

# **Final Report for Publication**

**Public**

**PROJECT ACRONYM  
X-MOD/1 (X-MODAL<sup>L</sup>)  
Contract No IN-97-SC.1128**

## **THE OPTIMISATION OF MODULAR INTERMODAL FREIGHT SYSTEMS FOR EUROPE 2000+**

**Project**

**Co-ordinator:** Pell Frischmann Consultants Ltd

**Partners:**

Datapath Ltd (Realimation Ltd)  
Electronic Data systems CVI  
Geosoft Ltd  
Hughes Rae Ltd  
IM Technologies Ltd  
Kungl Techniska Högskolan  
Northumbria University at Newcastle  
Studiengesellschaft für den kombinierten Verkehr eV  
Sy-Kon International Ltd

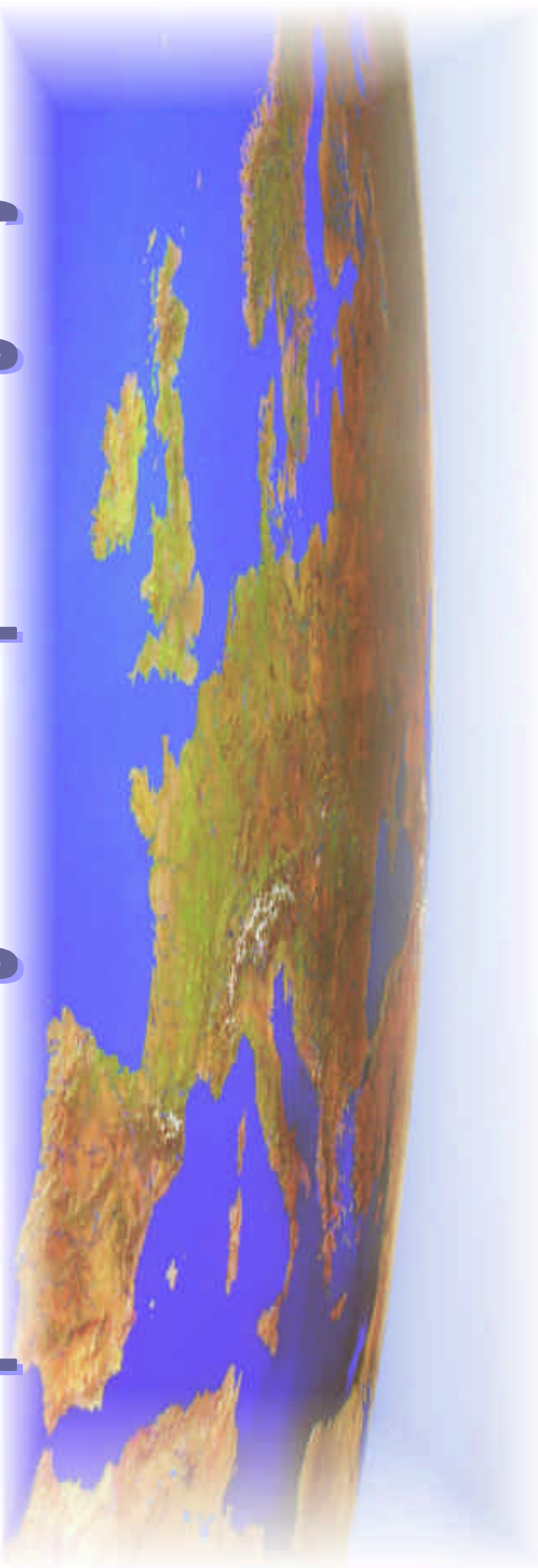
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OF THE 4TH FRAMEWORK.



# Development of Integrated European Freight Systems



## **Transport RTD Programme** **of the 4th. Framework**

**EC Project: X-MOD/1**

**Contract No: IN-97-SC.1128**

**June 1997 – October 2000.**

**For DGVII**

## **FINAL REPORT FOR PUBLICATION**

## **PUBLIC DOCUMENT**

The text that describes the modal methodologies and associated procedures in this document is **indicative only** and is not intended to convey the full value of each operating procedure at this time. It is **composed purposely to give readers a general overview** of the development perspective.



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## 1. EXECUTIVE SUMMARY:

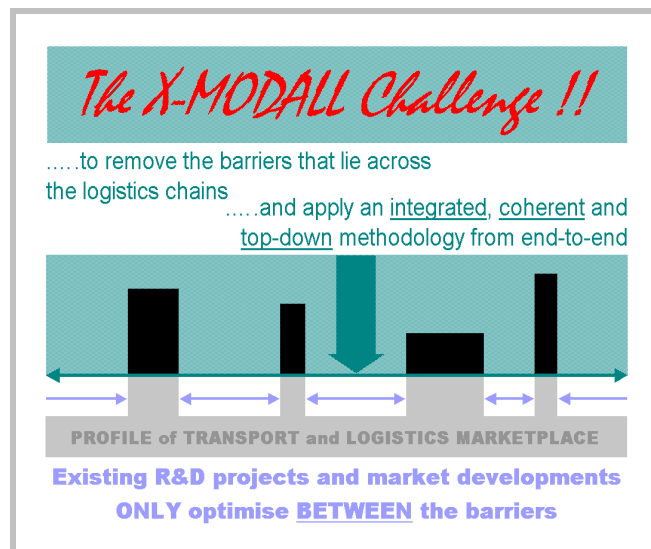
The *X-MOD/1* study - referred to as *X-Modall*<sup>®</sup> - is an R&D Project funded in part by the European Commission's 4<sup>th</sup> Framework Programme to examine and validate the feasibility of a new concept in freight transportation designed specifically to meet the requirements of European industry in the 21<sup>st</sup> century, and at the same time to provide a sustainable freight transport system, identified as essential by all political and environmental interests in Europe.

