

ENAPS – A European Network for Advanced Productivity Studies

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Abstract

This paper describes an ESPRIT project proposal to establish a European Network for Advanced Productivity Studies. Performance issues are of great interest to today's industry. Companies face the need to reengineer their business process to improve their performance in a global competition. There is a need for a European Network to assist European industry to obtain and exchange knowledge about best practices. Based on studies of competitiveness on national (macro) level, and on the results from research projects like the Norwegian Productivity Programme on EUREKA TIME Guide, ENAPS will facilitate studies at enterprise level and the exchange of the findings. ENAPS will operate based on modern IT and communication technology, and will have agents in most EU and EFTA countries.

1. Productivity - A major issue for enhanced competitiveness

Competitiveness is a field currently of great concern to industry. Several studies have thrown light over the competitive balance between enterprises in various geographical regions. One example is the MIT study "Made in America" that focuses on the competitiveness of US industry compared to Japan and Europe. Even more famous is probably the work of Professor Porter documented in three books addressing both the national and international levels. Other significant work could also be mentioned, like Hayes and Wheelwright's "Restoring our Competitive Edge", and Sink and Tuttle's books on measurement techniques. Some have even started to talk about a paradigm shift. This paradigm shift can be partly characterised by a few important aspects like:

- * Total quality focus
- * Globalisation
- * Object oriented approaches
- * Process oriented approaches

The reason for this shift is changed market requirements, perhaps best characterised by:

- * Declining market segments
- * Global competition
- * Customer in focus
- * Life cycle requirements
- * Environmental aspects

The answer to this is believed to be the "extended enterprise" with a focus on enhanced productivity.

The future enterprise is "lean" or "agile". The customer is in focus. All activities in the company must add value for the customer. Otherwise they represent a waste of resources. The customer worries about price, quality, service, and delivery. Total quality management has become a new topic addressing all these problems. TQM definitely goes far beyond product quality. It looks at quality in every link and every activity. The customer's expectations must be exceeded.

Lean manufacturing is only possible with an efficient and lean production management. High quality must be secured at minimum cost and with the shortest possible delivery time.

The market is international. Each business process in the company must be benchmarked against the very best world-wide. But not only the market is international. The same is true for the company.

An important aspect in industrial development is process oriented thinking. 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 reengineered to be as competitive as possible.

It is important for the European industry to develop skills and motivation to perform a process of change to improve productivity. In this respect a European co-operation may be instrumental.

This paper describes a proposal for establishing a European network for advanced productivity studies - ENAPS. This proposal is now being considered by the European Commission.

2. Background

Performance issues are of interest to industry, governments and educational institutions alike, concerned with creating jobs and maintaining high standards of living. Looking to the future improvement of performance, much will depend on networks of companies working together to create opportunities and fulfil the needs of specific customer groups. This calls for a new mindset away from the traditional enterprise as a factory of brick and mortar to partnership networks with production and human resources distributed globally. It calls for a business process oriented approach.

As depicted in figure 1, we have traditionally thought of the enterprise as "My Factory is My Castle". This model served us well for years when business could be done purely on a transactional, quid pro quo basis, in a stable external environment. Based on a viewpoint which can be characterised by "We Cover the Globe", organisations expanded from one location to many, still replicating the formula that worked so well in its first location. The orientation of this multisite-oriented organisation is global but still assumes a predictable, stable operating environment. Decreasing product life cycles, increasing product complexity and the need to reduce costs are forcing companies to think about the total supply chain and how to integrate it, "We are an integrated supply chain".

When thinking of orders, projects or programs, this orientation is perhaps adequate. However, in implementation there is usually an integrator and "integrates", i.e., a prime contractor forcing suppliers to play by his rules. In practice, "we are an integrated supply chain" does very little to free the entrepreneurial spirit and collective creativity that today's challenges call for.

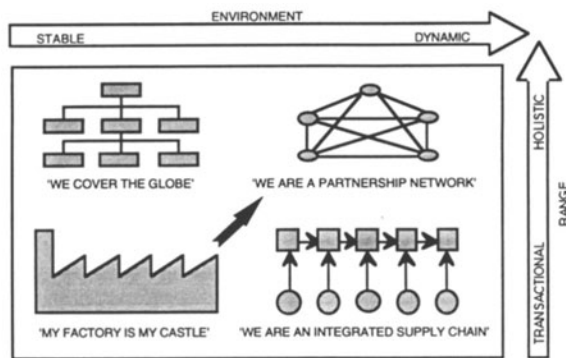


Figure 1 Production paradigms

The ultimate challenge is: "We are a partnership network". A collective enterprise of several independent companies integrated and aligned, combining capabilities to create new business opportunities no one would have on their own. The orientation is external, customer oriented and based on relationships of people and processes constantly being redefined and reconfigured. The operating assumption is that technology and customer preferences are constantly changing. The goal is to quickly capture business opportunities and do it in collaboration with those best suited to meet the needs of the customers. The effective working relationships of people, processes and products is the hallmark of this paradigm.

