Changing times, changing conditions

IT Commission report 8/98

IT Commissions 1994-1998

The first IT Commission was appointed on 17th March 1994 by the non-socialist Government, with the then Prime Minister, Carl Bildt, as chairman. Its deliberations resulted among other things in the report "Information Technology - Wings to Human Ability" (SOU 1994:18), a vision of Sweden and the information society of the future.

The change of government in 1994 was followed, on 19th January 1995, by the appointment of the second IT Commission, chaired by Co-ordination Minister Jan Nygren. The Government's remit (Dir. 1995:01) made this Commission an advisory body on general, strategic matters, at the same time tasking it with spurring developments, disseminating knowledge and looking ahead in the IT sector.

Much of the Commission's work was concerned with laying down guidelines for an action plan and inaugurating implementation of the plan itself. Large parts of the Government's IT Bill (Prop. 1995/96:125), passed by the Riksdag (parliament) on 4th June 1996, are based on deliberations and proposals by the second IT Commission.

The Government reshuffle in March 1996 resulted in a third IT Commission, this time chaired by the Minister of Transport and Communications, Ines Uusmann.

On 6th June 1996 the Government adopted revised, partly new terms of reference for the IT Commission (Dir. 1996:46).

The main task defined in the previous instructions remain unaltered. Certain tasks in the supplementary terms of reference, e.g. that of initiating an IT law observatory, were a consequence of the Government's IT Bill. Above all, though, the work of the Commission is being made to focus on three central issues:

- How can IT use contribute towards growth and employment?
- How can IT availability be increased, regardless of residential locality, gender, education and age?
- What is the scenario for the future, what will be the consequences of IT use and what strategic decisions must be made?

The IT Commission is required by its terms of reference to submit a final report on its work on 31st May 1998, when the remit of the third IT Commission expires. The Commission has chosen to present this final summing up in the form of the present publication. For a more detailed account the reader is referred to the individual reports, listed at the end of this publication.

Changing times, changing conditions…

When the third IT Commission began work under my chairmanship, one of the first things it did was to produce an action programme, "Sweden and the imminent change of epoch" (SOU 1997:63). By "change of epoch" we mean to say that we have come to a historic turning point where the use of a new technology base, information technology, implies a major transformation of society.

We will be faced with new questions which we have to resolve, but there will also be new conditions and new opportunities for good economic growth and for the continuing assurance of universal welfare. This makes it important that Sweden should lose no time in grasping the new opportunities creatively and constructively. These changes are already upon us, and we cannot sit back with our arms crossed, in the belief that everything will sort itself out in the end.

I firmly believe that we will cope successfully with the change of epoch. By international standards we are outstandingly well placed for doing so, with our comprehensive IT use and our high level of IT maturity. Our telecommunications networks and other infrastructures are comparatively well-dimensioned. In Swedish enterprise, decision-making paths are often shorter, organisational structures flatter and the tone between employees and management less prestige-bound than in our principal competitor countries. Our public institutions are usually more flexible and less bureaucratic than their foreign counterparts.

Our starting position is good. We have a lot to build on and upgrade which can give us a relative head start on the rest of the world. There are many new activities and enterprises which can be developed and which can grow strong and contribute towards new jobs, faster growth and welfare. This is all conditional on us tackling, fearlessly and on a consensus basis, the challenges and new opportunities which IT and the change of epoch are bringing with them.

"Changing times, changing conditions…" is a summary of the work of the third IT Commission, and we hope that this publication will enhance understanding of the change of epoch and stimulate development. It will be followed by a further publication, "New conditions, new opportunities…", describing, in reportage form, how the use of information technology has created new job opportunities in both old and new branches of economic activity.

This publication was compiled by Per Odebrant, in collaboration with the Secretariat and Members of the IT Commission.

Ines Uusmann
IT Commission Chairman
Minister of Transport and Communications

Heading for…

The continent of knowledge

A new epoch is dawning. Ahead of us lies the knowledge society. An almost completely unknown continent, but full of possibilities. If we learn to understand and dare to respond to the changes now sweeping the world, we have a unique chance of becoming an important motive force of development.

Not just technology
IT is short for "information technology" and is usually defined as the technique for collecting, processing, storing and distributing information. This involves computers (hardware), programs (software) and electronic communication networks, but also the telephone, telefax, radio and TV.
This definition is biased towards the purely technical aspect of IT. Strictly technical know-how, which today carries most status, is less important for an understanding of IT. The essential thing is being able to regard IT as a part of something, rather than as a technical solution.
"IT know-how" is primarily a matter of the holistic view - of being able to understand the use of the technology, the context in which it is used and the consequences which this entails.

Faster and faster we are travelling into the knowledge society, impelled by powerful forces. Information technology is developing at an unparalleled rate. Television and radio signals, telecommunications and data communication are merging into a single entity. Wherever in the world we happen to be and at what time of the day or night no longer makes any difference. With the new technology we can work, study, live and perform any number of tasks practically anywhere.

In this way a continent of new and unexplored possibilities is opening up. But to find it we have to clear new paths and have the courage to think along new lines. The reality with which individuals and society, the economy and politics are being confronted is in many ways fundamentally different from industrial society.

If we keep up with this development, we have every chance of succeeding. If we desist and keep to the old wheel tracks, developments will catch up with us and carry us off, without us having any chance of controlling our future. For the new tendencies are world wide. And under their impact, many of the patterns of action and virtue of industrial society, its analytical and intellectual models, its organisational and administrative structures, have started to erode.

We can see it all around us. Instead of moving from one worksite to another, the construction site management co-ordinates things from a single point, using his computer and communication equipment. Aided by advanced information and communication systems, the switchboard operator, instead of just putting through phone calls, has become the customers' factotum - someone who can answer every possible question and get things done wherever there is a telephone connection.

The engineering worker is no longer world champion at performing five operations in a predetermined sequence. Instead he is a process supervisor, whose computerised control systems and machinery, as well as his own experienced eye, enable him to instantly discover and rectify faults and bottlenecks in the production process. The insurance company's claims adjuster, with his laptop computer and mobile phone, can report a claim on the spot, settle it and there and then give the anxious client a firm answer.

Some people's jobs are essentially the same as before. Other people's are new. Everyone, though, needs IT for their job. They are doing their job in a different way now and their work has become more advanced, responsible and demanding.

Their role as "cogs in the machine" has diminished. Individual capacity for tackling a larger number and variety of tasks has grown. For many people this has meant a new, greater pride in their work.

This is what Monica Nordqvist Svensson of ABB Atom has to say in IT Commission Report 4/96, "Women and IT", concerning a project at the beginning of the 1990s for streamlining the company's document management:

"The secretaries have been responsible for training the other personnel to use the new system. This training function has given them higher status within the company. Secretaries amount to a large group of employees who are now witnessing the transformation of their professional role."

But the change is also bringing concern. There is no longer anything secure and safe to hold on to, the way there used to be.

People wonder:
What's going to happen to me? Will I be able to keep my job? How are my children going to make out? What sort of work will they do? Will the security and welfare we've grown accustomed to still be there? Will something else appear instead, and if so, what does that look like?

In future we will quite certainly be doing a larger number of things, and more difficult things, in the time it takes us at present to perform fewer and easier tasks. And it is also supremely likely that we will be doing things in quite a different way, with far more personal responsibility.

Some of us will have jobs which cannot be imagined at present. And many jobs which today we take for granted will be very hard to imagine tomorrow. This is all we can say for certain about matters which affect and involve all of us.

For IT is not just the business of so-called IT enterprises. And only in one sense - a fundamental, decisive one, admittedly - is IT about technology. The direction of our voyage into the knowledge society has been and is being decided no less by a number of other factors and complicated relationships deep down in the roots of our existence.

But there is still no firm foundation on which to base definite answers, comparisons and decisions in enterprise and society.

Even so, neither the rosy visions of apple-cheeked optimism nor the pitch-black doom scenarios of hollow-eyed pessimism are likely to come true.

New steps and measures?

Measurements and classifications are important. That which is quantified can be controlled. So long as you know what you are measuring and why and how the measurements are to be interpreted.

What is an IT enterprise?
Skandia AFS is usually described as the international insurance brokering company of the Skandia Group. More than anything else, though, it is an IT enterprise and, more-over - after posting a profit of some MSEK 2,200 for 1997 - a good deal more profitable than any other IT enterprise in Sweden except for Ericsson and Telia. If its profits are viewed in relation to its relatively small personnel strength (about 2,700), Skandia AFS, which was started in the UK eleven years ago, is a good deal more profitable (in terms of earnings per employee) than Ericsson.

OM Gruppen is another company which, with IT and fine-tuned communication channels as the kingpins of its operation, has achieved great successes.

IT Commission Report 2/96, "IT measurements. How can IT use be described?" describes about 500 measurements with a direct or indirect bearing on IT use. As was expected, authors Nils-Göran Olve and Carl-Johan Westin did not find any measurement that told the whole truth.

What, for example, does such a frequently used IT measurement as the number of PCs per head of national population actually tell us? Not much if we know at the same time that information technology is developing at unparalleled speed and, like electricity, can be used for practically anything. If we do not know how and in what connection PCs are used, the figure tells us practically nothing, especially as few of us dare to have any opinion concerning what is a "good" computer access ratio.

Or again, what does the number of IT enterprises in the country tell us, except that there are many of them? When SITO (since renamed the Swedish IT Companies Organisation) was admitted to membership of the Confederation of Swedish Industries in the summer of 1997, it immediately became the Confederation's second largest member organisation in terms of turnover.

But the individual member enterprises occupy themselves with a wide variety of things. A dealer, a firm of consultants and a software house operate under very different conditions. Enterprises vary a great deal in size. Out of Sweden's 500 biggest IT enterprises in 1996, the two largest of all, Ericsson and Telia, had between them more turnover than the other 498 combined. In other words, if Ericsson and Telia were to disappear, well over 500 new IT enterprises would be needed to make good the loss.

Our measurements and classifications, then, do not convey an unambiguous picture. Not even all measurements combined can conjure forth an overall picture. This in itself, though, tells us something important: we have not yet found any new yardsticks which seem reliable enough to give a concise description of the phenomena which most of us, intuitively at least, know to be crucially important to our personal future prosperity and that of our children and the society in which we live.

