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THE FUTURE ROLE OF IT

by

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The IT industry

Practically every human being is in some way connected to or affected by information technology either in business or everyday life situation. Today banks, insurance companies, supermarkets, health centres, governmental agencies, transportation companies, entertainment and industry amongst others are heavily dependent on information technology. The applications of this technology will only grow. We will see better and more diverse products, and new markets like for example developing nations, will open up.

The development of the IT industry has been very fast during the last decades. It has grown both in volume and in diversity. Whilst it was possible to assemble the whole community under one umbrella earlier, this is no longer possible. We see this perhaps best in the conference market. General conferences in computing attract few participants, whilst specialized conferences may still attract a large audience.

The earlier distinction between software and hardware is no longer valid. The IT industry of today spans over many branches like microelectronics, telecommunications, systems engineering, software products, human/computer interaction, standardization and interfaces, security, and applications.

This diversity and the fact that IT is a major tool in any business, puts IT in a special position. Much of the growth in welfare for mankind will be due to extended and more advanced application of IT. The competitiveness of all sectors of industry is affected by the industry's ability to utilize IT to its advantage. The basic daily services of the society cannot be effectively handled without application of IT. At the same time this wide range makes society and industry vulnerable. The loss of information, incorrect information or incomplete information may endanger industry, health, environment or peace. No other technology carry the same all embracing responsibility.

This responsibility has also led to a less desirable side of the IT industry: computer fraud and crime. IT is today utilized for criminal act in a way which is difficult to detect and control. The IT industry faces a challenge in computer security and protection, not only to prevent fraud, but also to maintain protection of integrity for individuals.

The global competition

Productivity is a frequently focused word in today's discussions in any industrial sector. The modern definition of productivity is the ratio between value added in an enterprise and the resources spent for that. This is an all embracing definition. Everything an enterprise does will affect productivity in this wide sense.

Several productivity studies has been done over the last few years. One of the best known is perhaps "Made in America" which was performed by MIT (Massachusetts Institute of Technology). This identifies differences in competitiveness between USA, Japan and Europe in some major industrial sectors. Other well known works have been published by professor Porter focusing on the national competitive advantage.

That these types of studies are being done, indicates a very important change in industry: Competition is becoming international. Products are produced for a global market. Trade barriers have been torn down, and competitive companies today regard the world as their market. They are competing on an international arena. To survive they must be world champion. The days of the national championships are gone.

The environmental aspects can only be dealt with at a global level. Pollution sees no national borders. Recycling and resource conservation can only be effectively obtained by studying the whole life cycle of goods and services.

Manufacturing is also becoming global. Enterprises are moving in a multinational direction. Their production units are spread all over the world. They are located where the total conditions for operation are most favourable. The same is true for design, product development, technology development and other crucial business processes in the enterprise. The modern enterprise will regard its customers and suppliers as part of their own company by establishing strategic alliances. Some have started to talk about the virtual enterprise.

Globalization is a very important development trend for industry in general and IT industry in specific. The virtual enterprise means the enterprise is run as one single unit but that the various parts of the enterprise may be geographically distributed.

Process orientation

Another important aspect in industrial development is process oriented thinking. As competition becomes global, it also becomes more fierce. To stay competitive is a continuous race. Industry must continuously improve itself. There is no time to "lean back and take a break".

This environment has led industry to focus on their core activities. Non-core activities are outsourced. The core activities are refined and rationalized. The company in this way tries to strengthen its competitive advantage.

New management philosophies have been developed, like JIT - Just in Time. Just in Time encourages the manufacturing of products in exact quantity, at the exactly required time and at the required quality. From it comes the analyses of the value chain of the company with respect to eliminate waste. This is done by evaluating each activity in the company, and estimating its added value for the customer. Activities with no added value for the customer, are considered as waste and should consequently be eliminated.

Just in Time leads to another important aspect in the modern approach to enhance industrial competitiveness: Customer orientation. The customer is focused in every part of the company. All employees are trained to think customer satisfaction. The global situation with the virtual or extended enterprise, extends the customer satisfaction approach beyond the customer. It actually includes suppliers, vendors, financial institutions and even owners. To have the best suppliers etc is considered as an asset. There is therefore an open competition in the marketplace not only for customers, but also for suppliers, owners, etc.