IBM Consulting Groups, working with academic partners in Europe, have conducted a number of country studies into manufacturing. These studies sought to ascertain

how European manufacturing matches up to world class standard. "Made in Europe" covers four European countries: UK, Germany, the Netherlands and Finland. The approach of this study was to develop an interview script addressing key areas of practice and performance in 46 core questions on organisation, culture, quality, cycle time, equipment and business measurement. Those questions were answered during comprehensive interview with board-level representatives by 663 participants in the four countries. The scores of the answers were used to construct indices measuring different aspects of site practice and performance.

The results of this study show that adoption of best practices indeed leads to improved overall performance. While only two percent of the companies visited reached world class standard, nearly 50 percent are potentially world class.

A restriction to the value of such studies is that the results are not based upon objective measurements and actual observation of practices over a period of time, but on "snapshot-opinions" of board-level representatives. Also a critical statistical evaluation of the Made-in-Holland study showed that the number of different questions and the number of aspects were too large in relation to the number of participants to achieve statistically meaningful results. However, the results are promising, extension of this type of studies to a micro level time phased measurement is required.

In Norway a large R&D programme, TOPP, has been run for the last three years. TOPP is focusing on measuring performance and competitiveness at enterprise level. Analyses are conducted on three different levels: Phase A is a self assessment methodology based on a comprehensive questionnaire, phase B is an assessment methodology for consultants, whereas phase C is a process benchmarking approach. SINTEF is a major partner in TOPP and is responsible for development of methodologies.

The TOPP methodology has also been applied in the EUREKA project TIME GUIDE. TIME GUIDE aims at developing software products for process assessment, process benchmarking (a tutorial package) and gaming. It also includes building a European benchmarking database for identification of benchmarking partners.

There is definitely a need for a European Network to assist European industry to obtain and exchange knowledge about best practices. This is true for both larger companies and especially for the large amount of small and medium sized companies in Europe. Performance studies on a micro-level are required to gain knowledge about best practice. It is at this level where business process engineering will show effect on the enterprise competitiveness.

As indicated in figure 2, the sphere of collaboration today between research institutes and industry is to a large degree limited to pre-competitive studies. Post-competitive research into best practices and the nature of performance improvement will benefit both industry and those involved in basic R&D. The European Network for Advanced Performance Studies will help fill the gap that exists today in post-competitive research, defined as learning from experience in the competitive arena to inform and guide basic research and pre-competitive R&D.

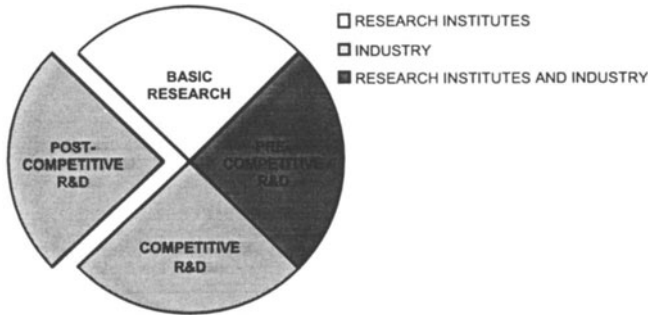


Figure 2 Linking research and user group experience/requirements

In a world that is more and more interdependent, productivity of the enterprise is a function of the region it operates in, alliances built with other companies, all directed towards creating value for customers. The hierarchy of key constituencies is shown in figure 3.

The nature and demands of each constituency are different:

- * Region - public and generic
- * Enterprise - strategic and focused
- * Joint-Ventures - tactical and consensus-oriented
- * Customer - bilateral and committed

The ability to change is crucial for being a successful partner in the extended enterprise. The change is related to the three core processes in figure 3:

- * Order fulfilment: where the enterprise reacts on the individual customer order.
- * Network creation: where the shared resources, knowledge and procedures are developed.
- * Product and process development: where the capabilities are developed to realise the order fulfilment process.