This company leads the world in technology for share and derivatives trading and is several steps ahead of all traditional computerised companies in what they themselves call "transactional technology". Among other things, OM has constructed the world's first two electronic stock exchanges. Most people, however, regard this company as a stock-trading and clearing house. When, in 1997, the journal Datavärlden and the Confederation of Swedish Industries nominated OM Gruppen Swedish IT Enterprise of the Year, a number of technical journals protested that OM was "not a real IT enterprise".

These examples admirably illustrate what the then Group President of ABB, Percy Barnevik, today Board Chairman of ABB and Investor, meant a couple of years ago when, interviewed by the American journal Business Week, he said:

"Before long there won't be any non-IT enterprises."

We are at the beginning of something new and it is hard to work out the direction in which we will be travelling. Even metaphors, images harking back to the familiar so that we can understand what is to come, fail us and misdirect our thoughts.

A couple of years ago, for example, we were speaking of "information highways" to describe the vision of global electronic communications, whereas what we actually meant was a phenomenon which neither resembles nor feels like a highway. Today, when speaking of the first manifestation of this abortive metaphor, the Internet, we employ another two-dimensional image - that of the net.

But the Internet is much more like a lattice than a net and still more like the galleries of a termite mound.

Many people, consequently, have a strong feeling that we are blindly rushing forward from order to chaos, from security to uncertainty. This feeling exists at all levels of society and must in every way be treated with the utmost seriousness.

Those who have invested so much in the industrial society, those who built it, are generally less enamoured of what is emerging. We have to show great understanding for this. But when, on the other hand, nostalgia is combined with indifference, ignorance and fear, it becomes dangerous, especially when this combination occurs in the minds of decision-makers in the public sector and in enterprise.

When this happens, there is a serious risk of our getting out the well-tried analytical models and applying the solutions to symptoms whose fundamental causes are completely new. There is then an imminent danger of our using the new tools for doing things on the terms which have applied up till now.

By reinforcing existing structures in this way, consciously or unconsciously we shackle the process of development and put the brake on renewal and transformation - a retrograde step by comparison with a more wide-awake world around us.

"…the same things over and over again"

Sweden's enterprise sector and public administration have been using computers for over thirty years. Sprung from the industrial society, computers for a long time remained an industrial excrescence.

IT was for a long time regarded solely as a rationalisation technique in the traditional sense. We invested in IT to cut costs, boost productivity and improve efficiency. This is how one of Sweden's best-known and most respected industrialists expressed the matter in a speech on 10th November 1986:

"The greater part of industrial activity and the greater part of the maintenance of society is not based on so-called entrepreneurship. It is a stable, routine activity with limited scope for imagination but plenty of room for competence. We are to produce tomorrow what we produced yesterday, hopefully with somewhat better quality and at somewhat lower cost. We cannot afford chops and changes in production. We

cannot redirect it because someone happens to hit on an idea. Otherwise industrial Sweden will collapse and with it part of our infrastructure. We need a little creativity - not much."

That speech was enthusiastically applauded. The audience had temporarily forgotten that both Volvo and nearly all the other big Swedish corporations had been founded at the end of the 19th century and the beginning of the 20th by - entrepreneurs.

The picture thus painted, just over eleven years ago, of stability and constant repetition was not uniquely Swedish. It applied throughout most of the industrial world.

A few years later the received wisdoms have been stood on their heads. Deregulation and globalisation of the currency market, the fall of communism in Eastern Europe, the steep recession in Sweden at the beginning of the nineties and the dramatic fall in the krona exchange rate led to a rude awakening to the fact of information and IT being a powerful resource and a factor of change in enterprise and society.

The forces which made themselves so dramatically felt on that occasion are no less powerful today. The only thing for us to do, if we are not to become their victims, is to accept them and turn them to our benefit.

In " Sweden and the imminent change of epoch", IT Commission Report 5/97 (SOU 1997:63), the IT Commission sees *a first challenge* in our upgrading and creating new products and services and developing new enterprises and structures. In this process we will become more and more dependent on new knowledge created at an every-increasing rate. *A second challenge* is that we have to create added value with a highly skilled labour force and with intellectual power and capacity. Only be developing and using a high level of skill can we become competitive and achieve long-term employment growth.

Creativity, renewal and co-operation are the new key words. The personal qualities and knowledge of the individual are growing more important. To enterprises and administrative organisations, the individual creativity and ideas of employees, and their capacity for working together, are a crucial asset, just as important as the buildings and plant of the industrial society.

That which used to be a virtue in industrial society can thus become a vice in the knowledge society where constant change and renewal are all that is really lasting.

Defending "big factories" at any price means defending a world picture in which the focus of attention is on uniform, centralised production. That way of looking at things leads into a dead end. For when other countries become as good as we are at mass production and assembly jobs, and they already are, our only possible way of retaining industrial employment is by undercutting wages.

Because of big wage differences, we can no longer even compete in certain sectors of the software industry. Good mathematicians and code-writers in India can cope with complicated tasks just a well as we can.

We must of course be very sympathetic in supporting those whose lose their jobs because of structural change. In the long term, though, only concrete action will help.

One important initiative is the MSEK 1,300 which the Government is allocating for an extra employment training scheme to give 10,000 people IT training. That scheme is based on an agreement with the Confederation of Swedish Industries - another positive approach - whereby various IT enterprises, such as Telia, Enator and IBM, are themselves providing the training.

The IT Commission has in many connections drawn attention to the importance of co-operation between the public and private sectors, most recently in our communication to the Government concerning electronic trading. Sweden will need a great deal more training of this and other kinds in future. The renewal of education has always been a pivotal theme of the IT Commission's work.

As ye sow ye shall reap

"Consider an apple tree. How traditional key ratios measure the crop. But what about sowing and the roots? They are the things on which future crops depend, but we don't measure the root system," says Leif Edvinsson, Executive Vice President of Skandia.

A textbook example
Unfortunately there are few high school students who can describe their daily routine in the same terms as Maria Larsson of Mönsterås Upper Secondary School at a hearing convened by the IT Commission on 4th December 1997 in association with the Ministry of Education:

"All work is done in groups and the group is recruited according to interest. First you select a field, then together you try to find a way of stating the problem that will take in everybody's interests. Next you plan the course, every lesson, when you are going to carry out analysis, briefings, field trips and so on. We choose fields with reference to what has to be part of the course. Any parts of the course which aren't covered by our work are dealt with in a lecture by the teacher or by some other expert. My group and I have chosen to look at the question: 'Is the woman always a victim?'

"We collect facts from books, articles, radio and television interviews etc. for the different angles we are covering. At the same time we discuss our findings together and help each other. We also co-operate closely with the Women's Refuge in Mönsterås. We bounce ideas off them. In this way we try to arrive at a holistic image of the women's problem in society, but also of the present-day view of women.

"Next comes perhaps the most important work, the analysis. It is now we tie together the questions we began with and the conclusions we have reached as work has progressed.

As ye sow ye shall reap, the farmer or the amateur gardener would have said. There is a lot of truth in that.

Society's seed time, its root system, consists of schools, universities and colleges. The most worrying thing, we feel, about this time of rapid change is that the education system - the part of our societal infrastructure where the foundations of our future prosperity are laid - despite very good efforts at renewal on the whole, still reflects the industrial society. This is underscored by practically all the IT Commission's reports.

For more than a hundred years now, schools have been training people for industrial society, equipping them for competence in the successful industrial nation that Sweden used to be. The emphasis of education and work organisation was on homogeneity and routine jobs for the great majority.

Those jobs have been disappearing from industry ever since the mid-1960s. During the present decade alone, 250,000 jobs have been shed while only 50,000-60,000 have been created. This adds up to a net loss of about 200,000, at the same time as industrial productivity has broken all records.

Take a modern classic like the mobile phone. Ten years ago it took three hours to make one. Five years ago it took forty minutes. Today it will soon take only five. For every generation of phones, the classical job content is falling by 30 per cent. At the same time, the phones themselves are becoming lighter, smaller, faster, more efficient and more sophisticated than their predecessors.

To the manufacturer, the cost of production and distribution in the true sense is virtually negligible compared with the cost of research and development, administration, market analysis and marketing etc.

And to the purchaser of a mobile phone, it is functions hinging more on software development and interaction with a pre-existing, complete mobile telephone network that matter, rather than the physical product. It is the service and knowledge content of the product that the customer is ready to pay for.

The same argument holds good for practically all manufacturing enterprises. They have been transformed into a kind of service producers. Many nowadays actually refer to themselves as knowledge enterprises and learning organisations.

A growing proportion of work in these enterprises, as in trading companies and outright service companies, is based on interpreting and conditioning our needs, creating variants and customising offers. If industrial salaried staff are to be included in the service sector, then that sector today already accounts for over 80 per cent of the working population.

This reality is making the individual person's knowledge and capacity more and more important. What we need is not uniformly educated individuals but individuals capable of performing a host of non-routine tasks. This applies both in production and trade and in public and private services, whether for export or for the home market.

In IT Commission report 3/97 "The Crystal Ball - thirteen voices about the future" (SOU 1997:31), Göran Johnsson, Chairman of the Swedish Metalworkers' Union, says: "A lot of the value added in what Sweden produces is knowledge. That explains why the simple jobs are being rationalised out of existence. So Sweden will not be able to afford citizens who say that they don't want to develop. Knowledge is becoming more and more of a perishable commodity, and so all of us in Sweden will have to grow accustomed to thinking

We analyse the conclusions, and we also try to find suitable measures in the group's subject field.

"When we have completed two-thirds of the course, it's time to present our findings. This is done both verbally and in writing. Before the verbal presentation the class have read the work, and so what we present is the group's conclusions, not just facts.

"At this point we discuss things with the whole class, to see if anyone has any views worth considering. We also try to involve the whole class in our work, perhaps by field trips or by giving them tasks to perform and discussing the various solutions and any differences in our findings."

The knowledge-seeking working approach which Maria Larsson describes is a model instance of what things ought to be like but very seldom are. Not once, be it noted, does she even mention computers or IT. She takes them for granted.

knowledge, even when we are grown up."

Göran Johnsson could have been speaking on behalf of all the other twelve participants. There is a widespread consensus here, just as between Sweden's parliamentary political parties, that lifelong learning is a key factor of Sweden's future success.

"Schools are one instance where IT can make it possible to conduct individual lifelong learning which will enable us to cultivate diversity but at the same time to make use of our talents," says, for example, Leif Johansson, at that time Group President of Electrolux and today Group President of Volvo.

