate of the second type of savings.

>>> This brings cumulative GAINER savings thus far to $330/yr.

Datacom / Security / Home PC Management

Whereas PC data communications capabilities have evolved rapidly, from terminal emulators and modems of yore, to modern remote access, PC-Anywhere and similar features even without a GAINER a home worker could be expected to be deployed with such capabilities.

>>> However, experience at Boeing and elsewhere showed that data communications management, computer security, groupware and management of the home PC were the four areas where home workers (particularly executives) drew most heavily on user support. It was found that the average executive working at home consumed eight times as much user support, during the first two months, as one who was still based at the office.

>>> Part of this was due to MS-Exchange/Outlook's poor support for home workers (as soon as you logged on it tried to download 8-10Mb of office-based past history data and there was no way to stop it from doing so – MS was quite intransigent on this issue until I made very loud noises to the Boeing CIO.

>>> It is probably fair, however, to postulate that – without GAINER – home workers for the first few months increase their draw on user support in low multiples – such as two to four times as much as when at the office.

Let's consider these three areas in turn.

1. Datacom

GAINER acts as a gateway, hub and filter to ensure that data communication – including connection with client-server applications and hosts – occurs seamlessly. GAINER itself should be capable of emulating common IBM and DEC terminals, and possibly with optional software exotics such as the Unisys A/B-Series poll-select terminals.

>>> The savings here is not so much on software products (terminal emulators are basically freeware today) but on reducing the support necessary to establish and maintain the home worker in his access to systems back at the office.

>>> Support services have a fully allocated cost of $75-100/hr to deliver over the phone and $150-200 to deliver in person (to the home workplace). Even minor savings on supporting non technically sophisticated users in their data communications activities can, over a deployed workgroup, represents a major cost avoidance, when it comes to a home workplace deployment. Without GAINER, such costs could become prohibitive.

>>> I thus believe that GAINER will create a ***saving of at least $75*** *(one hour of avoided help time) on IT user support to each home worker for data communications due to the fact that it has all of these features built in and locked down so the user does not have to install them, and cannot break them.*

>>> This brings total GAINER savings to $405/yr.

2. Security

This is a serious bane of home workers, since truly adequate security arrangements – until quite recently at least – have been a total pain to manage. I had certificate access at Boeing, dual-certificate access at Amdahl and dual-certificate access when on contract to the Canadian federal government.. In reality, all of these were essentially professional installs meaning that all homeward-bound PC's would have to be set up (and locked down) by IT prior to the deployment. Indeed, I myself made numerous calls to the IT support folks in each of the above cases in order to stabilize the installation and get it working on a reliable – and replicable – basis.
Boeing actually expected executives to self-install this at home – several IT support people (plus myself) spent something like eight hours getting one particular VP up and running on this and then his kids crashed the installation the next week.

>>> If out-of-the box GAINERs, properly configured before being sent home, can manage the basic security function. I don't have any hard number for Boeing, but believe that for executive and information workers at home they spent 2-3 hours at least to support computer security issues, above and beyond the time supporting the establishment and maintenance of basic data communications. However, this included application security, some of which GAINER won't touch.

>>> While GAINER will clearly be of help here, I don't have a firm basis for citing specific additional savings above and beyond datacom so here again I will choose to err on the side of being conservative and declare no savings.

3. Remote PC Management

Most non-technical workers do not want to manage their home-based PC beyond setting up directories where they will store things. They want backups done seamlessly and they want software upgrades to appear magically and without upsetting everything which existed earlier.

There is no doubt that GAINER's ability to be 'master of the PC' permits a properly authorized remote IT support user to fully manage, back-up, restore and software-upgrade the PC on a basis which is invisible to the user and which is just as authoritative as if the PC was brought in to IT by the home worker.

>>> If you can avoid one trip to the person's house by an IT field support person and/or one instance of the user actually having to bring his PC back into the office then ***a labour cost avoidance and disruption avoidance of at least $180-200*** *can be claimed. I am basing this on the following:*

> *-loss of one hour of worker time ($35) plus two hours of IT support time ($75 X 2 = $150) where the user brings the PC back in to the office, takes it to IT, collects it, takes it home and sets it up again; or*
>
> *-estimated cost of a field visit by an IT support person ($200).*

>>> We need to add explicit functionality to support this remote management capability in the GAINER functional specification document.

>>> For home-based workers who are telecommuters, this probably favours a lock-down arrangement where:

> *-the user cannot install software or re-arrange the directory structure;*
>
> *-GAINER offers the ability to permit a fingerprint-authenticating mouse to be employed such that only the home worker may access the GAINER and PC.*

>>> This is the approach we pursued in the home workplace hosting plan with Amdahl.

>>> If we use ***$200 annual savings*** *(and I believe even that is quite conservative)* ***we now have a total of $605/yr in savings from GAINER.***

Totalling Quantitative Savings– Telecommuting Context

Of course, all of the above-cited savings must be seen in the context of being savings not against the current situation in the office, but rather as savings when comparing a home workplace environment with GAINER to a home workplace without GAINER.

>>> Skeptics will argue that the organization can naturally avoid with the 'home workplace without GAINER' costs simply by not sending workers home at all, but the obvious reply is that in that event it will also not gain the quantitative and qualitative benefits available from the home workplace.

Providing a more balanced approach, TABLE 7-1 normalizes the savings discussed above by considering three scenarios:

-conventional office;,

-HWP-without-GAINER; and

-HWP-with-GAINER.

In most cases, only the costs which vary are shown; for example long-distance telephone is assumed to be the same, provided only that the home office and conventional office are not long-distance from each other. GAINER savings areas are **boldfaced** in the table.

TABLE 7-1 – ANNUAL OFFICE AND HOME WORKPLACE COSTS COMPARED (USD)

Parameter	**Conventional Office**	**Home Workplace (no GAINER)**	**Home Workplace (with GAINER)**
Office Space	$6000 (300 sq. ft X $20/yr)	$0	$0
Conference Space Share Allocation **Other Work Space Share Allocation**	$1000 (500 sq. ft. X $20/yr X 0.10) -use of conference space only	$2000 (500 sq. ft. X $20/yr X 0.20) -use of conference space and use of a small workstation up to two days per week	$2000 (500 sq. ft. X $20/yr X 0.20) -use of conference space and use of a small workstation up to two days per week
Office Equipment Share Allocation	$250 $5000 – photocopier $3000 – HD laser printer $2000 - other $10,000 total -two year amortization or lease cost $10,000 / 2 = $5000 -shared by 20 users $5000 / 20 = $250	-not provided	-not provided
Office Equipment Services Purchased (ex: Kinkos)	-not required	$100	$100

Parameter	Conventional Office	Home Workplace (no GAINER)	Home Workplace (with GAINER)
Office and Computer Supplies	$500	$700 -requires more paper and printer supplies	$700 -requires more paper and printer supplies
Basic Telephone Service	$240 -behind PBX ($20/month X 12)	$600 ($50/month X 12)	$600 ($50/month X 12)
Second Line Telephone Service	$0 -not provided	$600 ($50/month X 12)	$600 ($50/month X 12)
VOIP (where provided)	$25 $50 device amortized over two years	$25 $50 device amortized over two years	**$0** -included with GAINER
PC	$2000 -hardware allowance -software / upgrades	$2500 -hardware allowance -software / upgrades -includes printer and scanner	$2500 -hardware allowance -software / upgrades -includes printer and scanner
PC User Support	$150 2 hours	$150 2 hours	$150 2 hours
Datacom User Support	$75 1 hour	$150 2 hours	**$75** 1 hour
Remote PC Management	-not applicable	$200 -1 occurrence of carry in or on-site visit	**-not required with GAINER**
Unified List Management	-not provided	-not provided	**-$140** -time saving of 20.8 hrs X $35/hr
Voice Dialing	-not provided	-not provided	**-$140** -time saving of 4 hrs X $35/hr
TOTAL	**$10,240**	**$7025**	**$6445**

Parameter	Conventional Office	Home Workplace (no GAINER)	Home Workplace (with GAINER)

The following notes relate to TABLE 7-1.

1. The cost of the GAINER itself is *not* included in the above table, but if GAINER cost even $1500 and if this amortized over two years it would have a basic cost of $750/yr assuming only that its support costs could be buried in the support costs already reported above and that the capital cost also included two years of warranty support from the vendor. In this scenario the resulting $750/yr cost brings an annual benefit of $580 ($7025 - $6445) which equals a **38.66% annual rate of return.** Alternatively, if the GAINER costs $1500 its payback can be calculated at $48.33/month ($580/12), so the **payback is 31 months.**

2. **The more significant number, of course, is the comparison between the $10,240 cost of having this worker remain at the office versus the $6445 cost of having him at home with a GAINER**. That is because experience has already shown that conventional home workplace scenario – with conventional equipment and support mechanisms – does not work well for telecommuters and that very many telecommuting trials have proven lackluster or have failed entirely and were quietly killed. (This is true even in cases where HR does not demand exclusive control of the deployment and true in almost all cases where they do.)

*>>> One could thus argue that by making the home workplace really practical for telecommuters, where nothing else fully accomplishes this, the $750/yr cost of the GAINER brings a $3795 ($10,240 - $6445) annual benefit for a **506% annual rate of return**. Or, considering the total cost of $1500 and converting $3795 to a $316.25/month benefit, the **payback is 4.7 months**.*

3. In the above scenario, the employer does *not* pay the employee for home office space, but of course does provide him with the benefit of not having to commute or of else commuting very little. The employee must also provide a high-speed Internet connection with an Ethernet interface, which in most cases will be piggybacked onto the employee's phone, cable or satellite service. The employer does provide:

-GAINER;

-locked-down PC;

-printer and scanner;

-office supplies (available through an outlet such as Kinkos);

-local office equipment services (available through an outlet such as Kinkos);

-two business telephone lines; and

-all required user support.

4. The table assumes that the employee begins working 3.5 to 4 days per week at home and then gradually moves that towards 5 days. Ample (bookable) small work cubicles and conference rooms exist back at the office.

5. This calculation also (implicitly) assumes that the worker will otherwise remain at least as productive, on an annual basis, as if he had been at the office. Otherwise the table would need to show a productivity drop as a result of his being at home. Most studies do in fact show that where home workplace projects have succeeded workers have been at least as productive and very often more so. True too, they have invariably developed more flexible work styles and have been happier and more challenged.

6. Against this, however, are the following important issues:

-supervisory and middle management (where it still exists) tends to believe workers they cannot see could not possibly be working;

-home-based workers become deprived of their access to most of 'petty politics' and those who thrive on it become despondent and disaffected – even those who don't tend to get locked out of the office gossip mill and may thus miss important opportunities to impress the boss, avert back-stabbing by rivals and so on – it is far easier for petty-politicians back at the office to prey on those who work at home, don't realize what is going on and thus cannot defend themselves – this is something executive management needs to head off BEFORE it starts by fostering a culture throughout the organization which is HWP-friendly;

-except where a worker is at home 100% of the time, some paid travel time occurs during the work day which tends to make other employees jealous that Jack is being paid to commute while they are not;

-it is necessary for the employer to ensure that group medical, accident and worker compensation plan providers are aware of the home workplace situation and formally acknowledge it so they are unable to try to void coverage later on – the US Supreme Court recently struck down an attempt by an insurer to charge an employer more because some employees worked at home.

7. If the employer also gives the employees who remain back at the office a GAINER they too will probably pick up - at the very least - some of the $280 of list management and voice dialing benefits, *thus reducing their $10,240 cost, but also thereby lessening the home workplace GAINER business case slightly.*.

>>> This, of course, is nothing other than silly-stupid (indeed perverse) accounting since there will be even greater true net gains for the organization if giving GAINER to both groups further lessens the operational disadvantage of those being deployed to the home workplace. It will be hard, however, to convince accountants of that!

>>> While selling more GAINERs to a given client is obviously good news for any vendor, due to this 'accounting anomaly' we may get into a business-case 'do-loop' when we try to quantitatively prove the benefits of also using GAINERs back at the office, even though these benefits are intuitively obvious. Of course, if the argument is accepted that only the current office and HWP-with-GAINER scenarios are relevant (and that therefore the HWP-without-GAINER scenario is irrelevant to the analysis since it is not really practical for many telecommuters) then we still have an astoundingly good business case which can sustain the hit of being reduced by $280 assuming we decide that office workers will share ALL these benefits as much as home workers. Specifically, the $10,240 becomes $9960 and when $6445 is deducted from that we are left with $3515/yr in benefits which is $292.91 per month. This means our $750/yr GAINER cost now brings a paltry ***468% ROI*** *and* ***monthly payback is now 5.1 months****.*

8. Some observers may still argue that the above estimates are insufficiently conservative. For example, what if the home worker transfers to his peers only one contact data set per week or month? They may thus want to see the $280 of contact management and dialing savings removed entirely from savings and thus added back in as a cost. They may then also proceed to argue that we should really compare the resulting $6725 HWP-with-GAINER cost ($6445+$280) with the $7025 HWP-without-GAINER cost for a net benefit of only $300 for the GAINER scenario. This approach *is totally unreasonable*, however, for the following reasons:

-home-workers will in general be far more dutiful in tracking contact information since they won't as easily have access, for example, to such luxuries as not remembering a guy's name but remembering where his office is, and thus being able to just go down there and stake him

out;

-home workers will therefore treat contact data as being of relatively more value than will most office-bound workers, with the possible exception of those in working sales who of course fully understand the value of contact data;

-because they don't have the luxury of just writing a contact's data on a yellow sticky and handing it off to a colleague, nor of photocopying a business card, they will be forced to use a system-based means of transferring this information far more than is the case today, since dictating it over the telephone is quite clumsy, slow and error-prone;

-there is almost no doubt that home workers will make more phone calls than the equivalent workers back at the office since they cannot simply wander down the aisle to Sam's cubicle when they want to ask him something, not matter how casual the subject;

-all calls must be somehow dialed and therefore the opportunities for saving time both on looking up numbers and dialing them are absolutely PERVASIVE in the home workplace;

-nothing else will do what GAINER is capable of – if there was already an out-of-the-box product which permitted massive home workplace rollouts, they would already be complete – there is no such product/service set available anywhere which is optimized to home workers – *they are treated as technological second- or third-class citizens in almost every way* – in terms of LAN access, system access, telephony access participation in pre-arranged meetings and so on; and

-if GAINER can, as we claim, serve as the key enabler of truly practical home workplace deployment for workgroups of any size it is the current office situation and the one we would create with GAINER which must be compared – and as indicated above if GAINER serves as an HWP enabler it occasions very substantial savings no matter how many contacts a user does or does not transmit to his peers.

7.8.4 QX Functions (Types A..Z) in Further Detail

QXs Constitute An Additional Benefit

It is crucially important to note that thus far in developing our business case calculations, the GAINER has not yet sent out or received a single QX – all of the above estimated savings come in relatively conventional areas, just by having better CTI and a generally more HWP-friendly device on the home worker's desktop.

For telecommuters, GAINER's ability to exchange QXs will (as shown below) provide the ability to co-ordinate their efforts even though they are decentralized. For DWP and SOHO users, the GAINER will permit much better organization of all of their relationships with customers, peers and suppliers beyond their own walls. For all three groups, GAINER will also open the door to participation in a much wider economic – and social – commonwealth wherein anything they can dream or conceive of can be offered up to see who else might be interested.

Qualitative Benefits

Unfortunately, the following does not provide a firm basis on which to quantitatively estimate the net benefit of the organization being able to use QXs, even internally. That is because the examples are each entirely anecdotal and thus cannot be generalized nearly as easily as the need to look up contacts, call them or obtain user support.

At the one extreme, there will be cases, like Train #44 as discussed above, where a single QX could avert a catastrophe and loss of life. At the other extreme, an under-occupied home-worker could spend half his day flinging useless QX queries throughout the organization, consuming a lot of communications bandwidth, GAINER MIPS and PC MIPS, all to no avail. In reality, there will be the two extremes and every shade of gray in between. True too, QX effectiveness (and value) will vary with individuals over time (since the latter individual will eventually smarten up or else be fired), from one individual to the other, from one role to the other and among workgroups and organizations.

True too, we do not yet have any way of knowing how quickly various organizations will advance down the GAINER learning curve insofar as using QXs to make their business smarter is concerned. For example, two very similar insurance companies may implement GAINERs company-wide at the same time – one may quickly begin to utilize most of the capabilities described below while the other reaps only the most basic CTI and HWP benefits and takes forever to figure out how to use QXs effectively.

This situation (of being unable to estimate QX benefits on an unchallengeable basis) points to creating a GAINER price-point which, where necessary, can be justified solely on the basis of the very obvious – and provable – CTI and HWP benefits estimated above and which thus treats the QX capability as 'gravy', at least at the beginning.

>>> It also points to being able to simulate workflows with and without GAINER. The Comprehensive Workplace Simulation (CWPS) approach postulated in ANNEX B does address this issue in part.

Identifiable Benefits by QX Type

This section makes a preliminary attempt at identifying and defining a standardized set of values for the TYPE-SECONDARY parameter which would further define a QX type.

>>> All of these QX types would be included with the out-of-the-box GAINER.

For example, under the ASSOCIATE type of QX, definitions have been produced for the ASSOCIATE primary type combined with an INTEREST secondary type (which can be written as ASSOCIATE+INTEREST or else as ASSOCIATE-INTEREST) and this combination is then detailed.

The objective here is to begin considering the actual role which these combinations of primary and secondary QX type would play within a business enterprise. Specific examples are therefore provided for some of the combinations, not only of how this specific QX primary/secondary type combination would actually be used by a decentralized workgroup, but also of what types of responses could be expected.

Where possible a few ballpark estimates are made of the savings (available from using an QX) versus handling the same issue conventionally. Savings estimates are **boldfaced.** *These estimates are anecdotal and they are admittedly somewhat crude, but they should at least help us to begin developing an order-of-magnitude estimation of the benefits of GAINER in service, once QXs begin travelling around the organization in large numbers.*

>>> We will, without a doubt, be able to prove that GAINER's ability to launch QXs will be of at least some value over and above the CTI and basic HWP benefits considered above.

The big benefits estimation issues are:

-effectiveness of the QX as a substitute for a given conventional method of doing something;

-willingness of users to employ a QX for this function;

-accuracy of our estimate of the cost of the conventional method; and

-number of occurrences per year for a given category of worker.

What we have here is the freeing up of time which workers can put to better use. Most workers will put at least part of this time to better use, all will take some back for their own enjoyment and a few will squander it. The fact is, however, that we simply don't know yet the distribution of these time re-allocation practices among individuals since nothing – not even the advent of the PC – has ever had the potential to save an organization as much time as a properly deployed and use population of GAINERs.

For simplicity, it is assumed below that:

-all workers are paid a fully allocated direct-cost rate of $35/hr;

-the office and HWP-with-GAINER cost structures are as set out in TABLE 7-1; and

-there is no incremental cost to process queries on existing databases which are already in production throughout the organization – that will also extend to GAINERs which are dedicated as front-ends to organizations, projects or databases.

The following is the default template for expected responses, from the above-cited document.

TYPE SENT	TYPES EXPECTED IN REPLY
A-ASSOCIATE	A-ASSOCIATE or C-COMMUNITY
B-BUY	S-SELL, I-INTEREST or Q-QUESTION
C-COMMUNITY	C-COMMUNITY or A-ASSOCIATE
D-DECLARE	I-INTEREST, K-CONFIRM or J-LEGAL
E-ENTERTAIN	E-ENTERTAIN or I-INTEREST
F-FETCH	F-FETCH or R-RESPOND
G-GROUP	G-GROUP
H-HOUSEHOLD	A-ASSOCIATE, C-COMMUNITY or E-ENTERTAIN
I-INTEREST	I-INTEREST or L-LEARN
J-LEGAL	J-LEGAL or K-CONFIRM
K-CONFIRM	(NONE)
L-LEARN	L-LEARN, I-INTEREST or A-ASSOCIATE
M-MEDICAL	M-MEDICAL
N-NETWORK	A-ASSOCIATE, C-COMMUNITY or N-NETWORK
O-ORGANIZE	O-ORGANIZE, C-COMMUNITY or K-CONFIRM
P-PERSONAL	P-PERSONAL
Q-QUESTION	R-RESPOND
R-RESPOND	K-CONFIRM
S-SELL	B-BUY, I-INTEREST or Q-QUESTION
T-TRADE	T-TRADE, I-INTEREST or Q-QUESTION
U-UNDERTAKE	A-ASSOCIATE or C-CONFIRM
V-SURVEY	R-RESPOND or Q-QUESTION
W-WORK ITEM	D-DECLARE, G-GROUP, I-INTEREST, K-CONFIRM, L-LEARN, O-ORGANIZE, Q-QUESTION, R-RESPOND or U-UNDERTAKE
X-EMERGENCY	X-EMERGENCY, R-RESPOND or K-CONFIRM
Y-SPARE	(TBD)
Z-SPARE	(TBD)

>>> For each primary-secondary type combination a fuller description is also given below of how it is best used, followed by an example scenario.

A **ASSOCIATE** offer to associate (basis/purpose/time)

This primary type is intended to permit the user to seek out those who may have a common or related idea, concept or interest to that being proffered by the user. It seeks to identify and form the basis for a (relatively loose) association among the originator and one or more some of the recipients. It is also used to gang together information, systems and people for various purposes. ASSOCIATE is far less formal than using DECLARE, GROUP or ORGANIZE and is thus ideal for launching 'trial balloons', floating new ideas or even conducting 'fishing expeditions' across:

-the GAINERS of some or all co-workers; and

-GAINERS which function as 'front-ends' for projects, applications or databases.

The following primary-secondary type combinations have been identified.

ASSOCIATE-INTEREST – this QX declares an interest in order to determine who else would like to share in this interest or in some way add or contribute to it

>>> The VP Sales declares and interest in opening up a new territory and seeks 'associates' – at any level and I any department - within the company who might have had past experience in that geographic market and seeks to learn what they know about it. If sufficient 'associates' are found a study group might be formed to assess the feasibility of entering that market.

>>> The most logical response would be an echo ASSOCIATE-INTEREST type QX with subject material delineating each person's interest. This is defined as a 'populated echo'.

ASSOCIATE-CONCEPT – this QX puts out a concept to see who else would like to associate with it with a view to further developing it – this type of QX can be used to associate people, documents and other information items and past transactions

>>> Jack floats Idea X about how to improve the Shipping Department to his peers and his boss.

>>> Logical response would be an ASSOCIATE-CONCEPT populated echo.

>>> In the conventional world, if he chooses the above-described semi-formal route and uses E-Mail, Jack incurs the cost of sending an E-Mail to ten people and then following up by phone with each of them as well as the cost of each of them, in turn, spending 10 minutes with him on the phone:

-time for Jack is 100 minutes;

-additional total time for all of the other people is 10 minutes X 10 people = 100 minutes; and

-total time cost (and available GAINER savings) is 200 minutes / 60 = 3.3 hours X $35 = $115.

>>> The above estimate does not count the cost of the two minutes each of the ten people took to read the E-Mail before Jack called them. If we did add that in, there would be another 20 minutes for 0.3. hours X $35 = $11, which added to $115 gives a total of $126.

*>>> If Jack floats even one new concept, idea or suggestion per month using GAINER instead of the above method represents an annualized savings of **$1512** ($126 X 12)*

>>> True too, if in the conventional world Jack had made a 'rolling social event' out of wandering around and actually visiting all of these folks in person to get their comments, and since at least a couple of them

might also be unduly social – turning a ten minute meeting into a half-hour one by chatting about everything under the sun – the process of further evolving (or killing) - Idea X could easily turn into a $500 total cost exercise and in such a case GAINER offers the exact equivalent savings. If he does this monthly, GAINER would save up to $6000 per year by offering the opportunity for that much time to be creatively re-deployed. The colloquial counter-argument, of course, is that if Jack behaves in this manner, he will (if provided a GAINER) just use the time saving for other social pursuits like chatting up the boss's cute admin assistant. Naturally, many others in the organization will make better use of the time saved.

