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TRANS2000

A PARADIGM SHIFT FOR THE YEAR 2000 EUROPEAN VIRTUAL MULTIMODAL TRANSPORT OPERATOR

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1. SUMMARY

Transport services represent a major business area within the European economic scenario, employing almost 8 million people and directly affecting final costs of goods and products. Market structure is characterised by a widespread galaxy of SMEs and by few large multi-national groups. SMEs appear to be quite similar one to another, as far as their service offering is concerned, independently of their country of origin. This fact leads to a high degree of competition that is currently almost exclusively biased towards costs rather than overall quality of supplied service, implying a much needed background shift from bureaucracy to customer satisfaction.

Customers appear to be demanding for more added value from their transport service providers, asking for increasingly sophisticated partnership within their production pipelines and up to a complete out-sourcing of own logistics.

Currently, most transport activities are carried out on ground, road haulage holding by itself a share of about 70% of European transportation market. Large groups can better perform when it comes to handle multimodal transportation, that is the capability of managing the most effective mix of transportation means to serve one's customers in the best suited and most competitive (in any sense) way. Increasing internationalisation of business, elimination of barriers and customs within the EC, increasing environmental concerns (truck haulage is the first responsible for air pollution in the EC), sustainable mobility, etc., are influencing SMEs to reconsider their traditional approach to market.

All this given, the capability for SMEs to exploit new business practices that can allow them to adequately adapt to the quickly changing market appears to be fundamental if they are to resist and compete on the long run. Structural factors such as organisational infrastructure and financial capability represent the major drawbacks to pursuing a competitive policy versus well-established, multinational Multimodal Transport Operators (MTOs). It is in this context that the idea of a networked enterprise, made-up of tens of SME transport operators, all acting and behaving so to be perceived from the market as one large enterprise, can represent a paradigm shift for thousands of European SMEs, enabling them to act as de facto MTOs within a virtual company. This new business practice can be named Virtual Multimodal Transport Operator (VMTO).

A VMTO might then be thought of as being formed by many - as many as needed - independent companies all adopting, to different extents, a common organisational infrastructure, obeying and complying to a well-defined reference model, presenting comparable cultural background and exploiting common IT potential. In this scenario, IT is seen as the strategic enabler of the change.

The Trans2000 Project proposes two European SMEs that are willing to work-out the VMTO business best practice, approaching the pilot experiment with much determination and commitment. The goal of the Trans2000 pilot is to demonstrate the feasibility of the above proposed VMTO, working to achieve a complete definition of the organisational reference model and advanced IT infrastructure that potential future VMTO members can pragmatically adopt.

The Consortium set-up to achieve pilot's goal is composed, besides the two user industries (Intertrasport and ITG), by one major consulting firm (KSA) and a much experienced system integrator (TXT), each one contributing with adequate skills and knowledge to the overall project. Intertrasport will act as primary pilot, whilst ITG will participate as co-pilot, thus proving the feasibility of the overall co-operative environment.

Pervasive quality is considered a necessity in the design of the new business practice. Notwithstanding that, BPR is perceived as the most effective methodological framework in which to effectively carry out the proposed changes, allowing for the re-design of a quality aware organisational environment without the limitations current business practices would induce if a somehow smoother approach, such as TQM or continuous improvement, would be chosen.

G. Doumeingts et al. (eds.), *Modelling Techniques for Business Process Re-engineering and Benchmarking*

Major benefits are expected from the VMTO business best practice. Among others, overall diminished overheads, sharpening of the users' competitive edge, pervasive enhanced practicability of more sophisticated services, widespread saving of consumable resources, such as paper, and wide geographical coverage, both national and international.

The European transport market size and structure ensure wide exploitation of project's results. Exploitation will be carried out internally to Intertrasport and ITG organisations, to complete and disseminate achieved results. Outside dissemination and exploitation will concern both project specifications and deliverables, some of which can lead to marketable products such as the VMTO Organisational Handbook and the VMTO IT infrastructure. All four partners will disseminate and exploit project results together or independently from one another, according to the case.

The Trans2000 pilot experiment is planned to be completed within a 30 month period and it is partly funded by the Commission of the European Communities under the ESPRIT Programme, Technologies for Business Process Domain.

2. BACKGROUND AND STATE-OF-THE-ART

2.1 THE BUSINESS SCENARIO

Transport Services in Europe employed about 7.9 million people in 1991, corresponding to about 4% of total EC employment. Considering the freight transport only, road haulage takes a share of about 70% (1991), while railway transport account for 15%, waterway and airway transport for the rest (source: Panorama of EU Industry, 1994).

