Technology Foresight Panels

Expert Papers

Technology Foresight Summit Budapest 27-29 March 2003



Changing Economy, Changing Technology, Changing Opportunities

István Fodor

Technology Foresight Panel 5

"Help yourself and God will help you!" Hungarian saying

This paper is compiled first of all for those preparing decisions in the CEE and NIS countries, with the intention and hopes to provide utilisable notions for their long-term economy development programmes.

The end of the 80s meant a turning point in the modern history of Central and Eastern Europe. With the collapse of the Warsaw Block certain previous processes intensified and new ones started. More than ten years have passed from the turn. The events and trends of this period make it possible that opportunities, or at least methods determining and planning the future of the following twenty years for the region, can be specified. These 10+20 years must be analysed, evaluated and planned together, as a whole process. Nowadays we know much more about processes and trends that determine the opportunities. Besides considering their specific economic interests, international communities have to pay utmost attention to the closing up of regions lagged behind, to the easing of economic and political tensions. Together with this the attention has to be drawn to the fact that most of the CEE and NIS countries have significant potential values and possess considerable, although sometimes uncoordinated, capabilities, the mobilisation and "lining up" of which are serious tasks that require sustained work. We cannot count on that economic players of the developed countries, struggling with competition, will help this region philanthropically. That is why active and typically independent activities and programmes are required from the countries concerned. There is a Hungarian saying "Help yourself and God will help you!". This popular proverb seems to suit this situation to a great extent. It is in the interest of each country in the region to perform the programmes securing the maximal utilization of their opportunities. Every society must have a reasonable vision and must do its best to achieve it!

Following the turn of the millennium possible image of the countries in the region are determined by many factors of different weight. The active participants of the society can influence the effects of most of these. A social vision can be approached in many ways, depending on one's point of view regarding the processes. The exactness of a vision depends on the level of rationality of elements we base our model on. The economic approach contains more objective elements; therefore the future programme it provides may be achieved with higher probability than the one based on social elements.

The effects of social, economic and technological processes of various weights, taken on the societies, are differing in time and – in terms of continents – in space as well. Some of them are not present in every part of the world at the same time, others appear in an undeveloped country even decades later than in a developed one. Global processes – in spite of differences experienced in various societies – are characterised by unified, general trends. Another matter is that in different countries and regions these processes are in different phases

at the same time. As regards several processes the current situation and position of CEE and NIS countries significantly differ from the one experienced in developed countries. Lags and differences that can be traced back to the past decades reached their peak in the period of change of the regime, and then, following stagnation in certain cases, closing up started. Current lags – at least comparing to European countries – vary from the point of view of the future of countries: in some areas they are decreasing, but unfortunately this is not typical. In spite of many common elements, the way and method of development and closing up differ in every country.

The processes

The most significant processes of the last decades of the century and the first decades of the new millennium are the following: globalisation, forming of the information society, technological revolution and, above all these, European integration. A programme aiming to build the future of any country has to consider essentially these processes. Linear development is impossible in CEE and NIS countries; because in most cases basic conditions were missing following the changes occurred ten years ago, at the start. In addition to financial, market, economic, regulatory, political and infrastructure conditions, it is the way of thinking and attitude that have to be emphasised. The lag may have been the biggest in this very field. Dynamic development of the economy can only start following the establishing of the necessary conditions, that is why development was not linear in the thirty years examined. This also means that development has to be accelerated in order to prevent stagnation.

The generator of the rapid development of *globalisation* was the collapse of the socialist empire. 15-20 years ago half of the world was isolated from free trade, from free information flow. Nowadays only a few countries cannot access the free networking systems. The world has opened. As a result of this, globalisation, as an economic process, has accelerated and become complete. Several phenomena with different content may be characterised by the attribute "global", but it is more appropriate if only the geographical and methodological expansion of economy, capital, industry, trade and services are referred to as globalisation. Typical examples are: McDonald's, global operators in telecommunications, Nestlé, media empires, banks, etc.

Globalisation – to an extent differing in each society – offers opportunities but may hold significant threats at the same time. A characteristic feature of globalisation is that its existence and effects are hard to influence. It is similar to storm or sunshine: they arrive irrespective of our will, we may hide from them but they scorch and destroy our environment. But there are methods for rendering such powers harmless.