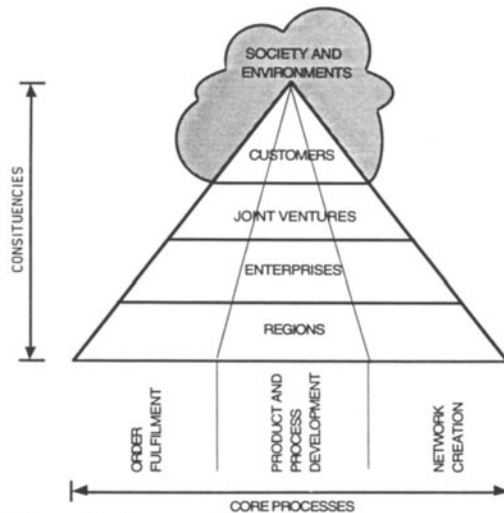


Figure 3 Key constituencies and core processes

Changes in the order fulfilment process, is to realise the learning curve that enhances the price performance ratio of the products continuously.

The ability to perform network creation in a fast and effective way, heavily depends on the available infrastructure. This infrastructure does not only consist of transportation and communication facilities, but also of common methods for order passing, contract negotiation, co-operation in development projects, etc. It is the quality of this infrastructure that enables enterprises to start effective co-operation with new partners.

Change in product and process development, is adoption of new technologies and practices for faster and more effective development of new product families. In this process, networks of enterprises are used.

This requires close co-operation between research, industry and government. It should be realised that the attractiveness of a region as a location of enterprises depends mostly on the quality of the infrastructure in terms of transportation, communication, skills of labour force and the availability of support from research and constancy. It is the (local) authorities that are mainly responsible for the development of the infrastructure of their region.

Focusing on changes of the core processes, some topics of interest to examine are:

- * JIT delivery and performance
- * Network of contractors and suppliers
- * Production planning and control principles
- * Electronic communication of technical and commercial documents
- * Concurrent engineering principles
- * The extended enterprise concepts
- * Enterprise modelling and business process reengineering
- * Distribution technology
- * Benchmarking of enterprise performance
- * Organisational and individual development

Most companies have exhausted the possibility of improving productivity by better efficiency of the various functions. Further progress is dependent on an inter-functional, process oriented approach to improvement.

3. The ENAPS network

ENAPS is a proposal to establish a European network. The end result is an operational network with capabilities and competence as described in the succeeding. The network will have nodes in all countries. (These nodes are referred to as agents.)

The following types of partners will be involved in ENAPS:

- * *Steering Committee:* This is the superior body responsible for results and resource utilisation. It will give policy and directions, and it will decide on approaches to be used and which studies to be carried out. The steering committee is intended to be active. Industrial expertise at high level is heavily involved. The steering committee will consist of the five partners of enterprises or industrial federations. It will meet at least two-three times per year.
- * *Co-ordinating body:* which is the core team that will be responsible for the daily updating and operation of the network. This team will include 5 countries from different European regions. There will be one academic partner and one industrial

partner from each of these countries. These partners will develop necessary tools and will involve other bodies such as agents and experts in the execution of the work.

- * *Agents*: who are academic or industrial contacts or consultants in each of all countries in the network. The agents will perform activities in their own country and will represent the link to industry and organisations (users) in that country. The agents will serve as a national or regional link between the users of the results, other national contributors, and the operational body. They serve an important role as the local or regional part of the entire project.

Agents should have the following commitment:

- Serve as national node and point of contact
 - Apply methods and tools to do local performance studies
 - Engage experts where necessary
 - Involve in development of network
 - Serve as pilot company for benchmarking and studies if appropriate
 - Act as advisors and help in quality assurance
- * *Experts*: who are national or international specialists in areas of interest. These experts are called upon based on current need. Experts may come from consultants, industry or academic institutions. They will obtain contracts in each case for doing a targeted study, analysis or evaluation. There will not be a fixed set of experts, but those applied must go through a qualifying procedure.
 - * *User groups*: who are end users of results. Such groups may be regional or sectorial. They may comprise both industry, consultants, governmental agencies etc.
 - * *Industry*: which is the primary recipient of the results.
 - * *Government and public*: which will receive generic results from the studies.
 - * *Industrial nodes*: which may be chamber of commerce, etc.

The model will work such that needs arise from industry. The co-ordinating body will initiate the necessary actions. By doing so, it will use its primary point of contact, the national agents. These agents may perform education and acquisition, promotion, will do an early awareness function and will plan events and disseminate information. The agents will contact experts who will typically execute the events.