Market structure in transport services is today characterised by:

- low degree of product differentiation
- low degree of concentration (with a large number of SMEs all over Europe)
- low sunk costs
- medium amount of regulatory measures

which, in turn, lead to a high degree of competition, today mainly based on costs rather than quality of offered services.

The concept of *Quality* in transport services is, however, evolving, following the significant changes in the geopolitical and economic scenario that have taken place in the past years:

- The creation of the Single Market in Europe and the elimination of custom barriers, as well as the subsequent trends toward liberalisation, allow transport service organisations to operate abroad (even if still with various degrees of limitations, depending upon the mode of transport). This has re-vitalised the transportation service market, and particularly road freight transport, which has seen in the last years a continuous growth, as well as a consequent increase in competition. This has two effects: on one side, efficiency and profitability are becoming increasingly important; on the other side, a process of concentration (particularly in very specialised services) and, mainly, co-operation (due to the large number of small players in the market) can be observed.
- The elimination of custom barriers and the increasing competition encourage transport operators to shift attention from dealing with custom clearance and bureaucracy to innovate and upgrade their services to meet developments in demands: customer satisfaction is becoming a key competitive lever.
- Industry's trend toward viewing transport as part of the production process - on the critical path to achieve JIT production - leads to more frequent deliveries of planned low volumes of goods. Market internationalisation, moreover, augments the number of picking-up and delivery points that have to be reached. This, in turn, requires higher degree of flexibility and reactivity from transport service providers, as well as the capability of covering widening geographical areas.
- Transportation and distribution of goods are increasingly seen by industrial enterprises as tasks that can be out-sourced, requiring from transportation service providers the capability and the commitment to take full responsibility for 'turn-key', flexible, reliable and low-cost delivery and distribution services, which will become integral part of their customer's added value chain.
- The increasing attentions to environmental issues forces transport service providers to search for environmentally friendly solutions for their customer transportation problems (for instance, road freight transport is considered one of the main contributors to pollution, accounting for, e.g., 80% of carbon monoxide emission in the EC).

A recent study conducted in 1993 in France with a base of 1400 operators in transport services have pointed out that in their view, whilst price continues to hold a key position together with punctuality, among major areas of potential improvement in transport services to meet expectations of the European market, other issues, such as capability of covering a wide range of Europe-wide services and overall quality (reliability, availability, etc.) are becoming increasingly important.

To respond to new challenges set by the changing market scenario described above, a new kind of transport service providers, known as MTO (Multimodal Transport Operator), has shown up into the market. A MTO is capable of taking full responsibility for a door-to-door transportation service, on behalf of its customers, and is capable of defining the "optimal" solution, taking advantage of the availability of different modes of transport (road, rail, water, air) and finding their most efficient and cost-effective combination. In other words an MTO is able - on its own - to contribute true added value to transportation services.

2.2 MTOs TODAY

Only five European transport service providers are recognised as true world-wide MTOs: Danzas (CH), Kuhne-Nagel (D), Lep (UK), Panalpina (CH), and Shenker (D). These companies grew up from a former hybrid situation where both forwarding agent and carrier skills and resources were in time widened - directly shopping existing businesses - to comprehend diverse transportation means and wider geographical coverage. It was then obvious - though not easy - to set-up synergetic relationships among diverse divisions and branches to secure an appropriate competitive edge to global business. All the above happen to be large groups, resulting from a process of concentration and integration of independent traffic segments, operating with own large fleets and offering complete though mainly standardised services.

Most European transportation SMEs do not hold the financial and structural capability to grow up by subsequent acquisition and merging of existing firms. Moreover, SMEs providing transportation services do not always fully understand their role and the significance of their potential as added value suppliers in the overall production chain. In particular, this is due to an individualistic approach to the market, centred around consolidated, but structurally very simple relationships with counterparts abroad, which co-operate in managing traffic between key geographical points (e.g., Paris, London, Milan, etc.).To this respect there is no hope for them to compete - on the long run - with established larger enterprises unless a new concept of MTO is to be pursued: the **Virtual Multimodal Transport Operator (VMTO)**. With this definition we intend to identify a set or consortium of SME transport service providers which, even though might not singularly posses the whole spectrum of proprietary resources and skills which constitute the assets of a real MTO, nevertheless as a whole do strictly co-operate so that the resulting meta-business appears and acts as de facto MTO. A VMTO is thus expected to implement an indeed original and pursuable business best practice.

The challenge of adopting such a business best practice should also take into account the limitations and problems existing MTOs are facing today, firstly high carrying costs and indebtedness thresholds (source: Panorama of EU Industry, 1994), which should not represent a problem in a networked enterprise such as the one figured out for the VMTO. Since no one is buying anyone, and everyone is co-operating with anyone else within the network enterprise, a truly synergistic exchange is expected among actors, with the whole meta-business focused on widening its own global market share. Such a situation is substantially similar to that which a real MTO can be thought of being in.