These are wise words. Broader education is needed for the prevention of knowledge-related and social gaps in society. Spearhead training is needed to facilitate the development of new economic activities, lines of business, services and products.

And above all, ongoing education is needed, not only in early years but for life.

The foundations of capacity for and interest in lifelong learning must be laid in school.

A great deal of the discussion concerning educational renewal has focused on IT and computers. But technology, if it is in place, is not really interesting. The topic of discussion, therefore, ought to be a change of pedagogics in favour of a knowledge-seeking working approach whereby the individual, both individually and together with others, is given a large measure of personal responsibility for creating his own knowledge, with IT as an obvious and powerful aid.

Contributing towards an educational renewal and swinging schools in the direction of a knowledge-seeking working approach must be a priority concern for the State and the municipalities of Sweden. IT is not exclusively or even mainly a technical question in schools, any more than in enterprise and administration.

Here and the world

What ought we to be defending, then, instead of the present order of things? There must be something that computers and robots can't do and which, for some time yet, still can't be done less expensively in other countries.

Things of this kind include caring services, passenger and goods transport and other things that have to be done on the spot, things that can only be done "here".

Things we have to do "here", however, seldom yield any export revenues. To earn the latter, we have to venture forth into the arena of "the world". There we have to do something which is appreciated by the international market, something which puts us one step ahead of the other players. For example, the unprogrammed, the creative and the innovative.

This applies not only to intellectual creativity but also to a great deal of human interaction. "Reading" situations and doing the right thing now can depend as much on intuition and empathy as on a high level of specialist training.

Science and technology study programmes, in other words, are not the whole answer. Knowledge of languages, creativity and the humanities are also needed.

But not even that is enough. Round about these skills we must be capable of organising and re-organising value-creating systems. Even if the skill and ability of the individual are growing more and more important, success will hinge on how well individuals are able to co-operate. Even if our hopefully still high standard of living will be based on how many people are able to engage in creative and interpretative work, it is in enterprises and public activity that we can achieve more than the sum total of what individuals are capable of.

It is impossible to say with any certainty

The wood and the trees
"It is high time we stopped talking about technology for its own sake. The first thing we have to ask ourselves is what the organisation's aims are. The next thing is to investigate the way in which IT can support the achievement of those objectives. This calls for leaders who are capable of seeing both wood and trees, that is, capable of handling overarching objectives and concrete measures simultaneously. Women often perceive new possibilities more easily, for the simple reason that they are better able to see across functional boundaries," says Professor Dag Ericsson in IT Commission Report 4/96, "Women and IT".

the form in which this co-operation is to occur. In enterprise we can see how the hierarchic, functionally segregated organisation is being superseded by flat organisations focusing on projects with lateral, IT-supported flows of work and information.

There are also examples here of more loose-knit forms of co-operation, with formally independent companies with different core competencies linking up in every direction with the aid of IT, into virtual or imaginary organisations, forming highly competent, value-creating entities.

"One very powerful challenge both to me in future and to other entrepreneurs in the sector is to network a great deal more, both nationally and internationally. We are many small producers who would like to get into a higher league. We can only do that by joining forces and turning many small and weak entities into a few big, strong ones," says Ylva Johansson, President of CD-Media AB in IT Commission Report 7/97 (SOU 1997:124), quoted from a hearing in June 1997 on the new media and software industry.

It is hard to say how much of this can be transferred into what is often a very information-intensive public sector. That sector is subject to somewhat different formal regulations from the market. Nor is it influenced in the same way by pressure of competition and the profit motive, the two most important underlying factors of changes in enterprise.

Considerable sub-optimisations could, however, probably be avoided through co-ordination and new working procedures based on a thorough analysis of existing flows of work and information, as well as effective, easily changeable IT support. With greater administrative efficiency in the organisations, economic resources could in the long term be switched over for augmenting communal resources in such core fields as education, physical/technical infrastructure and caring services.

Through farsighted use of IT, public institutions and administrations can also improve and simplify the interchange of

information with citizens and enterprise. This is greatly emphasised in the Government's IT Bill, passed by the Riksdag in the spring of 1996, and it also occupies a prominent position in "Digital Democracy", IT Commission Report 2/97 (SOU 1997:23).

All in all, this could also have big positive effects on IT industry and the creation of new enterprises and job opportunities in general. Especially if public sector activities were to adopt a more open attitude towards today's very swift changes in the IT sector and the opportunities which those changes afford for organisational change.

This, however, calls for a high level of procurement competence on the part of both personnel and management, and it means that we must start thinking of IT as a strategic resource for renewal and development.

National, local and regional authorities, as well as enterprise, are less foreign to thoughts of this kind today than they were just a few years ago.

During the late autumn of 1997 the EuroFutures AB firm of consultants compiled, on the IT Commission's behalf, a survey of regional IT projects in Sweden, entitled "IT and Regional Development. 120 examples from the counties of Sweden ", IT Commission Report 1/98 (SOU 1998:19).

The sample presented shows a wide diversity with regard to both the emphasis and size of projects. There are no firm conclusions to be drawn from this, which is in the nature of things. Many IT investments, both in enterprise and in public activity, like investments in research and development and classical infrastructure, have the character of options. They are a kind of wagering about the future.

IT does not have a long history of success and failure from which conclusions can be drawn. It does not even have a stable present. It is developing all the time. Every forecast, therefore, is bound to be uncertain in the extreme. Making the old, secure investment calculation - which, with its plus

and minus for discounted in- and out-payments, radiates the kind of incontrovertible reason that is conferred by only the simplest mathematics - is as impossible as it is futile.

The necessary rapid structural change towards more knowledge-intensive activities and jobs must therefore be based on the principles of diversity and experimentation.

This demands a great deal of honesty, skill and boldness on the part of decision-makers.

It will not do for politicians or heads of companies to hide behind the misjudgements, exaggerations and sheer stupidity that every significant shift of technology brings with it, or in any other way to abdicate their responsibility.

Looking back on the future

By looking backwards we can put the future into perspective. And if we look clearly we find that there are lessons to be learned which, hopefully, can help to enhance our preparedness.

The change of epoch of which we can now see the beginning is not the first in human history. We have previously moved from a hunter-gatherer society to a craft and agricultural society, to a mechanised industrial society, from the bow and arrow, to the plough and irrigation, to the steam engine and the railways and electricity and the combustion engine.

On no occasion have we started from order and ended up in chaos. All the time, by winding paths, we have moved progressively deeper into an increasingly composite existence.

We have moved towards chaos at first, but in transit have created for ourselves increasingly solid models for organising our existence. We have organised ourselves by building up and using new physical and intangible infrastructures and systems. And through these we have been able to utilise the possibilities and respond to the needs arising as a consequence of the new technical advances.

Adjustments have never been painless. Industrialism made possible the rationalisation of agriculture, which in turn released manpower for industrial employment. And at every stage of the latest epoch - each one being dominated by a tone-setting, impelling technology - economic activities, enterprises and occupational categories

have disappeared, never to return in their old guise.

It was some time before new ones replaced them. Human and organisational changes move less rapidly than technical progress. The steam engine was invented and for a couple of decades was used for pumping water. Eventually it became an industrial power source, then it was used for transport and then it was used for generating electricity - as it still does in coal-fired, oil-fired and nuclear power stations - which in turn could be used as a power source in industry and for the transport and development of new products.

It takes time before inventions, discoveries, innovations and technical breakthroughs are recognised and full use can be made of their potential. And this happens when the new technology in new applications is permitted to interact with new organisational and conceptual structures and new models of analysis.

For about 35 years now, job opportunities have been dwindling in Swedish manufacturing industry. But the surge of unemployment was almost completely offset by the expansion of the public sector. That expedient is now closed. Only by building up knowledge and wisely employing IT, quickly and in all areas of society, can new job opportunities be

Ever faster...
Taking the technical and scientific progress of society from the beginnings of time to the last turn of century as our unit of measurement, that development was of equal magnitude between 1900 and 1950, between 1950 and 1970, between 1970 and 1985 and between 1985 and 1995. Between 1995 and the turn of the century, our development will be as extensive as between pagan times and 1905 (the dissolution of the Swedish-Norwegian union). Or, putting it another way: 90 per cent of all scientists who ever existed are alive today.

created which will lay the foundations of growth and prosperity.

We are at the very beginning of development. Most things remain to be done in the world arena of knowledge and co-operation. But if we are not to be sidelined or upstaged, we must lose no time in creating for ourselves the possibilities of a pivotal role in the global drama. For what is happening now is happening faster than ever before. And it is comprehensive.

Many of mankind's staging posts towards an ever-greater complexity of existence have been dramatic enough, but only in rare instances has the interplay between the new technology and the new forms of human activity made possible by that technology had such explosive power that the economic base of society has also been shifted and what we may term an epoch shift has taken place.

Not in the sense of the previously dominant economic activities disappearing. In our part of the world, the hunting society lives on, with incomparably greater efficiency, in the form of commercial fisheries, the agrarian society lives on in our agriculture and forestry, and the industrial society in a number of still prosperous, long-established enterprises.

But that is no longer where prosperity and growth are being created. Prosperity and growth now stem from new means of production which are also becoming the dominant asset of human beings, enterprises and society.

The collective name for the means of production which we will have to develop and use in future is *knowledge.*

Ahead of us lies the new continent and…

The map is being redrawn

With the full breakthrough of the industrial society, soil and land became less important as assets. Today, similarly, classical fixed assets like buildings, machinery, vehicles and raw materials are growing less important in relation to intangible, "soft" assets. The economic map is being redrawn.

Growth today is instead taking place in knowledge, creativity, ideas, patents, trademarks, confidence in the enterprise and market and other intangible assets.

Ericsson, Astra, Hennes & Mauritz, IKEA and Skandia AFS are all enterprises which have scored great international successes. They are also among the enterprises whose personnel strength in Sweden grew most between 1988 and 1995.

The progress made by these companies has hinged entirely on their use of IT. And their growth has occurred almost entirely in their intangible or intellectual capital, i.e. through the build-up of knowledge, faithful customers, patents, trademark cultivation, knowledge of systems and markets and so on.

When administrative tasks were automated with the aid of IT, this often resulted in lower demands being made on the knowledge and competence of employees. But, with a new view of IT in companies and in public activity, organisations are becoming more and more knowledge-based and demands on the skill and competence of the individual are rapidly rising.

IT is a lever for knowledge. Properly used, IT can improve everyone's capacity for making independent, soundly based decisions at all stages of life. IT can help to strengthen creativity and to create perspective, overview, holistic comprehension and other qualities which will be in demand in the vocational roles of the future.