ASSOCIATE-GROUP – this QX seeks to define (and hence create) a loosely associated group who share a common interest, propensity or activity. It establishes an 'potential interest list' of associates.

>>> Jack asks who would be interested in participating in a company car rally if he were to undertake to organize one.

>>> This is a much less formal QX than ORGANIZE-GROUP, discussed below, which formally establishes a group.

>>> The answer could be a populated echo, ASSOCIATE-INTEREST or CONFIRM-BASIC reply.

>>> If Jack follows up as for Idea X, the cost would be similar, but in reality it will likely somewhat higher because people are likely to ask far more questions if they think they are in the process of being roped into joining a new committee or other group and this will result in extra workload for them. If the calls are just 15 minutes each, then the above-estimated cost rises to ***$175.***

>>> Alternatively, if the recipients are not called initially by Jack it is likely that – in their reactions to his E-Mail - they will form a normal distribution, something like the following:

> *-two will indicate an interest right away and will spend 10 minutes writing a good E-Mail response (2 X 10 minutes to respond plus 2 X 2 minutes for Jack to read for a total time of 24 minutes);*
>
> *-three will indicate some interest in an E-Mail response they put together in two minutes each of which will take Jack just a minute to read (for a total of 3 X 2 + 3 X 1 = 9 minutes);*
>
> *-three will not reply at all and will require a 10 minute follow-up phone call from Jack to determine whether or not they are interested, and it turns out that one is and two are not (3 calls X 10 minutes X 2 people per call = 60 minutes); and*
>
> *-two more will not reply at all and when contacted will tell Jack to go away during a one-minute call (2 calls X 1 minute X 2 people = 4 minutes).*

*>>> In this scenario we have consumed 97 minutes (about 1.5 hours) to get our answer about who might like to just associate on some basis - at a cost of approximately $52***,** *which would of course be saved by using GAINER.*

>>> Jack may less often need to set up associative groups than he likes to try out new ideas, but if he does this even four times per year, in this scenario we have a ***$204*** *($52 X 4) minimal annual saving with GAINER. In the previous (call everyone) scenario, we have an annual saving of* ***$700*** *($175 X 4).*

ASSOCIATE-INFORMATION – this QX is analogous to a query in that it seeks to obtain more information which is similar or analogous to that which I already have and offer in the QX – it says "this is what I know about X, who can provide me more?"

>>> The example, given above, of Train #44 always being late on Tuesday is a good example of a situation where this type of QX could avert a catastrophe.

>>> Replies of a populated echo or INTEREST-BASIC would be logical.

>>> For the moment, let's forget about averting a train wreck and just consider the comparative cost of doing this manually. As above, the most efficient way would for Jack to send out an E-Mail and either call everyone or else simply await a response by E-Mail and call those who don't respond.

>>> It is entirely reasonable to suggest that the ASSOCIATE-CONCEPT cost savings estimate is a good analog for this category, rendering a unit savings of $126 and an annual savings of ***$1512.*** *After all, most people in an organization will go seeking out some item of information at least once per month!*

ASSOCIATE-SYSTEM – this QX is a request to associate a number of GAINERs and/or PC's together to achieve a common purpose – it could be SETI-like in its intent; breaking a big problem into smaller chunks with each PC contributing its own MIPS to do its share.

>>> A GAINER could respond with its LINK functionality if the request is to do gang or daisy-chain processing and if its owner has authorized such participation with the GAINERs of those he trusts.

>>> The system engineering literature fairly adequately discusses the benefits of computing power pooling exercises, often under the peer-to-peer (P2) label. Many organizations have used this strategy to move low priority and batch processing to night and weekend windows when many office-bound PCs and servers are idle, thereby averting the costs of adding additional hardware. There are two counterpoints, however, in our scenario:

> *-the evening and weekend timeslots may not find home-based, company-owned PCs actually idle as often as office-bound PCs, but it is a fairly safe bet that most such PCs will be idle in the 1200-0600 HRS window, and the true night-owls can just take their PCs out of the prospective 'PC night shift'; and*
>
> *-the savings are more in cost avoidance than hard-savings and that will earn us the enmity of some of the green eye-shade wearers.*

>>> Actual savings allocation could be quite troublesome. Suppose a workgroup of 100 sends home 50 workers and only the latter group has GAINERs. By using a PC night-shift, they are able to avert buying another high-end Compaq Proliant for the Billing Department at a cost saving of say $30,000. If a two-year processing horizon is employed, and if this P2P function was not possible without GAINER, then one might argue that the direct savings are $15,000 per year. This amounts to $300/yr per GAINER in cost avoidance.

>>> But there are still cost allocation issues:

> *-the GAINERs did not in fact do the extra processing, they simply made it easier to unlock the potential of existing PCs so we really should credit some of the savings to the PCs, not just to the GAINERs – thus it is the GAINER/PC team which saves us $300/yr – so maybe we should show the GAINER as saving only $150/yr and the PC as saving $150/yr; and*
>
> *-conversely, there is no 'normalized amount of processing' which it is reasonable to ask the PC to do, so what if the workgroup sent home only 30 people with 30 GAINERs – if those 30 PCs could still do the same work should we then allocate the $15,000 over 30 GAINER/PC teams for a per-unit cost avoidance of $500/yr or $250/yr if split 50/50 with the PC?*

>>> My second McGraw-Hill book, Implementing Open Systems, has two chapters which address this issue of concomitant costing and we may need to draw on that work to come up with a coherent costing methodology. On the other hand, there may be another approach available from the literature.

>>> For the moment, I am going to stick with a very conservative approach and take the lowest of the four numbers discussed above, ***$150/yr*** *as the GAINER-attributable contribution to the savings from the PC night shift and consequent (billing) server acquisition avoidance.*

ASSOCIATE-ACTIVITY – this QX is an offer to associate for the purpose of engaging in a declared activity of any kind and which may be a one-time, recurrent or ongoing activity.

>>> The VP Production suggests a late-Friday pizza dinner for his direct reports so they can go over the quality data from last quarter.

ASSOCIATE-EVENT – this QX is an offer to associate for the purpose of holding or stating a single, one-time event.

>>> Jack suggests to his boss, and co-workers, that it would be fun to have a car rally in the spring and suggests that anyone else who is interested should associate themselves with such an event, which he promises to organize later if there is enough interest.

ASSOCIATE-COMMUNITY – this QX can be used to create a community of interest around an idea, concept, suggestion, event or activity.

>>> The VP Sales points out that a new competitor has emerged and is encouraging those employees who may encounter any information on the company to share it and to participate in group evaluation of the implications.

ASSOCIATE-OMNIBUS – this QX is useful for initiating any other type of associative effort not covered above.

ASSOCIATE-JOBLET – this QX can be used to associate QXs, subjects, GAINERs/GAINSHAREs and people with respect to a proposed or actual Joblet, which is a task, project, work experience opportunity or part-time job.

>>> Joblets are normally used within the wider commonwealth of GAINER/GAINSHARE users to offer and find short-term employment opportunities, but they can also be used within an organization to expose tasks for which it is necessary to find a person or group to take responsibility. For example, the VP HR may seek a group to plan and run the annual company United Way campaign.

>>> This and all subsequent Joblet QX sub-types are in a pre-defined and unalterable format as specified by WTC.

B **BUY** offer to buy X units of Y at unit price Z

The following primary-secondary type combinations have been identified.

BUY-BASIC – this QX is an offer to buy a declared amount or quantity of specified information, services and/or products at a proposed price.

>>> The Contracting Manager of a company may respond to an offer to sell a used school bus which can be used for employee commuter transportation by issuing an QX offering to buy it for $17,500. He might also use the BUY-ORDER type described below.

BUY-PO – this QX is a formal purchase order issued with a specification format which meets one of the following criteria:

-it is the default format provided with the GAINER/GAINSHARE, being just BUY-PO;

-it is an explicitly agreed format for use between the buyer and seller organizations, for example BUY-PO-BOEING;

-it is an agreed standard format for the industry in which it is used, such as BUY-PO-CRUDE_OIL_NON_OPEC; or

-it is a new public format which has been registered as a Tertiary type under this combination of QX Primary type and Secondary type, ex: BUY-PO-EXOTIC_PET.

BUY-RFI – this QX issues a Request for Information about services or products available from the recipient(s).

>>> On behalf of the CIO, the VP Contracts may issue an RFI to several vendors regarding the price and availability of new mainframe computers meeting certain (included) specifications. In most cases the actual RFI document would be annexed to this type of QX.

>>> Here again, they QX may use any of the default, two- or multi-party agreed, industry-standard or publicly registered formats.

BUY-RFP - this QX issues a Request for Proposals for services or products available from the recipient(s).

>>> Now that the CIO has reviewed the RFI results, VP Contracts issues an RFP to several vendors seeking firm bids for the supply, installation and integration of a new mainframe computer. In most cases the actual RFP document would be annexed to the QX.

>>> Here again, they QX may use any of the default, two- or multi-party agreed, industry-standard or publicly registered formats.

BUY-RFQ – this QX issues a more general Request for Quotation for specified information, services or products from one or more suppliers.

>>> The General Manager of a city roads department may seek several quantity quotes for road salt for use next winter.

BUY-INTERNAL – this QX is an internal purchase order or chargeback request which commands the supply of information, goods or services on the terms contained within it.

>>> In most cases, an organization will develop its own private format specifications (and hence templates) for this type of QX.

BUY-ORDER – this QX places an order for products or services which is submitted in free-form, as opposed to a being submitted in a strict company purchase order format.

>>> This could be used to buy something which is not normally purchased by the company and which does not well fit into its PO format or for which an unconventional purchase method or channel is being used, perhaps between companies which do not normally do business with each other.

BUY-FUTURE – this QX seeks to acquire a future absolute right in to do or buy something at a specified price and usually under specified conditions.

>>> Of course, most user groups and industries would develop their own derivations of this to meet their specific requirements. .

BUY-OPTION – this QX seeks to acquire a future option in to do or buy something under specified conditions and may or may not incur any cost to the originator.

>>> Of course, most user groups and industries would develop their own derivations of this to meet their specific requirements. .

BUY-JOBLET – the originator seeks to obtain services to fulfil a Joblet which he has fully defined in the body of the QX – he may be willing to pay, provide a learning or apprenticeship experience or may be simply seeking a volunteer.

>>> Jack seeks someone to cut his lawn.

C COMMUNITY communicate concern/inform of event/activity

The following primary-secondary type combinations have been identified.

COMMUNITY-INFORM – this QX informs the member of an (existing or proposed) community of interest of something which it is believed will be of interest to them.

>>> The Manager of Employee Services informs all employees who live in a particular suburb that he has just learned that an important bridge will be closed for the next three months and he, thereby, also forms a new community of interest for any such future messages.

COMMUNITY-EXPOSE – this QX exposes the existence – and particulars – of an information, service or physical resource to a community of interest who may wish to use it.

>>> The Cafeteria Manager informs everyone that a new outdoor barbecue has now been acquired and that is available to support pre-booked internal and visitor luncheons.

COMMUNITY-OFFER – this QX makes an offer of any kind to a defined community, who have one or more attributes in common (they all like horses, they are all handicapped etc.) – it can also be used interchangeably with COMMUNITY-INFORM and COMMUNITY-EXPOSE.

>>> The Manager of Employee Services offers to explore chartering a commuter bus for the impacted employees during the time the bridge will be closed, if sufficient interest is expressed.

COMMUNITY-ASSOCIATE – see ASSOCIATE-COMMUNITY

COMMUNITY-JOBLET – this QX seeks to define a community with a common interest, either in issuing or finding Joblets.

>>> A carpenter may seek to form an informal collective so he can bid bigger Joblets than he could on his own.

D DECLARE make personal or legal declaration

The following primary-secondary type combinations have been identified.

DECLARE-IDENTITY – this QX declares, or re-declares, the identity of the originator and can be used whenever any component of the GAINER address data, as defined in Paragraph 11.1 above, is changed.

>>> The VP HR informs all of her colleagues that she has a new cell phone number.

>>> Note that unlike the case of leaving voice messages or sending E-Mail messages, using an QX to accomplish this permits an automatic update of each recipient's contact data. The recipient GAINER automatically updates it contact database and the human recipient does not have to intervene in any way, but will still be informed of the change.

DECLARE-INTEREST – this permits the user to simply publish a Subject-Propensity Declaration (SPD).

>>> This would normally be done only where there is reason to believe that in doing so some new or renewed interest will be attracted on the part of one of the recipients.

>>> A single person who is a member of a dating service might re-publish their partner-seeking propensity declaration after terminating a previous dating relationship.

DECLARE-LEGAL – see LEGAL-DECLARE

DECLARE-EMERGENCY – this is the GAINER equivalent to dialling 911 and depending upon the type of emergency declared, the recipient(s) will automatically be selected.

>>> This type of QX can be initiated simply by using voice input to state one of the standard tertiary types for DECLARE-EMERGENCY, for example by saying "Declare emergency police". These and the indicated actions as shown in TABLE 7-2 below.

TABLE 7-2 – QX EMERGENCY SUB-TYPES AND ACTIONS

QX Type	Actions Taken by GAINER
DECLARE-EMERGENCY-POLICE	1. Dials 911 on LINE 1. 2. Plays address, name of user and says that police assistance is required on an emergency basis at this address. (If the user breaks in using the handset, speaker or microphone his voice will over-ride play of the message.) 3. If a police emergency GAINER address has been logged this type of QX is automatically transmitted to that address. 4. If a home security system which detects an intruder is connected to the GAINER via the X.10 port or a USB port, the GAINER will automatically initiate this type of QX.
DECLARE-EMERGENCY-FIRE	1. Dials 911 on LINE 1. 2. Plays address, name of user and says that a fire has been detected and that fire department assistance is required on an emergency basis at this address. (If the user breaks in using the handset, speaker or microphone his voice will over-ride play of the message.) 3. If a fire department emergency GAINER address has been logged this type of QX is automatically transmitted to that address. 4. If a home security system which detects smoke and/or fire and is connected to the GAINER via the X.10 port or a USB port, the GAINER will automatically initiate this type of QX.
DECLARE-EMERGENCY-MEDICAL	1. Dials 911 on LINE 1. 2. Plays address, name of user and says that emergency medical assistance is required on an emergency basis at this address. (If the user breaks in using the handset, speaker or microphone his voice will over-ride play of the message.) 3. If a medical emergency GAINER address has been logged this type of QX is automatically transmitted to that address.

QX Type	Actions Taken by GAINER
	4. If a medical condition or event monitoring system which detects a medical emergency is connected to the GAINER via the X.10 port or a USB port, the GAINER will automatically initiate this type of QX. *>>> Note that when commanding this type of QX, the user may add an additional term to describe the nature of the emergency such as 'stroke', 'heart attack' etc.*
DECLARE-EMERGENCY-REPORT	1. Dials 911 on LINE 1. 2. Plays address, name of user and says that the caller wants to report an emergency described as _____ . (If the user breaks in using the handset, speaker or microphone his voice will over-ride play of the message.) 3. If a general emergency GAINER address has been logged this type of QX is automatically transmitted to that address. *>>> Note that when commanding this type of QX, the user may add an additional term to describe the nature of the emergency such as 'airplane crash', 'car accident' etc.*
DECLARE-EMERGENCY-INTRUDER	1. Dials 911 on LINE 1. 2. Plays address, name of user and says that police assistance is required on an emergency basis at this address due to an intruder. (If the user breaks in using the handset, speaker or microphone his voice will over-ride play of the message.) 3. If a police emergency GAINER address has been logged this type of QX is automatically transmitted to that address. 4. If a home security system which detects an intruder is connected to the GAINER via the X.10 port or a USB port, the GAINER will automatically initiate this type of QX. 5. Pushing a panic-button which is connected to a home monitoring

E ENTERTAIN offer/seek recreational opportunity

The following primary-secondary type combinations have been identified.

ENTERTAIN-BASIC – the originator seeks to offer, participate in or provide an entertainment experience.

F FETCH obtain specific information from other system

The following primary-secondary type combinations have been identified.

FETCH-INFORMATION – this QX seeks to fetch SPD data, contact data, subject data or other information from the recipient GAINER and/or seeks to obtain files form the recipient GAINER's PC.

>>> Naturally, the two GAINERS must have a sufficiently high trust relationship to permit the this fetching process to occur.

>>> If they first establish contact via the PSTN, if the two GAINERS judge PSTN bandwidth to be inadequate, they may mutually agree to transfer the material via an alternative channel.

>>> While Jack is away on vacation, his boss may fetch from his PC the last month sales report which Jack forgot to send to him before leaving.

>>> This QX permits a wide range of specification, and search, parameters to be employed to locate the desired information.

FETCH-FILE – this is a narrower form of the above-cited FETCH-INFORMATION type because it is used only to fetch a specific file from the PC file system by its name.

>>> To use this type of QX, Jack's boss would have to be assured that he knew (or could intelligently guess) the actual file name which Jack had assigned to the desired file.

FETCH-DOCUMENT – this is a still narrower form of the FETCH-INFORMATION type, but it specifies the document by its author, title and if desired version number and whether or not the document is believed to be a draft or final version. This is done without reference to actual file name of the document. Where it is believed that the document may exist in multiple formats, the preferred order of formats may also be specified.

>>> The GAINware software running on the PC initiates a systematic search of the files believed by it to be most likely to contain the desired document until a positive match is found.

FETCH-ITEM – this is a very broad fetch QX which may use the widest form of search parameters, but would only be executed by a recipient GAINER which had the highest level of trust for the originating GAINER.

>>> See FETCH-INFORMATION above.

FETCH-QX – this QX seeks out another QX which was transmitted earlier and seeks to 'recall' it to the originator by asking the recipient GAINER to erase all trace of it - in certain cases it may be necessary to pinpoint and recall an QX which was issued in error, which is incomplete or to which changes must now be made and where it is impossible or impractical to simply issue a supplanting replacement.

>>> Of course, there are several restrictions on this recalling of QXs;

-only the originating GAINER could issue such a recall;

-the recipient GAINER would need to have a high level of trust for the originating GAINER; and

-the QX would need to be one which has not yet been acted upon – if the recipient GAINER has already sent back anything more than the originally requested acknowledgement response (i.e. if it had responded to SELL offer with a BUY offer) then the recipient GAINER would of course refuse to permit the recall.

G GROUP pass message specific to group

The following primary-secondary type combinations have been identified.

GROUP-ORGANIZE – this QX permits the originator to seek the organization of a formal group of other GAINERs (and hence their users) for a specific, stated purpose.

>>> The CFO strikes a task force to figure out a new change to the corporate tax laws.

GROUP-DISBAND - this QX notifies the members of any earlier-defined group that its leader or moderator is now disbanding it.

>>> The CFO thanks the members of the task force and terminates its existence.

H HOUSEHOLD identify worker, household, family, home

The following primary-secondary type combinations have been identified.

HOUSEHOLD-BASIC – this QX identifies the issuer of being a member of a household and usually contains more information about the other members of the household.

>>> A family might use this type of QX to announce its arrival to its new neighbours and hence to seek out mutual interest opportunities. This might be used as a header to make a number of additional specific declarations for each member of the family. For example declaring that the household included a 9yo girl with interests in Pooh, Barbies and cats might bring a quick response from a potentially compatible new playmate.

HOUSEHOLD-JOBLET – this QX identifies the issuer as being a member of a household and usually contains more information about the Joblet status of two or more members of the same family.

>>> Three brothers declare that they would like to find large painting jobs which they can work on together.

I INTEREST offer/seek special interest information

The following primary-secondary type combinations have been identified.

INTEREST-BASIC – this QX is most often used by a recipient GAINER to express a basic or general level of interest in something which was described in an QX received earlier.

>>> Some of Jack's co-workers could use this to express interest in a car rally which he proposes to organize.

INTEREST-ASSOCIATE – see ASSOCIATE-INTEREST

INTEREST-JOBLET – this is an expression of interest in a Joblet which was offered earlier.

>> Usually it will be a reply to a SELL-JOBLET, BUY-JOBLET or TRADE-JOBLET offer.

J LEGAL pass legal/regulatory information/concern

The following primary-secondary type combinations have been identified.

LEGAL-ADVISORY – this type of QX is used whenever any person seeks to advise another person about a legal issue, including the case of issuing a warning.

>>> The VP HR may issue a formal notification to an employee who continually violates company policies that the next violation will result in dismissal. This will (ultimately) have a much higher standing than sending anything short of a registered letter.

>>> A householder might thus warn his neighbour that he will sue him for trespass if he does not keep his dog off the property.

LEGAL-INQUIRY – this is used whenever any person makes a legal enquiry of another person, a corporation or a governmental body.

>>> An employee could formally request a review of his sick leave days taken record which he believes to be in error. Again, this would have more clout than just leaving a voice message or sending an E-Mail.

>>> An aspirant could enquire of the regulator what are the legal requirements for obtaining a broadcasting license.

LEGAL-INFORMATION – this type of QX would normally be used in reply to the LEGAL-INQUIRY type.

LEGAL-DOCUMENT – this type of QX formally transmits a legal document (which is attached) and it may also do one or more of the following:

-reference to a courier or registered hardcopy which is being forwarded in parallel;

-reference to a proof-of-service of a hardcopy; and/or

-request for agreement to waive hardcopy transmission requirement.

LEGAL-DECLARE – this QX makes a legal declaration to the recipients which may or may not include an attached document, but in most cases will be accompanied by a parallel LEGAL-DOCUMENT type QX.

>>> The VP Legal may issue to the shareholders of Company X the firm's intention to make an offer to purchase their shares.

LEGAL-RETAIN – this QX is issued only to formally retain the services of a lawyer, para-legal, accountant or similar professional.

>>> The VP Legal retains a new corporate counsel, who specializes in QX law, on a retainer basis to support the company's home workplace program.

LEGAL-JOBLET – this QX is used to offer or seek legal services by means of a Joblet.

K **CONFIRM** request/provide confirmation of other QX

The following primary-secondary type combinations have been identified.

CONFIRM-BASIC – this type of QX provides a simple confirmation that an earlier QX has been received by referencing it in explicit terms.

>>> The GAINER of the VP Sales confirms that it received the monthly sales report in good order.

CONFIRM-ACKNOWLEDGE - this type of QX provides a simple confirmation that an earlier QX has been received by referencing it in explicit terms and is also used to confirm any previously made arrangement which that QX proposed.

>>> If the QX transmitting the monthly sales report also requested that the VP Sales approve it, then he might later send back this type of QX which tells the recipient that he has not only received the report, but he has also read and approved it.

CONFIRM-RECEIPT – this type of QX explicitly confirms receipt of a referenced QX or of anything else.

>>> The pet shop which shipped Jack five white rabbits may request this type of QX be sent when they have been received alive and in good order.

CONFIRM-DOCUMENT – this type of QX simply confirms that a specific document (title, author, version, format etc.) which was sent has been received in good order.

>>> The VP Legal may send a confirmation of a draft contract for purchase of the school bus.

CONFIRM-ORDER – this is used whenever the recipient is being asked to confirm that an order submitted previously is still valid.

>>> Once the contract for the school bus is completed it may be sent as part of a BUY-ORDER type QX and then vendor may then request that the buyer confirm the order with this type of QX.

CONFIRM-JOBLET – this provides positive confirmation that a Joblet arrangement has in fact been concluded and it is now binding upon both parties.

>>> Refer to the example given above.

L **LEARN** offer/seek learning opportunity

The following primary-secondary type combinations have been identified.

LEARN-BASIC – this type of QX offers or seeks any type of learning opportunity which is defined in its SPECIFICATION field.

>>> The newly hired Admin Assistant seeks someone to train her on the photocopier since her boss has no time.

LEARN-JOBLET – this type of QX seeks or offers a learning opportunity by means of a Joblet.