Major organisational problems, mainly introduced by company merging, do actually arise in the process of building a MTO, and substantially similar problems are expected to arise when adopting a VMTO business best practice. In this context three main work areas can be identified (see section 3 for a detailed description of actual situation at Intertrasport and ITG):

- *Internal organisation*; this applies to single companies that mostly comply with an old-fashioned, strictly hierarchical, Taylor-like operating model stressing the relevance of control rather than of co-ordination of activities. Moreover, such businesses suffer of structural inefficiency inherited from the absence of widespread consciousness of the relevance of key factors such as pervasive quality and co-operation among functions.
- *Inter-company relationships*; this applies to the wide area of inter-company communications and co-operation, often characterised by cumbersome and inefficient exchange of data, information and documents and lacking in synchronisation of reciprocal activities.
- *IT support*; currently available systems appear much oriented towards *data*-processing and *paper production*, rather than towards *information* processing and *process support* in a co-operative working environment. All of these systems appear in line with requirements arising from traditional carriers, which focus on managing fleets, costs' control and administrative paperwork. Inter-company communications usually rely upon the usage of traditional devices such as phones and faxes. EDI has been partially adopted. Nevertheless it turns out to be difficult to use since it

imposes complex message structures and therefore it is mainly used to support the flow of legal and administrative data (e.g., orders, invoices), rather than of relevant, process oriented information.

Such major changes in co-operating organisations require and deserve full top-management commitment. If on one side the change could be implemented bottom-up, on the other it is fundamental that top and intermediate managing structures fully comprehend the significance and relevance of opportunities brought in by the new business best practice.

2.3 EXPLOITABLE INFORMATION TECHNOLOGIES

Recent IT developments offer the potential to support significant changes in transportation service industry, where many activities deal with the processing of information, both in terms of *transformation* (i.e., arrange and access information in appropriate ways) and in terms of *communication* (exchange structured and filtered information). As a consequence, new available information and communication technology possess considerable potential impact, offering opportunities for economies of scale, growth of efficiency rates, lead-time and cost reduction. IT thus becomes an essential *enabling factor* for the change.

In this scenario, two groups of technologies have been identified as particularly relevant:

- Workflow and work-group technologies. The need for providing customers with complete, reliable, customised and "optimised" transportation calls for the capability of exchanging information in a *structured way* among all actors involved in the process of supplying Europe-wide multimodal transportation services. Each actor in the process needs a wider view of the actual process scenario and access to wider ranges of information as well as enhanced timely communication with counterparts, within or without the specific organisation. To achieve efficiency and effectiveness in the management of these information, old communication means (fax, phone) necessitate to be sided by more appropriate infrastructures, such as those made available by state-of-the-art workflow management tools, which allow the screening and management of information flows consistently with the structure of the business processes they support.
- (Tele)Communication technologies. The opportunity for SMEs to adopt a VMTO business practice, through the establishment of appropriate co-operation with counterparts all over Europe and world-wide, requires that co-operating companies prove capable of communicating in a cost-effective and quick way. Information highways and communication infrastructures, such as the Internet (which is today increasingly widespread, low-cost and sufficiently mature and standardised), provide the technological layer on the top of which appropriate information exchange mechanisms can be established.

2.4 DEGREE OF INNOVATION

This Project promotes the formerly introduced new idea of the VMTO and intends to design and implement an innovative business best practice framework consisting of a comprehensive organisational model - derived from a pragmatic business vision - and related IT environment - strictly based on state-of-the-art technology. It seems no reasonable to think of totally changing each partner's organisational infrastructure to comply with a theoretical VMTO model. Nevertheless we believe that such a scheme, if existing and supported by adequate IT infrastructure and tools, could prove extremely useful even if just partially adopted and implemented. Moreover, it appears eligible to be viewed as being a necessary and appropriate - though not sufficient by itself - aggregation factor for candidate VMTO partners.

The project promotes a new perspective in looking at business processes within the context of a multimodal transport service provider, intending to demonstrate the actual feasibility of the proposed approach at Intertrasport's. From this point of view, Trans2000 actual goal is not simply to work-out at Intertrasport's methods and techniques that can work in that given business, but rather to develop a generalised environment - standard and repeatable - capable of defining the new leading edge of transportation business practices. The innovative features resulting from the project will affect the overall competitive edge of European transport service industry in two major areas:

- *Business and market opportunities*:
  - SMEs will be capable of proposing themselves as European-level players in the transportation service market.
  - SME's customers will enjoy more flexible and customised services.
  - Customers' requests will be satisfied in the most economical and convenient way exploiting the availability of multimodal transport potential.
  - SME's and their customers will benefit Total Quality as natural requirement of the overall project and as such resulting in a pervasive focus on customer satisfaction.

