DELIVERABLE 13: CO-ACT Final Summary Report

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Contents

1 Introduction

1.1 *Introduction to this report*

This report has been created as a summarising and finalising document to the CO-ACT project, it is intended to serve as an outline of the research, the results achieved, and the work done during the lifetime of the project. In essence this document aims to act as both a compilation document for the project, and a guide for further study, research and investigation into the topic of cargo transport by rail in Europe.
It is envisaged that this document may be used as a source of reference for future work into the topic and has therefore been structured and produced in such a manner as to highlight the main results, demonstrate the findings, and exhibit the main issues encountered.
A short introduction to the CO-ACT project is given below, including a summary of the purpose and aims for the project, followed by a description of each work package, its specific aim, and a summary of results found and/ or achieved. The last section of the report focuses on summarising some of the main conclusions of the project. A documentation list, listing the documents produced within the scope of the project, has also been included.

1.2 *Introduction to the CO-ACT Project*

1.2.1 The CO-ACT Project

CO-ACT (or Creating viable concepts for **CO**mbined **A**ir/rail **C**argo **T**ransport) was a project within the 5th Framework Program “Competitive and Sustainable Growth” of the European Commission. The intended duration of the project was 27 months, starting January 2002 and due to be completed at the end of March 2004.

The consortium consisted of 25 members, or partners, (as listed on the cover of this report), from industry, consultancy and university sectors.
The project had a two-fold strategy. Firstly the consortium would develop a fast cargo train for time-sensitive cargo (especially air-cargo) that would operate in a pilot study between Amsterdam Airport Schiphol (AAS) and Fraport, (Frankfurt Airport). Secondly, the realisation of this fast cargo train was to be placed in a broader European context, as it is necessary for market participants to be able to develop the same services on other destinations, built on the practical experience and the information generated in the project.

1.2.2 CO-ACT's General Objectives

The main aim of the CO-ACT project was to identify and develop viable solutions for multi-modal cargo transport, with specific focus on the transportation of air- and time-critical cargo (for example flowers) by rail.
The main objectives of CO-ACT were therefore the development of concepts for fast cargo-trains at a European level, and the development of inter-modal cargo-transport systems, thereby improving sustainable mobility. This study would result in:

- Insight into the feasibility of cargo transportation via rail in Europe.
- Insight into the most promising technologies for multi-modal transport and transhipment.
- Recommendations for the use and harmonisation of load units, equipment and procedures (including administrative) in the multi-modal sector.
- An overview of the most promising innovative 'total' concepts for fast rail-transport of air-cargo and other time-critical cargo in the EU, including a validation of concepts on the basis of their economical, commercial, organisational and technical viability.
- Practical experience gained from a pilot train study between Amsterdam Airport Schiphol (AAS) and Fraport.

1.2.3 Research and Test Trials

In order to realise the overall objective of developing concepts for fast cargo transportation by train, a series of work packages was created to cover the relevant issues, development requirements, and the necessary testing of developed concepts.
Two integral activities, namely research and test trials, allowed the complete coverage of material. The research would provide valuable information in relation to the short- and long-term possibilities for development within the CO-ACT project. The test trials would be used to support and enhance the work done within the research packages and to demonstrate the concepts developed in operation.
The project consisted of nine work packages, the first four of which were research oriented, with the fourth being focussed on validation. Work packages 5 to 7 (inclusive) were test trial oriented, work package 8 was a communication and dissemination package, and package 9 consisted of the management function of the project. Each of the work packages contained a number of integral tasks.

1.3 *Project History Statement*

The CO-ACT project was started at the required date, January 2002. The work packages produced good results and the consortium worked well. Some minor delays in work packages were encountered due to varying reasons, however delays did not generally exceed 2 months. At mid-term of the project (January 2003) the mid term report was submitted and unfortunately rejected due to the Test Trials of WP5 not meeting the Commissions expectations. An adapted version of the Test Trial scenario was created by the consortium at a whole consortium meeting, however the Commission still found cause to dissolve the contract. After much deliberation and discussion the project was unfortunately stopped by the EC in August of 2003. At this stage work package 1 had been fully completed, submitted and accepted, WP2 was nearing completion, with a draft already having been submitted, and all other work packages were well underway to achieving their set objectives.

2 WP Summaries

The following is a summary of the results and conclusions found from the respective work packages. Note that an introduction to the work packages content and purpose is given, followed by a summary of the findings.

2.1 *WP 1; Production and Demand Analysis*

2.1.1 Introduction and Aim

Work Package 1 consists of a production and demand analysis. The package aims to indicate the operational opportunities, restrictions, and the (developments in the) logistical requirements for initiating combined air cargo concepts in the current European setting. The package also aims to establish demand profiles of potential users of combined air cargo transport.
This package comprises of nine tasks to achieve its goal. The nine tasks are designed to cover

- an analysis of the current operations in the classical air cargo and integrator chain, through the identification of the actors and an analysis of business practice;
- the availability of transhipment facilities and infrastructure, including facilities at or near major European airports and the capacity and accessibility of rail infrastructure throughout Europe;
- existing rail concepts (for co-loading opportunities and stand alone applications);
- air/rail concepts that have already been developed (realised or not);
- an identification of market opportunities through the analysis of market potential, demand requirements, and market trends;
- an indication of the commercial opportunities and operational requirements for concepts of combined air cargo transport given through the synthesis of the results found in the study.

The output of these tasks forms the Deliverable 3 Document.

2.1.2 Findings

The solution to time constraints is found in the introduction of freight transport by air. The higher costs are justified by the ability to deliver to markets faster. Shippers are increasingly concerned with the reliability of their carriers. In this context, the forwarder is no longer simply a shipping agent, his business practice is directed to an increased need to provide value added services. They should aim to adapt themselves to the current quality and productivity requirements of the shippers.

A bottleneck in using rail in the air freight supply chain is the rarity of inter-modal air-rail freight terminals. We only found four airports that have an existing rail terminal on site. These airports are Frankfurt, Liège, Vatry and Madrid. Most airports, however, are connected with a sophisticated railway connection, which transport millions of people to their final destination every year. Vatry and Liège airports can be described as specific freight airports. The majority of airports have a rail terminal in the neighbourhood. Some airports offer services comparable with an on-site terminal. Transportation between the airport and the terminal is still necessary and takes extra valuable time.

Air freight concerns rather small flows. Hence, it has been investigated which existing passengers and (fast) cargo rail services could provide opportunities to replace existing trucking in continental Europe, most notably for distances of over 500 km. Existing, sufficiently fast (120 km/hr), opportunities are especially in Germany, Austria and Northern Italy as these areas have the highest number of direct connections of long-distance passenger trains and the largest number of departures. A main problem however is that the majority of passenger trains travel during daytime while actual hub-to-hub transport of air freight is concentrated during the night hours.

The viability of air cargo transport concepts by rail is conditional upon a number of factors. On the basis of experience in a number of concepts, projects and research studies, the success factors are:

- compatibility of loading units to ULD´s;
- at least price and quality have to be comparable to truck transport;
- high speed trains running at min. speed of 140 km/h in order to allow operation during the daytime. That is only possible if there is nearly a same level of speed performance between high speed cargo trains and passenger trains, which allows running on the same tracks by equal grading of cargo and passenger trains. (One of the failing reasons of the Cargo Sprinter was the max. speed of 120 km/h, which was not fast enough for passenger trains);
- equal grading of high speed trains and passenger trains concerning slot times; “mixed traffic” structure;
- to pay attention on the logistic concepts and requirements of users;
- high standard of reliability and punctuality;
- information, monitoring and track and tracing systems;
- new train and infrastructure technology , e.g. automated coupling and brake systems;

Although air cargo flows are rather small, our analyses and forecasts for air cargo transport in particular and time critical cargo transport in general prove to be sufficient for viable rail concepts between airports in Europe dedicated to time-critical cargo, and also for a fast cargo between the airports of Amsterdam and Frankfurt as foreseen by CO-ACT.

Our market potential survey shows that there is sufficient market demand between Frankfurt and Amsterdam in 2000 for approximately 4 trains in one direction and 6 trains in the other direction. In 2008 this will be approximately 6 and 8 respectively. In 2015, this will even be 8 train in one direction and approximately 10 trains per day in the opposite direction. These results are conditional upon reliability of service, competitive transport prices and transport times (with truck transport).