The economic validation work item of the study confirms that the concept is economically viable, but it is likely to take a decade or so for the market to move from existing systems to those fully compliant with *X-Modall* principles. This transition period will allow industry gradually to refocus investment into more efficient systems and services, and allow existing capital expenditure to work through its current life cycle. In the shorter term, some significant but limited benefits will be gained from the implementation of integrated IT services within the management of legacy flows where the inherent operating functionality is underpinned by *X-Modall's* overall architecture.

The complementary technical validation work found that the design and implementation proposals were practical, feasible and well within the capability of today's technology, but noted that in order to maximise fully system performance, certain current regulations would need to be amended/harmonised across the full supply/transport chain. The concept of the highest common denominator across the chain requires to be applied (which is not the case today) otherwise the weakest link defines the operating/quality standard.

There are many other benefits inherent within the full application of *X-Modall* that are as yet unquantified, which will bring further economic benefits to the marketplace, if EU and national regulations and policy can be aligned more closely with the requirements of integrated and coherent transport and logistics systems.

The purpose of an *X-Modall* approach is to integrate fully all modes efficiently and transparently, so that they may all contribute their strengths and not their weaknesses. Intermodality has a large contribution to make in that it can facilitate the movement of goods to be independent of mode, where the load platform is specifically optimised for the market sector and goods in transit. This will provide a strategic key to realising the full potential of sustainable freight systems. The project does not thus solely focus on combined-transport issues, but considers integrated systems across the full supply chain as a whole, and what is necessary to enhance the wider freight markets by an order of magnitude simply not attainable today.



It is important to note the close correlation between the principles of *X-Modall* and the objectives of the European Commission as set out in its document COM 243 and in the stated aims of the Common Transport Policy, with respect to the development of efficient and cost-effective intermodal freight networks that minimise energy consumption and adverse social/environmental impacts.

Too many of today's developments are short term, bottom-up and fragmented, focusing on single link and modal issues, rather than integrating and optimising the supply chain from end-to-end in both the physical and logical dimensions that are necessary to support e-commerce trading transparently.

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## 2 THE TRANSPORT SCENE:

### 2.1 INTRODUCTION:

It is only very recently that the global IT networks have been able to deliver the transparency and visibility of the supply chain to the marketplace. This now questions the validity of the current business model. Many market sectors are being asked rapidly to re-engineer their commercial strategies, adopting a radically different approach just to stay in business. This wave of change has not yet hit the freight sector but it is coming. The whole sector will have to modify its relationships with industry and the consumer and reflect upon the radical changes that are being made in the **B2B** and **B2C** world. The demands of industry and the consumer are currently in flux, but it will not be long until the new order starts to assert itself.

It is thus an appropriate time to question the manner in which goods are moved. Are the norms of yesterday suitable for efficient use tomorrow? From an *X-Modall* perspective, there are so many obviously trapped costs in each modal operation that a new way of sustaining freight transportation must be found to complement the new e-business model.

Networked IT systems and their applications have to be coherent in processing terms in order to produce the value that makes them relevant. It is this logic that must now be brought into the freight markets to make freight flows as dynamic as the forces that are driving the change, the applied processing of business systems that operate across the global IT networks.

*X-Modall* applies a systems approach to the provision of freight transport in Europe with a level of transparency commensurate with that available in information technology upon which it is itself reliant. The freight transport chain can now be fully integrated which will enable a significant performance increase through improved asset utilisation and the releasing of trapped costs.

It implies a paradigm shift in transport management and operation, being applied on a top-down basis, with many benefits accruing to all parties; governance, community, shippers and industry.

### 2.2 SHORTCOMINGS OF TODAY:

European transport policy makers have come to a clear consensual view that the current structure of the European freight transport system is unsustainable and that a new systematic approach is required. While the European transport industry is faced with increasing demand, both in the growth of tonne/kilometres of freight transported and the quality-of-service expected, the negative effect of infrastructure shortcomings and resultant congestion has a detrimental impact on the overall competitiveness of European industry.

### 2.3 THE DRIVERS FOR CHANGE:

A number of disparate factors are contributing to the increasing demand for the movement of goods which coincides with the growth in use of the infrastructure overall, and particularly in the use of the private car.

#### *POLITICAL & SOCIAL:*

As society becomes more affluent the number of motor vehicles and their use increase, it has become the general expectation that every citizen should have the right to drive anywhere at any time, with almost free access to the infrastructure. This increased pressure on the limited capacity of the existing infrastructure has a detrimental effect on the quality of freight services.

#### *SINGLE EUROPEAN MARKET:*

The creation of the Single Market led to a change in distribution patterns by replacing national distribution systems with a reduced number now serving the EU as a whole. This inevitably has led to an increase in the distances over which freight is moved. The subsequent introduction of the Euro encourages the development of cross border purchasing, again increasing the demand for transport. This demand for inter-regional freight services will continue to outpace growth in GDP.