- *Organisation paradigm and resource exploitation*:
  - Shift from paperwork centred to added value centred activities.
  - Shift from data to information management.
  - Shift from individual work to group work and to inter/infra-enterprise communication and co-operation.
  - Exploitation of IT as de facto pervasive enabler of the above stated changes.

3. PROJECT OBJECTIVES AND RESULTS

3.1 THE PROCESS TO BE TRANSFORMED

The main process subject to the re-engineering approach can be identified as the actual transportation service supply, initiating with a customer's transportation service request and continuing all the way through to cargo delivery and data collection needed by subsequent administration tasks. Transport requests can be viewed as being direct or indirect, that is originating from explicit customer's transportation orders rather than coming from some other kind of activity - i.e., transportation services originating from in-house customer's out-sourced logistics operations.

It is within this process - and its possible variants - that most, although not all, of added value activities take place, and it is within this process that most, although not all, of interface relationships between actors do take place. It is in the roll-out of this process that, indeed, most functions and resources are interacting, be them infra as well as inter-company. From sales to warehousing, not to mention administration, traffic operators, custom experts, and so on, they all are eligible to participate, to some extent, in the above defined process.

One should regard actors in the process as being normally scattered over a wide geographical area. They may be part of a MTO or a VMTO, for the latter belonging to independent companies, strictly co-operating and non-redundantly structured. Process interactions, as detailed in following sections, appear to be deeply interlaced.

It is then understood that only an innovative and coherent re-design of this main process is capable of defining the needed "standard" process model which candidate VMTO partners can refer to. It then goes by itself that such a process model can be adhered to - totally or partially - by any transport operator wishing to evolve towards a MTO like organisation even if not participating in a VMTO structure.

This process, as described above, directly involves about 130 people at Intertrasport (70 in the proposed project domain, since Intertrasport will perform as primary pilot) and 270 people at ITG (30 in the proposed project domain, since ITG will perform as supporting pilot).

3.2 THE BUSINESS PERFORMANCE METRICS

As any observable phenomenon, the transportation service process can be qualified with a well-defined set of performance parameters that can be referred to as being intrinsic of the process itself when observed in the actual process unfolding framework. These parameters can be either expressing measurable values, i.e., costs, or depicting non-dimensional characteristics such as personnel stress thresholds. The project will try to rely mostly upon measurable parameters to obtain a clear, metric picture of before and after pilot scenarios. When this approach will prove impossible, qualitative ranking will be used on a simple scale based on four values: very good, good, fair, unsatisfactory.

Among all possible performance parameters, the following are to be considered as the fundamental ones:

- *Lead time*; this parameter represents a major gauge with reference to transportation service supply overall responsiveness to market solicitations. Measures include complete process crossover time and specific process portions crossover time. Lead time knowledge become definitely important when working in a certified quality environment where assessments become contractual obligations. It is measured with appropriate time units like hours, days and the like.
- *Overhead costs*; this parameter represents a major gauge with reference to transportation service supply overall competitiveness. These costs represent the macroscopic epiphany of more subtle and somehow quantitatively weaker parameters like:
  - *Efficiency*, expressing process performance rates in terms of optimal resources deployment and exploitation.
  - *Allocated resources*, expressing process performance rates in terms of units-of-resource allocated in the process, be them material (manpower, machines, dedicated warehouse surface,

etc.) or immaterial (computer software, royalties to industrial patents, proprietary technologies, focused education investments, etc.).

- *Consumed resources*, expressing process performance rates in terms of units-of-resource consumed in one process cycle, be them physical (paper, fuel, etc.) or not (computer CPU time, TLC throughput, etc.).

- *Quality*; this parameter represents a major gauge with reference to transportation service supply overall competitiveness. It can be measured in terms of:
  - *Efficacy*, expressing process performance rates in terms of compliance with declared process objectives (crossover lead time, unitary shipment costs, suitability, reliability, etc.).
  - *Suitability*, expressing process performance rates in terms of compliance with specifically *requested* (or hypothetical) process objectives (delivery scheduled time, delivery lead time, cargo safety, etc.).
  - *Reliability*, expressing process performance rates in terms of compliance with specifically *declared* process parameter values (delivery scheduled time, delivery lead time, cargo safety, etc.).
- *ROI*; this parameter represents a major gauge with reference to evaluation and validation of investment policies specifically intended to enhance the process and is directly measurable in terms of expected/actual gross margin besides metric parameters discussed above.