The possibilities of storing, retrieving, analysing, filtering, compiling, distributing, presenting and combining information are practically endless. All in all this can bring an enormous knowledge reinforcement, of great consequence for the internal activities and management of organisations. But, and this is perhaps the most important point, it is also making information and knowledge one of the principal means of competition, for enterprise and for the individual.

This latter point is seldom noticed. Employees are no longer, as in the days of mass production, a cost factor to be rationalised away. In the new economy they are an important part of the intellectual capital of the enterprise and the organisation.

The enterprises and organisations which succeed best in taking care of, respecting and showing appreciation of their associates will have a great advantage over their competitors.

A great deal will centre round the building of confidences. And this is going to be still more important in future. For, by virtue of their increased knowledge, employees will control a progressively greater part of the means of production.

Engineering a silent explosion

IT is the locomotive for the growth of knowledge and competence and the transformation of society. This is connected with the explosive pace of IT development and its "facilitating" properties.

The IT lorry

It is hard today to think of a single product, service or process where IT is not included.

Let us take the "system" of the lorry. IT is used to design, manufacture and market a lorry. IT is used to pay the workers' wages and to communicate with subcontractors and dealers. IT is built into the vehicle, for example in its braking and fuel injection systems, into control and warning systems for improving its performance and to provide new functions.

When the lorry goes in for servicing, the garage uses IT to test it, to order spares and to invoice the haulage firm. When the driver tanks up, he uses the IT built into the pumps, and afterwards he uses his card to record the purchase in the petrol company's computer system. The transport company often uses very advanced computer systems and communication channels for its logistical services.

The companies where the driver picks up and delivers goods are interconnected by IT and in this way, perhaps, employ sophisticated systems for ordering, warehouse invoicing and materials and production management.

IT is used for collecting and processing data about traffic, which in turn form the basis of IT-assisted technical design, expansion and maintenance of the road network and, in the bigger cities, management of the entire traffic system. And so on.

An estimate by the World Bank tells us that one calculating instruction per second in a computer today costs less than one hundredth of a per cent of what it cost 25 years ago.

Thus for the same price as 25 years ago, we are getting 10,000 times the calculating capacity. This represents an annual price drop of 30 per cent in real terms over the past couple of decades.

The almost mind-boggling speed at which the ratio between price and performance is changing means that the field for theoretically possible new products and services and improvements to existing, "mature" products and services is expanding at a rate which we have never before experienced.

IT in itself adds no value. Only its use can do that. It is important to distinguish between these two things. IT, like electricity, is a power source, a "facilitating" technique. And the possibilities, quite simply, are infinite.

Not only in the more limited sense of IT as an end product in the form of hardware and software. IT can be used in all activities, in all branches of the economy and, moreover, in all operational functions, both in enterprise and in administration. New business ideas and operational processes are being developed with IT. The information content of products and services is growing all the time.

IT handles all the information in digital form. This can seem perfectly obvious, but it is fundamentally important.

Information can consist of words, sounds or images. And because information is represented by ones and zeros, it can be handled by computers at both ends, without any human intervention. This digitalisation also means that the content or importance of information is independent of the way in which that information is stored, transmitted or presented.

A piece of music can be "unpacked" as notation on paper or as sound after being transmitted through telecommunications cables or by satellite, or over radio or television networks. Newspapers can be adapted to the subscribers' personal preferences and identically distributed anywhere in the world. Weather forecasts can be shown as charts, tables, maps or by speech.

IT's capacity, properly used, for elevating the users' knowledge, its incomparably rapid development, general character and digital information processing are four fundamental "benefits" which increase at a hectic pace as more and more computers are connected up in networks and are able to communicate with each other.

It's just like the telephone. The more people the network includes, the more useful it will be to each individual subscriber. It is usually said that benefit increases by the square of the number of users. The telephone, for example, became a "must" when the number of users attained a certain level. The same thing is now happening with electronic communication, due to the explosive growth of the Internet.

Boundless, boundless

Computers and networks are everywhere. Companies, organisations and individuals are becoming less dependent on time and space. The Internet obliterates boundaries.

The IT Commission was swift to notice the potential of the Internet and the web as a medium and as a channel for electronic business communication and trading. This is reflected by "The Commercial Useful-ness of the Internet", IT Commission report 8/97, from a seminar convened in associ-ation with the Swedish Scientific and Technical Attaché Service in June 1996, which deals with a number of Swedish case histories and provides an overview of the international situation at that time. The same thing was done in the follow-up of the seminar in 1997.

The IT Commission's commitment to the Internet was severely criticised in some circles to begin with. Most people find it today easier to see the benefits.

The Internet does not require any costly new investments. All that is needed is access to a telephone, a standard computer and modem for linking the computer to the telecommunications network, and simple, standard software.

The communications standard is open. Spontaneous contacts can be made without it having been decided beforehand what technical standard is to be employed. Inter-net communication costs are low and are falling steadily.

In practice, the Internet is the most important standardisation in the IT sector hitherto.

Parallel to the expansion of electronic networks, it is becoming increasingly poss-ible to work more independently of time and space. Folksam is one of the companies which have committed themselves to tele-working personnel.

"Thanks to the telephone, the PC and the modem, we can live and work where we please," says Christina Pettersson at Folksam's Möja branch in the Stockholm Archipelago, which is where the company manages its customer services.

Christina Pettersson has six colleagues, but not more than half of them are ever at work simultaneously. They all work half time, whereas Christina Pettersson works full time. Seven new job opportunities means a great deal on the island of Möja, which has about 200 permanent residents. Getting here from the centre of Stockholm takes between two and three hours. By IT it takes just a couple of seconds.

This example comes from IT Commission Report 4/97, "IT and the Environment - a collection of good exam-ples" (SOU 1996:178). That report contains good examples of unfamiliar working arrangements and of IT's manifold uses and applications, with reference to the environ-mental context.

The Internet has dramatically expanded opportunities of communication through data networks, both within organisations, between organisations, between individuals and organisations and between individuals. In particular, the World Wide Web appli-cation and the introduction in 1993 of the first simple and functional search programs have given the Internet a pace of develop-ment over the past few years which has no counterpart in the almost fifty-year history of IT.

In areas such as tele-medicine and dis-tance education, therefore, the possibilities today are quite different from what they were less than five years ago.

The whole thing can be rather drastically summed up in the following terms. Why should a hundred patients or students have one doctor or teacher when one patient or student can instead have a hundred doctors or teachers?

Three years ago, Professor Henning Johansson started, at Luleå University College, a postgraduate study programme

in learning which he described at a hearing convened by the IT Commission last February together with the Ministry of Transport and Communications and the Ministry of Education.

Through his contacts with Professor Paolo Freire, the Brazilian educationalist, Henning Johansson had soon started discussing the potentialities of the new technology for postgraduate education.

This discussion assumed firmer shape at the beginning of the nineties, with the result that they organised a distance study programme and put out a small advertisement to see how many people would be interested in an Internet-based postgraduate study programme. The interest proved to be overwhelming. There were 630 applicants, thirty of whom were accepted.

But who was to tutor them? Luleå University is a long way from the big universities and a good research environment always requires "a critical mass" of qualified research students and teaching staff.

The point of putting the study programme on the Internet is that, in order to create this good research environment, you don't have to construct a building where postgraduate students and their tutors meet and work. The "critical mass" can be scattered all over the world.

It proved perfectly feasible both to recruit internationally renowned professors and to create an "educational room" on the web, and today, like a sort of spider in the web, Henning Johansson is co-ordinating thirty postgraduate students in Sweden and Norway and twenty tutors all over the world by this method.

They are using simple, standard software to communicate with each other. And yet the technique is so adaptable as to provide many pedagogical alternatives.

Every student has a "box" to which only s/he, the tutor and Henning Johansson have access. Other "boxes" take the form of postgraduate seminars to which all postgraduate students and tutors have access.

This is where the students contribute to the discussion. They can also supply images and charts illustrating what they are writing about. Of course, the seminars can also be organised on particular themes or subjects, or in the form of reading seminars. Sometimes there have been up to 20 seminars of this kind in progress simultaneously, which is impossible in the established system.

Technology is also opening up new examination possibilities. It is perfectly possible to pick out all the statements a postgraduate student has made in the various discussion groups. Together with the student, the tutor can then go through them, sort out misinterpretations of concepts, and so on.

All in all this provides opportunities for a highly individualised assessment of the postgraduate student's ability and progress during the course and for a highly personalised planning of studies, in which the student's previous practical and theoretical experience can be factored in from the very beginning.

"There is a tradition," says Henning Johansson, "of education being something apart which people come to. With the new technology this distance can be reduced, especially when you see the benefits both to the individual and to education itself."

Everyone can communicate with everyone else - one to one, many to many, one to many and many to one. And communication can take place when both parties are on line together or when the recipient logs in later.

This all adds a new dimension to communication. Unlike an electronic letter, which of course is always sent for a purpose by one person to another person's mailbox, or the types of communication which required sender and recipient to be connected simultaneously - someone has to answer the phone in order for a phone call to materialise - the web also means the recipient being able to pick up the information on his own initiative.

Communication is now controlled by the recipient, not by the sender. As a mass medium, the Internet can be used on the individual's own terms.

A new kind of meeting point can be

55+ conquering the web
SeniorNet Sweden is an initiative by the IT Commission modelled on the SeniorNet which has been going for 12 years now in the USA. SeniorNet Sweden, a non-profit NGO, was formed in November 1996.

The purpose of this organisation is to disseminate knowledge of information technology and to facilitate older people's encounter with it, partly by arranging local electronic meeting points and by means of special senior pages on the web, in order, through new contacts, to enhance the quality of life, bridge generation gaps and overcome social isolation and loneliness.

"The new technology is ideal for older people, the physically not so strong and the disabled," says ViviAnn Lundberg, 66, Board Chairman of SeniorNet. "It improves our capacity for taking part, for doing different things faster and more easily, for communicating more frequently and less expensively. Today the technology is ready for a place in our homes. It gives us new social experience and makes our lives more enjoyable."

SeniorNet today has five hundred members, ten local clubs and another twenty in the process of formation. Its oldest member is a 91-year-old woman and its youngest was born in 1957. Being over 55, then, is not an absolute requirement.