Just in Time is a tool and a philosophy. It is a philosophy because it is a new way of thinking requiring a changed attitude in companies. It is a tool because it provides directions on how to rationalize the enterprise. So far most of such activities have been carried out in various departments or organizational groups in the enterprise. However, a company may be world champion in each of the functions of the enterprise, and yet it may still not be competitive. This is of course due to what happens in the transfer of information and products between the functions. This has led to a process oriented approach rather than a functional oriented approach.

The process oriented approach identifies the business processes of the company. Each process is then studied, for example by techniques like Just in Time. Then each process is re-engineered to be as competitive as possible. The most commonly used buzz-word for this is "business process re-engineering".

However, in re-engineering the business processes, it becomes necessary to compare with other similar processes to learn and improve. This is called (process) benchmarking, and is perhaps the most promising technique for productivity improvement.

Excellence becomes a key parameter in enterprise performance. This is understood as total quality, and many of the above discussed aspects are therefore often part of a Total Quality Management (TQM) approach.

IT as the enabling technology

Of course all the above aspects apply to the IT industry as to any other industry. However, the It industry is in a special position. The products of the IT industry represents the major opportunity for productivity improvement in all other industry. IT is the enabling technology to improve the business processes.

In the preceding two development trends were given:

- Business process re-engineering
- Virtual enterprise

The enabling IT tools for business process re-engineering are mainly modelling techniques. The enterprise and all its processes need to be modelled to be defined. This is a challenge for the systems analysis industry. Many tools and methods are available. Still there is a need for development of more precise techniques. There is also a need to validate such models, and there is a need to develop software directly based on the modelled process.

Simulations is a powerful tool that is very interesting in business process design and in enterprise layout and operation. Simulation enables the possibility of simple testing of complex tasks and is a technique that is far from being fully utilized. Better and more user friendly tools will be developed.

The virtual enterprise needs IT enabling tools on the wider range. Since the virtual enterprise is decentralized by definition, digital communication becomes the backbone of any information system. Fast, reliable and efficient communication tools becomes a crucial issue, but at the same time it raises a problem of security and protection.

A major problem for the virtual enterprise is the integration of various types of systems across different cultural barriers and national borders. Interface standardization and common systems architecture guidelines becomes essential. The open systems must become a reality. Database design and information retrieval becomes equally important and represents again a challenge taking cultural and geographical differences into account.

A computer terminal will represent an important part of any employee's workplace in the future, independent upon if the employee is a white or blue collar. Human/computer interaction and communication devices will represent important development fields together with systems architecture.

The future systems will no doubt be decentralized and yet integrated. The decentralized systems approach is much facilitated by the use of object oriented systems engineering both for technical and administrative systems.

The IT industry will have a key role in meeting the requirements of the future global competitive industry.

The role of IFIP

IFIP - International Federation for Information Processing - was established in 1960 under the auspices of UNESCO following the first World Computer Congress held in Paris in 1959. IFIP is an umbrella organization for societies working in the field of information processing.

There can only be one full member per country. IFIP is non-profit, and almost all work in the organization is carried out by approximately 2500 individuals on a volunteer basis.

IFIP has a mission to play to improve the position of industry. But IFIP has a much wider goal. The organization is also working to help developing nations by technology transfer, and it covers all aspects of information processing, not only those of interest to industry.

The role of IFIP can be more clearly understood by the IFIP mission statement:

> *IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of Information Technology for the benefit of all people.*

The principal elements of this mission can be summarized in the following nine items:

1. To stimulate, encourage and participate in research, development and application of Information Technology (IT) and to foster international co-operation in these activities.

2. To provide a meeting place where national IT Societies can discuss and plan courses of action on issues in our field which are of international significance and thereby to forge increasingly strong links between them and with IFIP.

3. To promote international co-operation directly and through national IT Societies in a free environment between individuals, national and international governmental bodies and kindred scientific and professional organisations.

4. To pay special attention to the needs of developing countries and to assist them in appropriate ways to secure the optimum benefit from the application of IT.