3.3 THE PROPOSED CHANGE

In the following, attention will be focused on primary pilot, stressing the characteristics and the objectives the proposed business best practice should enjoy. Intertrasport is then taken as the working laboratory to perform the change. Nevertheless, co-pilot needs, partly overlapping with pilot's and partly forcefully independent, are taken into account since their satisfaction is essential to the success of the overall trial. The final VMTO model will be tested on Intertrasport while ITG co-operation will allow testing and validating close inter-company relationships along the new process scheme.

3.3.1 The Process today

Current organisational model strictly relies upon a hierarchical structure where different functions take charge of specific transport modals, each one accounting for a complete set of roles and skills thus duplicated throughout the organisation. See Appendix A for a detailed functional chart.

Current process development can be summarised as follows:

- Customer calls the specific department whose services it is interested in.
- Each department handles its own customers' requests independently from other departments with a consequent replication of roles and tasks.
- Communications represent a major problem and are mostly managed via person-to-person direct contact. Telephones and fax machines do get hot.
- A huge amount of paper is produced for internal use and in compliance with international regulations.
- Last minute arrivals, mistakes, extemporaneous inconveniences and wrong data influence quality and productivity.
- Own or third party carriers take over and are responsible for good delivery of cargoes. Fragmented communications and poor shipment tracking do occur.
- Currently computers do handle procedural data processing. Nevertheless a relevant amount of errors happens because of poor exploitation of non structured information, usually filed on paper.

Appendix B reports a summary picture of current archetype process.

This situation can be qualified as being:

- *Function based*; functional and hierarchical structures coincide and are responsible for the overall service supply process plus decentralised administrative tasks such as billing and cost management.
- *Geography* focused; each traffic division is further divided into "work groups" aimed at managing specific geographical areas.
- *Paperwork oriented*; each work group member handle required bureaucratic tasks all the way through from booking to cargo delivery.

- *Action centred*; each individual tends to perform his/her tasks focusing strongly on a set series of strictly procedural steps.

Main pros and cons are summarised below:

Pros:
- good knowledge of one's own work and transport modals characteristics
- "personal touch" in relationships with third parties supported by appropriate knowledge of counterpart's language
- awareness of officially set procedures
- strong hierarchical control of activities
- low cost clerks since involved in activities with negligible added value

Cons:
- poor inter-functional communications and co-operation
- no inter-operability among functions because of adoption of strongly customised schemes for operating processes within different functions
- uneven performance and resources exploitation levels, according to management's skills and experience
- uneven service quality thresholds
- replication of roles, tasks and competencies in functions
- focus on the production of official paper documents
- functional framework oriented towards data handling
- poor check points and weak error recovery actions due to personal only awareness of process status
- little to none responsibility due to poor added value contribution

IT is widely used to support operating tasks. Such an approach is exploiting entry level capabilities - data entry, document output, data processing and the like - suffering an evident bias towards data management. Notice that this situation is reflected by marketed software packages, nowadays decidedly unsatisfactory from an information handling perspective.

Such a situation prevents a competitive (economical in the wider sense) accomplishment of the process outside a given environment, from which the practical impossibility to set-up tighter co-operation between independent actors proceeds.

Please, refer to Appendix C for a detailed summary table of current process performance values.

3.3.2 The approach to perform the change

To achieve the above mentioned objectives, we propose a **Business Process Re-engineering** approach to the current process.

This option, which is based on a drastic re-design of the process itself, has been selected taking into account the following issues:

- Market changes previously described are taking place rapidly. Organisations adopting smoothest approaches (e.g., continuous improvement) would risk to be late in answering to the market challenges and to miss the opportunity offered by current changes in the European scenario.
- Smoothest approaches, while less traumatic and thus, in some sense, less risky, build however upon existing organisational models and working practices. The resulting evolution will easily end-up with compromises between old behaviours and the new ones required by the described market challenges, impeding in the long term the full achievement of all potential improvement.
- The necessity for transport service providers to hold ISO quality certificate is increasing. This hint could suggest to adopt a TQM approach to process enhancement. Current process, however, is not at all designed according to TQM concepts, viewing customer satisfaction as the driving force. Thus, it seems preferable to re-engineer the whole process in such a way that quality and customer satisfaction will be embedded within the new process model. ISO9000 certification will then be a direct and much welcome consequence of the overall re-engineering activity.

The proposed approach is based on few cornerstones:

- Balanced mix of interventions on *organisation* (processes, sub-processes, activities, information flows, roles and responsibilities, working practices, etc.), on *human resources* (corporate culture, individual skills, multi-functional development, etc.) and on *information technology* (tools supporting all the above). Timing can be conceived in such a way that while the organisational infrastructure is being created, personnel will be trained, so that it will be ready to carry out work,

assigned according to new practices, once the new organisation has been established. IT infrastructure will be created in parallel, ensuring that it will be available when new organisation and working practices are assimilated.