First of all as a consequence of the rapid development and convergence of the information and communication technologies, with the globalisation of manufacturing and service provision as well as the media industry, a new way of life, new functions and behaviour are forming in the society. New scales of values are being created. This new way of life and behaviour, appearing in a wide circle, as well as the economy combined with information technology, are called *information society*. It is established in a period and at a pace differing from country to country. It depends on the level of development of the society – in a broad sense: level of economy, that of liberalisation, status of the IT infrastructure, etc. – and on the culture. Examining it from the present it seems endless as a process because of its continuous improvement, although as regards the change of the most important methods and order of values, the period of its formation can be estimated in the case of a given society, if the satisfactory level of its formation is defined. In line with this for example in the developed countries of Europe the formation of the first phase of the information society can be estimated to finish in the middle of

this decade, i.e. 3-4 years later than in the U.S. With the help of a network consisting of several parts, most of the households, the public administration, e-commerce, information systems, education, entertainment, media, public health and many other fields will create a huge information system, mostly based on the Internet. Information society involves positive effects and threats as well. But the most important thing is that it is much easier to influence, manage and drive this process towards a socially advantageous direction than we could do that with globalisation.

The *revolution of technology* first of all means the rapid development of info-communication technologies being present everywhere. During half a decade the convergence of telecommunication and IT technologies has completed, and the integration of the media is in progress. The doubling of the capacity of microelectronic components within less than one year and a half, as well as the significant increase in the rate of operation have led to the general spreading of computing. The significance of expansive spreading of packet-switched technology is similar to that of digitalisation occurred decades ago. Our new world, the new communication methods and our 'operation' are formed by two phenomena: Internet and mobility. The change affects all areas of life, irrespective of the social, economic or scientific fields in question. Similar revolution, although to different extent, takes place in biotechnology, material technology and other fields as well. The role of ICT in the development of several sciences is undoubtedly worth examining. May ICT have a revolutionary effect on the development of other sciences?

* * *

The three social, economic and technological processes mentioned – although in different time and to different extent for each country – are determinant factors in the development of the following twenty years. European integration has to be added to these, or to be more precise; they have to be encompassed by the complex programme of the latter. This means that trends and phenomena connecting to certain processes have always to be analysed and interpreted from the aspect of the continental integration process.

Globalisation and competitiveness

Players of the economy are extensively affected by the general and overall phenomenon, namely that in the globalisation process with no borders the criterion of survival is the ability of being competitive – and within this the pressure to continuously improve their performance. Competitiveness is a concept of both quality and quantity. Basically it is the characteristic feature of economic units, but also implies the social environment the organisation or group of companies operate in. That is why competitiveness – as a characteristic feature obtained by applying analytical methods – can rate a country among other factors¹.

¹ The World Economic Forum annually prepares the list of competitiveness of 55-60 countries on the basis of a detailed survey and analysis.



Competitiveness is determined by four main factors: costs, productivity (effectiveness), innovation and education. The weight of these parameters differ by areas and in time, however it can be estimated that in most cases the effect of costs almost equals to that of the other three altogether. These proportions, of course, vary in the different segments of economy. In the advanced phase of competition excellent quality is considered to be a basic criterion, therefore it is not included in the list.

Costs will remain a determinant factor regarding the competitiveness of manufacturing and service providing sectors for a good while. Within the group of costs, the weight of wage-related costs is the most significant, but governmental² and infrastructure costs have also to be mentioned.

Productivity and effectiveness is the parameter of utilisation of various resources. Both the effectiveness of labour force and that of capital may have decisive importance. A "classic" method of increasing effectiveness is the enhancement of automation, but this will result in unemployment and social tension. The advisable step is not to hinder modernisation, but to fulfil both requirements at the same time by creating new jobs and realising investments as a result of the increase in competitiveness. Another method of increasing the efficiency is the wide-scale utilisation of knowledge, skills and modern information infrastructure (e.g. Internet, intranet).