4. The partners

The following partners are involved in ENAPS:

- AMT, Ireland
- AUGRAI, France
- BIBA, Germany
- Federation of Norwegian Engineering Industries, Norway
- GRAI/LAP, France
- Industrial Technologie Centrum, The Netherlands
- Technische Universiteit Eindhoven, The Netherlands
- SINTEF, Norway
- University College Galway, Ireland
- Volkswagen, Germany

5. Expected results from ENAPS

This network will provide a vehicle for the European industry to do performance studies at a micro level. Such studies will focus on business process best practices in the participating enterprises. By means of telecommunication, best practice experience and data will be exchanged between the participating enterprises and to interested small and medium-sized enterprises through the network structure. Such communication will be enabled through the European effort to create the data highway and by means of multimedia technology.

The aim of the network is to utilise the competence and expertise in selected European industries and academic institutions for the benefit of all European industry. Performance studies, education, and industrial projects, are meant to stimulate performance in the enterprises and to improve their competitiveness. The network will involve larger companies but should aim at technology transfer towards small and medium-sized enterprises (SMEs). The network is intended to play a critical role in helping European industry, government and educational leaders appreciate and prepare for this new reality based on business processes engineering by:

1. Providing a platform for interaction and collaboration across national boundaries within Europe through a permanent network focused on advancing the understanding of performance for mutual benefit.
2. Researching best practices in performance and their causes, such as the use of supplier/customer contract relationships, self-managed teams, concurrent engineering, supply chain management, etc.
3. Stimulating regional strategies by which governments can begin developing an infrastructure that will attract networks of businesses.
4. Educating key players that productivity is the ratio between value added in the entire enterprise and the cost of resources consumed, rather than the narrow definition of output per man-hour, and that the key issue in this respect is engineering or reengineering of business processes.
5. Enhancing the blue collar human capital through appropriate training.
6. Shaping educational curricula for university students and professionals to prepare them for working in cross-cultural, process and team-oriented environments that stress collaboration within and between companies rather than the old adversarial, win-lose model of business.

The network will engage on research. Findings from this research will help industry to:

- * Develop communication and IT strategies.
- * Assess manufacturing capabilities and the application of modern manufacturing methods and technology.
- * Develop enterprise business strategies.
- * Model enterprises/processes to quantify the performance benefits and payback of performance improvements.
- * Assess Supply Chain Management opportunities for improving performance.
- * Analyse potential for performance improvement within a company.

- * Benchmark European manufacturing, logistics and engineering systems.
- * Evaluate and model macro-economics trends influencing European enterprises and their performance.
- * Train and educate in concepts/methods, tools for improving performance.

6. The overall project plan

The ENAPS project comprises three phases:

1. Network development
2. Business process performance
3. Test operation

6.1 Phase 1 - Network development

The objectives of phase 1 are to set up the network by selecting all the appropriate agents, defining the enabling communication technology and developing international relationships. The results after this phase are:

- * A set of agents. There will be one agent per country. The total number of agents is 16 covering Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Norway, Portugal, Spain, Sweden, The Netherlands and United Kingdom.
- * A job charter and business description for the agents.
- * Defined procedures for communication by electronic and other media between the operational body and the agents.

6.2 Phase 2 - Business process performance

The objectives of phase 2 are to select methods and measures for business process performance, and to make the network operational. The results after this phase are:

- * A set of appropriate performance measures for each industrial sector. The benefit of this is for the use in company performance identifying best practices and setting improvement targets.
- * A set of selected generic tools and methods for performance improvement in enterprises. The benefit of this is to support improved competitiveness and performance addressing both technical and human aspects of managing change.
- * Completed studies of performance development in enterprises. The studies will cover at least one business process in each enterprise. They will address differences in performance between the enterprises and if possible within and between sectors and regions. The benefit of this is to focus on performance and awareness of what it takes to obtain best practices, i.e. lead in the global market. It enables the user group to establish their relative performance world-wide.
- * Drafted trend analysis on new technology and technological development which impact on performance. This will include evaluation of the potential of new technologies. It will generate different scenarios, and perform gap analysis both in enterprises, sectors, and regions.

6.3 Phase 3 - Test operation

The purpose of phase 3 is to specify a knowledge transfer package and to develop a set of demonstrators. The results after this phase are:

- * A set of specified curricula for universities and for professional development in the field of business process reengineering and productivity and performance management. The benefit of this is enhanced human capital, improved skills and competence qualification of the employees.
- * Completed two experiments or case studies illustrating the impact of new performance improvement techniques by the developing of demonstrations in individual enterprises. The benefit of this is early awareness of new tools and techniques, and it motivates change and desire to implement.

7. Status by June 1995

The project proposal has been submitted for consideration by the Call of Proposal, Technologies for Business Processes, for ESPRIT in IV Framework, closing 15 March 1995. It is still being considered for funding, and we hope for a successful final evaluation, and a possible project start in the autumn of 1995.

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