- Vision of IT as the strategic enabler. Other business process improvement approaches, such as TQM, see IT as operational support, i.e., as an add-on allowing to "automate" and out-perform certain tasks more cost-effectively. The BPR approach insists upon the strategic role of IT as enabler of the change; that is, the proposed change is becoming possible only thanks to the availability of suitable IT components (source: Hammer, Re-engineering the Corporation, 1992). Thanks to today's availability of appropriate off-the-shelf technologies the establishment of the appropriate IT infrastructure will rely upon state-of-the-art tools and will be mainly based upon extensive system integration.
- Gradual implementation of the new process structure. As explained above, the one under examination is the core process in the company business and its re-engineering is likely to affect about 70 people at Intertrasport and 30 at ITG. Project work-plan foresees a transition period during which some will start working according to new process structure, while others will keep on with old practices, taking up the new ones gradually. This will ensure that operations within the firms will neither be disrupted nor negatively affected by re-engineering activities.
- Full commitment of top and intermediate managing structures. Ideas and behaviours are most likely to widespread in a top-down fashion. Top and intermediate managing structures will be involved since the very beginning of definition and set-up phases, and will be stimulated to discuss and enrich the contents of the evolving project with their suggestions. To cope with the need of avoiding any undesired "personal" bias, a comprehensive programme of education and stimulation sessions, specifically designed and dedicated to top and intermediate management, will be carried out. Committed management will prove fundamental in creating the appropriate working environment setting up all necessary motivation and rewarding mechanisms.

3.3.3 The Process tomorrow

Foreseen organisational model strictly relies upon a process oriented structure where different functions take charge of specific process tasks, each one accounting for a highly motivated and skilled set of professionals thus achieving top expertise throughout the organisation.

Foreseen process development can be summarised as follows:

- Customer calls the company's toll free number and asks for the services he is interested in.
- A centralised booking desk handles requests and sets up appropriate electronic documents that are forwarded to appropriate destinations via E-Mail.
- Customer Satisfaction work group takes over gathering all needed information and preparing appropriate electronic documents. Suitable transportation means are selected.
- Communications become clear and linear to/from all actors co-operating in the process. The optimal mix of transportation means is selected. Resource allocation is performed through appropriate tools.
- Warehouse and cargo handling activities are performed on a well defined and planned base. Paperwork is limited to outputting official documents.
- Own or third party carriers take over and are responsible for good delivery of cargoes. Continued communications and constant shipment tracking do occur.
- Service providers tightly communicate in order of being able to constantly respond to customers info requests and unforeseen schedule changes that might arise.
- Error free administration tasks are carried out automatically from data collected all along process development.

This situation can be qualified as being:

- *Process & work-group based*; functional and hierarchical structures do not necessarily coincide being tailored to master and control well-defined portions of the service supply process, no matter how complex this might be, ISO9000 compliant.
- *Mission focused*; each work-group is eligible for being responsible of a well-defined set of tasks (services) to be accomplished (supplied) and is therefore totally dedicated to achieve top score levels in overall performance.

- *Information exploitation oriented*; each work-group member handles just the required process information to/from other co-operative partners so that paperwork is limited to the effectively required bureaucratic accomplishments.
- *Thought centred*; each individual tends to perform his/her tasks focusing strongly on a set of requirements (timing, quality, costs, etc.) to be fulfilled in completing actions that are well understood as milestones in a wider process scheme.
- *Knowledge biased*; data collection, handling and processing are essentially meant for communications and information purposes.

Main pros and cons are summarised below:

Pros:
- strong goal oriented control and measurement of activities based on pre-defined performance and resources exploitation levels with well defined and measurable check points and error recovery actions
- good knowledge of one's own work and objectives leading to high level of responsibility and maximum added value contribution
- strong inter-functional communications and co-operation through the adoption of flexible and customised process models within work-groups with well defined goals and interfacing rules
- appreciable inter-operability within work-groups thanks to the normalisation of roles, tasks and competencies in functions
- homogeneous service quality thresholds according to process model and company wide awareness of quality standards
- "personal touch" in relationships with interfacing work-groups, within and outside the company
- suitable foreign language support where needed
- functional framework oriented towards information handling and exploitation
- work-group awareness of process status

Cons:
- need of well designed process models
- need of skilled and adequately educated human resources
- need of sophisticated MIS to support process oriented work-group operations

Such an approach is exploiting advanced level capabilities of IT - information dispatching, document imaging, information processing and the like - contributing relevant added value functionality to former plain data management. Notice that this situation is not likely to be found in marketed software packages for the transportation industry, nowadays decidedly unsatisfactory from an information handling perspective.