Innovation, or simply the organised creativity, is a really important factor of the future. Its role becomes more and more important; its significance is growing day by day. Innovation must have a strategic role in the programme of an economic player, a company operating in the forefront of the competition. Gaining ground tomorrow is based on the innovative spirits. The prerequisites of innovation, broken down to individuals, are culture and qualification first of all. Encouraging and supporting of innovation, as well as deploying the innovative approach within a society are very important tasks for the economic policy. These are the bases of the programme of evolution, start and restart.

Analysts and politicians are dealing more and more with the importance of innovation and its role in industry

² In order to achieve competitiveness, the government may also decrease costs by tax optimisation and by keeping administrative costs on a reasonable level, but the truth is that these are not determinant items.

policy³.

Education's role has never been as important in the history from the point of view of competitiveness and economy of a country as it is today. Many developed countries are trying to find a solution for increasing the level of education. An extensive unspoken international competition seems to have started in this field. Countries being in the best position cannot have a rest either, because even traditional education values can be the engine of competitiveness in a renewed form only. The most frequent advices are the following:

An intense networking system has to be created with the everyday life and economy urgently.

The latest information technology has to be used expansively.

The prestige of professions lasting for a whole life has to be replaced by continuous learning.

The number of participants in high quality education has to be increased.

For example in some countries of EU-15 strong social awareness and social net decreased the ambition to participate in higher education and as a consequence of this the diploma lost the value it had 10-20 years ago. In these countries a significant lack of well-qualified experts can be experienced today in the field of advanced technologies. These countries run the most intensive educational reforms.

Trends and phenomena

Knowledge of trends and phenomena connecting to global processes helps us plan the future.

Industry reorganisation: (The below phenomena can surely be found in several fields of industry, but based on the authenticity of facts here they are considered to occur in the electronic industry⁴ first of all.)

To increase competitiveness by all means is a fundamental direction and daily task for companies wishing to

survive these days. Globalisation of the competition requires successful and futureproof company management based on strategy and focused on business. In addition to this the management has to achieve aims being contradictory in essence, such as to improve quality and efficiency, to achieve increasing sales at a reduced price level and to decrease costs at the same time. In order to fulfil these requirements to increase efficiency in the



THE STRUCTURE OF THE MANUFACTURING INDUSTRY

³ "Our society has to provide priority for innovators rather than force them to work on average level. The political background has to support creative energies rather than hinder development by bureaucratic regulation. Our financial institutions have to become the drivers of development in every possible way, for example by providing capital bases for entrepreneurs and by other means. The co-operation of academic institutions, innovators and the economic life has to be encouraged.

These aspects are much more important than state subsidies and benevolent rules appearing in the form of so-called "innovation policy". Innovators always know better what to do than legislative bodies. Parliaments, governments and European institutions have to strive for framing a financial policy ensuring that companies starting with success cannot be killed by regulations. And let further tasks done by the market, it will complete them in a much more effective way."

Written and advised for his country by German Professor Manfred Lahnstein. IMD Lausanne, 30 June 1997.

⁴ The breakthrough of electronic industry on global scale can be clearly seen. For example in the U.S. in 1970 the production of electronic industry was 8% (agriculture: 5%, other industrial sectors: 87%), while in 1997 electronics came to as much as to 30% (agricult.: 4%, others: 66%). Forecast for 2005: electronics: 47% (agricult.: 5%, others: 48%). (Source: Marvin Zonis & Associates).

usual way is not enough any more⁵, therefore the reorganisation of the structure of industries started.

The borders of companies' activities are changing. Suppliers' relations are also changing. The technology level⁶ of suppliers' activity is generally increasing. In the sphere of manufacturers the proportion of hardware to software is significantly changing in the favour of the latter. Based on actual production costs this proportion exceeds even 70% software, 30% hardware in the field of telecommunications and information technology. The size of hardware elements is decreasing, while the capacity of microelectronic elements is rapidly growing. As a consequence of the decrease in size and the development of robot technology, the production capacity of factories is rapidly increasing; therefore equipment manufacturing is being concentrated. Examining all this in the supplier and assembling industries it can be clearly seen that companies that are specialised horizontally as much as possible and are able to produce in the largest volume possible will be competitive (this is another form of globalisation!).