#### *REDUCTIONS IN INVENTORY:*

This economically driven process has led to smaller consignments being moved, to more frequent deliveries, and to a consequent growth in LTL services, at the expense of full loads.

#### *TYPES OF FREIGHT:*

The decline in heavy industry has reduced the traditional rail freight market to a marginal share of the market. Rail has proved incapable of adapting to the requirements of the new marketplace, which is now dominated by road transport due to its flexibility and competitive costs.

#### *FOCUSED PRODUCTION:*

The centralisation of production following the development of the European Union, and the need to move industry to areas of lower labour costs, have both contributed to an increased demand for freight transport and the tonnes/kilometres carried.

*INFORMATION TECHNOLOGY:*

The transparency of the global IT networks provides a model for the integrated transport system of the future. The efficiencies provided by this application of logical processing across global networks must be replicated in parallel across the physical transport chain.

The growth of electronic home shopping via the Internet on a pan-European basis places additional demands on the freight industry in the **B2C** markets. The lack of transparency in the end-to-end movement of freight prevents the optimum asset utilisation and particularly discourages the use of rail freight.

*2.4 CURRENT SITUATION:*

Due to its historical development, the transport industry finds itself where it is today, focussed almost exclusively on the national interests of the individual European States, whereas its function now is to serve a single market of some 320 million people (and 500+++m. west of the Urals). Rail transport has been eclipsed by road and finds it difficult if not impossible to implement the changes that are required.

- Road transport dominates the freight market, and is likely to do so in the foreseeable future. It has achieved its present market share through its flexibility, cost effectiveness, responsiveness and ability to meet the requirements of its customers.
- Road transport has developed a range of equipment that meets the needs of customers that appears efficient within the constraints of the regulatory framework within which it operates, and is pan-European in its approach to the market.
- Road transport pricing defines the threshold viability for other overland transport modes
- The demand for freight transport will continue to outpace GDP growth.
- For political, economic and environmental reasons, the European road and rail infrastructure is not capable of significant enlargement to the extent necessary to satisfy ad-hoc freight demand.

*2.5 TODAY'S PROBLEMS:*

Maintenance of the *status quo* is no longer an option that is politically acceptable. In the last 25 years total passenger traffic in Europe has more than doubled whilst freight traffic has increased by almost as much, with only marginal development/increase of the transport infrastructure.

These trends will continue:

- The rail infrastructure and operating procedures are designed to meet the needs of the passenger and not freight transportation.
- The rail network is based on national systems, where inter-operability between States has had no priority in the past.
- Ownership of the rail industry is still largely in the hands of the individual States, with a consequent lack of dynamic management and decision taking.
- The average distance over which freight is transported is generally too short for current combined-transport services to be competitive.
- It is said that terminal handling costs for intermodal transport are too high to permit competition with road over distances less than 500 kilometres.
- There is a lack of transparency in rail transport due to the absence of any real time tracking system for unitised freight.
- Road freight transport is under threat from the environmental lobby as it is perceived to cause increased pollution.
- Congestion increasingly imposes inefficiencies on road transport so that it fails to meet the standards required by industry.
- Congestion increases the cost of road transport.
- Intermodal services have failed to make a significant breakthrough into the freight market due to their increased tares and the inefficiency of today's combined-transport systems.
- Inland waterway and short sea transport have only limited potential to increase their share of the market due to their marginalised activities.
- Urban distribution is sub-optimal and disjointed.

Many of the above items have inherent structural deficiencies that inhibit intermodal systems-wide optimisation.

### 3 THE X-MODALL SOLUTION:

*X-Modall* proposes a comprehensive solution to the problems of today's transport market by simply stripping away the self-evident redundancies and replacing them with more appropriate, integrated and sustainable modal equipment and operations. A central component of this is an integrated information system (*X-CRS*) that manages:

- The demand (shipper requirement) for transport
- The available capacity (the supply side)
- The optimal use of infrastructure
- The optimal use of assets.

Allied to this are new operating systems for road and rail services that radically improve physical performance both within the path slot and across the freight markets. Some development aspects give rise to added values that accrue directly to industry, ones which will significantly assist in optimising the supply chains. *X-Modall* networking has an infrastructure of nodes and terminals located at strategic distances from each other in order to permit single shift out and home working by an HGV driver. The solution now becomes structured and asset driven. Here particular attention has been given to the overall performance of each mode across the network, referred to as *X-NodeNet*. Information technology is the key to the *X-Modall* system and all movable assets will be tagged for automatic identification and tracking through the system within the *X-CRS*.

#### *X-NODENET:*

comprises of a network of nodes/terminals through which the trains, trucks and barges will load and unload their unitised cargoes. Situated approximately 175 and/or 350 kilometres apart they will provide a sophisticated and cost effective transfer operation between transportation vehicles of all modes. Collection and distribution services will operate within this nominal structure. There is no make and break (*M&B*) function within the network itself thus groupage activities are reduced to a minimum (less than 4/5 pallets). The network only handles fully unitised and conforming units.