In addition, there will be some specific user requirements with regard to future rail services. The COFAR report gives a broad overview of these requirements and also the interviews that have been carried with integrators, airlines and handling agents indicate some specific requirements with regard to compatibility, speed, frequency, reliability and geographical scope.

Dedicated rail concepts for time critical cargo within Europe can be developed in the context of rather stable trends in demand and supply. Air cargo still is the only option to provide reliable services for highly time-critical cargo. It can be assumed, that the requirements resulting from trends in the logistics system will foster the demand for those operations that meet the desired characteristics of the air cargo industry. Learning from September 11th, it seems that the airline and air cargo industry very much depend on overall consumption climate. The stabilising factors for the air cargo industry are mainly driven by the logistics system itself and the trends reshaping this system into highly integrated supply networks with reliable fast and frequent transport services.

2.2 *WP 2; Compatibility and Interconnection*

2.2.1 Introduction and Aim

Work package 2 consists of an investigation into the compatibility and interconnection within the multi-modal chain. The study is designed to investigate currently used techniques, procedures and equipment related to cargo load units, the modal-transfer process, and the administration of cargo transportation in general, and to identify areas of potential impedance to the smooth and seamless operation of a multi-modal system. The investigation in turn allows the development of specific harmonised solutions based on existing transportation methods, in order to overcome possible bottlenecks or areas of friction within the multi-modal chain. The package therefore aims to identify and define possible solutions for compatibility and interconnection in the chain through three areas of focus

- Physical compatibility; identifying and developing possible solutions towards the harmonisation of air/ rail/ road load units;
- Transhipment development and planning; identifying and developing possible solutions towards fast, efficient, and potentially value adding, harmonised transhipment techniques and facilities;
- Administrative compatibility; identifying and developing possible solutions towards the harmonisation of administrative procedures, tracking and tracing methods and techniques, and information systems.

The output of these tasks forms the Deliverable 4 Document.

2.2.2 Findings

Investigation has shown that the transfer process forms one of the major bottlenecks in the multi-modal cargo transport process, and that friction at these points can be attributed to the choice of loading units, the method of load unit transfer, and the administrative procedures governing the transportation of the cargo.

Load Units

Task 2.1 focussed on creating an inventory of existing load units, identifying the issues related to the development of dimensioning of units, identifying current standards for units, and discussing the issues related to the development of load units for a multi-modal transport system. Positive and negative aspects of existing units were identified, defined and discussed, and the results were used to generate concepts for possible implementation scenarios for load units into the CO-ACT system.
The task concluded that the load unit plays a major role in modern day cargo transport, and that suitable load unit implementation is vital in the development of a multi-modal system. The choice of unit is governed by a

variety of factors including size and dimensioning characteristics, inter-operability and transferability of the unit, and the flexibility in its use. The major consideration in the choices made for a multi-modal system was found to be related to the speed at which cargo can be transferred between vehicles, hence a close connection exists between the selection of load units and the use of transhipment equipment.

The CO-ACT project proposes the (short-term) use of specialised swap-bodies with side-entry capabilities as the large load unit of choice, and the use of the 10 foot air-cargo container as an intermediate, with possible addition of other Logistics boxes similar to the air-cargo ULD mentioned (for example the 'Stadsbox'), for the carriage of air-cargo and other smaller load units (such as pallets and roll-containers). Detailed developmental designs of the concepts for the load units have been included in the report. The medium- and long-term observations show a shift from the use of the large load units to containing the intermediate load units directly within the vehicle.

Transhipment Technology

Task 2.2 focussed on creating an inventory of existing techniques and equipment used in the transhipment processes of the chosen load units, the selection of handling techniques from the inventory, and the development of possible concepts for multi-modal systems. Large, intermediate and small load units were treated separately to allow a more comprehensive view of the above mentioned aspects, and the distinction is made between proven (or commonly used) and special (or branch specific) equipment and technology. Positive and negative aspects and issues of the various technologies investigated have been summarised to allow effective selection and development of the systems for multi-modal application, with particular reference to the CO-ACT train system.

The task concluded that efficient transhipment is regarded as paramount for an effective and fast overall system, especially for a system such as CO-ACT dealing with time-critical cargo, and that fast transhipment heavily relies upon the choice of suitable equipment and techniques. The studies also found that speed with respect to loading and unloading of an *entire* train is of vital importance, along with the issues of flexibility of the chosen equipment (to allow application to various terminal situations) and the harmonisation of selected systems with load units.

The systems chosen for CO-ACT consist of a series of reach-stackers to load and unload entire swap-bodies from the train onto trucks or vice-versa (where required), and the use of horizontal transhipment (roller-bed) technology to unload and load the intermediate load units from the swap-body onto trucks or vice-versa. Detailed designs of the horizontal transhipment equipment have been included in the main report.

Administrative Compatibility

Task 2.3 focussed on investigating the use and procedural requirements for the administration of the transport system. The investigation concentrated on experiences gained from past projects, currently employed transport administration methods, and available tracking and tracing and electronic data exchange technology. The task specifically aimed at identifying and developing solutions for the areas of documentation, tracking and tracing, and electronic data exchange in order to overcome existing inconsistencies between transport elements and possible problems arising from these inconsistencies.

The investigations show that the flow of information and documentation is of great importance to the smooth operation of a multi-modal system, and that tracking and tracing and electronic data exchange systems can enhance the speed, accuracy, and efficiency of the transport operation.

The task concludes that administrative procedures, methods and equipment installations must form a coherent network and be inter-connected with each other. The results show that the need for a centralised and harmonised system is recommended for a multi-modal system, one that bridges all transportation elements through data and information exchange, whilst still allowing individual practice at each step.

The systems recommended for the CO-ACT network include a centralised, web-based administrative database which forwards all information through the use of harmonised electronic data exchange systems and combines tracking and tracing technology in order to allow effective control of cargo in transit. The simplification of documentation for multi-modal systems (rather than allowing individual mode documentation) is also recommended. A detailed example of a possible overall system is given in the main report.

Conclusions

In conclusion the studies found that harmonisation between modes, both in equipment and administration, is of great importance for a multi-modal system. The smooth and seamless running of a fast network requires the inter-operability of currently (partially) separated systems, hence requires an overall network approach where harmonisation must be realised for appropriate functioning. A necessary requirement for the adequate functioning of the system is the careful consideration of load units, transhipment equipment and administration techniques and technology.

Selection of suitable load units, transhipment equipment, electronic data exchange systems, tracking and tracing technology, and administrative procedures is of vital importance to the effective functioning of the network as an entity.

The solutions offered by CO-ACT strive towards a future vision of multi-modal cargo transportation, incorporating existing elements of the transportation network into one coherent unit, system, or network, thereby allowing the formation of a multi-modal entity rather a combination of a number of separated transportation elements.

2.3 *WP 3; Development of Transport Concepts*

2.3.1 Introduction and Aim

Work Package 3 combines the information and knowledge generated in work packages 1 and 2 to design and develop concepts for the inter-modal air/rail cargo transport system. In a first step, the package primarily developed a methodology for the design of concepts based on operational and technical characteristics, the friction costs involved. Based on this methodology a number of potentially viable concepts consisting of an origin-destination pair discussion, technical and operational characteristics and types and roles of actors involved was built. Different scenario concepts were created along the lines of the methodology in order to cover possible differences in layout, configuration, characteristics and requirements. Special attention is paid to the air/ rail interface.

The output of these tasks forms the Deliverable 5 Document.

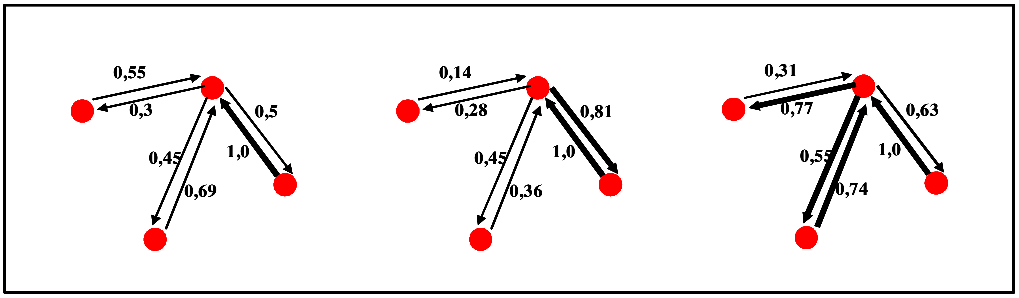
2.3.2 Findings

In the first task of Work Package 3 a methodology had to be developed. This methodology enables to consider a huge number of opportunities for the creation of the complex system by reducing complexity in a manner that the interactions between its elements can be grouped and thus properly assessed. As the basic underlying instrument within the chosen approach the morphologic box was applied.