As it regards the added value, processing and assembling industries, representing a lower level, have to be differentiated from the other side, namely the integrating, knowledge-intense industry. Small and middle-sized companies operating between the two levels may become suppliers for both, or may break out and become multinational companies. We have seen several examples for both ways in the past decade.

As it regards software the trend is reversed from the point of view of manufacturers' co-operation. Increasing quantity, more and more complex systems, growing number of services, as well as the combination of standard and customer applications have resulted in the decentralisation of software production. This is a continuously widening area of technology and innovation, where new rules, new priorities, new speed and quantity criteria and a lot of young people have appeared. This is the field where qualification and skills are the most important features. Neither industrial traditions of any kind, nor decade-long experience are important; one only has to acquire a good position.



New structure of the industry

⁵ When the desired result cannot be achieved by various methods (e.g. increasing the level of automation, reorganisation, system of interests, extensive utilisation of information technology, etc.).

⁶ Most of the electronic multinational companies produced practically every hardware element (metal structure, plastic elements, cables, etc.) themselves about ten years ago, and now they purchase the most part of even the electronic elements from suppliers. This is another type of customer–supplier relation, of course, because the continuous development of technology, safe delivery and excellent quality require a closer and more professional connection. Big traditional multinational companies gradually terminated their hardware manufacturing during the past years. Another extreme example of this industrial reorganisation is an IT world leader established in a "garage" having practically no equipment manufacturing activity. It has all hardware manufactured by partner companies.

Systems are more and more complex; tasks are more and more complicated. Vertical industry specialisation is leading towards the system integration. The so-called "open systems", where the entire system or a part of it is built up using universal interfaces that are available for every manufacturer – namely vendor-independent parts – are spreading. New universal and global technologies (e.g. 3G mobile communication) cannot be developed at the required pace by any huge company alone. Alliances established for technological co-operation will be the dominant players of new applications through world standards first of all.

The strategy of huge companies will change. This means for example that present role and relations of multinational companies manufacturing communication infrastructure will change. Among the present 15-20 multinational giants only 6-9 will remain on the top, but the winners will become significantly stronger. And what is more, among them we will find former "exclusively" IT companies as well. They will fulfil the role of global system integrators, they will specify and elaborate standards. These few multinational firms will drive technology and R&D activities, and they will be the members of various alliances. Further 100 large companies will partly serve these giants, partly develop, manufacture and sell smaller systems. On the third level, in the lower part of the pyramid about 10,000 middle-sized companies will operate as suppliers. This estimate is mostly valid for hardware and software manufacturing as well.

As regards the software sector that was previously considered to belong to computing but later it started to produce applications for the information technology, no significant hierarchy is expected to form. In spite of the fact that the giants of this field already exist, numerous local service demands will give ground for small and middle-sized software producing companies as well. Open software products also support this process. This area is specially worth to our attention.

The breakthrough of electronic industry within industrial manufacturing was already mentioned. This may be an important factor from the point of view of the future of industry in most of the countries in the region. In the R&D part of this segment software design means manufacturing as well (serial products can be created by making copies). The cost-sensitivity, mobility, design capacity demands and other characteristics of software design⁷ have qualified it as mass production of the knowledge-intense technology. The software demand of ICT and numerous areas are rapidly growing. To fulfil this continuously growing demand, a software design industry of considerable size developed in India in the past ten years. The manufacturing capacity is improving – or more exactly: was improved until the recent past – in several countries of Asia. Following the events of September 2001, and due to the tensions in the Asian region, developed countries, first of all the overseas industry, need new supplier involving no risks.

Based on growing demands and expanding security aspects, software design capacity of the CEE/NIS countries may become a significant competitor of the Asian industry within a short time.

The research field of this segment is the real top of the technological hierarchy. Research centres are immobile and less cost-sensitive. Based on their technology-determining role they may become a potential economic force.

⁷ If proper general grounding is available, the so-called coding software design capability – being simple but requiring significant capacity – and capacity can be established in an organisation within a few months. The quality and effectiveness, namely the stability of competitiveness, are similar to that of the processing and assembling industries. (The Indian software industry is exactly based on this.)