>>> A retired dentist is willing to help dental technicians prepare for their practical exam in exchange for their help with maintaining his property.

M MEDICAL offer/seek medical information or advice

The following primary-secondary type combinations have been identified.

MEDICAL-BASIC – this type of QX seeks or provides basic medical information.

>>> The company nurse advises that she can provide flu vaccinations next Tuesday afternoon for anyone who is interested.

N NETWORK assist in the networking of a specific group

The following primary-secondary type combinations have been identified.

NETWORK-IDENTIFY – this QX identifies the originator as wanting to be part of a relay or hub-spoke network of GAINERs which shares information on a specific subject.

>>> It is also used to identify a specific GAINER within an Ethernet LAN setting.

>>> Jack identifies himself as a relay point for incoming QXs of a certain type which reach a company front-end GAINERs.

NETWORK-DEFINE – this QX defines a proposed or potential network of GAINERs which will function as a virtual processing engine.

>>> Jack proposes that five members of Department X pool their GAINER and PC processing resources to develop and integrate a multi-part project plan.

NETWORK-ESTABLISH – this QX establishes an actual network of GAINERs which will function as a virtual processing engine.

>>> The five parties agree and the network is established.

NETWORK-MANAGE – this QX is used to manage, and re-configure, a group of GAINERs which has pooled its resources and is acting in a manner analogous to a virtual private network.

>>> Jack adds three new members to the network of five.

O ORGANIZE organize a group or activity

The following primary-secondary type combinations have been identified.

ORGANIZE-INFORMATION – this QX seeks to identify, obtain, catalog and organize information which is sought by the user or which is known to be in the (collective) possession of the recipient GAINERs.

>>> *Jack seeks to collect all information about Customer X throughout the company.*

>>> *Where some of the recipient GAINERs are in fact front-ends to systems, this type of QX could have an embedded SQL query in the SUBJECT-SPECIFICATION field.*

ORGANIZE-DOCUMENTS – this QX seeks to identify, classify assign file codes to and index documents stored in electronic form.

>>> *Jack seeks all drafts, versions and permutations of a document which executive management has ordered him to destroy.*

ORGANIZE-TELECON – this type of QX pre-organizes a conventional telecon among a number of parties, some of whom may have only GAINSHARE (and not GAINER) functionality and who therefore are unable to participate in a GAINcall by establishing the call purpose, date, time, chairman, participants, dial/contact data and charge code.

>>> Jack sets up a telecon to discuss the budget for next quarter.

ORGANIZE-GAINCALL – this type of QX pre-organizes a telecon among a number of parties, all of whom have GAINERs, by establishing the call purpose, date, time, chairman, participants, dial/contact data and charge code.

>>> *The CEO sets up a GAINcall for next Thursday at 0900 HRS with his regional VPs.*

ORGANIZE-MEETING – this QX invites all participants to join in a meeting by spelling out the name of the meeting, the purpose or objective, date, time, location, agenda, participants and their roles, facilities and resources and other pertinent information such as a subject, department, workgroup, team or informal group reference.

>>> *Jack calls a meeting of the Property Committee, which he chairs.*

ORGANIZE-ACTIVITY – this QX normally follows up positive responses to an ASSOCIATE-ACTIVITY type QX which was sent out earlier – it formalizes the existence of a declared activity of any kind and which may be a one-time, recurrent or ongoing activity by providing activity name, objective, location and date (if applicable), convenor, participants, roles and similar information.

>>> *Jack sets up a weekly bible study group for Thursdays after work.*

ORGANIZE-EVENT – this QX normally follows up positive responses to an ASSOCIATE-EVENT type QX which has sent out earlier – if formalizes the existence of a single event by providing event name, objective, location (if applicable), date, convenor, participants, roles and similar information.

>>> *Sally formalizes the date for the company picnic and assigns roles for the organising committee.*

ORGANIZE-GROUP – this QX organizes a temporary or ongoing group based on a common subject area interest (per their SPDs), declared role (in sending one or more QXs) or propensity (as provided in their full SPDs) by setting group name, chairman, objectives, participants and roles, facilities and resources plus authorities.

>>> *The CIO creates a working group to explore acquisition of a new mainframe and report back to him when convenient for them.*

ORGANIZE-TEAM – this QX organizes a formal team or task force on a basis which is arbitrarily stated by the originator by setting group name, chairman, objectives, participants and roles, facilities and resources plus authorities as well as charter, workplan, schedule/milestones, deliverables and success parameters.

>>> The CIO establishes a task force to set a new groupware strategy for the company with a mandate to report back within two months with a technical architecture, acquisition strategy and support strategy.

ORGANIZE-PROJECT - this QX organizes and initiates an actual project a basis which is stated in an annexed project charter – the QX itself sets out the name of the project, objectives, charter reference, participants and roles, organization structure, facilities and resources, references (workgroup, team, department, subject or other), workplan, schedule/milestones, deliverables, budget, authorities, applicable project management methodology, other applicable functional guidance and success parameters.

>>> The VP Product development establishes a project to develop a new type of product and bring it to beta-test after which a go / no-go decision will be made about producing it.

P PERSONAL offer/seek relationship - pass personal info

The following primary-secondary type combinations have been identified.

PERSONAL-BASIC – this type of QX seeks a personal relationship, or other contact, based on specified parameters.

>>> This is not intended for use by the decentralized workgroup during office hours. Of course lonely members of the workgroup may make good use of it after hours.

Q QUESTION ask question to other users

The following primary-secondary type combinations have been identified.

QUESTION-BASIC – this type of QX poses a basic question about the specified subject to the recipient GAINER which will search its own database for the answer and if unable to provide it will pass on the question to the user providing his own SPDs indicate a potential interest in the subject.

>>> Jack asks who thinks that a collection should be taken up to buy a gift for Sam who is leaving the company. Other employees would normally respond with the RESPOND-BASIC type of QX referencing this QX and with YES as a subject.

QUESTION-JOBLET – this type of QX requests more information about a posted Joblet or one which was received by QX.

R RESPOND reply to question

The following primary-secondary type combinations have been identified.

RESPOND-BASIC – this is the most basic type of response which a recipient GAINER can provide to an incoming QX and it is simply a reply indicating that the incoming QX has been received in good order and was in the proper format.

>>> This would be used where the GAINER could not formally acknowledge an QX for any of the following reasons:

-subject was unknown;

-type combination was unknown; or

-the specification or object field was not fully intelligible.

>>> Jack's GAINER receives a weird message about mice from China and, based on his current Subject Propensity Declaration (SPD) database, doesn't know what to do with it so it will be brought to his attention for disposition. In the meantime it sends back a RESPOND-BASIC type QX.

RESPOND-ACKNOWLEDGE – this is the standard response which would be sent back to the originating GAINER when the recipient GAINER has finds the incoming QX to be correctly formatted, fully intelligible and of some potential (but as yet undetermined) interest.

>>> The recipient GAINER is in effect saying that it may be interested in further contact in the future with respect to this QX, but is not sure yet and this is no different than Jack saying: "I'm not sure, so I'll have to get back to you".

RESPOND-CONFIRM – this type of QX is a formal confirmation that what was contained in an earlier QX and was echoed back to us by the recipient in an interrogatory form (usually be echoing back the entire QX we sent earlier, but changing the type to QUESTION-BASIC) is indeed correct information.

>>> The VP Contracts sends a BUY-ORDER type QX to the school bus vendor who responds with a QUESTION-BASIC type QX seeking confirmation. The VP's GAINER changes the format of the received QX to RESPOND-CONFIRM and sends it back with most other data (except the transmission-related items) intact. The vendor of the school bus now has on file in his GAINER all of the following:

-his outgoing SELL-BASIC offer to sell the bus;

-the resulting incoming BUY-ORDER offer to purchase;

-his outgoing echo QX, but with the type changed to QUESTION-BASIC; and

-the final RESPOND-CONFIRM clinching the deal by confirming that the BUY-ORDER was real.

>>> For legal contracts, a CONFIRM-ORDER type QX could alternatively be used.

*>>> It is reasonable to believe that such an 'evidence trail' could ultimately, if necessary, be held up in a court of law as proof that the conditions of contract were met (*willing buyer, willing seller, capacity of each to contract, clear terms and exchange of consideration).

RESPOND-INQUIRE –this type of QX is used to ask the originating GAINER to provide more information about an QX which it sent earlier – it basically says "OK that is interesting, but tell me more?"

>>> Jack receives an junk-mail type QX for lawn mowers, but he is in the market for one so he seeks more information.

RESPOND-JOBLET – this type of QX is normally used to respond to a QUESTION-JOBLET received earlier and would usually provide additional information about the nature and terms of the Joblet, above and beyond those originally stated.

>>> Jack's offer of a Joblet for lawn cutting failed to mention when he wanted the work done so a local teenage boy responds with a question about when. Jack then, in turn, responds with a small RESPOND-JOBLET type QX saying that next Saturday would be fine.

S **SELL** offer to sell X units of Y at unit price Z

The following primary-secondary type combinations have been identified.

SELL-BASIC – this is a basic offer to sell a declared amount or quantity of specified information, services and/or products at a proposed price.

>>> Jack may be responsible for selling surplus office desks after his workgroup has deployed to the home workplace. He may launch a general sell offer to a large number of GAINER recipients which are used furniture stores as well as to many types of small businesses.

SELL-INVOICE – after a sale has been consummated the vendor can present the buyer with an invoice in any of the following formats:

-default format provided with the GAINER/GAINSHARE, being just SELL-INVOICE; or

-an explicitly agreed format for use between the buyer and seller organizations, for example SELL-INVOICE-XEROX;

-it is an agreed standard format for the industry in which it is used, such as SELL-INVOICE-CRUDE_OIL_NON_OPEC; or

-it is a new public format which has been registered as a Tertiary type under this combination of QX Primary type and Secondary type, ex: SELL-INVOICE-EXOTIC_PET.

>>> If Jack finds a buyer for the desks, he will likely use the basic GAINER format since his company is not normally in the business of selling desks.

SELL-QUOTE – this QX usually responds to an earlier enquiry or BUY-RFQ type QX and it provides a firm quote to sell a declared amount or quantity of specified information, services and/or products at a proposed price.

>>> A truck dealer issues a quote against a specification for dump trucks which was sent to him earlier by a construction company.

SELL-PROPOSAL –this QX transmits a detailed proposal to sell a declared amount or quantity of specified information, services and/or products at a proposed price and under specified terms and conditions, all of which are amplified in an annex.

>>> This is used where a more complex sale is contemplated and where pre-sale negotiations are a virtual certainty.

>>> An aircraft manufacturer transmits a proposal to sell airliners to a new airline.

SELL-TRANSFER – this type of QX confirms an internal sale and transfer of any information, service or product between two business units of the same company.

>>> Jack's manager sells one of the group's copiers to another division within the company.

SELL-PICK_LIST – as part of the sale process, this type of QX lists items which are to be picked (drawn from stock) and would be used where, for example, a large order was placed and approved earlier, but the customer had the right to determine what was to be shipped when.

>>> *Jack calls for office supplies to be drawn down under the framework of a bulk purchase made by his company at the beginning of the year.*

SELL-PACK_LIST – this QX details what has actually been drawn from stock and packed for shipment and would usually be sent to the customer as a result of the supplier receiving a SELL-PICK_LIST type QX.

>>> *Jack receives a notice that the items have been withdrawn from stock and will be shipped to him on Tuesday.*

SELL-SHIPPING_NOTICE – this QX notifies the customer that the items indicated have actually been shipped, also advising the shipping date/time, carrier, expected date/time of arrival and any relevant document numbers.

>>> *Jack receives a notice that the items have now been shipped.*

SELL-MANIFEST – this QX is a document which is prepared by the shipper and/or carrier and it details the components and/or contents of a shipment which has been taken on-board by the carrier.

>>> *A trucking company makes a pick-up of a shipment of 51 boxes of copier paper to be delivered to another city. The driver's IEEE 802.11 compatible tablet computer accepts a download of the shipment details and after he verifies the contents, it is transmitted to the company's headquarters which logs the data and then uses their front-end GAINER to launch this type of QX to the shipper.*

SELL-WAY_BILL – this QX represents the electronic manifestation of a traditional way bill which would be issued by any surface carrier to the shipper.

>>> *The trucking company issues a way bill to the shipper with a copy sent to the consignee.*

SELL-AIR_WAY_BILL - this QX represents the electronic manifestation of a traditional air way bill which would be issued by any surface carrier to the shipper.

>>> *An airline issues a way bill to a shipper with a copy sent to the consignee.*

SELL-CUSTOMS_INVOICE – this QX provides an international standard customs invoice which details for each class of items in the shipment the description, number, duty class and other information n necessary for customs clearance.

>>> *A company in Germany ships a new printing machine to Jack's company and transmits a customs invoice by QX.*

SELL-CARNET – this QX issues a carnet, which is a permission for goods to temporarily enter (or in this case perhaps remain within) a country for purposes such as a demonstration or trade show.

>>> *Jack obtains a carnet so that the company can ship its trade show booth to Mexico City for two weeks and then return it to the U.S.A.*

>>> *This would also be used, for example, if you ordered a new Mercedes-Benz for pickup (and subsequent touring) in Europe before shipping it home.*

SELL-OPTION - this QX seeks to sell a future option in to do or buy something under specified conditions and may or may not provide any revenue to the originator at the time of issue.

>>> *Of course, most user groups and industries would develop their own derivations of this to meet their specific requirements.*

SELL-FUTURE – this QX offers to sell the absolute right to buy something under specified conditions and may or may not provide any revenue to the originator at the time of issue.

>>> *Of course, most user groups and industries would develop their own derivations of this to meet their specific requirements.*

SELL-JOBLET – the originator seeks to provide services to fulfil a previously posted or QXed Joblet the details of which he has embedded in the body of the QX - he may be willing to accept payment, obtain a learning or apprenticeship experience or may be simply seeking to volunteer, but this type of QX would normally be used where monetary compensation was involved.

>>> *A local teenage boy responds to Jack's Joblet about lawn cutting and offers to do it for $5/hr.*

T **TRADE** offer to trade or exchange X for Y

The following primary-secondary type combinations have been identified.

TRADE-BASIC – this QX is a basic offer to trade a declared amount or quantity of specified information, services and/or products in exchange for another declared amount or quantity of specified information, services and/or products.

>>> *Jack offers to trade his 1984 Ford pickup truck for a travel trailer.*

TRADE-OPTION – this QX seeks to trade (in exchange for something else)a future option in to do or buy something under specified conditions and may or may not provide any revenue to the originator at the time of issue.

>>> *Of course, most user groups and industries would develop their own derivations of this to meet their specific requirements.*

TRADE-FUTURE – this QX offers to trade (in exchange for something else) the absolute right to buy something under specified conditions and may or may not provide any revenue to the originator at the time of issue.

>>> *Of course, most user groups and industries would develop their own derivations of this to meet their specific requirements.*

TRADE-JOBLET – this QX seeks to trade provision of one Joblet for provision of another.

>>> *Jack's neighbour offers to cut his lawn if Jack will fix his lawnmower.*

U **UNDERTAKE** offer/agree to provide and/or do something

The following primary-secondary type combinations have been identified.

UNDERTAKE-BASIC – this QX is a basic offer, or agreement, to undertake to do something, usually within specified terms and conditions.

>>> A woman offers to babysit pre-schoolers in her home at $150/week providing that they are already toilet-trained and at least two years old.

UNDERTAKE-JOBLET – the originator seeks to provide services to fulfil a previously posted or QXed Joblet, the details of which he has embedded in the body of the QX – he may be willing to accept payment, obtain a learning or apprenticeship experience or may be simply seeking to volunteer, but this type of QX would normally be used where monetary compensation was not involved.

>>> An unemployed man agrees to paint a house for a set fee.

V **SURVEY** seek information, feedback or consensus

The following primary-secondary type combinations have been identified.

SURVEY-BASIC – this type of QX is used to survey the recipient GAINERs on a subject or an SPD.

>>> Jack surveys his co-workers on who needs supplies because he is preparing a pick order from the supplier.

W **WORK ITEM** offer/seek/assign work item

The following primary-secondary type combinations have been identified.

WORK_ITEM-BASIC – this QX is used to offer, seek or assign a work item which can be any definable body of work, usually including a name, task details, deliverables and possibly additional information.

>>> Within a company, available an (un-allocated) task can be canvassed across one or more workgroups in order to seek someone to fulfil it. Alternative, the JOBLET-related QXs could be used, but the WORK_ITEM-BASIC type QX is the easiest to use since it can be used as sort of a round-trip-memo wherein someone who aspires to do the task simply echoes it back to the originator with their concurrence and any additional information they may see fit to add.

WORK_ITEM-SMART – this type of QX is a pre-defined and self-navigating work item which is capable of moving from GAINER to GAINER at its own instigation.

>>> The ability of GAINERs to send QXs throughout the allows the construction of a new, although not immediately tractable, concept; this is the concept of the 'smart work item'. In the same way that the worker can be simulated to ask himself what he should do next, the work item itself can be personified and thus simulated to ask itself the following questions:

> *-what is my first next functional requirement or bundle of functional requirements that I need to have performed on me by a worker;*
>
> *-who should perform that function (this may be an individual or category set out in the work item's definition or the definition may actually specify 'Jack' as having to do it); and*

-having arrived at that workplace, how long should I remain there before my priority level causes me to prod the worker to 'do me', or else causes me to migrate elsewhere to seek someone else to perform that function or set of functions on me (in draconian situations the work item might abscond to the boss's workplace to complain about lack of attention from Jack).

WORK_ITEM-JOBLET – where a Joblet is one of a related series of Joblets (such as where a project is being broken into small components and farmed out to different workers) this type of QX may be used in lieu of the BUY-JOBLET type.

>>> The advantages are that:

-it is possible to track a family of related Joblets more easily; and

-as with the WORK_ITEM-BASIC type QX, it can be used in round-trip (echo) fashion for faster negotiation and agreement.

X **EMERGENCY** declare emergency situation / seek assistance

The following primary-secondary type combinations have been identified.

EMERGENCY-DECLARE – see DECLARE-EMERGENCY

EMERGENCY-JOBLET – this type of QX is issued, often on a geographic broadcast basis, when the originator needs immediate help with a problem.

>>> If a pipe bursts in the middle of the night and Jack cannot find a plumber who will answer the phone, such an QX could easily bring help from someone who is both a night owl and has plumbing skills.

Y **SPARE** may be used for organization-specific item

The use of this type of QX, and its sub-types, will be determined in the future.

Z **SPARE** may be used for organization-specific item.

The use of this type of QX, and its sub-types, will be determined in the future.

7.8.5 Commonwealth Building

As is the case for a community of any nature or scale, GAIN functionality can assist a decentralized workgroup to become more mutually self-aware and functionally interdependent. In most cases, the development of this form of community within a workgroup will contribute positively to elan, esprit de corps and ultimately creativity and productivity.

>>> Unfortunately, the finance and accounting discipline fails woefully to capture the benefits of such developments and in most cases it is left to executive decision-makers to take ‘gut feel’ decisions on such matters.

7.8.6 GAINER Business Value by Scenario

A New Business

New businesses almost invariably have little money, inadequate facilities and are under-staffed given even their initial workload. The home workplace is a force- multiplier for new businesses because it:

-reduces initial capital and operating charges;

-thereby permits more funds to be devoted to developing the core business; and

-can be effectively camouflaged such that those who interact with the business by phone, fax, E-Mail, Web or QX are not aware of the fact that the company is not already well-established.

A Rapidly Expanding Business

When a business must expand rapidly, it frequently faces a huge training need (as new people are added), disruption or outgrowth of former business processes and hence the pressing need to institute new ones as well as additional cost, hassle and disruption of the cocoon-like shedding of physical facilities. As an SOHO business grows into the DWP league, GAINER will permit much more seamless expansion

Establishment of New Department, Business Unit or Workgroup

Where an enterprise decides to establish a new unit, in many cases new business processes will have to be templated from elsewhere or developed from scratch. This creates an ideal situation for creation of a deployable workgroup, because:

-all interfaces with other departments (and beyond the organization) are new anyway, so they can be custom-designed to readily accommodate the home workplace; and

-similarly, internal business processes can be optimized form the outset for the home workplace.

Entry into New Territory

Where a company wishes to enter a new geographical territory, it may be far more cost effective to create a substantial 'virtual' presence far in excess of the physical on-ground presence. This will permit an early assessment of whether the new market is viable. Conversely, once a firm has made a substantial commitment to physical facilities (and all supporting services) in a new area, subsequently backing out is seldom easy, elegant or inexpensive.

A Declining Business

A business which is forced, for whatever reason(s), to reduce the scale of its operation can use the home workplace to drastically reduce its facilities requirements – even far out ahead of the projected decline – such that fixed costs decline markedly, often by as much as 40%. This may, in some circumstances, even provide the 'breather' necessary for the company to take stock, regroup and begin rebuilding.

Terminating a Business

Where business operations must be terminated, home workplace again offers a way to vastly reduce facilities costs even at the beginning of the wind-up phase, possibly thereby saving money which would otherwise have been spent on under-utilized, even empty, office facilities well before the company

actually ceased operations. Of course, the ability to sub-let or effect early termination of leases and other standing purchase arrangements will be a factor in such cases.

7.8.7 Business Value by Time Allocation

Based on past experience, and general knowledge, it is possible to construct a baseline picture of the temporal impact of the home workplace, as enabled by GAINER.

Commuting Time

In most cases, employees who are able to avoid commuting three, four or more days per week on average will save time in direct proportion to their distance from the central workplace. By far the wisest approach is to split these benefits with the employee. If a person currently works eight hours at the office, but saves total commuting time of one hour each way by remaining home five days per week, the company should not then expect him to work ten hours per day. *This is an unduly short-sighted, tight-fisted and pecuniary approach which is both a misuse of the new technology and is bound to fail.*
A far better approach would be to ask the employee to ensure that he works at least eight hours and expect that in many cases this will migrate towards nine hours, still saving him at least an hour per day.

>>> Benefits arising from the home workplace MUST be fairly channeled so that both the employer and the employee benefit at least somewhat equally. Finance-induced attempts to see HWP merely as a technology simply for saving money and getting more work for the same money or even more work for less money have already been shown to be highly imprudent.

Time Spent Moving About the Office

Many employees spend more than the absolutely required time moving from one location to another within an office or office complex. By their very structure office buildings impose overheads since the average worker's office will not necessarily be adjacently located to the front door, the cafeteria, the washroom, the lunch room and maybe also not even the offices of those with whom he most frequently interacts.

>>> While some of this is undoubtedly a stress-reliever and social outlet, most resources which the home worker requires will be immediately available to him within his home office, or at least within his house. True too, when he does take a break to move around it will be because he feels the physical need to do so, not because he is forced to do so to conquer distance or because he is distracted or interrupted.

Idle Time

Employees who purposely waste significant amounts of time at work are naturally not the best candidates for the home workplace. However, a certain percentage of apparent idle time, in many occupations, is actually good think-time and working at home does provide the employee one protection; the boss or co-workers will in most cases be unable to accuse him of idling or day-dreaming when he is in fact thinking hard about how to solve a problem.

Sortie Time

Above and beyond the time strictly necessary for lunches – and even for coffee breaks – most employees at one time or other are forced to make additional sorties, during working hours, to do things which simply cannot be done after work or on the weekends. The majority of these involve dealing with official – often officious - organizations (governments, banks etc.) which do not have flexible or convenient working hours and virtually all employers provide some tolerance and leeway in this regard.

>>> Home workers are ideally positioned when it comes to dealing with these types of requirements since they are far more easily able to trade off an hour or two during the day for the time to be worked back in an evening or during the weekend. While most employers will expect their home workers to be generally be available during key periods of the day, such as for example during the 1000-1500 HRS core work period – they will have far more flexibility both inside and outside this window than those who work at the office.