The application of the chosen instrument of the morphologic box consists of five steps: a thorough analysis of the problem; the decomposition of the problem into elementary dimensions or characteristics; the determination of potential realisation alternatives per element; an analysis of alternatives as they become obvious from the re-composition of the actual problem and finally; the actual decision on choice of desired concept/problem alternatives.

In addition to the general methodology decision, some further preliminary thoughts were necessary to meet the set objective of meaningful integration of the test trial results into concept development. In that context, the actual task to develop concepts without a specific timely allocation was widened into an approach which follows a three level time horizon pathway of concepts. Therefore, three time horizons have been identified as suitable for the concept developed. The first horizon is represented by the test trials within the frame of the CO-ACT project. After a successful test trial in the duration of the CO-ACT project the concepts elaborated focus on a time period of 2 to 5 years after a successful realisation of the test trials. For this period of time, the concepts are developed on the example of the origin destination pair Frankfurt-Amsterdam to specifically elaborate on the outcomes of the test trials. These concepts can be adapted to other origin-destination pairs whereby the specific conditions particularly regarding the demand and resulting freight volumes have to be taken into consideration. The objective behind the definition of time horizon two is the intention to provide the opportunity to implement real, commercially viable day-to-day operations on at least one origin destination pair based on the outcomes of the test trials. Based on a running combined air/rail cargo system as the result of time horizon two pathways for targeted innovations and improvements in time horizon three have been outlined. Thus, the timely focus for these more futuristic conceptual ideas is at about 10 to 15 years from test trial. The definition of the time horizons is less dependent on actual time frames but on the reach of a viable commercial level of operations being the precondition to move forward along the pathway.

An analysis of the air freight flows in Europe revealed that for the closer future the volumes of air cargo are not sufficient to fill trains. However, enlarging the catchment area onto other time critical freight can substantially change the picture as it was proven in Work Package 1. The major airports considered being part of a network are Amsterdam, Frankfurt, the London airports and the Paris airports. Their spatial relation and a comparison of the freight volume exchange among them are shown in the following figure, whereby the freight flow Frankfurt Amsterdam is set 1 for confidentiality reasons to the data provider.



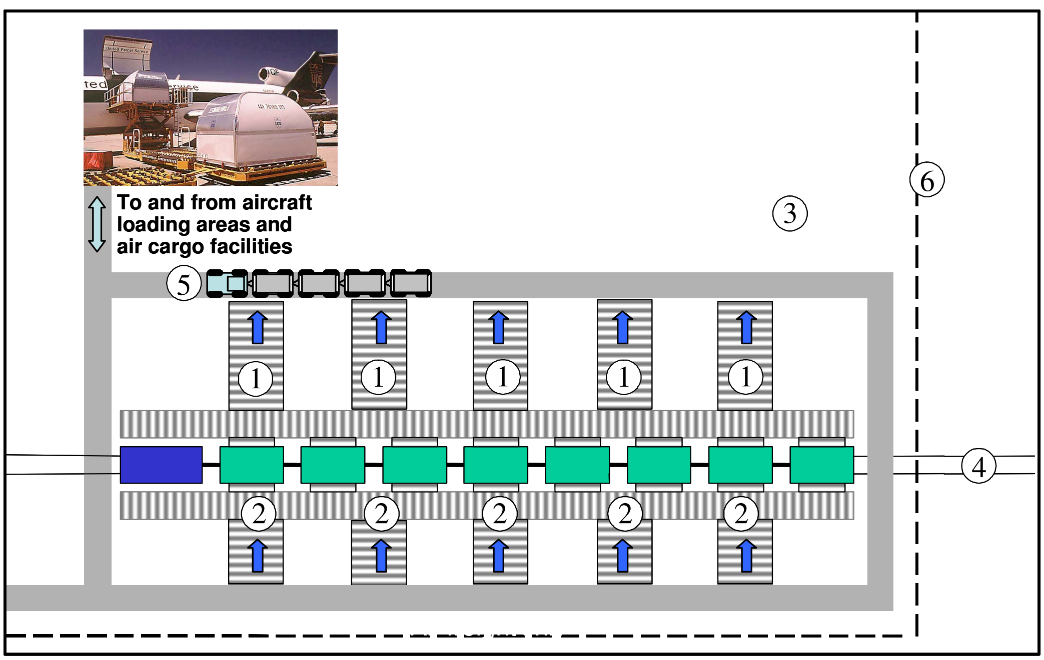
Spatial relation and comparison of air freight flows between Frankfurt, Amsterdam, Paris and London

Thus, the concept development for time horizon two had to consider two different types of operations: one focussing on air freight only and therefore to be located on an airport facility and another one also including other non-air freight cargoes which therefore has its location preferably in an axis of time sensitive freight flows possibly outside an airport. Since the decision on the freight to be covered and the subsequent locality decision have heavy impacts on safety rules applied and infrastructures available, both concepts result in very different technological and organisational patterns. A third concept was developed trying to combine the advantages of both conceptual approaches.

A further decision which had to be made in advance to the concept development deals with degree of sophistication and feasibility of rail-concepts to be applied. In the result of an in-depth analysis of the cost structures of rail operations it was found that at the current situation and in the close future (which also covers time horizon two) for commercial viability reasons no high speed rail cargo concepts targeting on speeds above 160 km/h can be applied. Since speed, however, plays a vital role in the air freight business environment it was decided to focus on fast cargo trains above 100 or 120 km/h up to 160 km/h. This differentiation is applicable in the context of the decision between fast and high speed train concepts due to the fact that the majority of safety, operational and control costs are generally differentiated at the speed barrier of 160 km/h. The reason for the decision must be seen in the fact, that under given framework conditions in the European rail industry the costs arising from exceeding the speed of 160 km/h in terms of infrastructure route costs and in terms of equipment costs destroys any commercial advantages of rail transport in comparison to truck operations. The associated rolling stock, traction and routes costs constitute approximately 90 % of all operating cost. However, since it is expected that the framework conditions will change in the long run high speed rail operations have been considered to be part of the long term developments towards time horizon three.

In the following paragraphs the concepts for the second time horizon are outlined. For the concept development the following dimensions have been considered: loading units to be applied; transhipment technologies and procedures; rolling stock used; train systems applied; rail terminal functionality and geographical position; terminal operations and ULD transfer operations within or to and from the airport facilities.

The overall conceptual design of **concept one** is shown in the following figure and represents the exclusive air cargo solution.



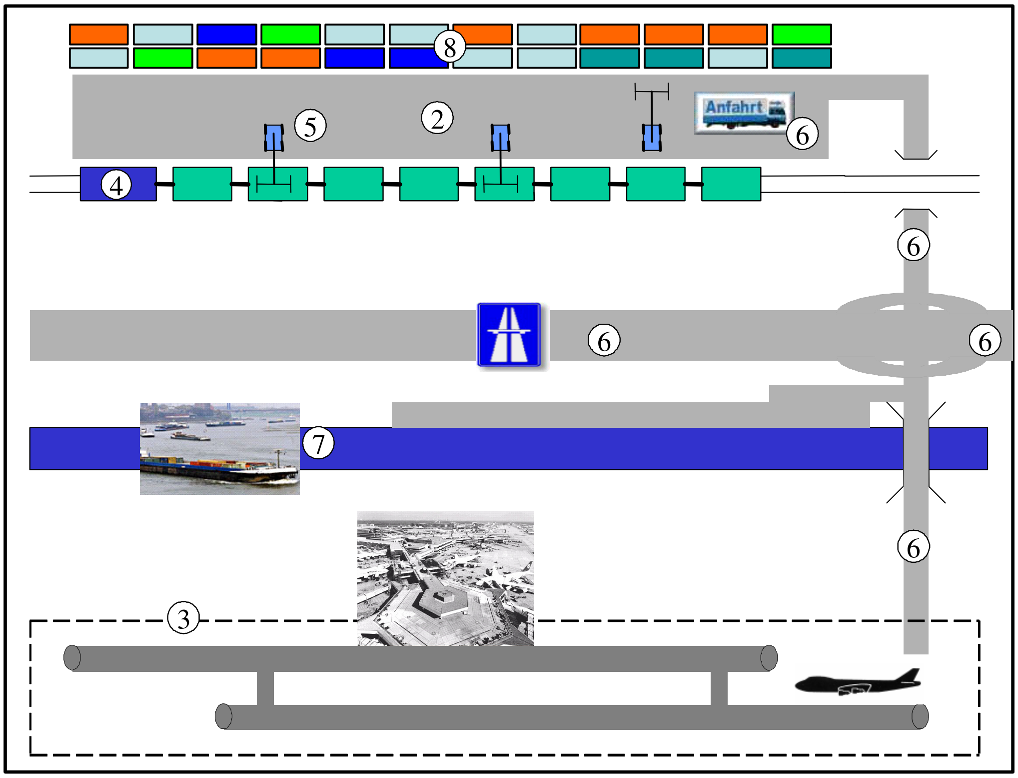
Conceptual layout of concept 1 – exclusive air cargo