#### *XPAK:(LOAD-UNITS)*

is the new range of modular freight units, including a selection of smaller sized platforms designed to meet future market requirements, optimised to meet the needs of product size and batch frequency. In all instances the load is separated from the conveyance vehicle, whether road or rail, in contrast to today's method of loading pallets direct to the bed of a vehicle. The *Xpak* design is uniquely pallet friendly. In legacy terms, existing semi-trailers and ITUs are also accommodated within the system but produce a reduced level of efficiencies. Multiple-stacking is an integrated function that radically improves slot performance and space utilisation.

#### *X-ROAD:*

is the road freight component of the system. It is referred to as the *HomeBase/AnywayBase* principle, being modelled on the 17<sup>th</sup> & 18<sup>th</sup> century stage-coach concept by which drivers returned home after each day's shift thereby allowing services to continue day and night as necessary.

*X-Road* has three elements:

- Line-haul (trunking & inter-regional),
- *Bus-Stop-Freight*<sup>®</sup> (multi-drop & regional),
- Drayage (local collection & delivery),

...all of which feed in and out of nodes at the start/end of a sector transit. The *X-Road* product now becomes a fully integrated and commoditised service.

#### *X-RAIL:*

is based on an on-line concept whereby rakes designated as "drop-set" and "front-set" make up a freight train. These auto-coupled and uniform rakes are scheduled to be deployed across the network so that at any time there is a rake-set available for loading. The terminal gang works full-time receiving a half-train every two hours or so, where the front-set appears to have "block" attributes moving continuously across the network as required and the rear-set is consecutively dropped-off and collected as scheduled. New designs of rail wagons, running at high speed between adjacent nodes set 200++kms apart, maximise the revenue-per-slot (*RPS*) by the introduction of double-stack capability, the integration of both high cube and weight units, and slipstreaming of non-JIT cargo platforms into the flow in order to minimise any/all empty space. All traction will work full-time nationally on closed loop cycles and there will be no intermediate restrictions about gaining access to any flow, as the freight space will be accessible to all at specific *X-Nodes* along the line-of-route. Equally, the *X-Rail* product now becomes a commodity, being able to compete directly with road, in making full use of its slot capacity and also in service terms.

*X-CRS:*

is an open-systems information management system which is the *glue* for operating *X-Modall*. It is an open and neutral brokering system (*NBS*) (*X-CRS*) that not only monitors the location of all movable assets, but also plans their optimum use and that of the infrastructure and transparently handles the billing between the various parties providing services throughout the transport chain. Any closed-user-group or company can use the system in an equivalent *Intranet* or *ExtraNet* manner as is required. The overall systems approach has been based on the airlines model and is totally secure and transparent in its service provisions to all contracting parties.

**3.2 IMPROVING PERFORMANCE:**

Uniquely the *X-Modall* system now brings together the benefits of e-processing on the *logical* side to the improved performance of the *physical* processes on the other.

Many other benefits accrue once this freight concept is adopted. It provides a framework for the development of both EU and national policies, and will offer a coherent view of how to rationalise sensibly the many harmonisation requirements that exist across the EU, as it offers full flexibility to the regions (subsidiarity) to manage their own service provisions within an *X-Modall* framework.

It is important to appreciate that the economic gains achievable through the introduction of *X-Modall* accrue both from the improved utilisation of slot capacity (*RPS*) and from increased operational efficiencies, both logical and physical.

**3.3 RELATIVE PERFORMANCE:**

*X-Mod/1* has identified savings of between 10-15% of the current cost of inter-regional surface freight transportation in Europe. These savings have been based on operating conservatively within current regulations. But many of the procedures are not sufficiently integrated across the chain to allow the optimal gain to be fully assessed, trapping unwarranted costs in the process.

If they were systematically removed, another 5-10% cost reduction would be available from within *X-Modall* systems. Further, there are many by-products of the system itself that are not easily quantified but would add significant value to the improvement of logistics operations, to industry and to the consumer markets that if taken together may produce another 10% overall. It is very dependent on the activities concerned as to the gains that may arise from a full *X-Modall* implementation (NB all additional gains are subjective estimates at this time).

The implementation of *X-Modall* produces these savings through a number of individual improvements to current systems each of which also benefits other parties, who may or may not be participants in the supply and transport chains. Lower costs are derived in part from higher utilisation of assets, which means that fewer individual units and movements thereof are required. Congestion, pollution and accidents are thereby reduced for the benefit of all.

Whilst asset utilisation is improved through the transparency derived from the *X-CRS* information system, it also enables the end user to track his freight throughout the door-to-door movement, thus providing greater reliability, and confidence in the use of environmentally friendly modes of transport, such as rail, short-sea and inland waterway. The information system enables movements to be co-ordinated, combining light and heavy freight to improve the *RPS*, such that it can derive maximum use of the existing and fixed capacity infrastructure (corridor space). The new *Xpak* regime will significantly increase the numbers of ITUs in modal flows so that terminal operations become viable reducing transfer costs and thereby enhancing the competitiveness of rail over shorter distances.

**3.4 EFFECTS ON EU POLICY:**

It should be noted that transport policy and its associated regulations will need in part to be revised in order to achieve a higher level of overall conformity if the full benefits of *X-Modall* are to be achieved. New hardware is a key element in achieving such a high level of optimised slot performance, as well as meeting the changing needs of industry.