Conduct of Actual Work

Various students of work and workflow have estimated that after any impingement of commuting time into working time, time spent moving about the office, idle time and sortie time are removed from the average information worker's eight-hour day that little more than 5.5 hours of true work is accomplished.

>>> With far fewer distractions, and far greater flexibility of what work is done when, a home worker might (for example) accomplish more in the 0830-1230 HRS and 1330-1530 HRS windows (total desk time of about six hours) than will most co-workers who leave home at 0745HRS and return home (exhausted) at 1800 HRS for a total commute-and-work span time of 10 hours and 15 minutes. Of course, by the time the office worker arrives home at 1800 HRS, our home worker will already have spent an hour on the deck with a good book, cooked dinner and watched a TV program.

7.8.8 Business Value by Cost Factor

The following provides a discussion of the impact of the home workplace, as enabled by GAINER, on various categories of costs incurred by a business which has information workers.

Facilities Costs

Buildings

Those telecommuting trials which have been successful have resulted in fixed facilities costs declines of about 40%, in cases where 60% of the workforce is deployed to the home workplace on a basis of at least three days at home per week on average. Fewer (and smaller) dedicated offices are required, although more conference space is often demanded.

Energy

Energy costs attributable to facilities can generally be reduced by a similar proportion to building costs.

Taxes

This is highly dependent upon the jurisdictions involved, but an increasing number of city, county, state and federal tax laws provide home workplace incentives. However, in general, where a business operates less intensive capital facilities – particularly for information workers who do not necessarily need to be congregated together in a very large facility – the tax overheads will be lower. True too, many jurisdictions provide tax incentives for car-pooling and other commute-saving activities and it is certainly reasonable to argue that they should do no less for a large firm which has a successful telecommuting program which keeps thousands of commuters off the roads every day.

Workforce Costs

Salaries / Benefits

Assuming that the same workers are able to complete at least the same volume of work, direct salary costs should not be impacted by a deployment to the home workplace.

>>> In practice, where whole workgroups are deployed, there is a tendency to increase creativity and productivity so that the company gets more bang-for-buck from the same group of employees.

Health Care

For most occupations, the home workplace provides a **lower-stress work environment**, for the following reasons:

-it is familiar and under the control of the worker;

-no one is peeping or staring at the worker;

-it is easier to re-arrange work and personal schedules, particularly when this is required on very short notice;

-as discussed above, a GAINER-equipped decentralized workgroup is reasonably well insulated from the worst forms of petty politics and intra-Nicene feuding; and

-where commuting is a stress item (as it is in the Los Angeles area where many people rise before 0600 HRS and commute 1.5 or more hours to work each day) the reduction or elimination of commuting is both a blessing and a stress-reducer.

Most (enlightened) occupational health and safety professionals believe that a lower-stress workplace contributes to a happier and healthier workforce. Therefore, all else being equal, a workgroup which makes extensive use of the home workplace should have lower stress and hence lower health care costs than one which does not.

>>> The important counterpoint, however, is that home-workers must learn to effectively separate their work and personal/family lives effectively or they will experience serious negative impacts, often including family disruption, separation and divorce. Some home workplace projects have even resulted in suicides.

Turnover

People leave jobs for many reasons; some of them are due to stresses induced by the factors discussed above. Others may leave due to better pay and/or career advancement opportunities elsewhere. Still others will leave because of problems with superiors or peers or due to life changes. The home workplace can assist in reducing turnover by increasing employee flexibility and satisfaction and by isolating the employee from those other employees with whom they least like interacting.

Special Leave and Similar Arrangements

A home workplace program offers a vastly superior capacity on the part of the employer to deal with special leave requirements due to childbirth, elder care, stress, injury and other factors which may require special consideration. In most such cases failure on the employer's part to respond appropriately will result in the permanent loss of the employee and hence the disruption and cost of recruiting and training a replacement plus the cost of the dip in productivity which is inherent in any such change.

Telecommunications Costs

Telephony

Whereas VOIP remains at a relatively early stage in its evolution, and is certainly not completely free to the organization when well implemented, the requirement for the employer to provide at least one line, and in many cases two, will lead to a significantly higher telecommunications cost - per employee – for those working at home.

However, there are three important potential offsets:

> -whereas most use of a family's personal telephone line occurs during the evenings and weekends, use of the employee's home phone number will be practical in many cases for many types of employees (this is also true for the home workers of the smaller DWP businesses) since the employee receives a major reciprocal benefit of not having to commute;
>
> -another scenario exists where the employer pays only for Line 2 (the voice/data line), and the employee's personal line is used as Line 1 (the principal voice line) – this is a mutually beneficial arrangement since the employee picks up what is to him a 'free' second line for outgoing voice calls during the off-hours plus an equally free conference-calling capability; and
>
> -in the mid-term future VOIP replacement of Line 1 and Line 2 will become more cost-effective and practical as quality-of-service improves, manageability evolves and costs fall along with a falling price of bandwidth delivered to the home.

For SOHO and DWP applications, it is also noteworthy that where home workers are sub-contractors to such firms, it would naturally be the responsibility of the individual sub-contractor to furnish their own PC, GAINER and communications channels.

Data Communication

By definition, GAINERs have access to the Internet and this will be their principal data transmission channel. For example, if two GAINERs agree to transfer from one to the other a large amount of data they will likely also agree to send it over the Internet and not via the PSTN.

Employees Own Costs

Clothing

Employees who work at home are free to work in their most casual clothes, their pajamas or even in the nude of they so-choose. By definition, clothing acquisition, cleaning and replacement costs will all fall in almost direct proportion to the percentage of the work week that an employee remains at home.

Commuting

For North American office workers, fully allocated monthly commuting costs vary from approximately $100 to more than $500. These may include bus or rail passes, the cost of car-pooling or of operating one's own car, parking space costs and other costs. In general, the employee is able to avoid these costs in direct proportion to the percentage of the week which they remain at home, providing only that this is known in advance.

Meals

When the employee works at home there is wider flexibility both in what to eat, and also when. Further, it invariably costs less to have the same food at home than it does to buy it a restaurant, cafeteria or snack bar. This is true even where employers subsidize cafeteria food costs or provide meal vouchers. The only exception is for those who can claim meals with peers, clients or suppliers as entertainment expenses. True too, in many organizations, bringing a brown bag lunch to work carries a distinct social stigma and is to be avoided at all costs, particularly in the professional and executive ranks. This imposes what is little short of a social compulsion to eat outside the office.

Housing

When choosing a place to live, most office workers must consider the practicality (in terms of time, hassle and cost) of commuting each day from that location to the office. This has several implications.

First, the most desirable location for the individual or family may not be within practical commuting distance of the office. Even if the dream home is in a good location, if the company later decides to move its office the commuting needs of individual employees are seldom considered, particularly in companies where the financial community has gained the upper hand and virtually all major decisions are therefore made on the basis of how much cost can be avoided. Despite the 'sympathy' offered by the HR department, executive management simply will not care if Jack's 30-minute commute is suddenly turned into a 90-minute commute and Jack therefore now has to rise at 0530HRS each morning in order to have time to get ready, have breakfast and be at work by his 0800 HRS starting time. For workers who work largely or almost entirely at home, a move of the central office is simply not a major problem or disruption since they infrequently commute in any event.

A home worker may (all else being equal) require a slightly larger house both because he will be spending more time there and because he definitely needs a closed office (one with four walls and a door) with which to isolate himself from the remainder of the household when working. However, if commuting distance is no longer a major constraint a far wider range of hosting alternatives may exist, including moving to a satellite town or even what is largely a cottage area. This means that the employee can choose from a much wider range of available properties, and over a vastly wider geographical area.

Due to school-year or other constraints, a new employee may be reluctant to move immediately to the city where his employer is located. If, however, he makes a 1-2 week visit to the new employer and then returns home with an employer-provided GAINER and PC he will be able to begin functioning as part of his new workgroup ab-initio and the move can thus occur later at a more convenient time.

If elder care or other reasons dictate a move away from the city in which the employer's office is located, some workers may be able to use GAINER to become home workers and remain in the employ of the company permanently or at least a transitional period. Even the latter arrangement will be helpful to both in that it will provide the employer more time to obtain a replacement and the employee more time to find alternative employment.

In still other cases, it may be possible to begin working for a new employer whose facility would be an impossibly long daily commute, but to actually travel there only one or two days per week and remain home the remainder of the time is workable. This would permit the new worker to retain his existing residence whereas a five-day week at the office would have necessitated an otherwise totally undesirable move.

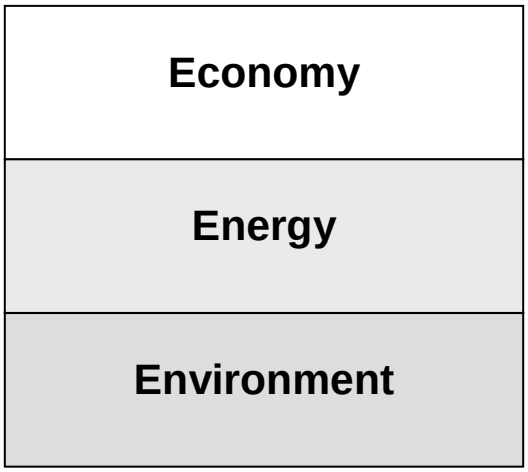
7.8.9 Value Estimation / Validation Methodology

Introduction to E3 Accounting

The term 'E3 Accounting' refers to a method of assessment which considers the Environmental, Energy and Economic implications of a planned action on a relatively co-equal basis. This is also referred to as 'Trinomics'.

Since the 1960s, Western civilizations have slowly, although progressively, realized that our Earth is a fragile ecosystem which is entirely interdependent and therefore so are all living things. In the most basic sense this can be characterized as in FIGURE 7-2 below.

FIGURE 7-2 ENVIRONMENT, ENERGY AND ECONOMY



>>> Without the basic environment which provides the ingredients not only for us to live, but also the required photosynthesis and other processes ultimately resulting in combustible fuels there can be no energy. We know from human history, and our study of pre-history, that the harnessing of energy (in the form of fire) by man was the absolute precursor to all forms of what we now consider to be an economy.

During the early 1950s the Great Northern Railroad made a promotional film about its operations, including the many industries along its lines, and extolled (among other things) the fact that a seemingly inexhaustible resource of coal was *"easily and economically extracted by strip mining…".* Of course, before and during the 1950s only the purely economic aspects of such an activity were considered and even the energy implications – much less the broader environmental implications – of actions taken by individuals, corporations and the state were treated simply as 'externalities'. In other words, such issues simply didn't enter into the corporate and governmental decision-making process except where they implicitly impinged themselves, such as when slag piles became too big to manage (necessitating distribution) or when steam locomotive crews suffocated on coal smoke in tunnels (leading to the development of cab-forward locomotives).

Governments around the world are increasing their commitment to environmental and energy conservation issues and the Kyoto accord is just one manifestation of this. Others will doubtless follow as market prices of natural resources, and particularly fuels, continue to increase over time. There will be increasing incentives – employing both the carrot and stick – to pollute less and to consume energy more efficiently.

A Concrete Example

Consider a scenario of Insurance Companies A and B, each of which have approximately 5000 workers in large office towers in the downtown core of a major city. Company A decides to send 4000 of its workers home on a full-time basis and 500 home part-time so it is able, once the deployment is successfully accomplished and validated, to do several things simultaneously:

-sell its office tower and move the remaining office employees to a much smaller low-rise office in a near suburban area, but maintains a luxurious storefront office downtown for walk-in traffic;

-thereby cut its fixed overhead operating costs by more than 70%;

-reduce health claims and absentee claims;

-reduce turnover costs including recruiting, hiring and training costs;

-therefore, also reduce premiums it charges for all lines of coverage due to reduced;

-improve customer service due to happier, more relaxed employees who have a more flexible and enjoyable work style; and

-even after reducing premiums, still increase profits and hence shareholder dividends.

>>> By most measures, this would be a well-performing company and its Board of Directors would be quite likely to increase management bonuses in such a situation and that could be the end of a happy story, but there is actually much more.

Meanwhile, Company B continues operating just as it always has and realizes none of the above benefits, but it does spread rumors that the home workplace is unpleasant and does not work well for Company A.

Now the city installs new traffic monitoring equipment in a cordon around the downtown core and requires all private automobiles which enter that area to carry a transponder tag and to pay a $5 daily fee. (This technology is already in use on toll roads and for border crossing.) The city now surveys the data on the transponder holders and maps this data to their measured commuting activity; staff can readily use motor vehicle registration data and employment tax data to match cars to employees, and hence match cars to employers. They discover that Company B has an average of 2500 employees who bring their cars to work plus an average of 500 who car-pool (at an average of two per car, so each employee is counted as a "half-car") for a total of 2750 (2500+250) cars per day. They also learn that Company A only has an average of only 250 who bring their own cars into the downtown plus 50 who car-pool for a total of 275 (250+25) car per day.

Alarmed at this vast difference between two such (otherwise) identical companies, city transportation planning staff brief their elected officials on this subject. More indignant than alarmed, the city council then decides that even the $5 tag fee for daily private car commuter trips is not covering the true (fully-allocated) cost of the resulting disruption – to everyone else – caused by so many cars coming into the downtown core when many could be working at home or in the suburbs. They therefore impose a $5 daily commute fee on employers for each private automobile which their employees bring into the downtown core. Based on the available data, they know that this will result in Company B involuntarily contributing $3,437,500 (2750 cars X 250 days X $5/day) in additional funds to the city treasury each year.

>>> This will, incidentally, further erode its competitive position against Company A which only has to pay $343,750.

Company B now throws the corporate equivalent of a 'hissy-fit' and hires lawyers to take the city to court, arguing that many cars carry both husbands and wives who work at different companies and that they should therefore not have to pay the fee, or should at least have the fee split between the two employers in each such case, but this results in several things happening in rapid succession:

> -the court rules that it is the registered owner of the vehicle who controls it and who thus permits it to be brought into the downtown core, so there is a chain of causality back to the employer since it was the employer's choice of location (and the lack of an adequate telecommuting program) that caused a decision to commute by auto for any employee who found transit to be impractical;
>
> -in a desperate attempt to avoid paying the fee, Company B quickly establishes a wider car-pooling program and buys a computer program to match up the commuters – but most employees for whom car-pooling was appropriate had already organized themselves into carpools through the informal organization and through knowing their neighbours so the intensified car-pooling program produces a very low yield;
>
> -Company B also explores the possibility of buying vans and renting them to employees, but this too has a low uptake, and in addition to fronting the capital to buy (or taking on the lease) for such vans, it would have to pay commute the fee twice – it would owe both the vehicle $5 fee *and* the company $5 fee for each such vehicle trip – only if the vans can carry 3-4 people each on average will the program be financially rewarding;
>
> -the CFO of Company B, which is growing more frustrated in its desperate attempts to avoid the tax now attempts to charge individual employees who commute by car its own share of the $5 fee by deducting it from their pay – two unionized bargaining groups immediately go on a very public strike, claiming that this is not in their collective agreement, and the professional bargaining unit requests Labour Relations Board mediation of the issue – this brings a torrent of unwanted negative publicity in the press; and
>
> -the mayor now calls a press conference to publicly denounce the attempts of Company B to avoid paying the tax, to take it out on its own employees and also to decry the cost of the city's legal fees for the earlier court case – he also decries the company's lack of a home workplace program and speaks favorably of Company A – finally, he announces the cancellation of all insurance business placed with Company B by the city, transferring it instead to Company A.

The Board of Directors of Company B, having had enough, calls a special meeting and makes major changes to the management team, firing all of the CEO, CFO and CIO along with the VP of HR who had earlier insisted that their current HR-oriented telecommuting program (with a 5% uptake) was all that was possible with regard to the home workplace.

It should also be noted that, beyond just information workers, Trinomics will ultimately apply to many types of manufacturing organizations. **The economic underpinnings of business, commerce and industrial manufacturing will change such that more of the total environmental and energy costs - or 'social' costs - will be borne by the producing organization.**

>>> Indeed, they will be brought directly to the boardroom door. This is due to the fact that a higher percentage of the costs associated with transfers of (or changes to) relevant information, hardware and the physical environment due to production, and costs associated with services directly or indirectly required for production will be accurately and successfully charged back to the producing organization.

We are already taking these costs into account in a 'front end analysis' when we study the environmental impact of a proposed factory or generating station. In future, not only estimated costs but also actual

costs will be able to be measured and charged back to the producer. The emphasis on 'unit cost' (which favours huge concentrations of capital and of workers) will thus diminish, encouraging 'cottage industry' production of a wide range of goods and services (although to a standard organisationally mandated pattern). Eventually, the only items to be produced in large factories will be those which it is physically impossible to produce in smaller facilities due to size and/or process.

>>>We are already well on our way. More and more of the costs of pollution are being brought home to the company that caused them, and this even extends to public rejection of packaging or of product content. This is a very healthy development as it is a means whereby our market economy can be a major driver of the required changes. Thus far, except in Los Angeles and in one Colorado city which considered a transportation tax based on land frontage, bringing home the costs of production-caused disruption to the producer has yet to become an established way of doing things. However, increasing congestion, fossil fuel shortages (with resultant price increases) and more creative tax departments will likely jump-start this process in the next few years. We therefore believe that the prediction inherent in the above scenario is a reasonable one.

7.9 GAINER as Home Workplace Enabler

GAINER is ideally suited to enable the home workplace because it:

-permits automatic coordination of work among decentralized workers;

-keeps workers aware of what each other are doing on an automatic basis;

-provides comprehensive computer-telephony integration (CTI); and

-secures data transmission and secures the PC for use only by the user; and

-permits remote administration and support of the PC.

7.10 Conclusion

Implementation of a General Access Information Network suggests some practical and policy imperatives which must be addressed. In brief, these are as follows.

1. Accept the premise that the existing telephone and telecommunications system will serve as the initial backbone network for workplace decentralization and that the extension of broadband or other high capacity service to each telephone subscriber is a high priority and justifies public loans or subsidy as may be required.

2. Support private ownership of the 'means' of communication and, if feasible, continued private ownership of the telephone system. If the telephone companies refuse to support workplace decentralization, or else seek to exploit the home workplace by instituting rates which would make its continuation uneconomic, then the government must intervene to prevent such actions from having effect.

3. There is a strong argument for publishing the specifications necessary to permit any application or device to generate, transmit, receive and process QX's so that the community of QX users can expand rapidly. It may also be desirable to promulgate a QX-processing software package as freeware (no cost software which is already compiled) or else as OpenSource (software whose complete source code is available).

4. While the telephone system will remain primary to the home workplace for many years, it shall not be the only system. It should be legal for any two GAINERs which have first established contact by telephone to supplement or replace such contact by any other convenient medium. As high-bandwidth Internet service reaches more and more users around the world, many GAINER-to-GAINER sessions will begin with a very short telephone call followed by a switch to the Internet.

8. The Home Workplace and Attention Economics

8.1 Overview

It is easy to demonstrate that it is in the very distinct interest of an organization to implement the type of device discussed here; it lets them decentralize while keeping much of the 'feel' of still being under one roof. Users won't need to be computer hackers to figure out how to use the devices (outside business hours) to achieve gains from trade first with their co-workers, and later with the telephone subscriber population at large. Soon after XYZ starts selling QX-capable devices to companies, it will make cheaper versions available to the general public.

A well-known Canadian communications thinker and writer, in reviewing my work on the QX, said that if the QX or smart work item was the 'little end' of a continuum of complexity of electronically performed work then the 'big end' was the 'Intelligent Project' or IPX. The IPX is a time/space interdependent fleet of QX's that interact with humans - and with each other - spawning new QX's and killing off old ones as they become obsolete. Thus, the IPX is not unlike the operating system of a modern computer which permits many parent and daughter processes to be performed simultaneously while it retains overall control. If the IPX is the 'big brother' of the QX in the conventional (but decentralized) private or public organization, then what I will call the 'electronic co-op' is the temporary or permanent banding together, via QX/IPX, of otherwise unrelated and uninvolved individuals for a common purpose. Such a co-op could arrange for the mowing of lawns, buy bulk commodities or services at a discount for its members or perform other beneficial functions. The home worker participants in such co-ops will, themselves, ultimately form a sort of electronic commonwealth.

Microprocessor meets telephone and the fruit of their spectacular union will provide the seed for a whole new way, in fact a myriad of new ways, of working and living. Decentralization of the office or of the 'workplace' as we currently understand it will mark only the beginning of the process of unlocking this potential. Why, you may well be asking, would anyone want to combine the peskiness of the travelling salesman, the persistence of junk mail and the vastness of the want-ads into an electronic whole? Fair enough!

But on casting our minds back for a moment it might also seem unclear why someone might have wanted to combine the racket of a series of controlled explosions that was the internal combustion engine, the motive qualities of the horse and the tippable qualities of the buggy into the horseless carriage. It might seem even less clear why someone might want to pilot a clackety, wire-bound contraption powered by such an engine off into the heavens without all that much thought given to the inevitable coming-down. We are on the verge of an immense technological and social revolution which will go far beyond any of its predecessors in giving the country back to the people, literally as well as figuratively, and whether they are ready for it or not!

In the 1860's any man on the street could have told you that the real benefit of the coming of the railway was not that it stimulated the locomotive or boiler-building industries or even the steel industry, but that it allowed movement of people and things from there to here with great speed and near certainty of a safe arrival. (In the 1860's the latter was considered a real benefit in ANY mode of transportation.)

Why is it then that many continue to believe that the benefit of 'high tech' is the high technology industry itself? While it is true that many of us derive our livelihood directly or indirectly from it, **the real benefit of information technology is that it will make information the raw material of work for most people**. That, in turn, will free us from the slavery of location, including both our daily commute and (for those who would escape it) the social life of the office coffee machine.... Ultimately, it will provide all of the benefits

which we and our ancestors sought in urbanization over thousands of years, but without the cities themselves, at least not as we know them.

To return to our example of Jack, if he can sell his tables or rocking chairs with virtual certainty at the touch of a button, then he can also sell information about who else has rocking chairs for sale or even instructions on how to build one. He will be able to create information not only about things but, ultimately, information about information. This too he will be able to sell.

Wealth creation of this almost meta-physical order confounds our historical conception of value, which assumes labour (or labour as it is stored up in a capital good) to be the basis of what is economically meaningful. Here, however, information begets value when someone is prepared to interact with me in order to appraise some package of information which I have created. This amounts to more than, for example, the mere sale of a software program for an amount of cash over the counter in a computer store.

8.2 On Wealth

8.2.1 Types of Wealth

Not being an economist, I am treading on this ice indeed when starting to write about wealth, however perhaps it is worth taking that risk. Traditionally we have tended to think that wealth is created in one of the following ways:

> (A) by bringing a new object or device of perceived and generally agreed value into the economy (by digging up a nugget of gold or growing a carrot);
>
> (B) by storing up labour in a hardware object or arrangement of objects squirrel-wise (conventional 'capital');
>
> (C) by performing a service which is generally agreed to be useful; and
>
> (D) more recently, by creating a useful package of information which, on its own merits or in connection with other information and/or the types of wealth described above, is commonly agreed to be of value.

In our Western economies we are still having enough trouble with Type D which we should have well mastered at the end of the Second World War but which many people still do not fully understand. To use the above examples, if I truthfully claim to have a map of where you can dig up a lot of gold, the telephone number of the most honest lawyer in town, a plan for getting 40 mpg from your Chevrolet Impala or some other such valuable information then you might just be prepared to pay me for it. As if the problems we continue to have with Type D were not trouble enough we now face Type E.

8.2.2 Paying by Paying Attention

Type E is the wealth which is created in my electronic piggy bank when I am prepared to interact with someone else's computer and with my computer at the same time in order to pay attention to some package of information or other thing which he has created. If I am willing to spend my precious time actually paying attention to something, then I automatically increase its value. If it is a hard copy book than we have no way to recognize incremental value created or added, once I have first paid for the book. The same is true if I spend the time admiring a tree. However if I spend an hour enjoying the computer-hosted electronic information product of another human being, we CAN viably measure the value created (by implicit appraisal) as such time is spent. To this point such a wealth creating process and the wealth resulting from it are nothing more than fictions.