5. To promote professionalism, incorporating high standards of ethics and conduct, among all IT practitioners.

6. To provide a forum for assessing the social consequences of IT applications; to campaign for the safe and beneficial development and use of IT and the protection of people from abuse through its improper application.

7. To foster and facilitate co-operation between academics, the IT industry and governmental bodies and to seek to represent the interest of users.

8. To provide a vehicle for work on the international aspects of IT development and application including the necessary preparatory work for the generation of international standards.

9. To contribute to the formulation of the education and training needed by IT

practitioners, users and the public at large.

From this mission statement it is clear that IFIP has an important role in the dissemination of information to all parts of the society and to all countries independent on political issues.

The IFIP operation

IFIP performs its work through a number of technical committees. Each of these committees usually have two major types of products they offer to fulfil the mission statement of IFIP:

- Organization of events
- Publications

An event may be a congress, conference, working conference, workshop or a seminar. Usually it is sufficient to distinguish between three levels:

- Congress which is the IFIP World Computer Congress held every second year
- Open conference where participation is open to all
- Working conference where participation is by invitation only

The IFIP World Computer Congress is the flagship of IFIP. The next event is scheduled for Hamburg, Germany, August 28 - September 2, 1994. A description of the program is included later in this article.

IFIP appoints the international program committee for the World Computer Congress, and is responsible for the technical contents. However, the organization is done by one of the member societies of IFIP, like for example in Hamburg where the organizer is the German Computer Society which is also the German IFIP member.

For each of the Congresses IFIP solicits bids from its members. The Congress in 1996 is to be held in Canberra, Australia, and the for 1998 is to be jointly organized by Austria and Hungary.

The World Computer Congress includes both invited papers and contributed papers. All contributed papers are thoroughly refereed based on full manuscript. The reject rate is very high, which is a very good quality indicator.

Open conferences are usually the responsibility of a technical committee or a working group and follows much of the same pattern as the Congress. Papers may be invited or submitted. Again submitted papers are rigorously refereed to the best academic standards. Participation is open to everybody. Organization is taken care of by a local body, but again IFIP appoints the international program committee and is responsible for the technical contents and its quality.

Several of the technical committees has their bi- or three-annual conferences. This is the case for the "World Computer Conference on Education" (WCCE), "Computer Applications in Production and Engineering" (CAPE), and the IFIP SEC on security to mention a few examples.

The working conferences are a bit unlike the open conferences. The organization is usually handled by a working group and the attendance is small and by invitation only. The purpose is to create an atmosphere fit for development. There are less rigorous standards for papers. The papers are subject to extensive discussions and group work. Ample time is therefore provided for this purpose.

The output of a working conference is usually a book of some kind. Also the papers of open conferences are published as proceedings in a book format. The same is of course true for the IFIP World Computer Congress. Publications are the second major product of IFIP.

Publications are issued in three major areas:

- Conference proceedings
- State of the art reports
- Journals

Conference proceedings is by far the largest group. IFIP has a contract with a main publisher that publish all IFIP proceedings under the IFIP logo and under the copyright of IFIP. IFIP is responsible for the technical contents of the book. The publisher is responsible for production, distribution and marketing. For many years the main IFIP publisher has been North-Holland. From 1995 a new contract has been signed with Chapman & Hall as the main IFIP publisher. IFIP is currently looking into the possibilities that electronic publishing opens up, although we believe that there will still be a need for the printed word for many years.

State of the art reports has been done in a few cases. These are special books either authored by a competent person or edited from a number of individual contributions. These books have been published with Springer Verlag.

IFIP has little experience with journals, but is currently looking into a stronger commitment in this field.

Last year IFIP organized about 90 events in about 40 countries and published about 40 books.

There is one special publication which must be mentioned, and that is the IFIP Newsletter edited by dr Jack Rosenfeld. The Newsletter brings current news from IFIP meetings and activities, it presents some of the people involved in IFIP offices and it prints the calendar of event and other crucial information.