The rail terminal is located within the airport's area fence (6) and becomes a part of the terminal (3). The rail terminal concept is designed to fit into the existing concepts of the respective airports in terms of available space, accessibility, expansion of operations, security rules and procedures and viability. It is recommended that the rail terminal will be driven, controlled and organised by the airport or its subcontractors. The engaged cargo trains have to operate under an airway bill with regular scheduled flight numbers. The integration of a rail terminal in the airport cargo area has to be communicated in advance and access of all operating airlines has to be guaranteed. ULDs are loaded (2) and unloaded (1) horizontally via roller beds from all door sliding door rail cars equipped with interior roller beds. Transport to and from air fields and air cargo handling facilities is undertaken by classical airport trolleys. The solutions for the different elementary dimensions are highlighted in grey in the following table.

Criterion	**Selected elements**				
Loading unit	ULD	ISO-Container	Swap body class A	Swap body class C	Trailer
Means of transhipment	Roller bed	Gantry crane		Mobile equipment	
Rolling stock	All-door-car	Container car	Pocket wagon	Trailer train	
Train system	Single wagon system	Group train system	Unit train system	Shuttle train system	Bimodal system
Rail terminal functions	Transhipment	Loading unit service	Freight service	Network organisation service	
Rail terminal position	Feeder position	Block position		Block knot position	
Terminal operation	Independent rail terminal operator		Airport operator	Rail operator	
Train operation	Rail operator		Road Feeder Service provider		
Transport airport/rail terminal	Ground handler		Road Feeder Service Provider		

The **second concept** focuses on general time critical cargo. In contrary to concept 1 the following idea of freight transport relates to the convergence of cargo as much as possible. For this purpose a broad access for potential customers has to be ensured. To establish a rail terminal in the general freight transport market a high acceptance is required from the beginning. All problems which originate on the supply side, e.g. inadequate infrastructure, insufficient transhipment equipment, lack of co-ordination, should be avoided. Only if a smooth implementation is in process, will the customer be disposed to think about the use of the rail terminal for his freight. To achieve this goal, the rail terminal has to be located according to the material flows of the customers, i.e. close to the main lines of freight flows. With this basic setting, the efficiency of the planned train can be enhanced and a commercial and durable operation of this rail service is a lot more likely.

The overall conceptual design of concept two is shown in the following figure.

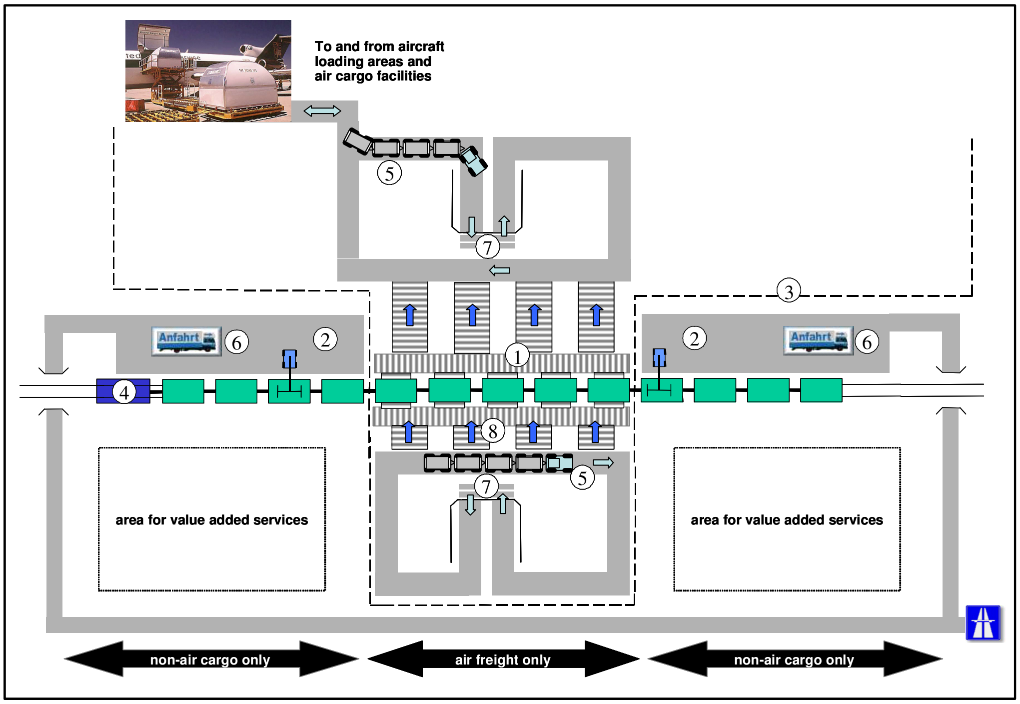


Conceptual layout of concept 2 – focus on general time-critical cargo

In that concept inter-modal swap bodies are applied as additional loading units carrying the ULD's. Therefore a transhipment area is build (2) (5) which can be accessed via public roads (6) from the airport (3). Due to the focus on general cargo the availability of other public infrastructure is desirable (7). Empty swap bodies can be stored at the terminal (8) to relieve the airport from this task. However, the major disadvantage is the additional truck-move via public infrastructure. The chosen elements are highlighted in the following table.

Criterion	**Selected elements**				
Loading unit	ULD	ISO-Container	Swap body class A	Swap body class C	Trailer
Means of transhipment	Roller bed	Gantry crane		Mobile equipment	
Rolling stock	All-door-car	Container car	Pocket wagon	Trailer train	
Train system	Single wagon system	Group train system	Unit train system	Shuttle train system	Bimodal system
Rail terminal functions	Transhipment	Loading unit service	Freight service	Network organisation service	
Rail terminal position	Feeder position	Block position		Block knot position	
Terminal operation	Independent rail terminal operator		Airport operator	Rail operator	
Train operation	Rail operator		Road Feeder Service provider		
Transport airport/rail terminal	Ground handler		Road Feeder Service Provider		

Contrary to the concepts 1 and 2 both groups of goods (air freight and general time critical cargo) will be handled simultaneously in **concept three** at the rail terminal within the airport and its vicinity. The underlying idea is that the terminal needs a special layout in the way that air freight due to security standards and other requirements, has to be handled within the customs area and the loading and unloading process of general time critical cargo takes place out of the customs area. The proposed underlying conceptual layout is shown in the following figure.



Conceptual design of concept three - combination of time sensitive freight flows at airport logistics centres

The chosen approach results in a number of obstacles to be overcome. First, trains must be suitable to a divided terminal infrastructure independent from their actual direction. This was met by the terminal design consisting of three sections. To cross the track (4) without conflicting rail operations a tunnel has to be built (7). In the medium section of the track air freight ULD's are loaded (8) and unloaded (1) from all door sliding door cars with roller beds. In the other two sections inter-modal terminal operations (2) are undertaken with connection to the public infrastructure (6). The connection to the air fields is made by trolley trains as in concept 1 (5). The chosen elements for the different dimensions are shown in the following table.