The conceptual framework provided by an *X-Modall* approach should be adopted for wider application as it provides a structured and highly logical way of implementing the effective development of freight transport policy in all Member States of the Union. It offers a very strong opportunity to implement regional developments around a set of flexible guidelines where subsidiarity is implicit. Furthermore, EC cohesion policy is assisted in that all marginalised countries are better able to trade with the Member States - more efficiently, transparently and securely. Investment policy can be focused within a definitive framework where modal performance criteria are clearly established.

### 3.5 THE BENEFITS:

The benefits are extensive and apply to the all parties involved: consumers, planners, industry, green interests, government, supply chains, manufacturers, etc.. If adopted by the EC and fully implemented across the EU, Europe will become much more competitive. This initiative will improve the quality of living of, and reduce costs to all consumers, both **B2B** and **B2C**. But the benefits can only be gained if there is a co-ordinated approach by both industry and by those in government who contribute to the development of the freight transport sector.

The timing for this radical shift in approach is very significant. As businesses struggle to come to terms with the effects of e-commerce and with the radical shifts in global sourcing of supplies, there is a window of opportunity to re-structure the supply chain to become more efficient and generic in the way in which freight is managed within logistics flows.

Significantly, if there is not going to be increased funding for extending the freight networks, it is paramount that the economic space of that available is fully utilised and exploited.

Price banding and the scheduling of freight services across the full 24 hours of the day will immediately reduce congestion. Increased inventory velocity and full slot capacity utilisation will enable industry to reduce costs. The number of movements will also decrease as freight becomes more transparent and visible. There will also be a significant reduction in the number of empty trucks. These benefits are only available within a systems approach to freight consignment that covers the EU as an integrated whole and not in part. Refer to Appendix "A" page 17.

### 3.6 IMPLEMENTATION:

The introduction of such a new integrated technical and organisational approach will need to evolve gradually so that the necessary consensus for change is generated. This process must be market driven and not directly managed by government agencies. They can act as very important catalysts, but industry itself must be mobilised to embrace the changes necessary to reduce costs and improve profits. Equally, the Commission and the regional agencies must be fully aware of the potential for the better management of freight flows so that the appropriate infrastructure can be proposed which will complement the requirements of European industry and its citizens.

In terms of time, there are three phases associated with *X-Modall* developments:

#### *SHORT TERM: (1-18 MONTHS, 0-1.5 YRS)*

- Develop *X-IT* systems (based on *X-CRS* logic) to better manage legacy resources.
- Initiate all short term supportive measures that facilitate *X-Modall* optimisation.
- Initiate first phase of equipment based developments.

This work should take 2 years to complete, with 6 months being given to initiate the programme.

#### *MEDIUM TERM: (12-42 MONTHS, 1-3.5YRS)*

- Apply *X-CRS* to selected corridors using legacy equipment.
- Initiate all medium-term supportive measures that further facilitate *X-Modall* optimisation.
- Complete all road-based equipment development for first phase.
- Evaluate new road-based equipment in demonstrator programmes using *X-CRS*.
- Evaluate rail-based operations in trials programme using legacy equipment & *X-CRS*.
- Finally, commence full roll-out of road-based operations.
- Review all activities and progressively enhance developments as required.

#### *LONG-TERM: (36-66 MONTHS, 3-6.5YRS)*

- Initiate all long-term supportive measures that further facilitate *X-Modall* optimisation.
- Complete all rail-based equipment development for first phase.
- Evaluate new rail-based equipment in demonstrator programmes using *X-CRS*.
- Commence full roll-out of rail-based operations.
- Apply *X-CRS* to all intermodal corridors.
- Review all activities and progressively enhance developments are required.
- Re-align infrastructure as necessary in order fully to optimise the European network and freight flows as an on-going requirement that will take many years to complete.

The above phases are indicative only and by necessity will be drawn out by the very fact that mind-sets will have to change and that various disparate components will have to be re-aligned over time, but particular market sectors can move ahead immediately and initiate developments.

#### 4 CONCLUSIONS:

*Given that the current system of freight transport in Europe is not sustainable for the future....*

*X-Modall* moves the development of European freight transportation from a link-by-link process driven by bottom-up demands, to a top-down process that encompasses the market and supply chain as a whole, thereby radically improving both the quality and performance of freight flows.

*X-Modall* offers an open-systems approach and acts neutrally in all of its provisions.

*X-Modall* operations can be introduced progressively and operate alongside legacy assets and infrastructure. The key is the development and introduction of *X-CRS*, the information system upon which everything else depends and from which legacy benefits can be derived immediately.