However so is the world (which we continue to believe is just around the corner) in which the streets are paved with gold, in which there is a reasonable degree of peace and harmony and in which everyone has a shirt on his or her back and enough to eat!

It is only because we all agree and say that things are worth money that they are. If we all agreed (for whatever practical or theoretical reasons) that human waste products were a precious commodity then that it precisely what they would become. They could be traded electronically and one might even buy and sell 'futures' in them. Would the squirrel trade his carefully gathered collection of nuts for winter for all the diamonds in the world even if we could communicate with him? What is a wealth creating process or asset and what is not depends entirely upon your point of view. It is even possible for radically different (even directly opposing) but complimentary or 'synchronized' wealth creating systems to co-exist in harmony. Gold may well be where you find it but wealth is clearly where you WANT it to be. One is also reminded of the declaration in the Bible about crass materialism and its ills: "Where your treasure is there will your heart be also." Just as important as the adjuration to have faith in Jesus and the life hereafter is the lesson that if our 'heart' is in hard goods and to some extent services it is because our perceived treasure is there also.

Recalling the earlier discussion of the Theory of QX, we note that the conventional transfer of a piece of information represents a trade and, if it creates any wealth at all, will likely only create that wealth which arises from gains from trade. This is not to be sneezed at but economists argue endlessly over the extent to which such gains represent new wealth versus mere transfers of wealth either parallel or perpendicular to the axis of asset-cash transfer. If someone created an asset of Type D above which he says is worth $100 I can only get it if I give him the money out of my electronic piggy bank. Naturally, the actual transaction can be handled by our two computers and in reality neither of us even needs to be at home at the time. While one can readily formulate visions of the master on his return saying to the computer: "Thou wicked and slothful servant, in my absence you gave away the shop..." such is about as likely as a Model T Ford responding to oft-made and terrified cry of "Whoa..." If we use the new technology within its obvious bounds then we will not have a problem.

We have, then, two separate models of the transfer of a useful piece of information from its creator to myself. In the first model (the conventional one) he becomes $100 richer, I get the package and I am $100 poorer, having transferred that amount to his computer. In the second model, my computer, his computer and I are all briefly joined together and (once this triple connection is verified by an independent host computer (a third one)), I get the information he created and he becomes $100 richer and I am no poorer except for the hour spent paying attention to his information product. This happens only because WE ALL AGREE that if I am prepared to spend an hour connected to his computer and to mine while paying attention to, and if necessary interacting with, whatever he has created then he is $100 richer. **New wealth is created by the very act of my paying attention**. I paid FOR the product by paying attention TO it.

In the first case the total cost to me is $100 out of my piggy bank and the time I must spend later to actually look at and interact with his product which is now stored (as yet unseen) on my computer. In the second case the only real cost to me is the opportunity cost of the hour spent connected to the two computers. (While viewing his product I was prevented from doing anything else.) Note however that just as in the first case, at the end of my connected hour the entire product will now be resident on my computer so that I can view it again in future if desired. In the first case the buyer has the advantage that he may later attend the material at his own convenience, obtains an instant copy of it and is not tied down now to view it but he also faces the very obvious disadvantage of $100 out of piggy. In the second case the buyer is tied down for the next hour but he has no out-of-piggy cash cost; he too obtains a copy for possible future review. Each of the two types of transaction has its advantages and disadvantages. There is no reason to believe that the two systems described above could not co-exist. However for the simple reason that our first buyer must eventually spend an hour to review the material anyway, if it is to be of any use to him, the second method would be preferred except where time constraints and/or the wide range of interests of the buyer dictated a non-interactive approach. If we assume that a later hour of the first buyer's time (tomorrow, next week or next year) is worth the same as an hour now then his total

cost will be $200, double his cash cost, as he will eventually have to spend time reviewing the material anyway. While the total cost to the second buyer will be an opportunity cost it may be only $100, however he will have no discretion as to when to view the material - *he must view it when he can get it because at some future time it may no longer be available.*

8.2.3 Rationale for Attention Economics

Where does the new wealth come from? The reader may consider that merely saying that it is created by our common consensus is not a strong enough argument. However consider that in the future (perhaps by 2030 or 2040) we here in North America may well have created automated systems which can produce virtually all of the goods and perform the lion's share of the services required to keep us at something very close to our current standard of living. If this is indeed the case it would lead to unemployment, as we conventionally define it, of perhaps 50 or even 80 percent. What will most of us do most of the time if there is no work for us? The simple fact is that unless we are able to devise new and meaningful activities for most people there will be massive social upheaval. The only other alternative is creating more of the silly jobs that cancel each other out just as surely as having one man dig a ditch and another fill it in. This risk of social unrest is just as true whether the government pays each of us a guaranteed annual income or whether a techno-peasant under-class emerges who live almost at the starvation level. (Certainly, the current rapid erosion of the middle class and a trend towards returning to robber baron capitalism, with its nasty exploitation of workers, is most disturbing.)

There is an even more direct argument for the benefits of paying attention to each other's information products. Consider the 'Tower of Babel' society depicted in the Bible in which the workers all spoke different language and were thus unable to work together to complete the desired tower; they were a project manager's worst nightmare! Consider, at the other extreme, a society of individuals with extra sensory perception and thus able to very well understand each other, anticipate each other's every move and co-operate superbly together. They are a project manager's dream and they could build the tower in no time at all! Information will become ever more important to how we live. We have seen that the existence of universities in our society has led to ever greater dispersion of knowledge and to a process of general enlightenment. Indeed, as the attention economy unfolds in the 21st century, universities will become the major capital engines of the economy that cathedrals were in Medieval Europe. Our ability to work with information, while working with each other, will become critical. **So as we all pay more attention to the creative efforts of each other, and thereby come to better understand each other, we move our total society along the continuum from the seemingly valueless Tower of Babel society at one end towards the more desirable ESP society at the other**. We become more valuable - as a society - because of our greater co-understanding: we can build better towers, better mousetraps and can make a better life for ourselves and for each other. It is this heightening of the overall value of the entire society that is the justification for the new wealth creation.

This is just as true at the individual level as at the societal tier. For years enlightened educators have tried to devise curricula, particularly for primary schools, that let children explore knowledge on a personal interest motivated basis. The problem has been to balance between what the child WANTS to learn and what society NEEDS him or her to learn. Beyond the most basic education, we will in future be quite able to let people focus their learning precisely where they want to, far more than even the most liberal and innovative school can today. What is more, this learning will be much more of a lifelong process, and for a much greater percentage of the population.

8.2.3 Migrating to the Attention Economy

In summary, we should expect and encourage the wides-cale establishment of the home workplace to lead first to confederations of enterprising individuals and later to the attention economy for the reasons set out below.

1. The home workplace lets most members of the society interact on more of a peer-to-peer basis than is the case now. The attention economy will aided by, and will aid, the home workplace during its latter stages of development. (We cannot expect to see emergence of the attention economy until at least ten to fifteen years after full scale workplace decentralization begins, but we should be planning for it now.)

2. As we pay more and more attention to each other we become worth (provably) more as a society. because we progress along the Babel-to-ESP continuum.

3. With less and less need for humans themselves to produce basic goods and services there will be a natural requirement to have something MEANINGFUL for each of us to do.

4. With the majority of the population engaged in the creation of, and paying attention to, useful information products a much smaller percentage of created (and transferred) money will be chasing products and services which harm the environment; much more of the money will be chasing other information products.

5. An increased ability to pay attention to each other, and to each other's information products, will bring about greater understanding on the part of individuals both within and among countries. This will traverse provincial, national, language and cultural barriers.

6. The economics of creativity (or 'Attention Economics' or AE), which is clearly an economics of surplus, can co-exist with our conventional economics of scarcity subject only to the minor constraints set out below.

7. Provision of aid in the form of self-instructing computer equipment to those living in abject poverty in the Third World will permit them - in a very short time - to begin offering their own information products to us. We will pay by paying attention (Type 2 transfer) and they will use the resulting funds to purchase from us the goods and services necessary for their survival and development. They will save us from boredom while we save them from starvation!

8.3 The Electronic Dollar

8.3.1 Electronic Transfers and Automated Banking

While we today have electronic funds transfers and electronic banking, our very conservative financial community has - in effect - simply automated what they used to do manually. However another part of the problem is surely the fact that what we are really talking about now is the transfer of our conventional dollars as we understand them now by electronic means. We can almost visualize thousand dollar bills rocketing through the wires and piling up in someone else's computer. Why have we not developed a new KIND of dollar, one that takes full advantage of the technology we now have available?

8.3.2 The Need for a New Kind of Currency

This situation is indeed curious when one considers that when various economic powers had a lot of trouble with petroleum we created the Petrodollar. When the European Economic Community found itself tripping over its own complicated internal and external monetary fixtures we created the Euro-dollar. When the world's airlines found themselves confronted with horrendous international exchange problems we created the Special Drawing Right or SDR. Moreover, the world banking establishment has become quite adept at lending money which it both does not own and does not expect will be paid back to all kinds of zany companies and to tin-pot-dictator governments in Third World countries. At various times

this too has resulted in 'innovative' new forms of money. It is therefore possible, one must conclude, to invent new forms of actual or fictional money, as required, so long as there is a large enough consensus among the financial powers of the world to do so. True too, while Bitcom may be a step in the right direction it does not go nearly far enough – at least not yet.

8.3.3 Characteristics of the Electro-Dollar

There are a number of characteristics which would appear to be relevant to, and necessary for, an 'Electro-dollar' (which we will also call the E-dollar or Z$) which do not apply to and are not practical for other kinds of dollars. They are as follows:

> (a) each dollar is unique and has its own serial number, pedigree, life history and all dollars are equal and none is more equal than others - there is no reason for dollars to be grouped together in lots of more than one or divided into fractions of less than one;
>
> (b) the recipient (current owner) of a dollar may legitimately duplicate it any number of time he likes (twice, a million times or fifty zillion times) but may only spend it once and when he actually does spend it all duplicates will instantly become redundant and unspendable; and
>
> (c) subject to the above rules of inseparability and non-duplicatability it is possible for an information package buyer's computer, together with a neutral intermediary computer, to create 'new' E-dollars (which are actually the monetary verifications of the attention granted to the seller's computer by the human buyer as verified by the intermediary computer) and to transmit them to the seller's computer as a real time process occurring in parallel to the buyer's actual interaction with the seller's information product.

If you can have any number of dollars (or dollar copies) in a computer but can only spend a given dollar once than possession of the original or any of the copies becomes far less relevant than the ability to transfer a dollar through the three-computer process. Taken only the slightest bit farther this gives rise to the following theorem: "A DOLLAR EXISTS ONLY AT THE ACTUAL TIME AND POINT OF TRANSFER AND THE RESIDUE (AND EVIDENCE) OF THE TRANSFER IS THE LICENSE TO CREATE AND TRANSFER A DOLLAR". This theorem has an interesting similarity to an idea advanced by Dr. G.H.S. Jones in an article entitled *The Myth of Chronos* in which he suggests that it is possible that as we progress through time we face alternate states of 'time change' and 'matter' but that we are never in both the matter state and the time-change or aging state at the same time. This is, in turn, analogous to a video in which we appear to have steady motion but where we actually have a rapid succession of individual frames.

Money would thus cease to exist primarily as a stock but would come to exist as a potential in the same way that an electric utility has the potential for a maximum generating output of several thousand megawatts. One will immediately suggest that the transition to such an economy, even in relatively civilized North America, would be a chaotic process but there are two things to remember. The first is that each bona-fide dollar creating 'potential' sitting in someone's computer in the post-change environment must have a heritage or pedigree leading back either to a dollar which existed in the pre-change time and which was physically destroyed when the potential was created or else to time spent by some person A while paying attention to the information product of some person B. The second thing is that, in theory at least, even the wildest counterfeiting schemes will eventually be neutralized by the aroused anger and intolerance of the masses in the resulting (and brief) periods of disruption. Also, the relative advantage of counterfeiting will approach zero as inflation approaches infinity! Small comfort, it might seem, but recall also that evolution of attention economics on a massive scale will likely not begin until the majority of the population has already decentralized. At that time our BASIC SURVIVAL needs at our homesteads (food, shelter, energy etc.) will be catered to very much by our own efforts and those

of our enclave neighbours. Therefore, hyperinflations may inconvenience us (accelerating or delaying planned purchases) but will not ruin or starve us.

The framework for paper money is the paper itself or the supposed potential to turn back into paper money of deposits or stocks of dollars denominated in terms of paper money. The framework for electronic money is its header and trailer signals which, like the shield of the knight of old, say something about its intentions, status and pedigree. Paper money carries a figure which tells how many units the piece of paper represents, however this sort of marking will be unnecessary for electronic money if all dollars are units of one and units of more than one are never used. The very presence of the header indicates the soon-to-be presence of one E-dollar. Paper dollars are transferred by being physically handed over (and we all know how dangerous and expensive the transfer of large numbers of them can be) or by being 'title switched' by manual or electronic accounting means. E-dollars would be transferred via a temporary or 'Intermediary Banker' (IB) computer which is brought into the loop by the buyer's and the seller's computers and which is at first anonymous both to them and to their owners. In the world of paper money we have a number of means to prevent counterfeiting and these include special marks and spots, serial numbers, the texture of the paper, ink pattern and colour, magnetization, border arrangements and so on. In our new system the intermediary IB keeps an 'undollar' record of each and every dollar spent by a buyer who is not paying by paying attention and of each and every dollar which is created by paying attention. Because the IB also leaves its own unique signature on the dollar it must be consulted by the next recipient of that dollar so as to ensure that the previous recipient has not tried to spend it more than once.

If, for any reason, the same IB remains connected to a buyer who tries to re-deduct from his piggy bank a dollar which he has already spent then the purported travelling dollar will be summarily erased by the IB itself. Each dollar would therefore carry a revolving (or at least moving) 'drum' of the identities of previous IB's through which it had passed during its travels and its history of life and ultimate pedigree could thus be determined for personal, commercial or official purposes. An E-dollar therefore becomes a monetary unit which is a collection of digitally storable and transferable signals or bits with a common leader and trailer but with a unique and dynamic mid-section.

Let us suppose that for each 0.60 of a minute (36 seconds) the origin computer or seller, as defined in the QX discussion, sends one 'attention warrant' with an encrypted (coded) signal to the destination computer or buyer via the IB computer. This tells the buyer's computer that during the past 36 seconds the buyer himself was interfacing with the computer and was paying constant attention to the seller's computer (and information product) and that therefore the buyer's machine should therefore create and send a brand new dollar to the seller's computer, again via IB. The buyer's computer now composes a new dollar (from scratch) including a header, a Bank of Canada pre-assigned serial number, part of the encrypted attention warrant just received and a pedigree origin address (the buyer's phone number, for example) and transmits this to IB followed by a standard trailer signal. On its way to the seller computer, IB will interrupt the progress of the E-dollar in order to insert a piece of its own code which is unknown to the buyer computer. If the seller computer should now or later spend the dollar thus created to Person B and if B should subsequently spend it to C then even C's computer should be able to verify the dollar's pedigree on the basis of any or all of:

(a) the included attention warrant justifying the dollar's genesis;

(b) the address of the original buyer computer which created it; and

(c) the address and verification added by IB which witnessed or policed the transaction (it could also counter-check the warrant code by checking with the seller host which will have retained a copy).

8.3.4 Conventional Trades Using E-Dollars

Turning now to the case of the more conventional 'trade money for information package' (or trade money for good or service) type of transfer we could envision IB collecting the E-dollars from the destination and title to the asset from the origin, checking to be sure that both were in fact what they were supposed to be and then passing them on to their rightful new owners. Here IB adds its address to the top of each E-dollar's address list (remember that the buyer is spending a pre-existing dollar here) and adds a transfer code to the top of the code list and erases the bottom entry on each list. Over time, a large number of such transactions will create an immense number of 'undollars' which will be a form of 'anti-money' in that they represent past transactions which can themselves never be precisely repeated. In certain cases the use of a real chartered bank as an intermediary with either an account-to-account transfer, of the type currently operational with debit card systems, or else an electronic version of a cheque may be desirable.

Everyone in the economy would have an assigned remote IB or intermediary computer which would be assigned through some central authority on a random and periodic basis (a person's IB would be changed every so often without his knowledge). Each participant in the economy would possess a small dedicated computer system which would be told by the central banking authority (or perhaps a regional or local one) for which other participant to serve as IB. The owner of this dedicated system would not know nor would he care for whom his computer was serving as IB at any given time. The system could even be tamper-alarmed to prevent its owner from interfering with its operation and in any event it could be charging a commission for its services as IB so the owner would have little incentive to interfere with it. Doing so would decidedly not divert the flow of transferring dollars into his own piggy bank. In certain classes of transactions it would be desirable to have both the buyer's and the seller's IB's involved. Because it would be necessary for the seller's IB to locate the buyer's IB in a hurry it might be desirable to have the telephone company (or some other central registry) control the IB assignments or at least maintain a current table of who was who's IB. Obviously, two systems cannot be each other’s IB.

8.4 The Electronic Economy

8.4 Alternative Scenarios for the Electronic Economy

Looking fifteen to twenty years down the road it is possible to visualize at least five major types of economic scenarios which could affect us in five distinctly different ways. If one presumes (let’s call it Scenario A) that the population, goods production and services production in the economy remain relatively constant and that the amount of information and the money supply both rise dramatically than, logically, prices should remain relatively constant subject only to any differential between the growth rates of information wealth and the money supply. If the same general situation prevails in Scenario B but the money supply does not increase then the total pie of goods, services and information available for a given pool of money will be much larger, in relative terms, and the price of everything in dollars should fall in real terms. If robots and other advanced technology devices allow us to turn out substantially more goods while keeping everything else the same as it was in the second option then (for Scenario C) then we should see prices fall even more. Scenario D contemplates dramatic increases in the available pools of goods, information and money with prices relatively constant.

The most scary option, and possibly the most likely, is Scenario E. In this situation our population stays relatively constant and the supply of goods increases dramatically however the amount of services falls as more and more people turn to information based wealth creation systems and away from the performance of services to earn their livelihoods. Naturally the supply of information increases very quickly. The beginning of the transition from a scarcity-based to a surplus-based economy brings about the kind of inflation before seen only in Weimar Germany and some South American countries. Such hyper-inflation could immediately reach levels of 200 to 400 percent per anum and might easily pass through the 1000 percent mark. About the only short term comfort is that, under the system I have been describing, the inflation rate cannot come any closer to infinity than level FL. FL is the rate at which all available dedicated home workplace and other authorized money-creating processors can copy (or even counterfeit) E-dollars. The limit would likely be in the 15,000 to 25,000 percent per anum range. Of course such instability will not last very long; it will in fact last only as long as it takes for us to realize that in any capitalist economy we face the ever-present danger of being consumed by our own greed if some socially and/or legally instituted means of restraining each other is not found.

The fact that my annual income goes from $50,000 now to $250,000 in the attention economy is simply not a problem providing I am mature enough to realize that if I (and most other people) try using the extra $200,000 to chase goods and services then not only will we drive prices of same through the roof but we will also accelerate planetary resource depletion, perhaps critically. If I simply sit on the extra $200,000 or else use some or all of it to chase information products then there will be minimal inflation, at least not impacting hard goods and services. Inflation of the prices of information products is more tolerable. Yes, I can use some of my new wealth to buy a stereo or a Cadillac but moderation is clearly necessary in determining how much of it to channel into the hard goods and services area.

The problem in an attention economy is not how much money is CREATED but when, at what rate, how and by whom it is SPENT. Or, more precisely, the problem is how much of the total money is spent on hard goods. These goods have the double difficulty of impacting the environment when produced and disposed of and of being relatively scarce. Even services are scarce when one considers that we humans (who produce most of them now) are finite in number, especially those who are more highly educated. If too many dollars begin chasing something scarce then, all else being equal, the price of that thing will rise. However, if there is much, much more to chase (mega-mountains of information, to be precise) then the hard goods and even the services may have far less relative importance within the overall market. They may indeed pale in comparison.

Since a commonwealth of home workplace devices is a decentralized but very smart and self-aware market, the market itself can govern the rate of flow or transaction in the same way that commodity or stock markets can halt or spur trading in certain circumstances. Therefore, it is possible for the 'system at large' to impose limits on how many TV's or Cadillacs the nouveau super-riche can consume. As we move to a conserver society, it will be come much easier to obtain information which will lure you away from your intended goal or acquisition objective. Consider a current day example. You go to the showroom to order a specific car but get sidetracked by the salesman who ends up selling you one from off the lot. Whether it is cars, wine or whatever, studies have shown that only the collector (and/or eccentric) has what economists call 'absolute preference' wherein all of the 'A or B' offers made to him (with B varied but A held constant) will result in selection of his intended acquisition (A) no matter what else is offered.

Moreover, the stark reality is that paying attention (both electronically and in person) to the information products created by many others will for most people become far more interesting and pleasurable than acquiring more physical assets, above a level of comfort and convenience that they themselves will define. (Paying with dollars or attention for information assets also has minimal environmental and energy impact. Buying cars for cash has far more of these types of impacts.) Thus, much of the wealth created by attention-paying transactions will simply be plowed back into conventional (swap cash for asset) transactions to obtain still other information packages for later review. Every dollar thus spent cannot be

spent on goods and services. Render unto Caesar that which is Caesar's! Or, translated for tomorrow, from silicon to silicon!

8.5 Cooperatives and the Home Workplace

8.5.1 Leveraging Cooperativism

As pointed out earlier, one organizational model which is well suited to supporting many aspects of wide-scale home workplace *'electronic reciprocity'* would be the co-operative model. Familiar to many Canadians (some 12.6 million co-op memberships are held in Canada in agricultural, financial and other co-operatives), co-ops would provide home workers with the flexibility to organize automatically (i.e.: by QX) on a permanent or temporary basis for any worthwhile purpose. Allowing for voluntary, open membership, democratic self-control, manageable capital growth, the accrual of surplus earnings to members and other well-known co-operative principles, co-ops would prove to be (for many, but by no means all purposes) a useful alternative to conventional hierarchical organizations. Co-operativism, as various studies have shown, is ideologically neutral, favouring neither the pure socialist nor the pure capitalist model; a co-op can be easily adapted to the job at hand. Co-ops will permit people to collectively acquire and manage sole-use or shared assets and, most importantly, provide group synthesis of (and responses to) incoming information. Electronically formed co-ops could allow members to obtain lower prices on bulk flour, new cars, trips to Jamaica, symphony tickets etc. They could manage specialized lawn care equipment or recreational vehicles shared by a number of families.

Once we have completed this perceptual metamorphosis we will realize something far, far more important. Our new economy will give us the means to (and will in fact demand that we) allow people in the developing countries to create information and ideas and to package the for our consumption. As they provide these products to us and we pay for them by paying attention to the we will thereby be providing them the funds they need. They will, in turn (and this long overdue) purchase from us the things necessary to their development. This will engender here a whole new industry of producing goods and services tailored to the needs of uneducated Third World buyers. Both parties to the deal can hold their heads high and both will benefit from it. They will save us from the boredom of a life where technology caters to our every whim and we will save them from starving or dying of exposure or disease. If such a planetary bargain cannot soon be struck they will eventually defoliate the planet and drag us down to certain destruction with them. Even if we cannot find the moral justification for such an economy (and I am one who believes that we both can and must) we must move towards it out of self-interest.

8.6 Workplace Decentralization as a Public Policy Objective

8.6.1 A Public Policy Foundation for Home Workplace

In order to facilitate and encourage wide-scale implementation of the home workplace, to bring about physical decentralization of a substantial percentage of the North American population, to foster the electronic economy and to create fertile ground for the formation of electronic co-operatives a number of public 'frameworking' measures are needed. Some of these are discussed below. This framework assumes a government planned and led, but privately implemented, workplace decentralization program or strategy, consistent with the dictates of environment (protection), energy (conservation and renewal) and economy (re-vitalization).