Criterion	Selected elements				
Loading unit	ULD	ISO-Container	Swap body class A	Swap body class C	Trailer
Means of transhipment	Roller bed	Gantry crane		Mobile equipment	
Rolling stock	All-door-car	Container car	Pocket wagon	Trailer train	
Train system	Single wagon system	Group train system	Unit train system	Shuttle train system	Bimodal system
Rail terminal functions	Transhipment	Loading unit service	Freight service	Network organisation service	
Rail terminal position	Feeder position	Block position		Block knot position	
Terminal operation	Independent rail terminal operator		Airport operator	Rail operator	
Train operation	Rail operator		Road Feeder Service provider		
Transport airport/rail terminal	Ground handler		Road Feeder Service Provider		

Another major aspect to be covered is the opportunity for an allocation of facilities value added services. Since in concept three the airports represent a kind of channel entry points for all kind of time sensitive cargoes the volumes to be expected from air customers as well as from other freight flows provide amber opportunities and enough volume for sufficient value adding operations. In the vicinity of the terminal a huge number of logistics service providers are expected to settle. They will provide all kinds of services, such as packaging, assembly services, customs duty, final customisation, freight consolidation, product quality control, container stowage and stripping, labelling, insurance services, financial services, fleet and equipment repair and maintenance and ground handling etc.

Time horizon two concepts are built very closely on the potentials as they arise from the test trials. However, it was attempted to draw a pathway into future conceptual ideas, which a high speed rail freight system for air cargo could look like once the framework conditions are sufficient. The following table gives an outline on the potential pathway into time horizon three.

Phases Design aspects	**Short term –2004 Test Trial**	**Mid term – latest 2010**	**Long term – latest 2025**
Type of network	Point-Point (Schiphol - Frankfurt)	Multiple points (Incl. airport at Paris, Milan, etc,)	European Network (Including terminals at larger cities)
Type of train	Test Trial train (up to 160 km/h), with flat bed freight wagons and locomotive	Full freight "fast train"(160 km/h) With Closed wagons and/or Flat Bed wagons	"High speed" (TGV, ICE) Combi-train or full freight train
Type of cargo / load units	Air Cargo Special swap bodies (with roller beds and possibly side doors) ULD's are transported in Swap bodies. Swap bodies on flat bed wagons	Air Cargo and Other Time-critical cargo ULD's, Swap-bodies and ISO containers. ULD's in Closed Wagons or special swap bodies. Swap bodies and ISO on flat bed wagons	Air Cargo and Other Time-critical cargo ULD's & Other new load units (e.g. city boxes) are transported in train.
Type of terminal & handling	Special (stand alone) flexible freight terminal in open air with conventional or slightly modified equipment	Evolved freight terminal integrated with airport with further developed handling equipment for load units	Integrated inter-modal passenger/ freight Terminal building with fast handling equipment
Type of connecting transport mode	Truck.	Truck, and (internal) ULD transport system	Truck, train, automated local transport systems (e.g. OLS)

A more detailed description of the concepts including friction cost analysis and process descriptions is given in the Deliverable 5 Document.

2.4 *WP 4; Validation*

2.4.1 Introduction and Aim

The objective of WP 4 is two-fold: firstly to develop a methodological framework for assessing the overall performance of alternative concepts of inter-modal air/rail cargo transport, and secondly to apply this framework with the assistance of the Industrial Validation Group and the project Advisory Board in order to assess alternative inter-modal air/rail cargo transport concepts developed as part of WP3 of the CO-ACT project. The operationalisation of the developed methodological framework, and therefore the assessment of the most promising inter-modal air/rail cargo transport concepts, considers the findings of WP 1 and WP 2 of the CO-ACT project, since the work developed within these two work-packages provides the attributes and characteristics that should be fulfilled by the identified concepts.

The work required within WP4 was organised into five tasks: task 4.1: Validation and evaluation methodology, task 4.2: Selection of most promising concepts through validation, task 4.3: Validation of concepts, task 4.4: Validation of results and test trials results and task 4.5: Deliverable.

The output of these tasks forms the Deliverable 6 Document.

2.4.2 Findings

Validation and Evaluation Methodology.

A methodological framework capable of assessing the overall (i.e. comparative) performance of the alternative inter-modal air/rail cargo transport concepts identified within CO-ACT was developed (Zografos & Giannouli 1998, Zografos & Giannouli 1999). The framework considers the following project characteristics, which determine the nature of the validation problem at hand:

- The fact that in inter-modal air/rail cargo transport concepts multiple institutional actors with multiple, and sometimes conflicting, objectives are involved;
- The fact that the CO-ACT project involved a variety of concepts, which may operate under different institutional, legal, and technical requirements, which may lead to different user needs and system design objectives, and;
- The fact that some of the measures of effectiveness used to evaluate the overall performance of the alternative concepts could be measured objectively, while others could be evaluated only subjectively.

The methodological framework was based on a holistic process aiming at identifying the assessment attributes, i.e. the assessment criteria and the indicators (termed measures of effectiveness) used for their quantification, such as to ensure that the evaluation process will consider all different aspects of the concepts under evaluation. For implementing the proposed methodological framework the following steps should have been performed:

1. Identification of the stakeholders involved in and affected by the development and operation of inter-modal air/rail cargo transport concepts.
2. Identification of the assessment objectives and criteria.
3. Identification of an appropriate technique in order to perform the assessment.
4. Identification of an exhaustive set of indicators for measuring the assessment criteria.
5. Development of the required data collection instruments.
6. Implementation of the data collection.
7. Analysis of the data collected and synthesis of the results.

Operationalisation of the Validation Methodological Framework.

Five out of the seven methodological steps of the developed approach were implemented within the timeframe that the CO-ACT project was active. A brief description of the outcome of each of these steps is presented in the following paragraphs.

Identification of the stakeholders.

In an inter-modal air/rail cargo transport concept it is very important to consider all the parties involved in order to assess its performance, therefore the proposed evaluation framework took into account all stakeholders involved in/or affected by the system. For the evaluation of the alternative inter-modal air/rail cargo transport concepts the following list of stakeholders was identified: Airport Authorities Services, Railroad Authorities Services, Infrastructure Owners, Third Party Providers, Couriers, Forwarders, Shippers, and Technology Providers

Identification of the assessment objectives and criteria.

Taking into consideration the system assessment objectives and their impacts to the relevant stakeholders, the following assessment objectives/criteria were considered in order to ensure that all aspects of the concepts were captured and assessed. Four assessment objectives/criteria were identified; concept feasibility, operational performance, revenues, and costs. In addition the concept feasibility criterion is further expressed by two additional sub-criteria; the technological feasibility and the institutional feasibility of the concept. Furthermore, both the feasibility sub-criteria, as well as the operational performance criterion can be further decomposed to more sub-criteria. The quantification of all these assessment criteria takes place through the identification of a set of indicators, which was done in the next steps of the methodological approach.

Identification of an appropriate technique in order to perform the assessment.

A Multi-criteria method will be used to perform the comparative assessment of the CO-ACT concepts. More specifically, for the performance of the comparative assessment the Analytical Hierarchy Process (AHP) method will be employed. The AHP is selected because it has the ability to:

- Consider multiple criteria
- Quantify the evaluation indicators
- Express the relative importance of the various criteria
- Compile the opinions of various decision makers and identify "compromise" solutions
- Perform sensitivity analysis of the results.

Identification of an exhaustive set of indicators for measuring the assessment criteria.

Based on the available input from WP1, WP2, the test trials (i.e. WP5, and WP6) and a literature review on the evaluation of transportation systems, a set of indicators have been identified that measures the assessment criteria and sub-criteria. The identified set of indicators is consisted by 41 indicators. For each of these indicators a clear definition was provided, as well as the way that they can be measured. The identified set of indicators was validated in terms of its completeness and soundness by the Industry Validation Group and the Advisory Board of the project.

Development of the required data collection instruments.

For the implementation of the assessment, a methodological instrument for data collection was developed. This questionnaire further to the information required for the implementation of the AHP evaluation technique is also requesting information on the background of the experts, and their degree of expertise in answering the different questions. Due to the length and complexity of the questionnaire the information was indented to be collected through in depth interviews of the CO-ACT Industrial Validation Group member.

2.5 *WP 5; Test Trial 1*

2.5.1 Introduction and Aim

Work Package 5 (Test Trial 1) consists of testing the timetable-driven operation of a fast cargo-train between the airports of Amsterdam and Frankfurt (via Cologne) under commercially viable conditions, that is, offering higher door-to-door transport speed against competitive costs compared to truck-only transport solutions. The main objective is to provide undisputed evidence of the competitiveness of rail-based air cargo transport between major airports.