SeniorNet's homepage was re-launched in February 1998, among other things with better facilities for searching the membership list and finding new friends who share the same interests or live in the same town. Public information, including facts about pensions, housing and various benefits, has also been improved. Education is another venture which will gradually be expanded with the addition of more advanced courses. Educational activities also include bridge, cooking and "grandparenthood" in present-day Sweden.

created. The IT Commission's initiative "SeniorNet" is one of them. It is open to all but is mainly intended as a meeting point to arouse curiosity and to encourage IT use among older persons in Sweden.

Many such meeting points are needed. IT must not result in a number of groups in the community being marginalised.

IT Commission Report 3/96 "When manna falls from heaven, the poor man has no spoon", from a workshop about IT and disability, shows how IT, in every way, can help people with functional impairment to achieve, as Professor Bodil Jönsson of the Rehabilitation Technology Centre, Institute of Science and Technology, Lund University puts it, "power over their own lives".

The thresholds to policy-making
assemblies - such as government, parliament, county councils and municipalities - can similarly be lowered by establishing spaces on the web to improve public dia

logue and debate. In this way many more people can gain a hearing concerning small and large social issues, as is pointed out for example in IT Commission Report 2/97 "Digital Democracy" (SOU 1997:23).

The Internet, in these senses, is the most democratic medium that has ever existed. For this reason, and given the knowledge-boosting potential of the Internet and the possibilities, through the Internet, of creating new job opportunities and new activities, not least in sparsely populated rural areas, as further heavy factors in the balance, it is of the utmost importance that the whole nation should have access to a modern technical infrastructure which can cope with large quantities of information.

Universal access to a viable, modern technical infrastructure for electronic communication has been a constantly recurring theme of the IT Commission, for example in our reports on infrastructure and on enterprise.

The new business logic

Physical interfaces are being superseded by electronic ones. Everyone can communicate with everyone else at low cost. The initiative comes from the person needing to know something.

Records on the web
In the not too distant future, the sale and distribution of all products and standard services amenable to digital packaging will be transferred to the Internet and the web or their successors. Records are an interesting example. Last year Sony in the USA made parts of its record catalogue available on the web. You pay by credit card and the records arrive by post. Here is the embryo of web trading with no middlemen, supplemented by a specialised carrier who looks after the physical distribution and, when necessary, a certain amount of stock maintenance.
CDs are small and robust and can be easily posted as packets, and it has been a long time since anyone

"What is happening is that a completely new business logic is developing which differs radically from the business logic of the industrial society," says Thomas Falk, Professor and head of the Infrastructure Division of the Confederation of Swedish Industries.

(An important source, above all for the section "Redrawing the map", is the statement which Thomas Falk made at the IT Commission's colloquy on 18th November 1997, "How offensive IT use can create growth for small businesses", Report 5/98, SOU 1998:54. A more exhaustive version of Thomas Falk's argument can be found in "Vision & verklighet - En idéskrift om affärslogistik", Posten On Line Center AB, 1997.)

In other words, when the number of

Internet users grows large enough and the supply of goods and services sufficiently attractive and accessible, then the middlemen or intermediaries whose task today is *solely* to put producers and consumers in touch with each other will be superfluous.

New and hitherto unsuspected
opportunities of increased earnings and cost-cutting for enterprise are being opened up by electronic business communication and trading. And in its public sector counterpart there are great efficiency gains to be harvested.

Thomas Falk's prophesy applies no less to public sector activities. Those whose sole task is to store, distribute and present "prepackaged" information are destined eventually to disappear.

needed to go trudging off to the record shop and listen to the latest hit through clumsy headphones. Radio, MTV and newspapers have taken over completely as marketing channels for music and artists.

Eventually the Internet may become the dominant channel for both marketing and distribution of music, inviting people to view and listen to a music video free of charge and to download the whole disc when they have paid up. The technology for this is already in place. The record companies, in principle, need no longer rely on retailers for distribution, marketing or administration of payments.

Developments in that direction have started already. The commitment of banks to the Internet is a clear sign of the times.

When the bank's customers can perform their transactions from the computer, there will be no need for a bank clerk turning to the screen and punching buttons, and no need for a bank front office either, because the customers will stay at home and do the job themselves. At least where routine transactions are concerned.

Walk-in banks will be needed for customers who want, and are ready to pay for, face-to-face financial consultations with a bank man. But fewer branches will be needed and fewer staff than at present.

Travel and insurance are two other lines of business which are developing in the same direction.

The case of the Internet bank shows us how easily a long-established service can be transferred to a new electronic channel. Of course, the reverse is also conceivable - an established channel or infrastructure

being used for new services. One such example is the presence of ATG and Svenska Spel in tobacconists' shops, providing on-line gambling.

The only question is how long they will remain there. With electronic payment routines accepted by everybody, betting can be done from a computer connected, for example, to the mobile telephone network. ATG has already launched an experimental scheme of direct gambling on the web.

Of course, one can also imagine a number of new services on the new channel, such as interactive newspapers, electronic market places where producer and consumer meet together directly, information and knowledge brokers who sort, package and upgrade information or do something else with it in addition to mere distribution.

But things are not that simple, as witness for example the poor profitability and low customer confidence surrounding the previously much-publicised, much-vaunted web bureaux and new media enterprises.

…and all the rest of it

A natty homepage is not the whole recipe for succeeding on the web. Everything one previously had to be good at in order to succeed will have to be done just as well if not better in future.

In the shorter term, it is by no means certain that communications between producer and consumer will be all that more direct.

It is probably in trade between enterprises and as an electronic variant of traditional mail order trading that Internet trading will achieve its first breakthrough as a cheap, efficient rationalisation instrument.

In "extranets", combined with intranets (internal corporate webs), there are great gains to be harvested in the form of almost negligible contact costs within and between firms.

Used as an intranet, the Internet provides great opportunities for co-ordinating and streamlining the use of information in the existing systems of businesses and

administrative organisations. With the extranet, parts of the systems can be opened up to and made to facilitate the interchange of information between customers, suppliers, associates and the general public.

The technique is already being used in this way by several big Swedish corporations. Others are now engaged in very radical reconstructions of their systems and their information flows, based on the Internet and web technology.

It is no less likely that the typical mail order firms will be the first to make a success of more large-scale consumer goods trading on the Internet. They already have the large background systems that are needed and have had long experience of handling large flows of information and

goods through different channels.

They are very good at internal and external logistics, i.e. organising these flows within their operation and together with their component suppliers, forwarding agents and customers. To them the electronic link-up with the customer's orders and payments is simply the latest stage of a much bigger and already efficient value-creating system of enterprise and individuals working together.

This is the kind of knowledge that all businesses have to compete with when they venture on to the web. And so it is a gross exaggeration to say that all firms are of equal size on the web. True, it costs everyone the same amount - practically nothing at all - to introduce themselves on the web, and at first sight no company looks any bigger than the others.

But, all other things considered, size may very quickly prove to make a difference. For, just as in the "old" economy, everything else demands loads of hard work and financial capital.

When everyone can communicate with everyone else, there are businesses, organisations, individuals, products, services and information to be looked up in every quarter. This being so, anyone with nothing else to show but a natty homepage and a smart ordering function will very soon find themselves cut adrift in cyber-space.

The system behind and round about also has to function impeccably. And the customer, who has the whip hand, must know that there is something unique to be had, or at all events a product or service or a combination of products and services which others at that particular moment simply cannot imitate.

The relatively few serious enterprises now successfully trading on the Internet do so much more by virtue of their superior knowledge of the complicated relationships they are operating with than on the strength of smart web applications.

System knowledge and original creativity, in both the technical and the general senses, are the master-keys to future good growth in Sweden. Those who rapidly find their style and understand how to navigate in - are able to draw their own maps of - the composite, changeable and apparently chaotic new world which, a page or two back, we dubbed the continent of knowledge, have every chance of succeeding.

Computers on the web
Dell, the American computer manufacturer, is one of few companies who have made a real success of Internet trading.

Last spring the company landed orders worth a million dollars a day on the Internet and it plans to be getting half its order intake this way by the turn of the century. If sales continue growing at the rate they have been for the past five years, this will mean orders worth eight billion dollars.

There is no real mystery attached. Dell sells exclusively to businesses, which means better guarantees of getting paid.

The products, PCs, are one of the foundation stones of the web, which means that, normally, the customers are "on the web" already and know about the product.

The company is fine-tuned for rational, order-driven production of customised merchandise right down to subcontractor level. It has no inventories and, operating purely as a mail order enterprise, it has always based its sales on efficient direct physical flows to the customers. The goods arrive within a few days, just as promised.

So the door to the Internet has been beaten down already.

The more customers there are configurating and ordering their goods with their own computers, the fewer fax transceivers and telephones the company needs. And when, as in the USA and, nowadays, in the UK as well, customers can pay by credit card from every country, this eliminates further stages of internal administration.

The Internet can streamline all kinds of business communication. The homepage of the American haulage company Federal Express receives over a hundred thousand visitors a day. With just a few clicks they can inquire and be told the whereabouts of their goods. Anywhere in the world and at any time of the day or night. FedEx's tracking system has nothing to do with web trading, but it saves an enormous amount of money on telephone lines and operators and gives better service to the customers.

The world and here

Despite sometimes excessively optimistically forecasts, electronic trading and other activities on the web are growing exponentially. We mustn't try to stop them. Instead we must open up to them, but we must also be aware of the consequences.

The commitments announced by the Government, and concerning which there appears to be a wide political consensus, concerning entrepreneurs and small firms are welcome in this connection. But in order for small firms to grow, take on more personnel and contribute to the Swedish economy, the need, once again, is for hard work and capital.

The colloquies and hearings which the IT Commission has arranged together with small entrepreneurs and the software and media industry have shown simpler rules, better communication between different authorities and research, training drives and better opportunities for co-operation between small firms to come high on the wants list.

The Government can help to eliminate these impediments by stepping up its commitment to technical infrastructure, regulatory changes and an education policy of pedagogical reforms favouring an investigative working approach.

One real stumbling block is the lack of genuine venture capital which many experience. Diversity and experimentation belong to a new age. But where are the people who can and dare to see the idea as worth banking on and developing further?

This calls for innovative thinking in every quarter, an active demolition of benchmarks and analytical models reflecting a vanished way of thinking, and a creative search for new replacements.

But this is a big challenge. The basics of financial accounting and the financial key ratios we still use are essentially the same as in the first textbook of commercial arithmetic, "Summa de arithmetica, geometrica, proportioni et proportionalita", which was written by an Italian monk, Luca Pacioli, and published in 1495. At best these figures show what things used to be like, but definitely not what they are like today and still less a kind of development desirable for the future.