Provided here is what I believe would be the best combination of policy measures to promote and accommodate the home workplace, once the people (and eventually, at some interval government) come

to understand the benefits which await such a deliberate policy. It is built around the concept of what will best promote the home workplace and is thus a technologically proactive approach; it is the opposite of sitting around and saying that since more people work at home each year that the whole thing will unfold anyway. It is, by definition, neither right wing nor left wing, since out future approach to politics will, in my view, be governed by a different continuum. Rather than left or right, we will be more concerned with how technologically proactive or reactive a party, policy or a politician is. I personally believe that for the next two decades, a policy of promoting the home workplace is justifiably proactive but by no means fanatically so. It would work to restore a balance between humankind and nature and would also remove much of the power over our lives now exercised by large and bureaucratic (not to mention cold and uncaring) institutions in general and the finance community in particular.

1. Adopt the concept of government planned and orchestrated, but privately implemented, workplace decentralization so as to ensure economic development consistent with environmental and energy realities.

2. Implement an interim master legislative framework for the development and encouragement of home workplace concepts and technologies, and practise setting out the role of all levels of government, corporations, co-operatives and individuals. All other related legislation would be referenced to this master statute, parts of which later could be constitutionally enshrined. Such a framework should cover at least:

-the role of each level of government;

-the role and importance of public and private communications carriers as well as of standards of technical practice and standards of conduct;

-economic incentives and assistance to be provided by the federal government to assist in the promotion and implementation of home workplace policies;

-the right to work either at home or outside the home, the rights of workers working at home and the rights of those working in the homes of others;

-the right to a clean environment and a minimum level of economic well-being (including a home) existing in the context of and as enabled by the home workplace;

-the right to personal mobility;

-the creation of prototypes, pilot projects and whole new decentralized homestead communities; and

-the legal and actual empowerment of the rural homestead citizen for protection of their personal (and family) life and property.

3. Take immediate steps to protect existing and potential agricultural land and other valuable resource land from urban encroachment to preclude the possibility of having to 'unpave' and 're-soil' land in the future.

4. Stress the development of small scale agriculture using the widest range of existing advanced technologies and concentrating also on biotechnology.

5. Instil in the national consciousness the fact that agriculture and food production are almost everyone's responsibility, and pursue food pricing policies which are fully compensatory. These policies should encourage limited domestic production by individuals and families of those food items which can be so produced.

6. End the apparent stigma which has developed concerning various aspects of rural life and, in particular, take all steps possible to remove from the national vocabulary all negative and regressive connotations relating to farmers.

7. Encourage and openly support the development of a 'hobby farm' class of expatriate urbanites who will, in fact, form the leading edge of the implementation of the new agriculture.

8. Establish as the first priority of the primary, secondary and post-secondary educational system the preparation of the individual to live and thrive in the political, economic, social and technological environment to which the country aspires. Educate children for the targeted future environment they will face when they leave school, not for the present environment! Instil in the individual the sense of national pride and of personal purpose, freedom and responsibility which will be required to thrive in a milieu offering an almost unlimited - and constantly variable - portfolio of voluntary activities and income-earning occupations or projects.

9. Federalize educational planning, standards and compliance oversight at the primary, secondary and post-secondary levels. Leave with the provinces and states a limited ability to prescribe enhancements or extensions to (but not deletions from) national standards and curricula.

10. Utilize post-secondary institutions as part of the leading edge of decentralization both of faculty and students. This can be accomplished by pioneering, prototyping and assisting in the wide-scale implementation of new modes of interaction among physically distributed individuals wishing to interact together for educational purposes.

11. Increase the input of the parent, child and local community into the form and structure of the child's education while blending new and existing technologies with the ancient 'tutorial' and 'apprenticeship' concepts of learning. To the extent possible, reduce the percentage of lifetime education which is concentrated between the ages of 12 and 20 both by offering more apprenticeship and co-operative work opportunities, and by offering even basic high school courses to mature students more conveniently and without stigma to mature students.

12. Accept the premise that the existing telephone and telecommunications system will serve as the initial backbone network for workplace decentralization and that the extension of broadband or other high capacity service to each telephone subscriber is a high priority and justifies public loans or subsidy as may be required.

13. Support private ownership of the 'means' of communication and, if feasible, continued private ownership of the telephone system. If the telephone companies refuse to support workplace decentralization, or else seek to exploit the home workplace by instituting rates which would make its continuation uneconomic, then the government must intervene to prevent such actions from having effect.

14. The functional and technical specification for QX processing should be public property so that anyone can build applications which can interact with Mk. 1 and Mk. 2 GAINERs. Further, a freeware or OpenSource application should be promulgated for free download, under a genial license regime, which permits a user to generate, transmit, receive and process QX's.

15. While the telephone system will remain primary to the home workplace for many years, it shall not be the only system. It should be legal for any two GAINERs which have first established contact by telephone to supplement or replace such contact by any other mutually convenient medium.

16. Establish the guiding principle that the production of required energy is a shared responsibility of the public utility and the homestead user. Create a system of grants, subsidies and loans supporting the industrial, commercial and residential creation of environmentally sound local energy sources (such as water, wind, solar and also organic fuels), thereby reducing the demand on the public utility.

17. Commit the nuclear industry to a serious investigation of the feasibility of the production of very small scale nuclear powerplants designed not to meet macro energy requirements but rather local micro needs.

18. Take all necessary measures to facilitate the establishment of direct contact between individuals and organizations in Canada and the United States and those in selected (pilot project) Third World countries. Permit conventional (Type A) trading transactions wherein Third World users of home workplace equipment trade information packages for our currency which they can then use to purchase goods and services here. This 'trade rather than aid' strategy is most likely the ONLY way to reverse the starvation, over-population and defoliation now rampant even in the supposedly 'semi-westernized' countries such as Brazil.

19. Create the means to stimulate a much higher degree of self-reliance on the part of the individual with respect to physical, spiritual and emotional/spiritual well-being. Take the position that the following are the most to least desirable means of meeting such needs:

-self-reliance;

-obtaining assistance on a private basis, via QX;

-obtaining assistance where the government acts only as the information intermediary, putting the party needing help in touch with the party willing and able to help, be it individual, co-operative, social service agency or otherwise; and

-obtaining assistance where the government acts as the resource intermediary, obtaining resources from taxes and making them available through a health, social or welfare service.

>>> This principle of self-reliance obviously applies least in the health care field, where there should be no basic changes to our public health system in Canada, but this is an area where the American health care system needs much work. It obviously applies most to such areas as unemployment support (which should basically disappear because, as we have seen, QX's permit jobs or projects and unoccupied people to much more easily find each other), welfare and in some cases to other types of support. While a professional family service counsellor may help meet the needs of a recently widowed woman, so also might a support group or another individual who has just gone through bereavement. Launching a QX is a lot less obtrusive (and requires less courage) than posting a sign on one's front door or even calling the often bureaucratic agency which stands between the woman and the counsellor. The thrust of this policy is not to eliminate the professional social welfare system, but to ensure it is used only where there is NO other viable alternative or where the situation is so serious that only a professional can meet the need. At some point there will be enough of us with enough resources to help each other that state-sponsored giveaways can end. It is highly dubious that giving a woman a washer, a refrigerator or a television provides her much initiative to improve her income earning status. Perhaps a QX would have matched her with someone with a good used one to sell or who would buy her one in exchange for a year of one-evening-per-week cleaning services. If such were the case, most of us would resent the new washer being paid for with our tax money!

20. Take immediate steps to comprehensively apply new technology to the care of the young, the old, the handicapped and others with special needs. It is morally intolerable that in this society, despite the various technologies available, we should allow an old person to undergo the continuous mental degradation of long years in bed in a chronic care hospital because they suffer from one or a small number of minor diseases or incapacities. We should employ advanced technology not only to mitigate physical problems but also to provide access to all kinds of information, thereby making life more interesting. There is no particular reason why even long-term hospital patients could not have a bedside GAINER.)

21. Provide incentive schemes, tax credits and even cash for volunteer work which creatively improves the community and particularly the lot of those least able to help themselves.

22. Rapidly phase out the concept of a person being either 'employed' or 'unemployed', in recognition of the stark reality that in a post-industrial information-based economy there will be five hundred shades of grey between these two extremes. The only fair means of taxation in the future will be a small head or poll tax plus taxation of the stock of hard (versus information) assets which one has accumulated.

23. Develop the concept of a guaranteed income support scheme to supplement whatever income an individual is capable of earning. Such a scheme should in no measure discourage the individual from working but should recognize the basic right to food, clothing, shelter and mobility. Given the ability to afford these four basic rights, the individual should be enabled to go forward to support himself. The other side of the same coin is that the poll tax should be set at a manageable proportion (say 10 percent) of the guaranteed annual income.

24. Adopt the premise that finding productive occupation(s) is primarily the responsibility of the individual and not of the state. However, the provision of the climate of opportunity is a government responsibility where the private sector is unable to perform this function. If both the private sector and government fail in this regard, then government must provide the requisite cushion in the form of income supplement such that the individual reaches the minimum nationally acceptable income, given location and number of dependents.

25. Establish and progressively implement a National Superhighway Program, a comprehensive vehicle specifications and standards program, and an urban vehicle access law identifying and differentiating among INTERCITY, UTILITY (including conventional gas and diesel) and URBAN vehicles.

26. Undertake comprehensive experimentation with the concept of transportation systems being used to deliver certain services which not only must be delivered physically, but which heretofore have been provided in a centrally oriented user-come-to-service format. Such could include library, dentistry and various medical specialties, certain services delivered by governments or co-operatives, as well as various specialized wholesale or retail businesses. Space in truck caravans (or more likely trains) dedicated to this purpose could be leased out as shopping centre space is today.

27. Further alter the process of economic regulation within the transportation sector and, where possible, limit it to those markets where steps must be taken to maintain essential services. Under no conditions should cross-subsidy be permitted, and all 'social' services which are operated at a loss should be directly and openly subsidized.

28. Take steps to facilitate the rapid formation, growth, re-organization, contraction and termination of corporations and co-operatives by conventional and electronic means.

29. Take steps to permit the formation of corporations by individuals and groups of all socio-economic standing. (Today, the huge majority of new corporations are established by those of upper middle class or upper class standing.)

30. Establish the consumer right to complain by QX to government regarding the behaviour of any business or co-operative. Mandate that response and an initial attempt at resolution MUST occur within five days.

31. Encourage service industries to continue to develop and to expand where feasible but accept the fact that, as with the professions, some services and some service industries will see greatly reduced demand for their services or even disappear entirely. When this occurs, the natural decline or death of an industry must be permitted to take place. To permit the service provider to instead entrench himself or herself by forcing members of the public to consume services which are neither needed nor wanted is to

impede the country's order, progress and social development about as effectively as the youngster who blocks the school washroom door.

32. Provide an appropriate climate for the growth of all sizes of information provider, from individuals to giant corporations. It will be necessary to develop norms of behaviour for QX's to prevent wanton misuse of network resources. There is no question that a large number of incoming QX's at any home workplace will be in the vein of what we now call junk mail and much of this will come from organizations and not individuals. However, the coin has two sides. Individuals, even those working at home, who work mostly for one organization may wish to preclude processing of most QX's not originating WITHIN their own organization, at least during prime working hours. Bureaucrats whose positions place them deep inside the organizational pyramid may not wish to receive enquiry QX's targeted directly to them by a member of the public merely because their names were in the hardcopy phone book or QX directory. How deep should a QX generated by an outside individual be permitted to permeate into the structure of an organization, regardless of the actual location of the worker? We may have to resort to atomic theory for some help with this question.

33. Establish federal government not-for-profit corporations to foster the creation, assessment, testing and commercialization of technology appropriate to the rural homestead including:

-electrical and heat generation;

-food production;

-vehicle fuel production;

-fertilizer production; and

-physical security.

Once the momentum reaches a certain level, the private sector will take over. The U.S. federal and state governments, and Canadian federal and provincial governments, invested in railways which were required to link the country together. However well before 1900 the railway building boom took on a life of its own and became fully supported by private capital.

34. Establish, and if necessary entrench by legal or constitutional means, a limit to the population, area and density of every incorporated community in Canada and the United States. At the same time, provide the jurisdictional and other means required for the rapid creation of new settlements, villages, towns and even cities in accordance with generally accepted planning principles.

35. Develop, or enable the development of, new uses for the large number of high density buildings in urban areas which will be vacated by business in favour of the home workplace, as well as the large number of suburban apartments which will be forsaken by their current occupants for downtown walking communities or for lower density suburban, small town/village or rural life.

8.7 Conclusion

The implementation of the above propositions would certainly lead to a more strident role for government in some aspects of our lives. However it would also enable, and indeed require, a much greater exercise of freedom (and responsibility) on the part of the individual and household. While workplace decentralization would surely preserve and increase our degree of emotional and intellectual interdependence it would also, without question, greatly reduce our physical interdependence. If some of the proposed measures may seem draconian while others may seem laissez-faire in the extreme, then

the reader should place himself in an 1890's farming village and look at our current arrangements. The villager would doubtless think the same thing

Sometimes, in history, one or a small number of enterprising individuals take an idea from the science to technology and from technology to wealth almost instantly. In other cases, progress is slow and plodding. Sometimes governments provide very visionary and dynamic leadership and bring this conversion process almost to a fine art. Sadly, they usually do not. Somehow, I hope that among the ordinary citizens, the brilliant entrepreneurs and the great leaders of our time we will find it in ourselves to bring about the changes called for, and anticipated, by this book.

9. Getting Started

9.1 Introduction

The intent of this chapter is to provide you, the reader, some immediate and practical guidance in seeking to adopt and use the home workplace for yourself or your organization. Some readers might think this a simple task for someone excited enough about the home workplace to write a book about it. The precise opposite is true, however. I have helped a number of organizations apply new technology to adopt the home workplace, but have been always very much aware that differences among people and organizations dictate a high degree of flexibility in each situation. A once-for-all cookbook simply won't be very useful. Therefore, this chapter will build on the previous ones by seeking to equip you with the ability to ask yourself the right questions about your work, the people who do it and how things will change in a home workplace situation.

There are a number of books in print (and more all the time) which very well address some of the human factors and organizational aspects of moving to the home workplace. This book is not one of them, since it concentrates primarily on the broader issues of environment, energy and economy.

9.2 The Four Pillars of the Home Workplace

Like a four-legged chair or table, a successful home workplace trial or pilot project implementation MUST take account of four separate realms or realities. They are as set out below.

9.2.1 Work Flow

It is necessary to have a thorough understanding of the work performed by the individuals who are to work at home. Who or what creates the demand for the work (i.e.: who is the customer or client) and benefits from it, who supplies the input components, who actually performs the work, how do they do it and so on? ANNEX B provides a good foundation for studying, even simulating, how you and your colleagues or co-workers perform work and for determining who can readily undertake what portions of it from home.

9.2.1 Human Factors

Most organizations today are, thankfully, well past the stage wherein the 'boss' would consider ORDERING anyone to work at home. However, we have far less experience with organizations (as opposed to lone entrepreneurial individuals) using the home workplace. A wide range of issues must be addressed in determining the suitability of each employee to perform a given role from a part-or full-time home workplace. It is most unwise to assume that just because a person volunteers to work at home they are therefore wholly suited to do so. The process of assessing who should have access to the home workplace must take cognizance of the background and orientation of the candidate employee group, their desires and concerns and their (anticipated) propensity to adapt. Nonetheless, the arrival of the automobile ultimately impelled most of us to learn how to drive.

9.2.3 Technology

In planning and deploying a home workplace pilot project, which if successful can and should lead to a full production situation, there are a number of technological barriers and opportunities which must be recognized. The opportunities appear throughout this book and some of the specific barriers are discussed below.

9.2.4 Logistics

The actual deployment of a group of people to work at home requires a very serious emphasis on logistics, such as how they will move items which are not computer-capturable between office and home, and vice versa. Where will they obtain their supplies such as printer paper, printer ribbons, pens and writing paper? If you immediately answered: "At the office" you might be correct. Then again, you might not. If a given employee's home is 30 or 40 miles from the office it may be simpler for your firm to maintain an account with an 'office supply' store and allow the person to visit the one closest to their home workplace.

>>> If any one (or more) of these four areas is neglected in planning a pilot project, you can expect problems. Sending home workers who perform a type of work for which there is currently no substitute to immediate contact (such as doctors, for example) is not particularly productive. Sending home workers who don't want to go will result in lower productivity and maybe even a revolt. Giving home workers a dumb terminal and a telephone when they really need an integrated computer/communications workstation is like sending your son to the baseball game with a hockey stick. Fielding a pilot group of thirty workers without proper thought to logistics is like dispatching his whole team in a school bus without also sending along a pickup truck to carry their gear; you will be certain to lose the game.

9.3 For the Individual

For an individual business person, professional or entrepreneur who is considering working at home the key issues will relate to what identifiable benefits and disbenefits (in terms of work style, opportunities for business development, opportunities for social interaction) are of primary concern. The person must make their judgement, deciding at the same time how much time, effort and treasure to risk on a new arrangement for which there can be no absolute pre-assurance of success. Much of what is in this chapter may have to be 'downscaled' to the individual's personal perspective.

9.4 For the New or Expanding Organization

One of the largest barriers to the expansion of an individual's small home based business (whose full- and part-time employees are crowding him or her out of house and home) is the 'office' as we know it today. I include here the 'mini-office', the 'omni-office', the 'incubator-office', the conventional office and all other manifestations. They all have one thing in common: cost. Cost is the enemy of the small, expanding business. Taking the business out of the basement and into an office costs real money. If the business is of such a type that it works mostly with information (or at least works with something that individuals can work with independently), it can use the home workplace to delay, perhaps indefinitely, the day it is forced to commit to an office. However even an organization of four or five people can gain from considering the items set out in this chapter in their own perspective.

9.5 For the Existing Enterprise

The benefits of the home workplace for an existing, established organization are treated throughout this book, since in the next ten to fifteen years it is such organizations which will be realizing much of these benefits. After all, many entrepreneurial and professional individuals are already working at home and many people are building new companies today without offices.

9.6 Home Workplace versus Current Reality

Beginning in the 1950's, the arrival of automation technology permitted organizations to increase the efficiency with which first highly regular, and then increasingly diverse, tasks could be performed. As the computers declined in cost, but increased in efficiency by six or seven orders of magnitude, the available raw power to manage information quickly came to exceed our ability to know how best to employ it. By the latter half of the 1980's the challenge had become one of how best (or at least how most intelligently) to apply technology to the various information management requirements of the organization. Top-down, monolithic applications of technology tended to be less successful than grass roots, bottom-up applications, although the latter sometimes lacked structure, almost to the point of chaos.

However, as the Information Technology (nee Electronic Data Processing or EDP) community attempted to reconcile the corporate and individual information management environments (as represented by the mainframe computer and the PC respectively) a critical, and incorrect, assumption was made. In seeking to network the PC's of individual workers together with each other, with workgroup or departmental systems and, ultimately, with the central system it was inherently assumed that workers would remain LOCAL. They would remain IN the office. Hence the 'Local' in the term 'Local Area Network'. Thus, it was also assumed that:

> -the communications channel capacity (bandwidth) which could be provided to the end-user was limited only by the type of wiring which could be run to that user's desk or workbench; and
>
> -the IT organization could gain immediate physical access to the end-user, his or her PC and network connection and the end-user could gain (reasonably) immediate access to professional informatics support'

A further implicit assumption was made, during the 1980's, that the next generation of minicomputers (now usually called mid-range systems (MRS) or workgroup systems) would function primarily as 'servers', simply offering data (or specific gateway or other services) to PC or similar workstations which would perform most of the processing. While the client-server model of computing is certainly a valid one, and has rapidly gained acceptance over the past few years, this approach had several shortcomings:

> -it assumed that actual logic-based 'processing' of information would therefore occur at the PC level or mainframe level only, often referring to everything above or 'upstream' the PC in the systems architecture hierarchy as the 'processing network' ;
>
> -it therefore belied and defocussed attention from the fact that minicomputer successors such as the MRS could not only 'serve' but could also 'process' data on a single-user or multi-user basis; and
>
> -it also ignored the fact that it is not a network which processes data; a network merely transports data, only processors can process data.

Finally, the application of general automation to the workplace (in such areas as telephony control, calendaring, document production and internal mail) became known as 'Office Automation' or OA. This was rather like the conceptual yoke which was occasioned by 'horseless carriage', as discussed earlier in this book.

The triple conceptual yokes of LOCAL Area Network, Client-SERVER computing and OFFICE Automation have greatly retarded the uses to which modern organizations have been able (or at least have seen fit) to put information technology. Specifically, they are believed to have retarded serious consideration of the home workplace as a viable strategy for new or existing organizations. These can be considered as the 'LSO BARRIER' because they represent a triple barrier to conceptual thinking as to how the technology might be used, particularly as regards the home workplace.

>>> To implement the home workplace, you have to overcome the LSO conceptual barrier both in planning and in practice.

Today, we also have small and efficient laptop computers and the so-called remote access servers which permit users beyond the walls of the enterprise to become remote users of the local and wide area networking facilities, albeit often as third-class users.

There is also a structural reason why few major computer hardware vendors or independent software vendors have developed products tailored to the home workplace. Most of the approximately 20 million Americans and Canadians who work at home, at least those who do so on a regular basis, are individuals or are part of small, independent organizations. Those who are part of large organizations tend to work at home only on an informal, unofficial basis or are part of very limited trials or pilots, usually under the banner of 'telecommuting'. Thus, in the main, large Fortune 500 companies have not understood the potential of the home workplace. There is also the fact that existing off-the-shelf software and hardware products are not only not optimized, but are in many cases simply not suitable, for this type of use. The big corporations have therefore not demanded home-workplace-specific products from the major computer vendors and these vendors therefore do not well understand the home workplace market.

>>> In recent years firms such as IBM, Sun and Cisco have become very committed to home workplace but - in the main - within very many large enterprises when someone is working at home it is considered to be ad-hoc, temporary, non-mainstream or in some cases just flat-out weird. Home workers who are part of a large enterprise in many cases are not the core workers; they may be summer students, handicapped persons, those on special leave (maternity etc.), former employees brought back as contractors, IT developers or support staff or those charged with particularly creative roles. Within many corporate cultures working at home is still considered to be unofficial holidaying or adopting a leisure work style or even hokey.

9.7 A Building-Block Approach

From the time of the publication of Alvin Toffler's discussion of the 'electronic cottage', there has been a general awareness of the possibility of utilizing computer and communications technology not only to allow more people to work at home more of the time but also to improve the quality of home life. Since about 1985, most of the basic 'building blocks' for the home workplace (at least from a purely technological perspective) have been available. Unfortunately, the same period has also seen considerable retrenchment of North American business, and in some cases behaviour bordering on irrationality, mostly out of financial panic. Most large and mid-sized businesses have been largely pre-occupied with reducing the layers of management and increasing individual authority and accountability among their workers. At this point, however, most of the productivity and efficiency gains available from such changes have already been realized. Further improvements in operations must come from other sources.

In the United States, and in Canada, a number of human resources and systems professionals have been writing on the subject of the home workplace, and the neighbourhood work centre, throughout the past decade. Governments have also taken an interest in the field. In Canada, the Department of Communications established the Canadian Workplace Automation Research Centre (CWARC) in Laval, north of Montreal to conduct study and investigation into various workplace environments, including the

home workplace. (An interesting side-note is that this centre was ultimately styled 'Workplace Automation' and not 'Office Automation' as a direct consequence of a brief which the author submitted to the Royal Commission on the Economic Union and Development Prospects for Canada in 1893.)