In addition to the intention of the technology owner, establishing a critical mass is also necessary for founding new research centres required for industry development. The increase of competitiveness requires the acceleration of research and the improvement of efficiency, where quality minds can gain ground. If these conditions are provided, there is a reasonable opportunity for establishing new research centres acting in international environment. The method of establishing a new, developed industry may be a process based on this.

In a globalised world some general characteristics of companies, which will survive the competition, can be stated. Primarily, these companies will:

- Take the convergence of information technology and telecommunications into consideration in time,
- Have a vision,
- Be solution-oriented,
- Have a leading role in technology,
- React to changes and events,
- Have sense of implementation,
- Operate under low costs,
- Be appreciated by customers and competitors as well.

Most of these features are characteristic of companies on a lower level of hierarchy as well.

As it regards *technological trends*, in addition to the convergence already mentioned the mainstream is the development and spreading of data communication and mobility, exceeding all expectations. The rapidly spreading Internet provokes all this and the convergence itself. The Internet fundamentally changes the content, type, structure, interactivity, role, method and technology of communication, in a word: everything.

The other phenomenon is the spreading of mobility, the intensifying of its significance and role. Mobility is a new way of life in communication: a location-independent, creative existence. Its spreading, together with the appearance of 3G mobile systems and the involvement of huge-quantity data communication opens up new dimensions. The one billion mobile users will experience a significant technological shift. The quantity of mobile data communication, as well as the significance of visualisation is increasing. In the second part of the decade the quantity of multimedia content, transferred via mobile systems, will be twice as much as that of voice information. Turnover will increase more than fivefold compared to the current one. The expansive utilisation of 3G technologies will appear in our way of life nearly as a social transformation. 4G, to spread in the first half of the 10s, will carry more than 25 times as much information specifically, and 90% of it will be multimedia. We will utilise the Internet in two ways: broadband Internet of huge capacity and high rate on larger screens and practically fixed terminals (WLANs will provide limited mobility in office or home environments, at a rate of more and more Gbit/sec), and in more than half of the time of our Internet session we will use mobile devices, with no limits in time and space. Based on the opportunities granted by these technologies, a lot of services and applications will be available.

The "marching" of mobile communication, predicted several years ago, came to a standstill due to the delay of 3G. It is true that faulty initial licence policy and some delay of the technology shifted the start with maximum a year. But there is another factor, the significance of which was not clear enough earlier. In addition to capacity and speed, the difference between 2G and 3G lies in basic structure. 2G is a mobile infrastructure for transmitting voice and data, while 3G is a bigger and more complex network, through which services are provided by plenty of

applications. It means that it is not enough to build 3G infrastructures, but applications have also to be launched. But the design of applications is not in line with the development of technology, since they are generally elaborated by different manufacturers. First basic technology has to be developed, and only then applications may arrive. The justification of the third, and later the fourth mobile generations is evident, since the demands for them are present in the development of the information society clearly or in hidden way. And demands mean market, so these systems will arrive.

In summary: a new communication system will take shape in the following years. The infrastructure will contain a "network of networks", including also the modified version of current networks, at user ends of which masses of applications will be running.

By "organising" the transmission of information in various ways, different networks operating parallel transfer current information to subscribers via access networks. Such networks will enable various personal services to spread, communication studios to be established and their networks to operate, as well as to create innovative industry solutions, to found companies operating without cables, and later on without premises.

The networks will transmit information; the services will be created and will be available at the nodes of different level. Intelligence will be shared, but it will be present mostly at the terminal nodes. Distance and duration will not exist anymore as indices. This outlined structure is in line with the philosophy of Internet. Terminal nodes will combine the elements of information technology and that of the classical communication, and, serving the purposes of the new way of life, they will become much more mobile than they are today. The application of this new technology will pass through all earlier borders. Machines and devices will communicate with each other. Internet and mobile communication will appear in practically all fields of life, production and science, and will transform these. In the following decade a new information world will begin. A new "info-communication" business concept will emerge, the driving forces of which will be the internal pressure for productivity increase in the commercial societies and people's "hunger for information" (knowledge, interactive services, entertainment...).

It is known that information and communication, as well as data transmission have appeared in every field of science and economy, changing the methods and processes applied so far. They connect areas that had no connections before, increase efficiency, overcome time and space. The method of dealing with science has changed; ICT is present everywhere. This is one of the reasons why issues and statements concerning this field may often be applied and interpreted in a general way.