Yardsticks and models concerned more with measuring the value of ideas and knowledge production are already being used today by many enterprises, even banks, in the USA.

In Sweden they are being practised by companies like Electrolux, ABB, NCC and above all Skandia, which is also pioneering a global perspective in this field, as the IT Commission very soon observed in its Report 2/96 "IT measurements. How can IT use be described?"

The kind of measurement and valuation models which these companies are systematically using are going to be necessary as steering instruments and supportive documenation for the evaluation of the increasingly knowledge-dependent activities of the future. What other new steps and measures will we have to take?

These at times very complicated questions have been touched on several times by the IT Commission, for example in "Draft framework for electronic business communication", which at the beginning of February was presented to the group of representatives of several ministries studying this question in the Government Offices. Similar issues are also raised in IT Commission Report "IT and the national state" (SOU 1998:58, Report 6/98).

It is in every way important that competence should be established among all players in trading and other activities on the Internet and in IT as a positive force and opportunity in every field. The Government can spur this development by searching with great openness for co-operation with enterprise, representatives of the labour market parties, other political parties in Sweden and the governments of other countries.

Voices from the colloquy
On 16th November 1997, at the instance of the Ministry of Transport and Communications and the Ministry of Industry, the IT Commission, acting in association with the Confederation of Swedish Industries, organised a colloquy for representatives of small firms in Sweden. Here are three voices from that occasion.

Lars Mårelius, Indonex AB, Linköping:
"The thing is to reduce solution lead-times resulting from cock-ups in a company's dealings with public authorities, specialists and so on.

By making offensive use of the Internet, the small firm can get within close reach of information and competent personnel. If this works easily and quickly then, as a rule, it will also be cheap enough for the entrepreneur to be able to afford it when necessary. Most things concerning contacts with public authorities need to be made a lot simpler."

Jimmy Tjärnlund, Pedal AB, Stockholm:
"One problem needing to be solved for small firms is access to capital. We could hire between a hundred and a thousand people in the Nordic countries over a three-year period if we only had 'the right money' and 'the right investors'. I'm not interested in paying 70 per cent of the money invested back into the system. That won't develop our operation."

Tomas Wolf, IAR Systems AB, Uppsala:
"For the general promotion of development in Sweden, we need to:
- Establish a vision for Sweden as a country and communicate it.
- Establish our place and position in the world and communicate it.

- Describe the objective better and focus resources - that is, thoughts and actions - in all political parties, enterprises and organisations, and communicate this,
- Start measuring the 'right' things and publishing this. Examples: Measure how we develop knowledge-intensive activity in relation to other activities. Measure net purchasing compared with net sales of knowledge-intensive products and services. Measure the numbers employed, trained etc. in attractive fields.
- Give people back their pride in being Swedish."

IT law ~ a chapter in itself

Law is commonly said to be lagging behind present-day developments. Is it? Don't we know what laws and regulations apply? What needs to be done?

Law in the long-term view
Our laws and regulations are one of the priority fields of the IT Bill introduced by the Government in the spring of 1996. That Bill had two aims. One was to look for solutions, within three years, to a number of specified legal problem fields. That aim has been partly achieved. The other was to try to find effective procedures for a continuous legal follow-up of the rapid pace of IT development.

To this end the IT Commission was to establish a legal observatory.

One often hears it said that the laws are out of date, the lawyers have been left standing and technology rules the roost. There is some truth in this. Because development and use of IT are moving at such tremendous speed, there are of course problems and also an inertia about the law which give cause for concern.

On the one hand it is important that new laws should be introduced in time. On the other hand, the legislative process must not move too quickly. If changes to the law are rushed through, the danger is that they will be ill-considered. If that happens perhaps we will lose confidence in the ability of the Riksdag to solve problems by legislation.

Ill-considered laws can also pose a threat to legal safeguards. There is also a risk of inadequate understanding of IT and its effects unconsciously distorting the balance between different interests that the laws are intended to maintain, in such a way for example that certain interests are favoured while others are unintentionally disfavoured.

To avoid this we have to start by asking ourselves *why* the use of IT entails legal problems. If we can sort this out, then perhaps laws and regulations can be made more appropriate to the changed society that is now emerging.

At the same time it is important to remember that our laws and regulations are more adaptable than many people realise. The "letter" of the law may seem rigid, but round about it there are other parts of the legal machinery tasked with interpreting the laws and pondering their purposes. With the aid of these tools of interpretation and implementation it is often possible to eliminate what at first may seem an impediment to extending the application of the laws into cyberspace.

But the fact remains that there is a lag which we will have to do something about, and that quickly. To achieve this we have to understand both the legal arguments and the IT ones. This need for a combination of knowledge is readily overlooked in reviews of legislation. Not infrequently one finds that putting a number of skilled lawyers and skilled technologists together in a team is not enough.

The Observatory
The IT Law Observatory stands as a "trademark" of the IT Commission's work in the legal sphere. The vision of the Observatory is to "create greater understanding for necessary changes in the law and help to lay the foundations of a future legal order in which IT is integrated better than at present". Its main purpose is to highlight and describe areas and questions where the use of IT involves legal difficulties - above all, those which at present are incompletely known and discussed - and in doing so to try and look beyond the legal aspects of IT which are topical for the present. The Observatory, in other words, is to devote itself to "legal futurology", i.e. looking into the future with a view to coming to terms with the criticism often heard to the effect that the law is lagging behind.

The IT Law Observatory, then, is to speculate and, with an eye to the future, consider new legal structures which can make discussion of the laws applying today and argument in favour of proposed amendments more detailed and complete. The Observatory's analysis of the law is to be speculative and analytical - a *lex ponderanda*!

The purpose of this is to formulate strategies for the future without confining oneself to the present-day legal impediments to IT use. It is also the Observatory's task to highlight positive opportunities for using legislation as a means of contributing towards good, efficient IT use. Another essential task for the Observatory is that of encouraging a debate on matters of IT law.

Their conceptual worlds are too far apart, there is too much scope for misunderstanding and the interchange of ideas does not run smoothly. Building up this combination of legal and technological expertise takes time.

Convergence questions are one instance where great understanding is needed of both law and technology. By convergence we mean here an amalgamation of different kinds of techniques for the distribution of information. Convergence is a result of the digitalisation of information, which among other things makes it possible for the same signals to be distributed in a number of optional ways, for example over the telecommunications network, on the mobile telecommunications network, on the radio network, on the television network or by satellite.

One effect of this convergence is to blur the boundaries between different additional services. This in turn means that there is no simple answer to the question of what legislation is to apply when, for example, within the near future we use our television sets to go surfing on the web. Does this come under telecommunications or broadcasting law?

Thus a closer look needs to be taken at the problems from both a technical and a legal point of view and we have to ask ourselves whether technical convergence calls for an amalgamation of the different bodies of legislation.

Consumer safeguards also need to be investigated. We have a strong system of such safeguards, but will it be strong enough when we start trading electronically across national boundaries?

The wide range of choices on the Internet can strengthen the role of the customer at the expense of the seller's. We have more, similar goods and services to make comparisons between. This can lead to greater competition between the sellers, which in turn can mean falling prices and better service.

At the same time it can be hard to know how and to whom to address a complaint when there is something wrong with the product, or where to turn if the marketing is misleading or one has otherwise been cheated, especially when the seller is in another country.

What law applies? The law of the "selling country" or that of the "buying country"? The answer is anything but clear, especially if the product too can be distributed electronically.

It is above all questions of privacy and liability in connection with marketing, the need for new and amended laws of contract and concerning sale of goods and questions of which country's law is to apply and in which country a dispute is to be adjudicated that require closer analysis.

The Internet presupposes knowledge and the assumption of personal responsibility by the consumer. But to enjoy the advantages of the Internet, we consumers still need a certain measure of support. And legislation, after all, remains the most important tool for dealing with the new situation now emerging.

Legislation, however, should not be passed too rapidly or in such a way as to create excessive restrictions that can damage the growth of IT. So there is a great need at the moment for producers and consumers to be allowed to work out for themselves the rules of generally accepted business practice which are to apply on the web.

But legislation will also have to be there as a juridical framework and support when the market defines its own rules of conduct. An ongoing discussion will also be needed, concerning the implications of self-regulation, for example how to guarantee legal safeguards in a system where there is no possibility of legal sanctions and no possibility of appeal. This makes it important that consumer organisations and other interests should actively participate and state demands when the rules are being worked out. In this way a confidence is created in the rules which facilitates compliance with them, the most immediate role of the State then being to keep developments under observation and not to introduce legislation until excessive abuses demand it.

Summing up, then, it is essential, in these times of rapid change and ongoing globalisation, that the Government create good opportunities for reviewing all relevant parts of the national regulatory instruments, so as to lay the foundations of the juridical deliberations which IT developments call for. This can mean seeing to it that new legislation is introduced and that existing regulatory instruments are adjusted more rapidly than at present, without jeopardising legal safeguards.

Since, however, these developments are global and the Internet is making geographical distances and national boundaries of less and less consequence, there is not much point in creating laws and rules for Sweden alone or even for the EU. The Government must take steps to help bring about an international co-ordination of legislative and regulatory initiatives relating to all Internet activities.

Consumer power on the web

"The position of consumers can be strengthened through the Internet, which presents consumers with great opportunities. We can become 'the world's strongest consumers', because we:
- are coming to be better informed, even though finding one's way around the Internet is not easy;
- get more to choose from, thanks to the global coverage of the web;
- acquire greater power, thanks to increased comparability between different suppliers;
- hopefully, need to pay less for different products, thanks to increased competition and better scope for putting pressure on prices;
- obtain better service from firms, thanks to the possibility of direct communication; and
- save time.
"This aim can be summed up in the expression 'market democracy'."
(IT Law Observatory Report 2/97, "Consumer rights in the information society".)

Paradoxes of IT law

IT law includes practically the whole body of law but still has to be delimited.
IT law can very well be technically neutral but must still be capable of normalising and steering technology.
Its handling requires a high level of legal and technical competence, but the solutions have to be simple to apply and understand.
It demands foresight but runs into difficulties already at the stage of prophesying developments.
It reflects desires for a new science of law but at the same time has to be based on traditions and existing law.
It must immediately solve local and national problems but at the same time has to take global conditions and preconditions into account.
It has to be framed as quick as a flash but still be carefully worked out and tenable.
(From "Den Nya Datarätten" by Peter Seipel.)