In the United States, various authors have published books and articles on the subject of telecommuting, covering its human resource, operational, legal and other aspects. With certain exceptions, the Canadian literature concentrates more on the use of communications (a Canadian technological strength) in the home workplace while a substantial element of the American literature is concerned with management and human resources, rather than technological, issues. Both state and federal governments in the United States have evidenced interest in the home workplace, however nowhere is this interest greater than in California, where the state government has actively explored telecommuting, including sponsoring a multi-agency pilot.

While much has been written on the science of the study of work, from the time/motion studies of the 1940's and 1950's to the present, little has appeared in the professional literature regarding how the science of work management might be applied to planning for the home workplace. Conventional data flow and functional analysis, as applied to the study of user requirements during the development of application software, is also inadequate. Therefore, a new approach is required; one which can equally well contemplate automated and manual tasks as well as location-independence of the workplace.

In my view, none of the reports produced on telecommuting pilots have adequately addressed the many logistical issues which attend adoption of the home workplace for a group of individuals, or for a discrete workgroup, within a large organization. Not all 'traffic' between the worker and the central facility, or among workers, can be scanned into a computer and then reduced to electronic signals. The worker may require bulky drawings, samples and supplies all of which must somehow be physically delivered. I believe that a true balance is required between work management, people management, technological and logistical issues if a successful home workplace pilot project is to be conducted. A successful pilot is an obvious pre-requisite to large scale commitment to the home workplace by any organization. Undue concentration on any one of these four areas, particularly where it is to the exclusion of the others, will at best result in a sub-optimal trial and at worst a disastrous one.

In summary, the key limiting factors which have caused North American business to remain shackled to the physical facility of the office are as follows:

-the LAN, Server, OA (LSO) BARRIER;

-the general lack of excellent computer-telephony integration (CTI) products;

-perceived requirement for 'over-the-shoulder' supervision;

-the fact that much work remains paper-based despite considerable automation; and

-organizational experience and culture;

9.8 Bottom-Line Arguments

9.8.1 Home Workplace Benefits in Context

North American businesses have been continuously seeking - throughout the past two decades - to increase their financial and operational efficiency and to 'cut' any excess equipment, inventory, business processes and personnel. These cuts have increased the efficiency of many businesses and have allowed them to not only to drive competitors from the home market, but also to improve their relative

position internationally. However, by the end of the 1980's the majority of the potential benefits achievable from 'rationalization' had already been realized. History has also shown that it is possible to 'over-rationalize'; for example many railroads cut so many branch lines and even main lines in the name of cost reduction that they ceased to be viable transportation companies. It has been remarked, not entirely in jest, that a corporation can best reduce costs by ceasing operations entirely!

9.8.2 Economic Benefits

However, with increasing access to world markets being facilitated by trade liberalization, it is clear that North American businesses cannot become complacent about continuing to increase their operational efficiency. To do so would be to accept, almost unquestioningly, that foreign competitors will have the upper hand in the international market, due often to government subsidies and/or lower costs for production inputs, particularly labour. If the home workplace can reduce operational costs and/or increase productivity then there is an **ECONOMIC** imperative to consider it, providing it is operationally viable.

9.8.3 Environmental Benefits

Combined with the efficiency imperative is the need to increase the attention paid to environmental issues. This impacts individuals and small enterprises just as much as large corporations, particularly where governmental intervention mandates such consideration. Recycling and re-use are positive steps but are clearly, by themselves, insufficient. Use of the home workplace reduces pollution in two ways:

-pollution associated with commuting is reduced by the net amount of employee commuting driving which can be eliminated, specifically driving for which vanpools, bus or LRV/heavy rail substitutes are not practical; and

-pollution associated with operating large office complexes is reduced in proportion to the downsizing of such facilities which the home workplace will facilitate.

There is thus an **ENVIRONMENTAL** imperative to consider the home workplace, where it is viable.

9.8.4 Energy Benefits

There is also an **ENERGY** imperative for the home workplace. Reduced commuting, and more flexibility when commuting IS required, leads to reduced energy consumption by employees. Reductions in central office size also point to reduced energy consumption by those facilities. It is noteworthy that each day a worker spends working at home:

-consumes no fossil fuel for commuting, reducing both congestion and pollution;

-consumes no commuting time and induces no commuting frustration;

-exposes to worker to less pollution and less risk of accident;

-requires less trunk system energy input and capital input for shelter and infrastructure support;

-permits the worker to be less distracted and to function in a more restful and pleasant environment, and one more to his or her own liking; and

-reduces employee clothing, dry cleaning and dining costs.

In most cases, increased pollution and/or energy consumption associated with more employee time spent at home (and with any local driving during the day) will be greatly exceeded by the environmental benefits and energy savings resulting from the home workplace. In a broader context, and over a number of years, widespread implementation of the home workplace would reduce urban concentration and congestion and thus reduce both the mega- energy consumption and mega-pollution associated with very large urban complexes. With intelligent telephone (and future network) access charges, distance from the employer facility would no longer be a major parameter in deciding where to locate one's home.

9.8.5 Summary of Home Workplace Benefits

Thus, over the mid-term to long-term, the benefits of the home workplace are as follows:

-reduction of mega-capital concentrations, mega-energy demand and mega-pollution due to the potential for major physical decentralization of the information worker population and moderate physical decentralization of 'touch worker' population (those who touch physical objects or provide non-information based services);

-greater individual and economic and physical independence;

-improved worker access to family life;

-increased opportunities for community and recreational involvement;

-ability to establish an organization which is a confederation of enterprising individuals; and

-ability to create a decentralized and flexible organization, in which the work items themselves become 'intelligent' and navigate their own way through the sequence of individual workers best able to 'do' them at a given time.

The above paragraphs may seem like a re-statement of much of the thesis of this book, but they are here for a reason. They are presented in a format from which you, the proponent of a home workplace pilot, can readily derive the material necessary to assist your senior management to link the home workplace to business objectives in their own minds. They may come to see the home workplace as a tool to improve their operational or financial position, or even as one necessary to their organization's survival. If you cannot help them to establish this link in their minds, a home workplace pilot likely will not have their support.

9.9 Making the Business Case

You will, of course, require additional ammunition because at some point someone will almost certainly ask about the bottom line. If no one else, it will be the accountant or VP Finance. You need to determine which of the following will be most favourably considered.

9.9.1 Cut Operating Costs

The home workplace allows a business or governmental organization to reduce operating costs by reducing the requirement for fixed facilities for those workers who work entirely (or even mostly) with information. In general, workers will still require some access to a central facility but savings of 30-40% per worker in terms of fully serviced floor space and office-related services are possible. Capital and operating costs associated with conventional office facilities can be substantially reduced.

9.9.2 Increase Operational Flexibility

With full- or part-time home workers, it is possible to rapidly increase or decrease the number of person-hours spent on any function much more readily, since it is possible to also have 'nominal' workers who have computer equipment already installed at their home workplaces and are connected (or at least are readily connectable) to the organization's central equipment. It is possible to establish market development, market assessment, sales or service 'outposts' in new territory much more readily and at much lower expense than opening a conventional office. It is also possible to transfer workers among department or functions, provided computer equipment is based on a corporate standard, with relative ease and without the need for physical re-location.

9.9.3 Make the Organization Smarter

In order to decentralize operations intelligently, whether for one workgroup or for a whole firm or division, it is necessary to systematically take stock of the work items handled by the organization or workgroup and to understand the 'workplaces' through which the work items flow. In considering the organization's work in this way, it is possible to identify opportunities for the work items themselves to become 'smart' and indeed to, in certain cases, navigate their own way to the workplace of the worker who is, at this instant, best able to 'perform them'. This is not unlike the 'just-in-time' inventory system implemented over the past ten years but there is an important difference; so far, we have not been able to have industrial products navigate their own way through the factory. It is clear however, that the work item/workplace paradigm can permit information-based work items to do just that. This type of work item navigation is fully consistent with steps already taken to empower workers.

9.9.4 Take Advantage of New Technology

The ability to deploy not only VoIP telephony, but also to fully integrate conventional telephony with computing offers almost any organization a tremendous set of benefits.

9.9.5 Reduce Energy Consumption and Pollution

Whether motivated by good corporate citizenship or by governmental mandate, the home workplace enables the organization to reduce its contribution to aggregate energy consumption and pollution in the areas where it operates. It may also provide lower cost commuting reduction or congestion reduction 'credits' than funding vanpools or contributing to rapid transit by levies outside normal property taxation.

9.9.6 Increase Employee Satisfaction

In future, the attitude of an employer towards an employee's desire to have a reasonable amount of time available for his or her family life will be a decisive factor in attracting, rewarding and retaining high quality employees. Organizations which fail to take steps to maximize the amount of time an employee has for family and local community/recreational activities may find it increasingly difficult to retain white collar, professional, managerial and executive staff. There is no better way to increase an employee's access to his or her family than to permit full- or part-time use of the home workplace.

9.9.7 Rationalize Acquisition of Supplies, Services and Support

Assessment of the organization's work flow, and consideration of the work items and individual employee workplaces separately, will (when combined with actual physical decentralization) highlight opportunities for rationalization of how the organization purchases and internally distributes goods and services for its own consumption. While this is a by-product benefit of decentralizing, the savings and other benefits can be considerable.

9.10 Anatomy of the Home Workplace Deployment Process

In all but the smallest organization, the process of considering, approving and actually moving to a home workplace pilot project will likely look something like this.

9.10.1 Feasibility Study

Whether for a five person company, or a fifty person workgroup within a mega-corporation, it is usually necessary to conduct brief but detailed (in-house or contracted-out) feasibility study of a your organization's business operations to determine the costs, opportunities and benefits which would accompany use, by a specific workgroup, of the home workplace. A single entrepreneur can likely accomplish this review for him or herself but obtaining outside advice is still a good idea; it is very hard to study yourself. This should in most cases include a systemized study of the workgroup's current work flow, using either the Work Flow Methodology (WFM) and Comprehensive Workplace Simulation (CWS) approach described in this book, or any other approach which accomplishes the same objectives. (Certainly, I do not have a monopoly on inventing methodologies and simulations, other approaches once tried and tested, may also prove viable.) Any well-qualified external consultant will want to interview managers and representative workers to determine the most appropriate general strategy for decentralization for the organization. Deliverables at this stage should include a draft report, presentation on the findings and final report.

9.10.2 Project Planning

A detailed pilot project plan should next be developed on the basis of the information already obtained, plus any additional information which comes to light in a planning session for management. Following this meeting, planning activities should result in production of the following:

-Statement of Pilot Project Objectives; and

-Comprehensive Project Plan Covering:

- -Workgroup Selection
- -Orientation and Training Services
- -Technology including Software, Hardware and Communications
- -Workgroup Deployment
- -Project Management
- -Project Assessment.

9.10.3 Project Management

It is necessary to have SOMEBODY (be it an outside consultant, the company's own human resource or information management group or the pilot project workgroup's own designee) to undertake responsibility

for the management of the home workplace pilot project including co-ordination of senior management and pilot workgroup activities with those of any third party technology and service providers. Project management should include use of a standard project management tool as well as the administration of questionnaires and other assessment instruments for use in selecting (from among a group of volunteers drawn from the pilot workgroup) the individuals to actually work at home as well as the control group (for comparison purposes) of those who will remain at the office. Regular review meetings are normally required to be held with management and with pilot workgroup members.

9.10.4 Systems Engineering

The in-house Information Technology (IT) organization, or someone else, should prepare a detailed specification for the integration of any new software and hardware to be used with that already installed. As a minimum, work flow management, office automation and word processing packages should be made available on a co-equal basis to home and office workers. Failure to provide at least this basic functionality will handicap the home workers from the outset, as well as tending to confirm the views of any managers who are dubious about supervising home workers. The specifications should also address software installation standards, keyboard assignments, terminal emulation and installation of software on a server.

9.10.5 Workflow Management Software

As stated above, it is important to have a means of tracking what work is assigned to, and actually performed by, those working at home. At this time, software is beginning to be released to the market which has been optimized to performing this function in a home workplace environment. Ideally, such software should permit an office- or home-based manager or supervisor to co-ordinate the assignment of work to a group of decentralized workers who will use stand-alone PC or similar equipment, and who will not need to constantly log onto and timeshare into a central system, except for a very small subset of computer functions. Existing Office Automation (OA) packages provide some of these functions.

Correspondence control systems provide another and even a simple database package can be modified to provide a cross-referencable dataset of this type. However a workflow management package optimized for the home workplace should provide some very special attributes not found in the others.

9.10.6 System Acquisition Management

Where the organization desires to acquire equipment or software from a trusted vendor, or competitively among two or more vendors, it may choose to issue a Request for Quotation (RFQ) based on specifications developed earlier by the customer or a third party. Responses should normally be evaluated first on technical grounds with all surviving compliant bids evaluated on the basis of price and value-added content.

9.10.7 Orientation

It is necessary to provide orientation sessions (with maximum class size of about 15 per session) for those who will be working at home, for those who will not and also for or their managers. Each session should utilize audio-video materials, lecture presentations, text backup and student participation. Several telephone companies and other entities have made useful videos on the home workplace. A number of books cover different aspects of the subject, however for a large pilot you may wish to abstract material from several of them, as appropriate to your situation.

9.10.8 Training

Next, you will want to provide on-site training (again with maximum class size of 15 per class) with one day devoted to home workplace operational procedures, your logistical support arrangements and intended workflow management software and an optional second day devoted to your intended office automation and word processing products if required.

9.10.9 Logistics and Services

Depending upon the scale, and geographical dispersion, of your trial or pilot, you may wish to establish one or more intermediary Community Work Centres (CWC's) which serve as a 'half way point' between your central office and the employee's home. At such a centre the employee can access a computer support person, obtain supplies and hold meetings with other decentralized workers. Of course, establishing such a centre can be expensive and you may wish to consider pooling with other firms also engaged in home workplace trials. Ask your telephone company to match you up with any other firms considering such an approach. It is in their interest to help you; some of them have established CWC's of their own. Plan carefully regarding any confidentiality or security concerns you may have. CWC's are also known as Group Work Places (GWP's) or Telecommuting Work Centres (TWC's). Some economic development organizations are offering low cost or even free space in CWC's intended to be used by a number of different organizations. In the main, however, these are intended as the 'pump primer' for city, county or regional economic development. It is most often an explicit objective of such CWC's to induce the user organization to eventually build its own local work centres, in the host county of course. Also, the organizations managing most such centres do not have the experience and technical sophistication to take full start-to-finish responsibility for a home workplace pilot project. This is particularly true where a pilot involves a substantial number of workers and/or a various heterogeneous computer systems requiring integration. Finally, there is a very real potential for conflict of interest, since some of the providers of local work centres (also called satellite offices) have no interest in the home workplace at all, and pay only lip service to it. They either want to induce the major user to build its own facility in their area -or else wish to continue to provide it services for a remote, managed office. If the premise is accepted that it is better to decentralize whole workgroups (or at least portions of them), it will quickly become clear that, for example, an organization's Accounting or Sales Department likely have members from throughout a given metropolitan area. Therefore, building a single remote or satellite office in one area, or even permitting decentralized employees to use any existing facilities there, is insufficient. However, the other alternative is to commit to building a number of remote work centres, perhaps before the full operational and commercial viability of workplace decentralization is established for the organization. There is also the issue of capital and operating cost, to say nothing of budget cycles.

9.10.10 Pilot Project Assessment

After the pilot project has been in operation for two to three months, it is necessary to produce an assessment of the pilot project in terms of technology, operational and economic factors. The pilot should be evaluated against the costs, opportunities and benefits identified at the feasibility stage and also against the specific pilot project objectives agreed earlier.

9.10.11 Transition Management to Production

When an organization elects to transition an existing pilot project workgroup to long-term production status, it is necessary to conduct careful planning to formalize, routinize and stabilize many procedures and arrangements which may have been quite ad-hoc during the pilot. At this time it is a good practice to produce a list of outstanding issues and problems, for which a resolution plan can then be formulated.

9.11 Conclusion

As with the adoption of open systems, as defined in earlier chapters, there is no substitute for 'learning your way in' when moving to use the home workplace. You cannot, and must not, start with the conviction that you will make no mistakes or that this (or any other) book can provide you with all of the information you require to succeed. The key questions which you must ask yourself, when reduced to their most basic form, are as set out below.

1. Which of the various benefits of the home workplace would be most relevant to my business/organization in the short and medium term?

2. What parts of our work can be decentralized now (or kept decentralized while we grow)?

3. What are the major cultural and other informal characteristics of our organization which may help and/or hinder a home workplace pilot. How can we exploit the positive ones and mitigate the negative ones?

4. Which workgroups would be most amenable to decentralization to the home workplace? From within these workgroups, which workers are interested and from among them who are the most suitable candidates to become our pioneers?

5. What combination of hard and soft technologies should we provide to the home workers. Should they have less, the same or more technology per worker (or simply different technology) than those who remain in the office?

6. Now that we know what work will be done at home, who will do it and how and what tools they will have, what logistical support capabilities and services do we need to put in place for our home workers? Who will bear the cost of the move to the home workplace, the home workplace equipment and the cost of the portion of the worker's home dedicated to the home workplace?

When you have read, thought about and understood the concepts set out in this book and have truthfully answered the above questions with reference to your own situation, I believe you will be ready to plan your move to the home workplace.

9.12 Resources

Depending upon your location in North America, the size of your organization, your financial resources and your degree of avidness to decentralize, there is available a wide range of resources, as well as a range of non-resources which you may wish to avoid.

By my unscientific count, something more than a hundred books have been published on non-conventional work alternatives, with many of them focusing on 'telecommuting' or the decentralized workplace. The books address technology, human factors, organizational development, public policy, law, economics, labour issues and various other disciplinal perspectives. Some of them date back to the 1930's so the idea of workers, even in large organizations, working at home part of the time is not exactly a new one. A number of Masters theses have been earned just by documenting the range of writings on this subject, so a comprehensive bibliography is certainly beyond the scope of this book.

The federal governments of both Canada and the United States, as well as various state/provincial governments, have conducted (or are now embarking upon, various pilots and trials. The California Department of Government Services (DGS) oversaw a wide-ranging trial touching many state government departments and agencies there. Also, there is a significant community of interest in this

field located in the vicinity of the University of California at Davis (UCD). Finally, a group of those seeking more information about, and those well experienced in, telecommuting came together recently to form an organization known as the Telecommuting Advisory Council (TAC).

You will not find help with the technological or logistical aspects of the home workplace at your local computer store, your store's supplier or distributor nor even with your favourite computer manufacturer. In fact, some of the large computer makers have a distinct aversion to the whole idea. They want to keep technology under the watchful eye of the hopefully friendly (to them) IT organization back at the office. They have also invested billions in LOCAL Area Networks, SERVERS and OFFICE Automation. Even conferences and exhibitions organized to directly address the home workplace have shown a woeful lack of purpose-specific technology. Actually, very few software and hardware products optimized to this market have been released. This means that you or someone in your organization will need to learn enough about computer technology to determine what your workers really require to work at home, how to specify and acquire it and how to ensure it is properly installed and integrated. Many home workplace functionality requirements are identical to those at the office, however many others are not, particularly when it comes to co-ordinating multiple tasks among a decentralized group of workers.

Regarding logistics, the challenge is mostly in determining what kind of supply and support arrangements you will require. Once this determination is made, it is possible to fulfil these needs in most communities.

Our firm, Workplace Technologies Corporation (WTC) is able to provide a range of services for the home workplace. We seek to place equal emphasis on work flow, human factors, technology and logistical issues. Our approach is, not surprisingly, based in part on this book. For more information contact us at (562) 494-8782 in the United States, or E-Mail the author at dperley@mtc-stm.ca .

ANNEX A - Brief to City of Ottawa on Home Workplace Bylaw

Objection to Bylaw 2008-250

There is a serious problem with Ottawa Bylaw 2008-250, part of which reads as follows.

127 Home-based businesses are permitted in any dwelling unit, secondary dwelling unit or rooming unit, in any zone that permits residential uses provided:

…

(3)	***Despite the unlimited number of businesses permitted, a maximum of only one, on-site, non-resident employee is permitted per principal dwelling unit.***
(4)	*On-site non-resident employees are prohibited in association with any home-based business located within a secondary dwelling unit, rooming unit, or dwelling unit within an apartment dwelling, low rise or an apartment dwelling, mid-high rise.*
(5)	***No more than one client or customer may be attended or served on-site at any one time by any home-based business within a principal dwelling unit.***
(6)	*No client or customer may be attended or served on-site in the case of any home-based business located within a secondary dwelling unit, rooming unit, or dwelling unit within an apartment dwelling, low rise or an apartment dwelling, mid-high rise*

(author's bolding)

During the past two decades we have begun to understand how fundamentally intertwined our **environment**, **energy** and **economy** actually are – *what one might call the E3 symbiosis* – but as a society, we have thus-far failed to realize that the advent of information technology permits us to unlock most work from geography and thus to gain very significant E3 benefits. With so many of us today working with information, there is no longer a need to commute daily to congregate in offices; the **home workplace** offers more potential E3 benefits than all fuel alternatives combined.

>>> Every home worker reduces auto traffic, parking demand and/or demand on the transit system, consumes less energy and contributes less pollution and carbon-footprint. We therefore need to encourage - not discourage - use of the home workplace.

Contrary to most perceptions, the home workplace actually has three distinct manifestations:

-**telecommuting** (TLCM) **-** people within large firms who work at home full- or part-time;

-small-office-home-office (SOHO) **-** individuals and small groups based at home**;** and

-**decentralized workplace** (DWP) - new companies with all or most people working at home, also known as *virtual corporations*.

Bylaws which unduly restrict how many people can be engaged in a "home business" within residence, or how many people can visit a "home business" suffer from several problems as discussed below.

1. While telecommuters may *appear* as home businesses they do not in fact technically fall under that category, however there is a very real possibility for a bylaw enforcement officer to confuse the situation since, for example, and employee of a large company and an independent information technology consultant would both have exactly the same type of equipment if working from a home office. Further, if husband and wife both work for the same company, both might be legitimately working from home and each of them could also legitimately have more than one visitor at time in connection with their work. There should be nothing to ban telecommuters from congregating in small groups as necessary to do their work. To do otherwise is to force them to go to an office for an entirely artificial reason.

2. Both SOHO and virtual corporations are "home business" operating within a residence, but they too have legitimate reasons why both husband and wife - and groups of up to five others - might both work from home simultaneously. There are also legitimate reasons why each such worker might have more than one visitor at a time.

3. All three manifestations of the home workplace provide very important environmental, energy and economic (E3) benefits to the city and to Canadian society at large. As fuel prices continue to rise all three will certainly increase dramatically. Bylaws which discourage this fly in the face of reality and defy common sense.

Proposed Remedy

1. Whether by formal objection to the OMB or simply by a review of City Council (under errors and omissions) Sections 127(3) through 127(6) of the bylaw need to be changed as follows:

> **-restrict the number of home workers in a residence to the residents plus a maximum of five (5) additional workers whether they are telecommuters, virtual corporation or SOHO; and**
>
> **-place no limit on the number of visitors to a home worker provided only that such visits do not disrupt parking patterns or otherwise disturb the neighbours.**

>>> It should be noted that the average house party, with 5-10 cars parked in a driveway and along the street, is likely to be far more disruptive to any residential neighbourhood than the number of people who might attend a meeting called by a home worker. However, the bylaw does not seek to ban house parties.

2. The restrictions on space dedicated to a home business or a home workers should be only by percentage (25% of total residential space) and not involve square footage nor telling people how much of their garage they can dedicate to home-based work.

ANNEX B - Comprehensive Workplace Simulation

INTRODUCTION

This annex presents an outline of a methodological tool which can provide an important bridge to the understanding of (and realistic planning for) the home workplace. It is capable of being implemented in a purely manual (worksheet) form, as a calculative (spreadsheet) tool or as a complete computer simulation program.