This package consists of six tasks;

- Defining the concept. Including definition of the required characteristics, features and specifications of the test trial;
- Design of the train and preparation for operation. This includes preparing the situation for the pilot tests;
- Development and engineering of load units and transhipment technology. This will be done with relevant input from work package 2.
- Development and engineering of administrative procedures and ICT technology. This will be done with relevant input from work package 2.
- Carrying out of the test trial, (therefore physically running the train);
- Evaluation of the test trial and validation of results through work package 4.

This test trial is viewed as the physical proof of the culmination of the research and preparation activities of the project thus far.

The output of these tasks forms the Deliverable 7 Document.

2.5.2 Findings

This report summarizes the work performed and the findings in WP5 from the project start in 01.01.2002 and its interrupt on 14.08.2003.

The work can be split into four phases:

- Phase 1: Project team worked according to plan (01.01.2002 till September 2002)
- Phase 2: Project team sorted out test trials under changed conditions (October 2002 till January 2003).
- Phase 3: Project team focused very much on new designs of test trials (February 2003 till March 2003)
- Phase 4: Project team stopped activities (April 2003 till 14.08.2003)

The results described were mainly achieved during phases 1 and 3.

It should be noted that Deliverable 7 was intended to summarize the results of the execution of the test trial (namely driving) only. According to the Description of Work, no other report was planned to be issued at this stage.

Work performed and findings

The following results were achieved during Phase 1 in individual tasks.

a. A scenario for the test trial was developed and verified within the team.
b. The team concluded that a regular service between AMS and FRA should be considered as soon as possible, based on the results of the test trials.
c. The team concluded that for the test trials the existing RFS (Road feeder service) sets the benchmark in terms of the objectives to be achieved. This includes the following restrictions:
    i. The level of market prices will be established in a small team at a time when the information is needed.
    ii. For reasons of standardisation the train must carry standard swap bodies and ISO Containers. The consequences of this decision on the technology part was left to members of the research team.
    iii. The train schedule for the test trial must capture a minimum of 50% of all transports scheduled between AMS-FRA and FRA-AMS from KLM Cargo and LH Cargo today.
d. The market addressed by the test trial train types consists of the total truck based transport. The catchment area will be determined by WP1.
e. Mainly for train operating cost reasons, the train operator suggested a scenario and paradigm model for train operation between AMS and FRA. It consisted of three timing levels for elapsed time of transport+ transhipment+ pre-and endhaulage+delay recovery time. Level 1 required 12 hrs., Level 2 required 8 hrs. and Level 3 required 6 hrs.
f. The team developed a specification for the rail operation at Hoofddorp.
g. With the support of a MCA for the alternatives CargoCitySued and Frankfurt-Hoechst, an agreement with Fraport was achieved on the transhipment area in Frankfurt.
h. The technology members of the team do not support a technology shift from a fast ULD and air pallet transhipment to a newly designed swap body towards a swap body transhipment to a rail wagon.
i. A decision was made to remove the ICT part from that WP.

The following results were achieved during Phase 2 in individual tasks.

a. Prorail communicated their position on the situation of Hoofddorp. A part of the team concluded to ignore Hoofddorp as a location for test trails due to non-availability for any further operations.
b. An analysis for an alternative transhipment location in Amsterdam was performed. From different alternatives, the potential terminal operation area Amsterdam Suezhaven was selected.
c. The team developed a concept for a fast transhipment operation for Suezhaven, based on the PIC experience. This included a combination of advance booking system, late road transport arrival procedures, traditional reach stacker transhipment, fast train coupling and prioritised terminal entrance and exit procedures.

The following results were achieved during Phase 3 in individual tasks.

a. A satisfactory time table was developed in cooperation with DB Netz and Prorail. Based on restrictions on rail track access and actual speed restrictions a non-symmetric day/night time table was proposed. Fastest door-to-door transport time 9 to 13% lower then RFS was achieved.
b. The train operations team developed a plan consisting of:
    i. an agreement to operate with two locomotives: a (not yet qualified) new loco with a two current power train and a high performance diesel loco. Both drives do not require a border-crossing stop.
    ii. A change of loco driver has to be carried out at border-crossing.
    iii. Three sets of two groups of wagons with modified bogies and fast coupling.
c. The team developed a plan and cost estimations for restoration of the old rail tracks and entrance rail track radius modification needed at the perspective Suezhaven terminal side.
d. A budget for executing the test trials was developed and a proposal for counter financing was made.
e. The team agreed on a detailed plan for the test trials starting in the week commencing 14.09.2003. All external parties agreed to the plan in principle. No final negotiations and binding agreements were carried out.

The following results were achieved during Phase 4 in individual tasks.

a. All external parties informed about the temporary and subsequently the final stop of the project.
b. With individual partners exit strategies were agreed upon.
c. Two counter proposals were made for rectifying the claims made by the Project officer. One proposal was selected on explained to the project officer by the Project Management Team and Project Support Team, without the WP5 leader.

In May 2003 the Management Team decided to stop all future work pending on the go ahead decision from the Commission.

Key results

The key results include:

- An innovative border-crossing train transport with an average traveling speed of 75km/h is possible with non conventional (=Express) rail track slot assignments and with the help of some train technology improvements (multi current loco, modified bogies, fast coupling) and innovative operation ideas.
- An improvement of 9 to 13% in door-to-door transport time compared with RFS based on AMS-FRA is possible over night with conventional technology and innovative operation concepts. For operation during a

day up to two hours more than RFS are needed for a rail transport. Both results met the goals from the freight parties.

- Even on the relatively short distance of 433 km between AMS and FRA, a competitive rail transport operation is profitable when considering a load factor above 70% and a share of more then 2/3 of high yield transports. There were two departure planned a day at each location. This includes also an operation with six sets of short wagon groups with fast couplings, operation with a mixture of electric and diesel driven locomotion and a rail operation between Amsterdam-Suezhaven and Frankfurt-Höchst. The requirements of the industrial and freight parties in the project could be met with this scenario.
- A concept for Railports was triggered based on the findings of this project. Railports consists of a new fast transshipment system for swap bodies, innovative train operation as developed in this project and a new terminal design which allows an in-door operation in a bypass of a drive through rail track lay out. This R&D work will continue on national (Austrian, German) and international level.

Test Trial Scenario

The Test Trial scenario proposed by the consortium combined all speed elements and technology in order to technically demonstrate that fast door-to-door transport of air-cargo by rail is possible and feasible. The scenario also aims to show that the system developed by CO-ACT is highly flexible and can be implemented in a multi-stage and time-horizon schedule. Together with a business case in which all cost and managerial issues will be dealt with, this should prove the commercial viability. The Test Trial scenario developed reads as follows.

The test trial will consist of at least the following elements:

- One German (Netlog) qualified locomotive to a speed of 140 km/hr
- One Dutch qualified locomotive to a speed of 120 km/hr
- A limited number of flat wagons to a speed of 140 km/hr
- At least one Co-act modified Jan de Rijk swap-body that can contain four air freight units
- At least one Co-act modified swap-body for carriage of flower roll-cages in small load units (i.e. logistic box or air-freight ULD)
- One Lödige specialised horizontal transhipment technology set-up (at Hoofddorp***)***
- One reach-stacker (or other available handling device for swap-bodies) (Fraport)

The test trial will be run as follows:

1. An adapted facility will be created at the present terminal of Hoofddorp[1], using automatic horizontal transhipment to load air-cargo 10-ft main-deck containers into a Co-act modified air-cargo swap-body on the flat wagon. The use of the Hoofddorp terminal has been made possible by the limited length of the train. KLM and Lufthansa provide the airfreight containers. For the flowers, a loading method will be used of roll-cages and Euro pallets in small load units (i.e. logistic box or airfreight ULD) that will be loaded into a swap-body on the flat wagon.

2. Lödige provides a specialised automated roller-bed system that will be triggered by the arrival of the train. This system loads/unloads four air cargo ULD's from a modern air-cargo truck into a Co-act modified swap-body on a flat wagon. The air cargo truck has back doors and roller beds. Jan de Rijk develops and provides (in the context of WP2 and WP5) the Co-act modified swap body with rear doors and side doors (on both sides). The opening of the side doors and the powered rolling of the air cargo ULD's into the swap body will be controlled by the Lödige system (the design will be detailed in WP2). Once the air cargo wagon is loaded, the Lödige system will trigger the closing of the side doors.