The IFIP Organization

Any national society with its main activity in the field of information processing may become full member of IFIP. The number of such members is limited to one per country. Full members have one vote at the annual General Assembly. Members pay dues according to a scale based on the United Nations assessment scale. For societies wishing to participate in a less committing way, there are two options: Associate membership and corresponding membership. Associate membership includes the same as full membership, but without voting rights. Corresponding membership is without representation in IFIP bodies.

Other societies than the national ones, may also become members in IFIP. This category is called affiliate membership.

Finally there exist honourary and individual membership.

IFIP currently have 43 full members, 4 corresponding members and 9 affiliate members. The full and corresponding members cover in total 67 nations. This is possible since a region of countries can be admitted as a full, associate or corresponding member.

The General Assembly is the superior body of IFIP. Each member may appoint one representative to the General Assembly. Meetings are held at the beginning of September each year. General Assembly decides on all policy matters and approves budget and accounts. A major part of the business at the General Assemble are the reports of all the standing committees. In addition General Assembly votes on the location of the IFIP World Computer Congress, and of course elects its officers.

Eight General Assembly members are elected Trustees. Each Trustee supervise a number of Technical Committees.

The IFIP President is elected for a period of three years. Before the term starts, he serves one year as President Elect. Likewise, he serves one year as Past President after the end of his three year term. This mechanism secures feasible continuity.

The Executive Board has the daily responsibility of the operation. It consists of the President, four Vice Presidents, a Secretary and a Treasurer. In addition President Elect and Past President serves on the Executive Board.

The IFIP organization is depicted in figure 1. As can be seen the Vice Presidents have certain responsibility areas. These are currently:

- Marketing
- Technology
- Publications

- Development

Each member of the Executive Board act as a cognizant officer for one of the standing committees. The most important standing committees are:

- Technical Assembly which discusses all strategic technical issues of IFIP
- Activity Management Board which is responsible for approving and monitoring of IFIP events

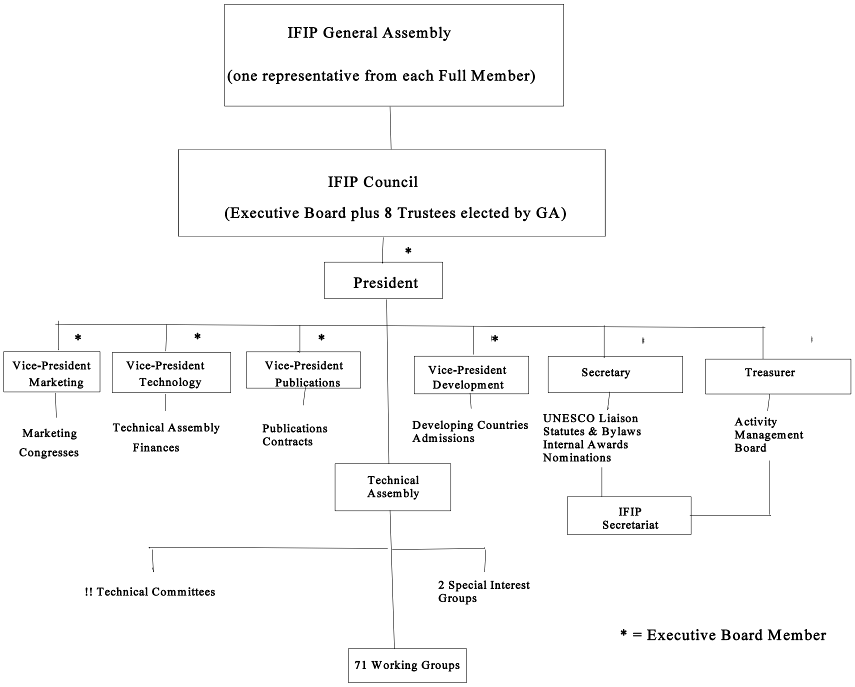

Figure 1 IFIP Organization Chart

- Publications Committee which discusses IFIP policy for publications and monitors and negotiates publishing contracts. It has a Contracts officer to assist on such matter

- Marketing Committee which discusses both internal and external marketing issues

- Developing Countries Support Committee which discusses technology transfer and other support to developing nations

- Congress Committee which discusses the congress guidelines and advices the General Assembly on the bids for organizing the IFIP World Computer Congress

The IFIP Secretariat is located in Geneva which is also the legal seat of IFIP. The Secretariat has two employees who looks after the daily business and organizes the General Assembly and Council meetings.