The internationalised welfare society

The rapid pace of IT development and the ongoing globalisation of the world economy are bringing new possibilities - and new constraints on politics and people.

One supremely probable development is that parts of the Swedish economy which had previously been exposed to local competition only will feel the impact of international competition to a far greater extent. The fact that services and products which can be distributed electronically can be fetched directly through the open networks also has a direct bearing on the tax base.

Indirectly, the expansion of Internet trading can strike hard at local stores and service enterprises, and make it more difficult to maintain separate national rules, e.g. concerning VAT.

Because cross-border trade in physical goods can be expected to increase, and although goods then become liable to both VAT and customs duty, things may become difficult not only for the local record shop but for the fashion store as well.

The mobility of human beings and enterprise may also come to be affected. Indirectly this can have very severe consequences if, for example, creative, newly started enterprises and their personnel leave Sweden. In the electronic world, intellectual assets are highly mobile.

The question is what this development means for the possibilities of financing welfare. How is the state to collect revenue in an economy of highly mobile enterprises

and human beings? What will it be more or less suitable to tax in future? What difficulties and opportunities does this imply for Sweden?

And there is more. Can it be that increased competition from outside is more than anything else an advantage, conducive to greater welfare? Can it be that the cement of welfare has dried and that sticking out for more of the old commodity is no longer enough? When the importance of the individual appears to be increasing and that of the state to be diminishing, ought we not to be searching for a new cement with which to hold society together?

These questions also have to be broadly discussed and thoroughly illuminated. The discussions must be started soon and conducted with a high level of intensity.

For, in the end, we also have to ask whether the system of government to which we have grown accustomed needs to be changed. It did at the breakthrough of industrialism, when the Riksdag of the Estates, the gild system, monarchic power and censorship collapsed and were superseded by universal suffrage, the modern Riksdag, freedom of enterprise and freedom of opinion.

What will follow in the wake of the knowledge society with no boundaries?

The needle trembles, but there are…

Forward-looking points of the compass

The questions are many and there are no firm answers. But if we shut our eyes, turn our heads away or step aside from the mainstream of time, we can be sure of one thing. The answers will come too late. So we must have the boldness and courage to move on.

Few people are capable of re-appraising a winning concept in good time, while it still works. So we will have to be bold and, on the boundless map of the continent of knowledge, begin by working out our bearings for the journey forward.

Knowledge is the asset on which growth and new welfare are built. So we have to learn to build knowledge. And the more we use it, the bigger it becomes.

Co-operation and understanding for the context in which we act are keys to success. So we have to bank on efficient forms of political co-operation, nationally and internationally, for the avoidance of severe social disruptions and imbalances.

Trust, more and more, is becoming the cement that holds enterprises and individuals together.

And so we have to trust individuals and enterprises to shape their future more and more on their own responsibility.

That which lies ahead of us is new and untried, and so we must be able to try new things in a spirit of experimentation and diversity, remembering that mistakes can also be learned from.

The pace of development is growing more and more hectic, and so we have to react faster to the obstructions without losing sight of those who are unable to keep up.

IT hasn't made the world a simpler place. There aren't any simple solutions. And so…

The IT Commission:

Advisory, enlightening and forward-looking

The IT Commission has the widest imaginable field to plough. Information and communications technology today is affecting the whole of society and nearly every aspect of our lives.

This is reflected by the IT Commission's reports, written communications to the Government, hearings and other activities, all of which span many, sometimes apparently very different subjects.

On closer inspection, though, one finds a number of scarlet threads by which all the activities of the IT Commission are held together, namely questions of education, growth and enterprise, access and democracy and the regulatory structure - law.

It is on this warp of central and in themselves composite questions that all activities are woven. Sometimes the answers are concrete and relatively unambiguous, sometimes they are as conjectural and ambivalent as could be expected. Since one question can hardly be asked without the others also being taken into account, the answers are very rarely simple.

In short, the tasks of the IT Commission could hardly be more exciting.

Three main tasks and a vision

The main tasks of the IT Commission can be summarised in three words: *advisory, enlightening, forward-looking*. For this work the IT Commission has adopted the following vision:

"The IT Commission shall actively follow, initiate and support development towards a society in which IT is a natural and integral tool for all, making it possible to elevate our common quality of life, deepen democracy and make Sweden more competitive."

What the Commission has wanted to achieve

In pursuit of this vision a number of targets have been defined which have guided the work of the IT Commission:

- Actively advising the Government on measures helping to fulfil the vision.
- By means of forward planning and overview, highlighting and evaluating selected important IT-related developments and trends, so as to communicate awareness and knowledge to the Government and the rest of society.
- Encouraging measures for the transition of the educational society from teaching to learning.
- Formulating concrete measures relating to IT and capable of increasing growth and employment in the long term by encouraging:
  - new development and renewal of products, services and processes in which IT enhances quality and efficiency,
  - knowledge and competence for the new forms of work organisation,
  - experience interchange concerning the possibilities created by IT.
- Formulating concrete measures which help to increase access to IT and change attitudes on the part of groups which at present are essentially outside the IT community.
- Assessing the need of organisation for the long-term development of good, efficient IT use in society.

How the Commission has achieved these aims

Between 1995 and 1998 the IT Commission has conducted a number of activities relating to the aims which it has defined. The following account is not exhaustive. Above all it does not include activities in which members of the Commission and Secretariat have taken part - singly or otherwise - such as conferences and meetings and a number of projects with various players in the community, with a view to informing, discussing, taking part in debates, influencing attitudes etc. with regard to IT and society.

Actively advising the Government on measures helping to fulfil the vision

The IT Commission has gathered experts and representatives of various interests for a large number of hearings, seminars, colloquies and talks devoted to free discussions of selected subjects and trends. Between 1995 and 1998, as a result of these trends, the IT Commission has submitted twelve written communications to the Government containing proposals on various questions:

- Draft framework for electronic business communication.
- Taxation of computers in the home
- The Millennium bug
- IT and legal information
- Infrastructure for information and communication
- EU-IT, telecommunications and new media
- IT and functional impairment
- Tele-working
- IT in SMEs
- Encryption
- Digital identities
- Schools, IT and lifelong learning

By means of forward planning and overview, highlighting and evaluating selected important IT-related developments and trends, so as to communicate awareness and knowledge to the Government and the rest of society.

Visions

Sweden approaching the change of epoch (SOU 1997:63, Report 5/97). This outlines the transition of the traditional industrial society to "the new industrial knowledge society". A number of challenges which Sweden will have to face in order to cope with the transition are pinned down and developments in certain important areas are studied more closely.

The crystal ball - thirteen voices about the future (SOU 1997:32, Report 3/97). A publication consisting of personal interviews with thirteen very different people. What unites them is an ability and courage to prophesy the future. The core issue is whether or not the onward march of information technology has caused a change of epoch, to which the answer given is "Yes".

New times, new conditions… (SOU 1998:65, Report 8/98). An attempt, in journalistic form, to describe the transition from industrial society to knowledge society and the consequences this has for the individual, society and enterprise, and also to describe, by means of a number of examples, the activities and standpoints of the third IT Commission. The intention is for this report to be followed by a part II, "New conditions, new possibilities…", consisting of a number of feature articles about Swedish enterprises now operating with IT as a crucial factor of success.

The national state

IT and the national state. How is the national state affected by the change of epoch? The flow of information and services over computer networks and the development of electronic trading are affecting such national core areas as taxation, legislation, labour relations, democratic issues etc. What is happening and how should we in Sweden prepare ourselves for this development? The IT Commission's report "IT and the national state" (SOU 1998:58, Report 6/98) will form the basis of in-depth studies of individual fields.

Technology, democracy and participation. A seminar in December 1996 examined the question of how IT can contribute towards a revitalisation of democracy (SOU 1997:23, Report 2/97).

Financing welfare in a globalised information society. The information society singles out certain changes in people's mobility. We are already familiar with the mobility of capital. Information and

communications technology is making possible new forms of business activity in which unfamiliar entrepreneurial structures are being built up. Electronic trading is slowly transforming our shopping habits. All this can have effects on traditional tax bases. What will happen then? What can we do to turn this to Sweden's advantage? In talks during early June, the IT Commission, together with representatives of various parts of enterprise, the public sector and research, will be trying to capture these issues for a possible hearing.

Enterprise

The Swebizz Association. The IT Commission was swift to realise the importance of the Internet as a market place. In 1996, on the Commission's initiative, the non-profit Swebizz Association was set up as a meeting point for the interchange of experience concerning, and the active encouragement of electronic trading on the Internet.

The infrastructure for information and communication. In September 1996 the Commission made several recommendations to the Government as the result of a first hearing in June 1996. The central issue concerned the need for common legislation in future with reference to telecommunications, IT and media. Access to networks was another important point. The expansion of digital ground-based television was a third. Lastly, the question was raised of a multimedia laboratory (Report 7/96).

The new software industry. The need for a new digital infrastructure was also a central issue at the hearing on the new media and software industry convened by the IT Commission in June 1997 (SOU 1997:124, Report 7/97).

Digital media. The IT Commission also arranged a hearing on infrastructure and digital media in October 1997 (SOU 1998:20, Report 2/98).

IT in SMEs. (See below)

The commercial benefits of the Internet. (See below)

The legal order

The IT Law Observatory. An IT Law Observatory was set up by the IT Commission in the autumn of 1996, tasked with distinguishing and describing areas and questions where the use of IT implies legal difficulties, above all difficulties of a kind which are at present incompletely known and discussed. The purpose of all this is to formulate strategies for the future - not only to remove existing impediments to IT use. The work of the Observatory is to form the basis of the IT Commission's recommendations to the Government on legal aspects.

In its project "the Law of Cyberspace", the Observatory is trying to pin down the basic changes in the legal order of the information society. This project includes, among other things:

- "The anonymisation of the transaction and its impacts on legal problems" a report by Joachim Benno, in which he attempts to answer the question of why legal problems arise in connection with the use of IT.
- Legislation and self-regulation: a report from a discussion on 9th September 1997, "Legal policy and IT".
- New association law - what forms of association can the information society need?
- Framework for "electronic trading" - are the law of contract and sale of goods law affected by this development?
- Questions of relevant law and jurisdiction - a central issue in the legal order of the information society.