3. A loco with maximum speed over 120 km/hr that is permitted to drive in the Netherlands and Germany is not available, while the industrial approval procedure exceeds the Co-act budget. Consequently, the loaded train will travel through The Netherlands on the power of a Dutch loco up to 120 km/hr. This speed is in compliance with the maximum allowable speed due to rail infrastructure restrictions. Once the train has reached the border, the Dutch loco will be removed and a German (Netlog) loco will take over, travelling at a speed of up-to 140 km/hr. Restricting speed in Germany to 140 km/hr prevents the need for costly modifications and extra qualifications. Internal calculations revealed that the use of two locos is also justified in terms of costs.
The train will arrive at Frankfurt. Both Cargo City Süd (CCS) and Hoechst are available for the purpose of the Test Trial and there is no clear difference in terms of facilities and accessibility by road. Customers and other stakeholders also do not show a clear preference for one or the other. The main criteria will be the accessibility by rail, i.e. time to get to the terminal. Exactly which location allows the fastest access by train will only become evident after further discussions with DB Netz on the exact train paths and our rail operator (Netlog). At CCS or Hoechst, the train will be unloaded using vertical transhipment technology (reach-stacker). The air-cargo and flower swap-bodies will be loaded onto a truck. This will highlight the flexibility of the system.

[1] A new rail terminal at Hoofddorp is planned. The new terminal however cannot be realised before 2005 because of land-use planning restrictions and expansion plans for space for trains.

4. In a similar way as described in point 4, the swap bodies will be loaded onto the train with vertical transhipment methods for its return to Hoofddorp.

5. The train will drive to Hoofddorp in a similar way as described in point 3.

6. At Hoofddorp, the train will be unloaded and loaded by means as described in point 2, restarting the cycle.

It should be noted that the proposed test trial shows great flexibility with regard to the employed transhipment technology. Different methods of transhipment are tested and can be analysed and compared. Different local circumstances at future airfreight terminals in Europe and differences between cargoes may require different approaches to transhipment. The test trial will provide comparison examples on the most favourable transhipment methods dependent upon terminal circumstances and type of cargo, with implications for the choice of loading units. Besides, the fast cargo train test trial will provide evidence of its flexibility and suitability to cope with widely differing conditions.

The costs for running this train, the costs of design and manufacture of horizontal transhipment and specialised swap-bodies are expected to be within the specific allocated budgets of Netlog, Lödige and Jan de Rijk. State of the art tracking and tracing technology of KLM, Jan de Rijk, and other partners will be applied in an integrated way for application in the test trail. The development of these systems is detailed in the context of WP2. A number of details for Test Trial 1 have yet to be elaborated such as dates, times, schedules, specs at an appropriate detailed level, etc.

2.6 *WP 6; Test Trial 2*

2.6.1 Introduction and Aim

Work Package 6, (Test Trial 2) focuses on inter-modal cargo handling terminals (freight centres) as smart inter-modal handling nodes. The package consists of tasks which primarily establish operator, user, and end-user requirements, and utilises this information to create a specific solution for Frankfurt Airport (as case study terminal). The case study examines how to develop an inter-modal air freight terminal with scenarios for a time horizon up to 2015. This case study provides the basis for this work package and will provide clues on how to place the realisation of rail freight terminals at other airports, as future nodal points for cargo transport. The study forms a platform for the development of a series of generic concept solutions for the integration of full-service rail-based freight centres incorporated with other facilities at airports. The package also formulates a prototype development plan for Frankfurt Airport (as study case), encompassing three time horizons up to 2015, which may be used for the development of other inter-modal nodes. The results, once complete will be evaluated and validated.

The output of these tasks forms the Deliverables 8, 9 and 10 Documents.

2.6.2 Findings

One of the most important goals that were reached within the WP6 was the prolongation of the contract with the Deutsche Bahn AG to keep the rail-tracks into the CargoCity South active. Without these tracks all further thoughts would have been in vain.

To create a specific solution for Frankfurt Airport as case study terminal for the project, different aspects were looked at within WP6. Several analyses, dialogs and studies were undertaken to evaluate the Status Quo with its interfaces and bottlenecks and to determine key aspects for a future rail-air-cargo handling. A detailed description can be found in the Deliverable 8.

Here is a short summary:

Air-Cargo Center

Even the lay-out, the importance and the operational aspect of air-cargo might differ looking at different airports, several generic criteria can be determined for most of the airports. These criteria will help to find possible generic solutions for the air-rail-cargo terminal. In the following chapters, Frankfurt Airport is used as a first approach to a common concept.

The interfaces, the security aspects and the flow of goods will be looked at in the coming chapters.

The interfaces of an air-cargo center

To understand the general function and operation of an air-cargo center, the cargo center itself needs to be looked at as a kind of “black-box” in a first step. The air cargo center is a facility where road- and air-cargo, and in some cases rail-cargo, interchanges. The travel-distance of air-cargo is in most cases longer than that of road-cargo. But also in road cargo, there is long-distance transportation. Thus a separation between local cargo and long-distance cargo within the road transportation has to be made. Rail cargo in most cases supports the long-distance road cargo transportation. Therefore, different interactions and different interfaces need to be looked at. Except of the local transport, the other means of transportation depend on a certain time-table. Local transport happens on short term information. As mentioned before, rail-cargo-transportation meets most features of long long-distance road transportation, thus in this picture it is best be positioned together with the Road Feeder Service.

Security Aspects

At Frankfurt Airport and at most other airports different zones with different security levels are defined. Cargo coming from the outside of the airport and traveling by plane need to cross all these security zones. At Frankfurt Airport, four different zones are defined, the public area, the landside-cargo-area, the airside-cargo-center, and the apron. No restriction concerning airport security apply for the public area. Only permitted vehicles are allowed to enter the landside cargo area. Usually forwarders are situated in this area. They can operate without further restrictions. Entering the airside-cargo-area can only be done by registered persons with special access-passes. The virtual border between the land-side- and the air-side-cargo area lies lengthwise inside an air-cargo terminal. The cargo-aircraft is of course on the apron. Once again to get from the air-side area onto the apron a security checkpoint has to be passed. Only people allowed on the air-side and having the license to drive on the apron can get to the aircraft. This of course applies for the Frankfurt Airport. On some other airports no separation between public- and land-side area is made or no separation between air-side and apron. In Frankfurt, with its already existing cargo-rail-station, it is also predetermined where the interface rail-transport to cargo center is situated.

Flow of goods

Looking at the processes from the cargo´s point of view, we have to distinguish between Import and Export. Even there is no difference in security and interfaces, the flow of goods is not just going one way or the other. Please see Deliverable 8.

Situation in Frankfurt

Frankfurt Airport is equipped with three railway-stations, one for the local passenger trains, one for long distance passenger trains (among these are the high speed trains) and one station for cargo trains. The cargo-railway-station is the one that could play a role for the CO-ACT-Project. Via Walldorf, trains can access this station which is located inside the CargoCity South (landside cargo area). Inside the CargoCity South, there is a 200m long platform which can flexibly be used for loading, unloading and transport. Currently, only one track is adjacent to this platform but enough space for an extension to up to four tracks will stay available.

2.7 *WP 7; Test Trial 3*

2.7.1 Introduction and Aim

Work Package 7, (Test trial 3), consists of an evaluation of different approaches and chances of a successful network for fast rail-transport of air freight and other time-critical cargo through the simulation of rail-transport strategies. This package takes into account information on demand and production as a management tool for operators and their clients in order to design and evaluate viable inter-modal transport concepts. The package consists of five tasks, namely

- Creating a simulation model (NEMO) to allow the simulation of networks throughout Europe;
- Defining the nodes in close reference to work package 1 activities;
- Establishing the specific air/ rail demand for nodes;
- Designing the networks and using the model to simulate the scenarios;
- Evaluation of the tested networks.

This package will provide a definition of networks and evaluation of these based on their operational, technical economical performance.

The output of these tasks forms the Deliverables 11 and 12 Documents.

2.7.2 Findings

The task within WP7 of the Institute for Transport, Railway Construction and Operation (IVE), University of Hannover, can be divided into two parts. On the one hand a detailed examination of the corridor Amsterdam – Rhine/Main area should provide information about the chances of operating fast cargo trains through a heavily used railway network. On the other hand the project was intended to develop a pan-European railway network for time-critical cargo with focus on operational questions. Both parts of the work package required the use of computer tools at both the microscopic and the macroscopic level.