Such a situation enhances the competitive (economical in the wider sense) accomplishment of the process within a given environment, proceeding from the possibility to set-up a tighter co-operation between independent actors.

Please, refer to Appendix C for a summary table of foreseen process performance values. Notice that these objectives are in average more ambitious than current market sector standards in business performance (source: Panorama of EU Industry, 1994). Comparable values, given the appropriate dimensional scaling, can be assigned to the co-pilot company.

3.4 THE PROPOSED PILOT

3.4.1 The Process at the end of the Pilot

Due to the nature of the process to be re-engineered, which crosses the whole of Intertrasport and affects its relationships with a large number of partners across Europe, the overall organisation has to be re-designed and actually transformed, according to the view above presented, to generate sound results and true benefits. Thus, as far as organisation issues are concerned, the expected changes at Intertrasport will be entirely carried out in the frame of the pilot experiment. Anyway, only personnel directly affected by this transformation need to be trained to ensure adequate take-up and full adoption of the new working practices. This accounts, today, for about 70 people.

As far as ITG is concerned, it is expected that at the end of the experiment the company will be capable of exploiting the new common process framework in close relationship with Intertrasport. Benefits will smoothly spread to other related processes. During the project development phases ITG will deploy some 30 people.

Regarding the creation of the appropriate IT infrastructure, only part of the system integration work needed to fully cover BPR needs will be performed during the experiment. It is anticipated that the following coverage will be ensured:

- New IT infrastructure will be entirely *designed*; in particular, workflow support and workflow management together with information exchange specs and mechanisms will be established.
- Further developments will take care of those software layers that will support the production of mandatory legal documents; project activities will deal with a subset of them covering road transport and out-sourced logistics operation needs. Road transport happens to be, among the various modes of transport, the one producing minimal amounts of simple documents (i.e., reduced development costs for software), while accounting for about 60% of all paper documents generated at the users' site (i.e., high return on investment). See detailed Intertrasport and ITG's exploitation plans in section 6.3 where air and sea transportation IT support development is taken into account.

This choice has been made taking into account the need for:

- Providing sufficient IT support to prove the feasibility and effectiveness of the proposed re-engineering exercise, as well as to measure actual benefits at the user organisations.
- Enabling user organisations to maximise their return on investment at the end of the project.
- Offering opportunity to perform the key architectural choices and to solve main technical problems, thus opening the way for a cost effective completion of IT related work after project termination.
- Enabling partners to collect extensive experience from the experiment so to come in the position of easily and effectively exploiting project results

Given the above scenario, the business objectives we feel achievable for the user upon termination of the Pilot Experiment can be summarised as reported in Appendix C. Comparable values, given the appropriate dimensional scaling, can be assigned to the co-pilot company.

3.4.2 Generic results available at the end of the Pilot

It is expected that at the end of the pilot experiment a new business best practice for the Virtual Multimodal Transport Operator of the Year 2000 will be defined and validated against on field experience, yielding the following deliverables:

- An organisational model, specifically tailored for the Transportation Service Industry and accounting for modern market requirements, which defines the new business best practice for the successfully competing VMTOs.
- An IT infrastructure specifically tailored for the VMTO environment supporting the new organisational model and business best practice.
- A methodological handbook, collecting real-life experience gained by project partners in establishing both the organisational model and the IT infrastructure in two relevant European transportation service operators. It will define the take-up procedures of the newly proposed business best practice.

3.4.3 Repeatability of the Pilot

It is expected that both the organisational model and IT infrastructure will be easily applicable to other firms in the transportation service industry. This sector is characterised by low degree of differentiation among enterprises. Moreover, Intertrasport and ITG can be considered representative of a large market segment (for size, current internal organisation, type of business activities, etc..) within the transportation service industry.

Intertrasport, which is today working in co-operation with some other 50 transportation companies Europe-wide, feels that most of those companies share a similar structure and way of working and comparable perception of market needs, and are currently facing very similar problems.

3.5 Expected Economical, Human, Social and Environmental Impact

Expected objectives are ambitious. Given the dimension of the re-engineering activities to carry out it is expected that returns on investment will derive, in particular, from reduced overheads and overall reduction of consumed resources. Direct costs, such as personnel costs, will be as well reduced and exceeding human resources will be trained and deployed in different growing activities such as logistics related services.