Other projects are:

- Intelligent agents - which regulatory instruments are affected by our beginning to make more and more use of these programs on the web?
- The model of abuse - another way of settling protection of personal particulars.
- Measures to combat spamming - what needs to be done?

Other projects and other information will be found on the Observatory's homepage:
http://www.itkommissionen.se/observ

Legal information and IT. At a hearing in the spring of 1996 it was asked what strategy society should have for disseminating legal information (Report 5/96). At the beginning of October 1996 the Commission submitted to the Government a written communication proposing measures to improve the digital distribution of legal information. At the beginning of 1998 a working group appointed by the Government submitted proposals and deliberations concerning a new system of legal information.

A new seminar in March 1998 included, among other things, a presentation of the working group's proposals. The Observatory is continuing its co-operation with the Foundation for Legal Information during the spring of 1998, partly in the form of joint talks with new players in the legal information market.

The new Millennium

IT problems as we approach the turn of the century. A hearing on Millennium-related IT problems was held on 18th December 1996. This was the first time such problems had been discussed on a general plane in Sweden. It became very clear that the problem was more serious than many had believed (SOU 1997:12, Report 1/97). The IT Commission wrote about this to the Government and took upon itself to co-ordinate Millennium issues in association with the Agency for Administrative Development and the Confederation of Swedish Industries.

Attention was made to focus on a new problem field in 1997, when it was found that the so-called embedded systems were also afflicted with the Millennium bug. About 5 per cent of all processors are included in what we think of in everyday terms as computers, while the remaining 95 per cent are embedded systems in motor vehicles, industrial robots, lifts etc. The IT Commission therefore arranged a hearing on embedded systems in November 1997 (SOU 1998:21, Report 3/98).

This work has been primarily concerned with building viable networks and not with setting up a separate organisation. The network consists of two main groups, the Turn of the Century Group and the Directors General Group.

The main purpose of the Turn of the Century Group is to discuss strategic issues, and the group includes representatives of the public sector and of business organisations.

The work of the Directors General Group concerns both strategic issues and matters of a more practical nature. This group includes persons responsible for the process of adjustment. Practically all big Swedish corporations and public activities are represented.

Reporting to these two groups, which meet once monthly, are working groups dealing with various subsidiary issues, e.g. legal aspects, embedded systems and testing.

In its Millennium-related work, the IT Commission has operated as the hub of the wheel, thereby helping to speed up this work in Sweden. In January 1998 the IT Commission presented the Millennium issue at a Cabinet meeting, where it was proposed, among other things, that a special Millennium Delegation be formed, with enterprise and the public sector both represented. The Delegation held its first meeting in March. This means that the IT Commission is successively relinquishing Millennium questions as the Secretariat of the Millennium Delegation is built up. The Delegation's Secretariat will share facilities with the IT Commission's.

Encryption and security

Secure electronic communication. A seminar on the use of encryption took place in December 1996 (SOU 1997:73, Report 6/97). This was jointly arranged by the IT Commission, the Ministry of Enterprise and Trade and the SEIS Association. The Swedish, as well as the global regulatory system needs to be adapted to the heavy increase which has occurred in the use of electronic communication.

The demands of enterprise, the individual and crime prevention have to be balanced against one another. These were among the questions raised at the seminar. Secure global communication for enterprise and individuals is important for the development prospects of the information society.

Identification and identity in digital environments. A sequel to the previous hearing was conducted in November 1997 (SOU 1998:36, Report 4/98) by the IT Commission together with the Ministry of Transport an Communications, the Ministry of Industry and Trade, SIES, EDIS and Swebizz. If many different types of vital all-to-all communication are to become reality for administrative organisations, enterprise and individuals in a future web-based economy, it is absolutely essential to be able to establish the players' identity. Vital questions dealt with in the hearing and analysed in the report include:
- why new modes of identification are needed in the information society,
- which people are affected and what needs there are of identification for new applications,
- what is needed for implementation in Sweden and what *can* be implemented,
- how best we can introduce systems for identification and how a balance should be struck between the interests affected.

Encouraging measures for the transition of the educational society from teaching to learning

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Educational questions have always had high priority in the work of the IT Commission. The challenge is to achieve the world's best educational system in terms of IT use. A hearing in November 1995 raised the question of whether or not the potentialities of the new technology demand a changed pedagogic.

The speed of change in the outside world is rapidly accelerating, making capacity for developing one's knowledge, lifelong learning, an ever-more important quality.

IT is a tool in this connection, not an objective, and so the aim is to conduct discussion of educational development, of the basic working methods of education systems. A change in the direction of a knowledge-seeking way of working is necessary if we are to be able in future to hold our own against international competition. A pupil who has worked this way throughout his or her education acquires knowledge-seeking as a natural reflex and is prepared for lifelong learning.

In December 1997 and February 1998 the IT Commission conducted two hearings concerning IT and educational questions in collaboration with the Ministry of Education (SOU 1998:70, Report 7/98. The report from the latter hearing is expected to appear in the summer of 1998). In the written communication, "Schools, IT and lifelong learning", submitted to the Government in March 1998, a number of measures are proposed for the furtherance of educational development using IT as a tool.

Formulating concrete measures relating to IT and capable of increasing growth and employment in the long term by encouraging:
- **new development and renewal of products, services and processes in which IT enhances quality and efficiency,**
- **knowledge and competence for the new forms of work organisation,**
- **experience interchange concerning the possibilities created by IT.**

IT yardsticks. Yardsticks of IT use are important for purposes of comparison and decision-making in enterprise and the community. An inventory of some 500 IT measurements was compiled on behalf of the IT Commission. This led the Commission to convene a seminar on 5th March 1996, to discuss IT yardsticks from various points of view (Report 2/96).

When IT doesn't work. The IT Commission arranged for the compilation of the report "ERROR: When IT doesn't work

- a report on IT and its usefulness". The report notes among other things that usefulness can be tested and measured and that insight concerning the importance of usefulness is mediocre among Swedish enterprises (Report 6/96).

The commercial benefit of the Internet. At a seminar in association with the Swedish Scientific and Technical Attaché Service in June 1996, it was noted that the Internet is already a market place, above all in the USA. A host of concrete, good examples of the commercial usefulness of the Internet from all over the world were considered and have been presented in a report (Report 8/96) available in digital form only, on the IT Commission's homepage.

This seminar was followed by another one in 1997. Experience from the two seminars formed, for example, the basis of the Commission's written communication to the Government in February 1998, "Draft framework for electronic trading".

The software industry. A hearing took place in December 1995. One concrete proposal put forward stated among other things that the State should support exports in order to steer the work of the Swedish software industry towards the needs of the international market. Another proposal concerned the need for the State to encourage procurement and market development aimed at developing new Swedish software on a commercial basis. A massive research commitment to software engineering was also discussed (Report 1/96). A continued hearing on the new IT industry took place in June 1997 (SOU 1997:124, Report 7/97).

IT in SMEs. In November 1997, on behalf of the Ministry of Transport and Communications, the Ministry of Industry and Trade and the Confederation of Swedish Industries, the IT Commission conducted a colloquy on the theme of "How offensive IT use can create growth in small businesses" (SOU 1998:54, Report 5/98).

The problems affecting all activities in small businesses are for the most part of a general kind. On the basis of its hearing in June 1997 and the colloquy in November 1997, the IT Commission has identified a number of problem areas in which, from an IT perspective, measures may need to be taken in order to help create good preconditions for growth and employment:

The regulatory structure. There are many things which can and should be done with regard to laws and regulations, so as to adapt them more closely to the emergent knowledge-intensive enterprises.

Capital supply. There are unsatisfied needs for enduring, specialised and courageous venture capital. The problem is that no genuine venture capital or adventurous capital exists in Sweden. The capital available is essentially lacking in courage, boldness and competence.

Competence supply. Access to knowledge and competence for the creation of growth in the knowledge enterprise is at least as important as capital supply.

Access to information. SMEs must be enabled to gain quick and simple access to relevant information, e.g. research findings and official information.

Regional ventures. The IT Commission intends to identify factors of success for regional IT ventures. The first stage comprises "IT and regional development - 120 examples from Sweden" (SOU 1998:19, report 1/98), a survey of ongoing IT projects in Sweden.

In March 1998 the IT Commission conducted three regional hearings on IT projects aimed at achieving regional development. The projects examined are included in the above mentioned survey. The themes of the three hearings were as follows:

IT for better civic service, Eksjö, 9th March, hosted and co-arranged by the Municipality of Eksjö.

IT and regional infrastructure, Luleå, 25th March, hosted and co-arranged by IT Norrbotten.

Increased use of IT, a means of regional development, Vänersborg, 31st March, hosted and co-arranged by West Götaland.

On all these occasions, six different projects judged to have interesting

experience to offer were presented and questioned. The hearings are being documented and will provide a basis for the IT Commission's recommendations to the Government on ways in which IT can facilitate regional development. The report is expected to be completed at the beginning of June 1998.

IT and the environment - a collection of best practices. A publication which sets out to disseminate good examples of how different activities can be conducted in a more environment-friendly manner with the aid of IT.

Through this collection of examples the Commission also wishes to show what can be done to further facilitate development towards more environmentally appropriate activity (SOU 1996:178, Report 4/97).

> **Formulating concrete measures which help to increase access to IT and change attitudes on the part of groups which at present are essentially outside the IT community**

IT and functional impairment. A written communication has been submitted to the Government concerning proposals for action to be incorporated in the Government's IT Bill (Report 3/96). Since then the Government has commissioned the Swedish Institute for Disabled Persons to draw up an IT program for the use of IT by persons with functional impairment and older persons.

Women and IT. A dialogue conference was held for a couple of days in December 1995, in collaboration with the Ministry of Health and Social Affairs, to discuss women's attitude to IT, impediments to greater use and measures capable of improving women's ability to influence technical progress and use. A number and variety of proposals were put forward, for example that computer activity centres should be opened up to occupational categories not normally coming into contact with IT and that IT centres should be established in every municipality (Report 4/96).

SeniorNet Sweden. The Commission has devoted a great deal of work to creating a non-profit NGO at a meeting point on the Internet for persons aged over 55, for the purpose of promoting use of IT by seniors and enhancing possibilities of communication and of using information services. The association was formed in the autumn of 1996, and its governing body was elected at the first annual meeting on 11th March 1997. SeniorNet Sweden now has about 500 members in ten local branches. Another twenty local branches are in the process of formation. For further details, visit: **http://www.seniornet.se**

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