Comprehensive Workplace Simulation (CWPS) is an approach used to simulate the flow of all types of work handled by an organization or unit on a person-by-person (or, more correctly, workplace-by-workplace) basis. Various alternative future work flow scenarios are generated and these can be evaluated both quantitatively (in terms of productivity, efficiency, and cost per work item in hours and/or dollars) as well as qualitatively (in terms of effectiveness, opportunities for creativity at all levels and, in certain cases, employee satisfaction). Once information on the present organizational structure, procedures, guidelines, work flows, information handling and employees has been gathered and entered it is possible to vary the following:

-computer capabilities provided to each worker -office/organizational networking strategy;

-role of existing computer equipment;

-information creation, storage and retrieval strategy; and

-information access hierarchy (security etc.).

The key outputs for a CWPS scenario include:

-work flow on a by-item basis;

-work item costing in hours and optionally in dollars;

-employee/workplace activity profiles; and

-total organizational workflows (the flows of work items through workplaces).

No simulation method or approach can claim to 'predict' with certainty. However what CWPS does do is to open up a new approach to the implementation of technology within the organization. It cannot prove that there will be more actual use of opportunities for co-operation, more 'co-thinking' or more individual creativity in the organization, but it can show where the greatest scope or OPPORTUNITY for such would actually exist. In fact, the approach is suitable for any of an organization with no workplace decentralization, one making moderate use of the home workplace or one now in full-scale decentralization. It thus permits consideration of how the organization would function with certain new technologies deployed, irrespective of actual physical deployment.

In choosing a final set of equipment the organization controls the technology to be actually applied however once it is installed that technology will in turn impact how the organization operates. CWPS can therefore highlight instances in which system characteristics might be expected to encourage or even necessitate changes in structure, information flows, the way in which work is defined and allocated, job descriptions and procedural guidelines. These types of changes can themselves be simulated by applying the CWPS approach, allowing further detailing of a preferred scenario.

DESCRIPTION

The simulation must accept as input a wide variety of readily collectable/derivable information from the end-user element of the organization. For each workplace in the organization the following are required:

-name of workplace occupant;

-occupant employee category of which the default categories are:

-EXEC (executive)
-PROF (professional)
-MGMT (management)
-ADMN (administrative)
-SUPV (supervisory)
-OPER (operational)

-computer and communications equipment provided;

-key role or function;

-reporting position within the organization;

-key words on personal interests, abilities, aptitudes;

-information/data normally held at workplace;

-function rating by function type (see below);

-fully allocated hourly cost; and

-functional preference ranking.

The user will also provide information on the classes of work item which exist within the organization. These could include for example handling outside enquiries, handling internal enquiries, tracking whatever it is the organization produces or manages, writing letters, memoranda and reports as well as the performance of other routine tasks and special projects. How are these work items presently generated and by whom? How are they allocated or assigned and then followed up? Optionally, particular employee propensities or behaviour can also be considered, such as working only 80% as hard on Friday or whatever.... More information is also required about the interrelationships and propensities of the work items themselves; for example, if work items type A and B interact, this will result in creation of a new work item type C while the first two types disappear.

An advanced simulation of this type can employ what is called a 'natural language interface' permitting the user to describe the work items, the workers and the workplaces in common English (or for that matter French) terms and extracting key nouns and verbs. Whether built as a simple microcomputer-based spreadsheet or as a huge program to be run on a mainframe, the primary purpose of the application program is to SIMULATE THE FLOW OF WORK ITEMS THROUGH WORK PLACES. Thus, the flow of the work within the organization is seen as the totality of the flow paths of all work items through whichever sequences of workplaces they visit. This is intuitive, for several reasons.

1. Most work items will at the very least be generated at one workplace and completed at another. There may of course be work performed upon the work item at many workplaces in between and even those generated and completed at one workplace may impact other work items.

2. When a given workplace is finished with a work item there are only two possible actions: either pass it on to the next workplace which will have to work on it or else 'sit on it'. The latter action is operationally impractical because if even a few workers sat on all their completed work items the flow of work of the entire organization would eventually become constipated. If accounting does not pay suppliers they will stop supplying and those who receive and process the supplies will soon be impacted.

3. Each work item (or class of routine work items) follows one or a small number of possible paths through the organization.

4. At any point a work item can spawn one or more children or clone itself into two or more successors. For example, an insurance claim may reach a stage where part of it is paid but the other part is submitted to an arbitration or appeals process.

The simulation by a computer of the flow of many work items through a finite and well-characterized group of workplaces produces the following information:

-WORK ITEM HISTORY detailing the path taken by a given work item from the origin to the ultimate destination workplace, as well as what human and/or machine functions were performed upon that work item at each stage;

-WORKPLACE HISTORY detailing which work items passed through a given workplace as well as what human and/or machine functions were performed upon them while they were at that workplace;
and

-RESOURCE HISTORY detailing the total amount of each type of human /activity and machine activity dedicated to the performance of work:

-upon any work item or class of work items;

-at any given workplace; and

-for any resource/activity type.

Basically, these three measures are perpendicular to each other in a three dimensional sense; they look at the same thing (the organization doing its work) from different perspectives. From the collection of all work item transaction histories (where the work items went, when and what was done to them as they progressed through the organization from workplace to workplace) it is possible to derive an organizational total work flow. Because the approach can address (if necessary even record) how much time people who are being paid at various rates and who are using various equipment actually devoted to each work item, it is possible to produce a much more thorough work item costing system, and one readily amenable to future extension to full E3 costing. If the total amount of employee time available per day or per year within a given organization is held constant, and the amount of work to be processed by that organization is also held constant, then it follows that the application of technologies which speed up and/or improve the quality of the processing of various classes of work items will create new FREE TIME envelopes (at various times and in various places) for many employees in which they may choose to:

-remain idle;

-perform residual tasks which otherwise are always put off;

-process more routine work items; or

-be creative in some potentially useful way.

In real life, versus our antiseptic theoretical world, actual organizations are frequently called upon to handle the current or even a growing workload with FEWER employees, often in times of rapid change and high uncertainty. However the point is that the organization (or more properly the individual who is the person to whom the many little 'envelopes' of technology-created free time will keep presenting themselves) can now choose how best to apply that free time. In most cases it will be a combination drawn from at least the above four kinds of opportunities. This simulation approach cannot predict that an organization will, if a given combination of new technologies is applied, suddenly become more creative at the individual or the corporate level. However what it can do is predict that many more OPPORTUNITIES for such creativity will be available. When you are doing a drudgery filled and repetitive job all day, or your in-basket is a foot high and everyone is screaming that you are behind, it is hard to be creative.

At the heart of any CWPS implementation is the work flow model which comprises five distinct stages. Work items may be interactively input by item or class, they may be residually generated by a certain condition set within the simulation or they may transaction-generated due to spawning/cloning or to scheduling problems. For example, if there are too many work items of type A contending for access to Jack's workplace some may become critically late, spawning work item type X, which is Personnel's work item of hiring Jack's replacement after he has been fired. It is recognized that in the real world work items will be generated by external stimuli, and by internal stimuli such as routing or bring-forward operatives, the existence of a given set of conditions, the issue of an instruction or even (for a suggestion processing system) the production of a suggestion by an employee.

A work item's characteristics (definition) may be driven by simulation user input, by some default data set or by the definition of its pre-clone cohort or pre-spawn parent. Work items are simulated to move among workplaces based upon characteristics and propensities of the work items themselves, those of the workplace and general policies, rules or guidelines existing within the organization (e.g.: all supplier invoices paid within 45 days). Work item allocation will occur by either of two methods:

-INSTRUCTION METHOD wherein someone uses a decision set to make a decision and handles the work item accordingly; or

-DEFAULT METHOD wherein the work item is created by an individual who is the only one who can do it or there are timing, loading or other factors which cause the work item to go to one individual automatically.

CWPS can also simulate a method of work allocation not yet widely in use today within organizations: the 'expression of interest' or 'bidding' method wherein the work item's creator person (or even the work item itself) declares its existence and solicits combinations of employees who would line up their workstations (in the logical sense, not the physical one) to process it. The best single or group 'bid' would win the work item; this process is not unlike the mating ritual in the human or animal kingdom. In transportation companies, for example, union contracts call for 'bidding' of certain runs or assignments. The work item, in such a scenario, is 'strutting its stuff' to see who might like to 'do' it.... Such an allocation method, within the obvious limits of not permitting workplaces without the required workers or machine resources or qualifications to perform the indicated functions, has many advantages. It is a microcosmic free market system operating right inside the corporation, matching requirements and their optimum potential fulfilments and providing employees a much more varied work life.

Let's consider a concrete example. It becomes obvious to Harry, the chief graphic artist in the publications section of an aircraft manufacturer, that next month's load of graphics production for flight manuals for a new and arcane variant of the firm's airplane will overwhelm his department. Even with overtime there are 20 illustrations (each requiring about five hours of combined human attention/Computer Aided Drawing/Design (CADD) station time) which his group cannot complete.

Conventional wisdom says he should then draw from the repertoire of things he knows how to do the non-routine work item called 'find a shop and contract the work out' and then apply it to the twenty drawings. But consider the total E3 cost of this work item, which includes:

-re-check contracting-out process (he rarely uses it);

-call around for quotes and best completion time;

-select best outside shop;

-raise a purchase order and any required cost justification documentation (overcome bean counter objections too...);

-prepare instructions for graphic artist plus samples;

-rush the required purchase order through Contracts department;

-get the material to the outside shop and brief them;

-visit the shop at least once to check on progress;

-messenger the materials back from the outside shop to short-circuit the sloth of the internal mail system;

-check the illustrations over assiduously; and

-accept shop's invoice and chase it through the system when the shop calls 70 days later to fleece their payment.

This involved much angst, midnight oil (extra electricity for the three hours of overtime Harry worked, to be precise), two messenger van trips, one return car trip, an eight dollar downtown parking lot charge, fifteen external phone calls, seven internal phone calls and the price of a large coffee to soothe and encourage a disrupted (and thus disgruntled) contracts officer to hurry up and issue a PO. Alternatively, Harry could have defined the 20 drawing work item electronically and put it onto the internal network.

Tom is an engineer who has been working too many long evenings but now has a break while QA checks over some of his designs; he is also an artist by hobby. Tom quickly bids and wins the job and completes it in half the time of the above process. He also does a better job because he helped design the airplane in the first place. What is more, even if Tom's department ABSORBS the costs (very often the bean counters make the charge-back process more painful, expensive and disruptive than just absorbing it) and also accepts the fact that a highly paid engineer is briefly doing the work of the less well paid graphic artist, the organization is still ahead both in conventional economic terms and in E3 terms. Tom got some much needed variety, Harry got a better product both faster and with less worry (about the outside shop doing a good job) and less hassle (with Accounting, Contracts, his boss etc.). Everyone wins except the bean counters, a whole lot fewer of whom are going to be required once this catches on.

Within the simulation (and this discussion of CWPS treats only the most basic cases and simplifies in some respects) the performance of work by humans and machines at workplaces, upon work items, is achieved by the application of one or more of fourteen functions to the work item. The performance of a function requires the electronic physical connection of the person and the work item; in other words the person, the machine and the work item are 'joined' by the fact that the person is using the machine to do things to the work item. In a conventional organization, the individual can interact directly upon the item (without the machine intermediary), but in a 'paperless' organization, and in a decentralized one, the machine would usually be in the loop, although sometimes the 'machine' is only the telephone. A given

person may only do one thing to a work item at one time. Naturally, any generic description of all of the types of functions is incomplete; the one provided in this basic presentation of the model naturally relates to an organization primarily concerned with the handling of information, as opposed to hamburgers or mice. The fourteen functions are:

-thinking (abstract);

-evaluating;

-analysing;

-comparing, contrasting, sorting or allocating;

-searching/retrieving;

-reading/reviewing;

-filing/dispatching/messaging;

-typing/entering/inputting;

-computing/calculating/logically processing;

-telecommunicating;

-meeting (physically/conferencing electronically);

-travelling; and

-composing.

The reason for selecting these particular functions was that it is possible to generalize with reasonable accuracy about the relative effectiveness of individuals within various work categories (within an organization) in performing each of them. Employees (by category) can be rated at anything between 0.00 and 1.00 in terms of effectiveness in performing each of these functions. In those organizations where actual measurement is feasible, there are various approaches and disciplines available to develop such ratings, although the reader is cautioned that several of these disciplines decry each other's approaches as nonsense. In any event, the initial run of CWPS for a given organization (in the pre-technology change mode) will allow comparison of simulated and actual (measured or logically imputed) work flows within the organization. This permits the ratings to be varied so as to calibrate the simulation to the organization being simulated (the thing being simulated is technically called the 'simuland'.) In other words, we want to get the computer simulation, which implements a model of how work flows through workplaces (and hence through the organization), to behave as much like the simuland as we can, when considering only the technology now deployed. For our example, suppose that everyone had a mainframe computer terminal on their desk, but there were at this stage no PC's or Local Area Networks (LAN's).

It has been well and truly noted that the application of new technology can (does not inevitably but at least 'can') improve worker productivity. Let us assume that enlightened technoids are now summoned who descend upon the organization. They first actually talk to the end-users and then implement the optimum combination of PC's, input/output peripherals such as printers and optical scanners/readers, communications and software such that people can now work more effectively. Let us also assume that (unlike most organizations) this one actually invests a lot of money up front in orientation, training and initial end-user follow-up support. In short, they make a good job of implementing the new technology.

We still have the group of work items which must flow through the same complex of workplaces, but now we have many new powers available at most workplaces. It will be noted that the application of new technology can enhance the ability of the individual to perform all but three (thinking, evaluating and travelling) of the fourteen functions. Whereas a new piece of equipment will generally not be applied to a given function (or workplace) unless it is expected it will bring some improvement, it is reasonable to assume (in general at least) that when an individual is performing a function on a work item where the aid of this equipment is helpful, that the total elapsed time to perform the work item TO THE SAME DEGREE OF QUALITY will decrease. It takes less time to produce a perfect letter, especially if spelling mistakes are first made or the boss changes a word or two, with a PC with word processing software than with a typewriter.

For each function (for example searching/retrieving), a given combination of equipment and software, both at the workplace and distributed throughout the organization will, where all other things are unchanged, permit the portion of a work item requiring that generic function to be applied to it to be completed in less time than it took previously. In other words, a combination of equipment and software, either at the workplace or elsewhere permits more rapid application of a function to the portion of the work item requiring it. For example, a given work item calls for five hours in the analysis (AN) mode and that work item comes to a person called 'Smith' who is of the professional (P) category and whose default rating for function AN is 1.00. However Smith has been pegged on the basis of past history (not being 100% effective at analysing) at 0.90 so the simulation will calculate that it takes him 1/0.90 X 5.0 or approximately 5.5 hours to complete this task. If, on the other hand, Smith is given a computer system which is capable of supporting his performance of function AN, then he could use it to reduce this work by the time reduction factor for that function, which we will here assume is .50 for AN. The computer lets Smith (or anyone) perform this type of analysis on average twice as quickly as THEY otherwise would have. The total time for Smith to perform the function with the computer would therefore be .50 X 5.55 or 2.775 which we would round to the nearest .25 hours to render 2.75 hours. (I realize this may seem like a Grade 9 math lesson but there is method in the madness....)

The total performance of work therefore involves four elements:

-function (AN);

-subject (work item name, information item name, data name);

-workplace (Smith, also 'P');

-several manifestations of time;

-arrival time of work item at workplace;

-expected time to perform AN component of work item;

-actual simulated time (given any Smith-unique info);

-total elapsed clock time work item was at workplace; and

-departure time of work item.

Work items generate:

-expenditure of human and machine resources at workplaces;

-flows of information/data into, within or out of themselves; and

-transaction histories (paths through workplaces.

A total of seven work priority levels has been (arbitrarily) identified as follows:

-urgent/interrupt;

-external stimulus/instruction-generated;

-condition-generated;

-bring forward;

-project/program/ongoing;

-routine/periodic; and

-idle/residual/reserve/creative.

While all members of the organization will have some work items which fall into each of these priority levels or classes, it will be generally true that the priority-level loading will increase with the seniority and degree of extra-organizational interface of an individual. For example, a filing clerk is less likely to be troubled by a continuous stream of urgent tasks than is a director-general. There are, of course, exceptions: it is clear that secretaries are constantly interrupted by telephone calls placed not to so often to them but to their principals.

If existing work items of all types can be processed more efficiently within the organization once new technology has been implemented, then it follows that CWPS can be utilized to identify the magnitude of the time envelopes which executives, professionals, managers and support staff members may find freed up for other activities. Of course, the many thousands of factors impacting these people defy capture in any simulation; all the model will give us is an approximation. The actual uses to which this 'idle/residual/reserve/creative' time is then put by either Smith or the company president will be a function of organizational policy, individual aptitude and interests and a number of other factors. While the simulation certainly cannot predict what might thus be created or even that creativity will occur, it can identify where in time and space such new scope for creativity is most likely to be created. This assumes only that the input information is valid, the model can be calibrated and something is known about the degree to which the new equipment can assist workers to more rapidly process routine and well-defined work items.

In flowing a work item through a workplace the simulation asks itself seven key questions on behalf of the simulated 'worker'. These are:

-what do I do first/next (i.e.: which is the highest priority work item, and if there are two or more at that level, which one has the most key words of interest to me);

-which of the fourteen functions is required, or what sequence of functions is required, to complete the work item;

-what information do I need to apply the first (next) function to this work item and what decision set should I use to act on this information;

-does the work item definition call for possible co-functioning with another specific individual or class of individuals (in other words, do I need others to help me to perform this function on this work item);

-will I create, modify, revise or destroy any information as a result of the function(s) being performed on this work item;

-if I have finished all functions that I can perform on this work item, where should it go now, and should I let anyone know that I have finished with it; and

-if, in going from one function to another while working on this work item, I drop more than five functions in my preference ranking (i.e.: I find myself performing any of my nine least preferred functions on this work item), is there someone else in my category and within my section or unit who I might be able to have perform those functions on this work item?

Clearly, this is simple logic which can be easily constructed; organizations can add additional questions for the simulated worker to ask himself as he performs the work item, with scope for any branches or permutations thus indicated.

Of much greater interest, this model also allows the construction of a new, although not immediately tractable, concept; this is the concept of the 'smart work item'. In the same way that the worker can be simulated to ask himself what he should do next, the work item itself can be personified and thus simulated to ask ITSELF the following questions:

-what is my first next functional requirement or bundle of functional requirements that I need to have performed on me by a worker;

-who should perform that function (this may be an individual or category set out in the work item's definition or the definition may actually specify 'Jack' as having to do it);

-having arrived at that workplace, how long should I remain there before my priority level causes me to prod the worker to 'do me', or else causes me to migrate elsewhere to seek someone else to perform that function or set of functions on me (in draconian situations the work item might abscond to the boss's workplace to complain about lack of attention from Jack); and

-when the worker of my current workplace moves to perform the work on me by applying the appropriate human and machine resources for the first/next function, what is his function performance rating on this function (1.00 or less), does he have the correct information (and if not did he get it), does or should he co-function with other workers and does his use of any particular function either eliminate or raise a new requirement for a subsequent one?

The user of the model may understand why this decision algorithm is necessary to the design of the simulation; however it may be less obvious why the concept of a smart work item is raised in relation to an organization's future. It is my belief that shortly after the present generation of 'office technology' systems now being developed have been deployed (here I refer to third generation 'OA' systems), current development work in the area of expert systems/artificial intelligence may finally be applicable in the everyday context. Specifically, it could dramatically increase the operational intelligence of installed workplace systems; thus, it is very possible that one of the first applications of artificial intelligence to the organization at large may be to reduce inadvertent delay or purposeful stalling of work items within the organization. This feature could be of very meaningful assistance to government. Like the wind, you cannot directly see elites and other manifestations of the informal organization but you can certainly see their effects. A systematic measurement of such delaying tactics would make the graphing of elites and petty political power groups that much easier. Graphing them publicly almost always leads to their demise.

CWPS defines 'co-functioning' as the situation where two or more workers, at their workplaces, utilize a common capability or facility or machine function (one supplied to both of them simultaneously by, or at least at, their workstations) to act together upon a given work item or class of work items. Co-functioning generally occurs when conditions A, B and C below are all true plus one of D, E or F is also true:

A - the workplaces are separated by one or no employee category tier levels;

B - both workplaces are 'available' in real time and are neither is pre-occupied with a higher order task;

C - both workplaces have access to the resources needed to co-function;

D - the initiator responds to a piece of creative development information created earlier by another worker and directly addresses himself to that worker to see if the two of them might presently work on this work item together;

E - the initiator conducts an 'interest search' which is aimed at locating another individual interested in co-functioning on this subject at this time; and

F - the work item definition itself already calls for parallel functioning but co-functioning would reduce TOTAL employee time and machine resources expended to complete the work item (in other words there are synergies to working together).

The individual workplace activity profile consists of the work items handled (number by class, hours by class and hours by work item unique identification number) as well as the flow of INFORMATION (not bundled with work items) occurring within and to/from the work item and workplace. The latter include internal information flows among the specific workplace's own storage and processing resources as well as external information flows between this workplace and all other workplaces both inside and outside the organization. The number of unduplicated bi-directional work flow and information flow axes (among workplaces) within the organization is defined by the expression:

$$FX = \frac{X^2 - X}{2}$$

where:

FX = unduplicated inter-workplace axes of flow

X = number of workplaces in the organization but counting only ONE workplace for workers who have two or more locations or roles

This work flow and information flow/transaction recording capability and its presentation system can be used to support the analysis and presentation of actual data collected in the field as well as the results of simulation runs. Thus it is possible to use the simulation to predict, and then to measure actual, work and information flows. The size and complexity of the organization, the range of tasks performed, and the degree of work item disaggregation will dictate final simulation complexity and hence the required software environment. The work item and unit designation systems described below can also be used as a link between the field assessment data collection/analysis activity and actual CWPS runs.

The work item description will contain the following items of information:

-priority;

-system, condition-set, person or entity which generated the work item (parent may be another work item);

-work item type;

-number of work items in this immediate class;

-subject or designator;

-allocating person or method; and

-definition (reference number of hours of each human and machine resource/function, with any restrictions applying to each, required to complete work item) plus key words and the archiving/recording method.

Apart from this descriptive information, each work item will have a unique sequence number assigned to it and a number of 'current' variables which will change as the work item moves from one workplace to another. These latter variables include:

-DIRECTION - name or general employee category of the workplace to which work item is to move' next);

-LOCATION - name of occupant of owner of workplace where work item is NOW being processed);

-TIME IN BASKET - time between arrival at this workplace and first processing in workday hours;

-ELAPSED TIME - total running time at this workplace;

-FUNCTION - function presently being performed on work item;

FUNCTION/TIME NEED - total time which it is calculated that this worker must spend performing each of the functions which he/she is required to perform upon this work item; and

FUNCTION/TIME SPENT - total time which has already been spent by this worker performing each of the functions which he/she is required to perform upon this work item.

Finally, a transaction history can be produced for each work item. The transaction history will record:

-workplace name (i.e.: worker's name and position category);

-function performed;

-time spent on function;

-information sought and used;

-information revised;

-information created; and

-total time elapsed to perform work item.

All units of information created and stored within the organization (whether in digital, hardcopy, video, image or other form) may be described in terms of the following:

-description of information;

-storage type;

-storage location;

-information type;

-information unit number; and

-revision number.;

In summary, then, work flow methodology and CWPS provide both a conceptual and a practical tool - in the hands of a competent analyst and a simulation specialist - which can be used to simulate the current manual or semi-automated flow of work through the organization as it exists now. Then, a simulation can be run for a more automated organization, which is ORGANIZED (AND ACTUALLY FLOWING WORK ITEMS AMONG WORKPLACES) IN A WAY WHICH IS OBLIVIOUS AS TO WHETHER THE ORGANIZATION EXISTS UNDER ONE ROOF, EVERYONE WORKS AT HOME OR ANYTHING IN BETWEEN.