Year zero is the time stamp at the end of the pilot experiment where actual return of investment is believed to start. The results of the pilot experiment will have a number of direct effects on both human and social issues:

- The new organisation and working best practice, together with the enabling IT infrastructure, will significantly reduce people stress by means of a goal driven operating environment focused on intellectual rather than manual tasks, normalised and asynchronous communications, friendly and homogeneous GUIs, etc.;
- In the new scenario people will be empowered by taking full control of their process portion, and will bear higher responsibilities committing to stringent checkpoints set to evaluate the quality of the internal services they are providing to counterparts on the process;
- The availability of measurable objectives for their work will favour the creation of rewarding mechanisms which are likely to translate into higher people motivation;
- The new process structure will be designed having in mind customer satisfaction and quality as driving concerns. This basic assumption will stimulate pervasive quality-consciousness in the human resources that bear responsibility on each sub-process;
- The performance of single tasks in the new process perspective requires the capability of managing more information with an overall, multi-functional view of the problems. Ultimately, job contents will be enriched.

The project will create the infrastructure to dramatically reduce paper documents production. It has been estimated that about 70% of all documents circulating in the world in 1994 can be somehow related to transports (source: international survey reported by Il Sole 24 Ore). Only a small percentage of these documents is strictly necessary to meet legal requirements (e.g., invoicing, custom clearance, etc.), while most of them support exchange of data and information with customers or with other co-operating partners. Intertrasport, considering just international activities, produces about 70.000 folders per year each one weighting about 200 gr. These figures correspond to about 14 tons per year of paper. The potential of this project, for reduction of paper consumption, is thus enormous: according to above mentioned estimates, Intertrasport alone could save about 13 tons per year of paper. This factor can be multiplied by orders of magnitude according to actual market size figures.

Besides any economic benefit directly rewarding Intertrasport itself, this will also lead to a very positive environmental impact, potentially contributing to save a relevant number of trees each year.

Road freight transportation is considered as one of the main contributors to pollution, accounting for, e.g., 80% of carbon monoxide emissions in the EC. For nitrogen oxides and hydrocarbons, estimates indicate that transport causes between 50% and 60% of all man-made emissions, and furthermore it produces 40% of all emitted particulate (source: Panorama of EU Industry, 1994). The concept of VMTO emphasises on the use of the "optimal" combination of various transport modals to satisfy customer's requests. Compared to the current situation, the new way of managing transport processes deriving from this project will prove to be more adherent to sustainable mobility criteria, as set forth in 1992 EC Green Paper on The Impact of Transport on the Environment.

4. THE POTENTIAL MARKET

As stated in the background scenario, transport service providers represent a major economic sector in the European scenario. A market survey conducted by KSA reports about 4.000 operators in Germany, of which about 2.000 are in the size range of Intertrasport and ITG, the remaining being formed of a few large groups and a vast universe of very small businesses. Italy accounts for about half of the above figures, and similar business profile. About 1.000 operators then fall in the size range that this project is looking at. France can be thought of being in a situation similar to Italy and Germany, as far as the market structure is concerned, with figures that are some 40% lower than the former. UK, on the contrary, is characterised by a much less fragmented market since a few very large groups dominate the scenario with a consequent reduction of the intermediate size range and a much larger number of very small enterprises. The overall size of the British market is comparable to Italy's. These four countries account for about 80% of total EC employment as far as forwarding agents are concerned (source: Panorama of EU Industry, 1994).

As far as the Italian market is considered, for instance, out of the above mentioned 1.000 transport operators only 24 are likely to candidate themselves as potential MTOs (source: L'operatore in Trasporto Multimodale e l'Operatore Logistico, Quaderni Confetra, 1994).

Thus, the potential market, at European level, can be thought of as being composed by at least 4.000 SMEs of size comparable to Intertrasport's and ITG's. Evidently target market is somewhat smaller. If a conservative reduction of 50% (considering factors as the necessary existence of a management strategic vision, appropriate organisational pre-requisites, actual availability of needed financial resources, etc.) is taken, a target market made up of about 2.000 SMEs seems reasonable as far as dimensioning is concerned.

The above considered, two aspects should be taken into account:

- Benefits which are expected to be enjoyed by the user and co-pilot companies are likely to be widespread and multiplied, thus providing an enormous potential return - Europe wide - from this project; indeed, taking Intertrasport's minimum estimated savings, and assuming a potential market of only 1.000 prospect businesses (further 50% reduction of the above figures) the total benefit on a European-wide scale of Trans2000 project can be estimated to sum-up to a rough ECU 1 billion. Of these, given the exploitation plans proposed by each of the Consortium partners, nearly 50 millions are achievable within three years from the project's deadline. This values the project's overall ROI to some 1000%!
- Tools and products resulting from project activities will empower market cross-section of all Consortium partners, each one exploiting, under diverse circumstances and conditions, the fall-out of common efforts.