Europe's position and the opportunities of the CEE/NIS countries

Comparing the three world units from the point of view of competitiveness, the leading position of the *U.S.* is indisputable. Its economy is privatised, it is a leader in the field of advanced technology, and it operates in a cost-effective way.

Asia is upward pushing, strong, but staggering. The most dynamically developing countries are in Asia; the improvement of China is determinant. Economic crises of the past years were corrected within a short time. Japan represents economic world power in itself.

Europe, the struggling continent. It is a problem originated from the past decade that some countries are

hindering reforms and paralysing evolution. It is difficult for them to face the disadvantages of the expensive welfare society established in the 70s and 80s. There are exceptions, of course, but for those generating most of the GDP it is not easy to awake. Several small countries have started to implement reforms. Conservative national forces, being afraid of losing traditions and positions previously gained, have a significant role in certain countries, and this causes conflicts between these countries and the EU. In 1997 assertive programmes started within the European Union in order to increase competitiveness. The Lisbon Declaration is unambiguously focused on rapid increase in the competitiveness of the continent. An internal renewal, completely based on the areas own strengths, however, may require more time than provided by the accelerated process of globalisation. That is why the countries of EU-15 need external resources: capacities and skills that will increase the competitiveness of European products and services on the cost side, in the assembling and processing industries, as well as in the knowledge-intense industry sector of higher added value, to a greater extent than it would be possible in the current environment. CEE and NIS countries may serve as such external factors contributing to competitiveness. Significant resources can be found in these countries, because the quality of education is generally high, in some cases even excellent, and well-qualified labour force is cheap. This may also be interpreted in a way that difficulties in Europe are opportunities for this region. Every potential newcomer has to make significant efforts for turning this opportunity into a strong Europe. This will be a long process, but the plan of the integrated Europe must be a basic element of the visions and the connected strategies outlined by these countries for 2020.



Challenges and opportunities in the CEE and NIS countries

Source: U.S. Department of Labor, IMD

Several years ago the fall in the price of PCs and their easy usability dramatically increased the quantity of electronic information exchange. A growing proportion of people having various jobs started to work on PCs, and by this the effectiveness of their work radically increased. Today the amazing growth of resources and quantity of available information is a daily experience for users. That is a reason why it is not surprising that the number of digital connections is exponentially rising. E-mailing is rapidly spreading, and the number of Internet users is doubled every year. In this opened world everyone - be it politician or economic expert, small or huge company, state-owned or private institution - pays utmost attention to international processes. However it must be taken into consideration that the period following World War II resulted in a lag in the societies of our region that makes it impossible to immediately adopt the methods elaborated in developed countries. This is a matter of the

level of economy and social awareness. But this coin has another side as well. The lag reaching its peak in the 80s does not mean a disadvantage in every respect. It may be easier, for example, to encourage a social stratum of low demand level in this region than urge a well-off Western European citizen to acquire a new profession. The phenomenon that during social and economic changes people's ambition is evidently higher than that of EU-15 citizens is probably experienced in several countries. In this area lags and disadvantages can be turned into a virtue. This may be another competitive advantage in this integration process. In this era of change the fundamental point for the countries of this region is whether they can turn these processes into a positive direction and accelerate them, or rather let them happen in a spontaneous way.

The *opportunities* of the countries in the region can only be specified in general terms. Probably every concerned economy has a programme, an action plan. Nevertheless the practice applied so far has proved that the "Technology Foresight" technique is able to provide a comprehensive and more professional development programme for a longer term. In the 20-year prospect mentioned earlier probably all concerned countries imagine their future as an economy being on almost European level, or rather plan to follow this path. Regarding such matters two decades may be too short, but may be enough as well. This depends on the quality of the country's programme and the level of its acceptance and support. Disregarding vis maior events (wars, economic recession, etc.), significant results can be achieved within this time. The goal that a certain country will become an active and symmetric economic part of Europe is considered to be reasonable.