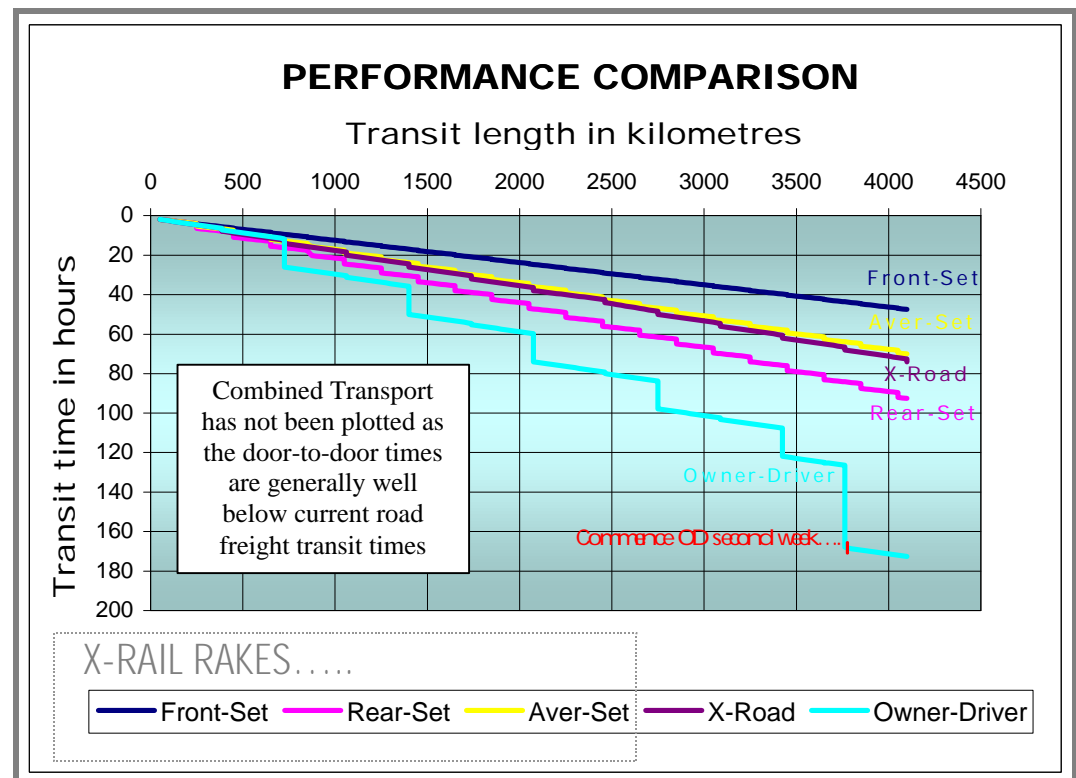
*X-Modall* is the only comprehensive model that uniquely offers a fully integrated solution which meets the needs both of society at large and industry as a whole, in that it integrates both the logical and physical elements in a single, coherent and non-exclusive architecture.

*X-Modall* has the potential to reduce freight transport costs in Europe by approximately 20%.

*X-Modall* is not designed to be prescriptive but seeks to provide a flexible development platform for all parties to contribute their skills and resources in order that freight flows within the supply chain can be fully integrated.

*X-Modall* will provide the quality of freight transport service necessary to maintain the competitiveness of Europe's industry in the global market in the coming decades.

*X-Modall* improves performance significantly in many areas and provides fully integrated, structured and asset driven networking, with consignment flows consequently accelerated and deployed 24 hours a day in order to reduce congestion. This brings many gains.



It is also significant to observe that Combined Transport in general and as operated today falls below the average performance of an owner driver (truck) and thus does not provide a longer-term sustainable solution that is sufficiently well optimised. Further, it should be noted that it is not the length of transit as such that limits optimisation, but when the transport assets become available for effective and repetitive re-use in a networked environment. There are many further gains not referred to above that will make an *X-Modall* implementation framework very worthwhile to European interests.

The changes being implied by the e-commerce revolution will directly affect the supply chains and thus consumers everywhere. The freight sector now needs to prepare itself.

In terms of overall performance, *X-Modall* has many very positive and enhancing performance attributes that can be readily exploited by the markets.

Activity:	Component:	Answer:
Market/Shippers	Open systems	Yes
	Improved reliability	Yes
	Reduced delivery costs	Yes
	Reduced delivery times	Yes
	Increased frequency	Yes
	Increased supply-chain transparency	Yes
	Increased inventory velocity	Yes
	More flexible distribution	Yes
	All load-decks are intermodal	Yes
	Modular load-platforms specific to market sector	Yes
	Ability to access production	Yes
	Buffering and warehousing inclusive within the transport means	Yes
	Extended market area	Yes
	Operators	Required to operate within a commodity driven & common carrier freight transport market and networks
Fully integrated services over competitive multi-modal networks		Yes
Improved service levels		Yes
Improved asset utilisation		Yes
Reduced costs		Yes
Reduced overheads		Yes
Faster transits		Yes
Virtual networking		Yes
HGV drivers live at home	Yes	
Extensive asset pooling	Yes	

*Table 1 Qualitative Performance Gains:*

At the same time these gains will be positively endorsed by the wider community, in that *X-Modall* promotes strong benefits to all associated parties. It also incorporates a safer and greener means of ensuring sustainable freight transport.

The performance gains come from the transport sector moving from running independent and too often ad-hoc services across a fragmented market place, to operating within and across fully integrated, structured and asset driven intermodal networks, as propositioned by *X-Modall*.

The catalyst for change is the e-commerce revolution, occurring in the way that the supply chain is being radically re-engineered, due to the power, transparency and low cost of the global IT networks and services. This is causing management - those that appreciate this fundamental change and not all do - to question all aspects of provision and supply. Many traditional product-based manufacturing companies are now opening up their supply chains to open tendering and to selling their products direct to the market (taking out a distribution and cost layer in the process). This will have profound effect on the shape and form of global logistics and freight transportation in the coming years. It will immediately lengthen the supply chain as the nearest source of supply is not necessarily the cheapest or most suitable, and in the process it will also reduce the number of value-added components in the chain itself.