The eight Trustees and the Executive Board comprise the IFIP Council. The Council meets twice a year, once at the General Assembly and once in early March each year.

The technical operation of IFIP is handled by a number of Technical Committees and Specialists Groups. The total number of such committees or groups is 13 as can be seen from figure 1. These cover literally the whole field of information processing.

Each member society in IFIP may appoint one member to each Technical Committee. The Technical Committees are the policy makers in their domain, and they are responsible for the organization of activities in their field.

There is a detailed charter with aims and scope for each committee. This can be found in the IFIP Information Bulletin which is updated on an annual basis. In addition there is a set of general aims and scope for all committees and working groups. They are as follows:

There are Aims shared by all or most Committees which are not subject specific. They are as follows:

1. To establish and maintain liaison with national and international organisations with allied interests and to foster cooperative action, collaborative research and information exchange.

2. To identify subjects and priorities for research, to stimulate theoretical work on fundamental issues and to foster fundamental research which will underpin future

development.

3. To provide a forum for professionals with a view to promoting the study, collection, exchange and dissemination of ideas, information and research findings and thereby to promote the state of the art.

4. To seek and use the most effective ways of dissemination information about our work including the organisation of conferences, workshops and symposia and the timely production of relevant publications.

5. To have special regard for the needs of developing countries and to seek practicable ways of working with them.

6. To encourage communication and to promote interaction between users, practitioners and researchers.

7. To foster interdisciplinary work and, in particular, to collaborate with other Technical Committees and Working Groups.

Under each Technical Committee, there is a number of Working Groups. In total there are 71 Working Groups in IFIP. Members of working groups are appointed on a pure professional basis. There are no rules about membership in IFIP from the country of a working group member, and there is no limitation as to the number of members per country. The Working Groups usually have a procedure for admittance of new members that include evaluation of the candidates' scientific or industrial merits.

The IFIP World Computer Congress

The IFIP World Congress for 1994 is held in Hamburg, Germany, August 28 - September 2, 1994. The congress format is new and challenging. The theme of the Congress is "Computer and Communications Evolution - The Driving Forces".

The Congress program is split in three phases:

- the *learning phase*, which presents new information
- the *assessment phase*, which analyses and discusses strategic issues
- the *feedback phase*, which prepares and delivers the Congress Message

The learning phase will take place during the first two and a half days of the Congress, when up to fifteen parallel streams will present sessions on computers and communications in these five topical tracks:

- hardware and software technology
- computer and communications applications
- impacts of computers and communications in solving major world problems
- foundations of computer science
- developing countries

To address these strategic issues, five key linkages among the five track topics have been defined:

Link 1:	Technology	↔	Applications
Link 2:	Technology	↔	Impacts
Link 3:	Technology	↔	Foundations
Link 4:	Applications	↔	Impact
Link 5:	Developing Countries	↔	First Four Tracks

These five links will be explored during the Congress in the assessment phase. For each link, one or two strategic issues were especially formulated to provide focus for participants' analysis and discussion. These issues are expressed as the following key questions:

- What should We build ?	(Link 1)
- How Much Applications Knowledge Should a Technologist have ?	(Link 1)
- When Virtual Reality Becomes Real.....	(Link 2)
- Utopia ? Or Chaos ? How Should we Control Technology Development ?	(Link 2)
- How Much is Safety Worth ?	(Link 3)
- Should We Invest in Intellectual Elegance or Computer Power ?	(Link 3)
- Who is in Control ?	(Link 4)
- Is Applications Development Focused on Real Problems ?	(Link 4)
- Is Technology Transfer the Answer ?	(Link 5)

The feedback phase is the one-day process and product of identifying key problems areas and their resolution for each issue. During this phase, participants will work in small groups to develop an Action Agenda for each issue. These Action Agendas will make up the Congress Message. The Message will be presented on the final day of the Congress and will be disseminated in print and electronically.