The description of processes, trends and phenomena, included in the first part of the paper, was essentially aimed to help determine the scope for action, the directions: the opportunities. Statements were generally originated from the ICT sector, but in many cases they can be interpreted generally, in a broad sense. Starting from this evaluation of the situation, professional teams of every industry have to draw the conclusions being the most important for the society concerned. As it is stated in the motto of the paper, every economy concerned has to elaborate the optimal programme itself, and it is also true for regions, because there are common interests and opportunities in this game of continental size.

To achieve these goals means significant challenge, of course. At the same time this is a task of historic importance, since an opportunity like this rarely occurs in the history of an economy. This explains the strength and weight of the task. We have to face challenges, to know and manage them. We have to reach the state where these challenges are simplified into tasks. These challenges may differ from country to country, of course.

The most important challenge for the CEE/NIS countries is for example whether they are able to reach the average level of the EU economy or to what extent they are able to approach it until 2020.

We must not forget that it belongs to the primary interests of the developed world – the developed part of the continents – that regions lagged behind catch up with the others. But this does not mean, of course, that the developed part will fulfil this task instead of those lagged behind. They may help, or, in the worse case, just keep their fingers crossed.

Recommendations

Below you can find a list including industry policy aspects and tasks that can be included in the Technology

Foresight programme of certain countries. They can be interpreted in a narrow circle (namely the ICT sector) or in a broader sense as well:

- Determining reasonable but ambitious goals for 2020, as well as the way and strategy of achieving them.
- Establishing a system of institutions, which, monitoring in time the partial results of a well-elaborated programme and changes in the international environment is able to react within a short time, thus ensuring effective execution.
- For achieving dynamic economic development, it is necessary to implement performance, effectiveness, quality, result-orientation and digital way of thinking. In order to achieve these in most cases it is inevitable to change our mindset.
- Achieving that a programme like this is unanimously accepted and supported by every political force of the societies.
- The information society has to be established in a fast and effective way.
- The position, strengths and weaknesses of the economy have to be assessed. The breaking areas have to be found and an improvement programme has to be elaborated for these areas.
- An exact Technology Foresight has to be prepared that can be realised by well-determined programmes.
- Common interest areas of the region have to be found and a regional action plan has to be prepared and achieved (e.g. software co-operation).
- A "best and worst practice" forum has to be established in the region in order that experiences can be exchanged.
- International capital has to be handled in line with our interests, in a symmetric way in all cases.

Comments by Kiril Boyanov

on Changing Economy, Changing Technology, Changing Opportunities by Istvan Fodor

Istvan Fodor's article expresses in a very precise way the processes, going on in the economy and the technology as well as the long-term possibilities for development of the CEE and NAS countries. The vision that most of the NAS countries have significant potential values should be the starting point in the creation of long-term programs and closing the gap between the EU countries and NAS. The author has emphasized on the main features of the contemporary development: globalization, information society, revolution of technology, etc. I fully agree with the presented ideas, even though one might consider also the spiritual side of life, the influence of the views of the public, etc.

The analysis of the industry reorganization and the tendencies for technological development are presented in a brilliant way. I am fully sharing the opinion that "the most important challenge for the CEE/NIS countries is, for example, whether they are able to reach the average level of the EU economy or to what extend they are able to approach it until 2020." The comments below are related to the possibilities to discuss problems, arising from the presented analysis and recommendations.

The main questions, which might be asked, are how to implement the presented recommendations and whether it is possible to use the facilities, available in the NAS countries.

For the development of the Information Society, a number of programmes were initiated. At present the 6th FP is on the agenda. NAS are participating in this programme with a different level of activity. To achieve the objective of the EU of reaching 3% expenditure of GDP in R&D, the most likely approach is to unite national with European programmes! Is that possible and what mechanism should be invented to reach that objective?

How the effectiveness of the research can be improved – could it happen by uniting the present resources (money in one pot), which might lead to reduced level of competitiveness, or the development of Network of excellence will be enough?

The free movement of people and workforce and the brain drain improve the level of team integration on one side but on the other decreases the potential of the small countries, which spend money on education and training on people, who later do not work for them. At least this process can be regulated.

How can the differences in levels of funding between the member states and the associated countries be regulated?

These are only some of the items which are on the agenda. Maybe they have to be separated in groups – in one group to include those, which are to be solved by Europe and NAS together, and in the other – by each country on its own!