This re-engineering of competitive processes will be a painful exercise for many regional economies, but efficient freight transportation and logistics lie at the heart of these globally distributed processes. Global IT is in the latter stages of metamorphosing from being vertical and proprietary to becoming a fully inclusive, horizontal and open environment. The PC has completed this change. They both have one thing in common, the move from proprietary to open standards. The most tangible outputs are transparency and accessibility that immediately accelerate the process involved.

The primary consequence of this will be a real increase in velocity or conversely, a saving of time reducing the time-to-market. The logistics sectors will then demand more effective transportation services so that these gains can be realised. At this point the transport industry will have to move rapidly from being vertically applied to becoming horizontally based.

This is the paradigm change that *X-Modall* is now proposing.

Regional economies, services and manufacturing are now being initiated into this once-in-a-lifetime change. Governments have yet to appreciate and assimilate coherently the radical change that is being thrust upon them and adjust accordingly.

The effects of all of this is that global industry and consumers everywhere will demand more transparent services and systems across the whole of the transport chain. The cost of moving goods must be reduced to the lowest service level acceptable to the requirements of a particular trade.

No frills where they are not needed. All surplus redundancies need to be stripped away to enable each supply chain and service to be tightly tuned to a customer's need.

As has been stated previously, at the operating level the relative gains accrue either from the improved capacity of the slot or from improved operational efficiency within and across modes. The question is not really whether these gains will be attractive enough for industry to implement, but rather what will initiate the wholesale move by the freight market to open systems.

Certainly life cycle costs will inhibit immediate change but the writing is on the wall for the sector.

It is the shipper (in order to stay viable in a global market) who will demand that the transport marketplace must change and move with the times, and embrace a global framework that is both logically and physically sustainable and efficient.

THAT FRAMEWORK IS AVAILABLE THROUGH IMPLEMENTING AN X-MODALL OPERATING ENVIRONMENT.

Please note that although *X-Modall* facilitates and concentrates on the optimal movement of the goods in freight transport terms with respect to "outside-the-box" issues, it also significantly contributes to improving logistics flows, where the value is driven by the requirements of the goods "inside-the-box" or transport envelope. It is thus of critical importance that these two aspects should not be confused, that a clear distinction is made in development terms between the two, and that they are two quite separate components within all forms of processing.

## 5 CONTACT INFORMATION:

For further information on *X-Modall* contact:

Project officer for the X-MOD/1 Study	Scientific officer for the X-MOD/1 Study
David B Coldwell, Technical Director	Peter N Cunningham, MD.
Pell Frischmann Consultants Ltd. Wakefield, UK.	Sy-Kon International Ltd. London, UK.
Tel: +44-1924-368145	Tel: +44-118-984-2560
Fax: +44-1924-376643	Fax: +44-118-984-4311
E-mail: <a href="mailto:dcoldwell@pellfrischmann.com">dcoldwell@pellfrischmann.com</a>	E-mail: <a href="mailto:peter_cunningham@onetel.net.uk">peter_cunningham@onetel.net.uk</a>

The *X-Modall* team would like to hear from any interest groups (from Europe/Middle-East/Africa, the Americas or the Pan-Pacific area) concerned with improving global logistics and transportation with respect to the global supply chain generally, or more specifically modal operations within a region.

## 6 RESTRICTIONS ON USE OF INFORMATION:

The purpose of this disclosure is to satisfy the requirements of providing a public document that indicates aspects of the work completed within the EC funded Project:

**X-MOD/1: Contract No IN-97-SC.1128**, completed in the period June 1997 – October 2000.

This document is subject to copyright restrictions and must not be further used/copied/amended in any way without the author's permission.

All specific terminology (many/all items in bold) is in the process of being registered/trademarked. Patents are being applied for concerning particular aspects of the development.

The text that describes the modal methodologies and associated procedures in this document is indicative only and is not intended to convey the full value of each operating procedure at this time. It is composed purposely to give readers a general overview of the development perspective. More specific and detailed documents are available for those companies/persons assigned to the implementation phases of the *X-Modall* programme.

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## APPENDICES

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**APPENDIX “A”:****SCHEDULE OF BENEFITS:**

The benefits of adopting an open-systems approach and framework are extensive. The effect of *X-Modall* will reach far and wide across Europe and have profound implications for all consumers:

- It is a philosophy that is flexible, adaptable, non-prescriptive and fully inclusive
- It states the performance criteria/regime within which European unitised freight moves
- Its benefits will apply equally to suppliers as well as consumers, both public and private
- It promotes the interests of all actors in the chain and thus no party is left marginalised.
- It strips all surplus redundancy from the modal chains
- It facilitates equality across all modes but also enhances the positive attributes of each mode
- It encourages optimal modal split and multi-modal integration for the flow need
- It integrates all modes both visibly and transparently
- It provides open access for all parties within authorised terms of reference
- It harnesses the power of global computing to fully integrate the transport chain
- It significantly accelerates the movement of goods in transit
- It will reduce freight traffic movement by utilising slot capacity more efficiently
- It reduces convergence & demand peaks by better utilising the time available for transit
- It only manages the optimised flow of unitised goods across the transport chain and does not become involved in any way with the logistics interest of what is carried, although it will indirectly enhance many aspects of logistics activities
- It will minimise groupage activities as all flows are compliantly unitised prior to dispatch
- It takes the transport flow directly to the process, instead of leaving it at the factory gate
- New equipment designs will be needed to enable further performance gains to be realised
- It distinguishes between JIT and non-JIT flows by applying price banding mechanisms
- It brokers/matches supplied capacity to market demand
- It manages capacity surpluses for redeploying assets and for improving the level of service
- It encourages leasing companies to provide free-flowing and pooled equipment for the movement of freight across the European intermodal network
- A new form of transparent commercial contract will be applied to the whole of the intermodal consignment movement, being supplemented with a new insurance and liability regime also
- It reduces industry's costs and thus makes manufacturers more competitive
- The EU's freight networks now become structured and asset driven
- Its core technology adopts an air traffic control model to manage saturated demand
- It thus sustains and further enhances freight mobility for the future
- It provides a platform for the development of coherent and coordinated governance & policy
- It specifically focuses investments into the sector, node or the facilitating infrastructure
- It will give the Accession Countries a key framework for implementing integrated freight systems so that the expanded EU becomes more cohesive and unified
- It bring added cohesion to those that are geographically marginalised
- It devolves responsibility to the regions in terms of subsidiarity
- All road freight provision and consumption is now localised to the region
- Each regional community can now vote on its freight transport provisions and thus influence its own economic viability
- It de-couples the road freight driver from managing the consignment to enabling it, and in the process allows the driver to sleep at home every evening
- It significantly promotes a green agenda
- It thus provides the EU and regional agencies/regulators with a fully integrated set of parameters to better manage the way in which the European freight market evolves
- It will provide trade flow statistics to enable planners to better optimise the transport means and infrastructure, for both local and EU requirements
- It promotes all actors to form alliances (at all levels) to enable more competitive and enhanced levels of service to be available at all points across the market
- It reduces the costs of moving goods across Europe to the benefit of all
- It provides a framework that can be implemented now

It is a framework that can be readily adopted by the European Commission, to be flexibly and consistently applied to all aspects of overland freight flows. It will significantly contribute to the effective implementation of transport policy and subsidiarity regionally.

Further, the system's framework is scaleable and fully adaptable for use on other continents.

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**APPENDIX “B”:****PROJECT COMPONENTS:***OVERALL OBJECTIVE:*

The objective of the project as a whole is to establish whether the concepts of *X-Modall* are viable in themselves and to what degree they may be applicable to the development of integrated freight systems, both within and across the European freight markets, over the next decade and beyond.

*CONSORTIUM PARTNERS:*

<b>PARTNER</b>	<b>COUNTRY</b>	<b>STATUS</b>
<b>Project Management/Project Co-ordinator</b> Pell Frischmann Consultants Ltd (PFC)	UK	Contractor
<b><i>X-Modall Concepts</i></b> Sy-Kon International Ltd (SY-KON)	UK	Contractor
<b><i>X-Modall Technical Specification</i></b> Studiengesellschaft für den kombinierten Verkehr eV. (SGKV)	Germany	Contractor
<b>Economic Feasibility</b> IM Technologies Ltd (IMT)	UK	Contractor
<b>Data Processing Feasibility</b> Electronic Data Systems (EDS)	The Netherlands	Contractor
<b>AEI Tagging Feasibility</b> Kungl Tekniska Högskolan (Royal Institute of Technology) (KTH) Northumbria University at Newcastle (UNN)	Sweden UK	Contractor Assoc. Contractor
<b>Spatial Processing/Centralised Mapping</b> Graticule Ltd (formally Geosoft) (GEO)	UK	Contractor
<b>Visualisation</b> Realimation Ltd. (formally Datapath Ltd) (DATAPATH) Hughes Rae Ltd (HR)	UK UK	Assoc. Contractor Contractor

*WORK PACKAGE OBJECTIVES:*

The primary objectives of each work package were as follows:

WP1	Project Management	to fulfil the Project Co-ordinator’s responsibilities for management and direction of the project, and for liaison with the Commission
WP2	Economic Validation	to establish the economic feasibility and overall viability of <i>X-Modall</i> for selected corridors and cross border flows, summarised for Europe as a whole
WP3	Technical Validation	to define the significant components of the <i>X-Modall</i> System
WP4	Data Processing Feasibility	to validate the data processing feasibility of the <i>X-Modall</i> concept, given the <i>X-Modall</i> operating regime and physical components, the expected market volume and areas and the available tagging technology, by designing a fully optimised processing environment, thus specifying the IT requirements for <i>X-Modall</i> and indicating the IT related costs
WP5	AEI Tagging Feasibility	to define the most appropriate cost-effective technology for the AEI of vehicles and consignments, and the adequate Vehicle Fleet Management (VFM) based IT support within a transparent, open and pan European network and indicate the AEI related costs
WP6	Spatial Processing	to define the way in which cost effective electronic mapping will be applied to support <i>X-Modall</i> processing and indicate the mapping related costs
WP7	Visualisation	to demonstrate the potential of using spatial modelling to help facilitate and focus discussion on some/many of the current problems within the logistics chain

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