The microscopic timetable analysis for the corridor between the airports of Amsterdam and Frankfurt/Main was very much related to the proposed operation of freight trains for time-critical cargo in the CO-ACT project (WP5). The operation of freight trains between the two nodes would have to be carried out under the condition of a given timetable and on an almost ad-hoc basis. The timetable analysis in this work package, however, did examine the chances and the flexibility of rail freight undertakings to operate fast freight train services without regard to an existing timetable, integrating train paths in a regular timetable construction process under most favourable conditions.

The most significant result of the timetable analysis concerns minimum journey times between the Airports of Amsterdam and Frankfurt/Main. Fast freight trains operating at 140 km/h max. may cover the distance in approximately 4 ½ hours only under the following conditions;

- freight trains are prioritised similar to fast long-distance passenger trains;
- no major construction or maintenance work is undertaken on the routes chosen;
- conflicts with regional passenger trains and other freight trains can be excluded.

These strict constraints are effective against an acceptable timetable in terms of capacity. Besides, construction and maintenance work will undoubtedly affect railway capacity and operational quality in the long run. A six hour one-way service including loading and unloading can therefore be generally excluded.

The development of an integrated rail service network for time-critical cargo was intended to be developed in a second phase. Proposed solutions would have;

- met market demands in terms of transport times and time windows;
- met the availability of rolling stock by the railway operators, and;
- respected operational constraints such as journey times, train reversals, the change of locomotives, etc.

In an optimisation process rolling stock requirements and links between services would have been defined. Due to the cancellation of the project the development phase of this task remains uncompleted. The following work was successfully carried out;

- development of a European railway infrastructure model on the basis of the program system NEMO including the definition of operational constraints mainly in nodes;
- definition and description of airport nodes and integration of nodes in the model;
- calculations of distances and journey times by route and verification of results;
- assignment process on the basis of a preliminary freight flow matrix.

2.8 *WP 8; Dissemination*

2.8.1 Introduction and Aim

Work package 8 consists of continuous (during the lifetime of the project) activities relating to the communication and dissemination of the projects findings. The package has two main functions, that of internal communication, and that of external communication. Internal communication aims to ensure that communication and sharing of materials, results and findings within the consortium is effective and adequate, whilst external communication aims to communicate the results to parties outside of consortium. The overall objective of this work package is therefore to ensure that the project outputs reach and influence the decisions of key decision makers in relevant businesses and governmental departments.

The only official output of these tasks is the Deliverable 2 Document, the Communication and Dissemination Plan, however the ongoing task of communication formed the basis for this package.

2.8.2 Findings

The following section has been divided into a number of paragraphs in order to effectively outline the results of tasks and the items produced.

Communication Plan

CO-ACT is an innovative project and therefore the industry, media, knowledge institutes, governments and other participants are likely to be interested in its results. The project communication plan illustrates when, who, how, and what should be communicated, and defines the goals and purposes of communication in the project in general. The plan formed Deliverable 2 of the project and was submitted to the Commission in the second month of the projects duration.

The CO-ACT management team planned to inform parties who actively seek results and information, and those who were deemed to be important to the projects progress and future development. These parties formed the target audience for external communication. External communication was kept fairly low key during the early stages of the project and was to be implemented further when concrete, validated results became evident.

The CO-ACT consortium is large, hence the communication plan focuses not only on external, but also internal communication. Internal communication formed the basis of the communication needs within the consortium during the life of the project. The communication between parties in the consortium was kept at a satisfactory level throughout the life of the project.

It was found that the communication plan aided in the overall internal and external communication tasks.

Communication Items

Apart from the above mentioned deliverable, a number of noteworthy communication items were produced in this work package. The items serve the purpose for both internal and external communication and provide a first reference for dissemination purposes.

a. Brochure / Leaflet

A brochure has been developed to provide relatively detailed information on the CO-ACT project. The brochure contains information on the background of fast cargo trains and the reasons for the project, the potential of these systems within future cargo networks, activities involved in CO-ACT (including research and test trials), and a list of consortium partners. The brochure is essentially meant to provide external parties with a detailed view of the why, what, where and how of the CO-ACT.
A copy of the brochure has been attached in Annex 1

b. Flier / Fact-Sheet

A flier outlining the project has been created to generate interest in the project and to provide any interested parties with basic information. The flier is produced in colour to capture attention and contains relevant information on the projects background, goals and aims, the research and test trial contents, and the partners in the consortium. The flier is designed as an eye-catching summary of what CO-ACT is and why it is interesting.
A copy of the flier has been attached in Annex 2

c. Websites

The websites have proven to be a powerful method of communication between consortium members and between the consortium and the public. The websites have been well used for both internal and external communication, and have provided other projects (and the public) the ability of becoming aware of the existence, progression and innovativeness of the project.

Internal Website

The internal website has been constructed for internal use by consortium members. It basically provides a secure internal communication platform for a variety of purposes. All members have a login code and password, which allows them to view, upload and download project documents and informative items. In this way the internal website works as a central project database for all participants and provides a virtual area for document storage and sharing.

Information that is available on the internal website includes:

- Consortium specific information, including photos of members, meetings, and project related topics, addresses and mailing lists, and member tasks and duties;
- Website specific information, including a site map and a user guide;
- Completed documents, including the Description of Work, Deliverables, Communication plan, and Progress and Management reports. These have all been included in both draft and final versions for reference purposes;
- A dedicated area for each Work Package to store information, draft work, and idea items;
- Completed items such as the brochure and the flier;
- Schedules for meetings, agendas, and deliverables;
- Minutes and agendas of meetings held;
- Background information in the form of a project library;
- Any important internal and external communication that has occurred and is relevant for storage in the website files.

It was found that the internal website was highly useful for the consortium and it was possible to use the site extensively for internal communication and information sharing. A picture of the internal website homepage is shown in Annex 3.

External Website

The external website has been specifically developed to stimulate the external communication. It appears that this site has worked well for the consortium, as a number of outside responses have already been noted through this medium. The site URL is www.CO-ACT.org. It can be visited by the general public without restrictions. A number of important items on the site include:

- A clear and detailed description of the project, including objectives, philosophy and goals;
- A presentation of the consortium members;
- A description of the organisation and the project management;
- A selection of relevant and interesting links detailing background information;
- Any other public item generated by the project, such as the explanatory brochure.

A picture of the external website homepage is shown in Annex 4.

Exploitation and Dissemination of results

Exploitation and dissemination of the results were to be among the key activities of the project. During the lifetime of the project a number of opportunities arose for the dissemination of the information, even-though the dissemination of actual results has been limited as there have not been any concrete validated results ready for publication as such. The results obtained consist mainly of items of innovative progress focused on individual elements in the transport concept. As envisioned in the project dissemination strategy, dissemination of results would become more important when the project had reached validation stage, especially with respect to the results from work package 3 (concept development), and work package 5 (test trial 1). The test trials were to be a major external (public) communication phase and it was envisaged that the concept would then be publicised to a greater extent.

The general dissemination strategy was to communicate concrete, validated results to the outside world, rather than raise high expectations beforehand. Given the need to inform those that express an interest in the project, the external website (see section 6 of this report), and the flier and brochure were created which outline some of the key project activities. A number of external parties have shown interest in the CO-ACT project, some have been contacted by CO-ACT, others have contacted the team regarding associated initiatives being undertaken. Interested groups have included market parties, political and governmental parties, other similar projects, thematic networks, and other interested groups (like universities, etc).

Due to the unfortunate stopping of the project, the major validated results have not been able to be officially publicised, however exploitation of the findings mentioned above and the concepts developed will occur through relevant channels. This document forms a summation of the results which will be disseminated. Workshops and seminars are already being planned, and the knowledge generated is expected to be used in other (similar or associated) future projects. Refer to WP 9 Management for more detail on future dissemination.

The dissemination nature of this report indicates that this report is a direct outcome of this work package.

2.9 *WP 9; Management*

2.9.1 Introduction and Aim

Work package 9 consists of all activities which hold reference to the managerial functions within the consortium. The aim of this work package is to ensure that all work is being achieved in line with the common goals, along with ensuring that the day-to-day running of the consortium is effective and efficient. Items and activities such as organising meetings, distribution of managerial notes and housekeeping information, communicating with the EC and external parties, outlining the project goals and aims, ensuring all work is progressing at the necessary pace, ensuring compatibility between packages, settling disputes, and producing relevant reports and documents (regarding management) fall under this work packages scope.

The output of these tasks forms the Deliverables 1 and 13 Documents, the Progress and Management Reports (I and II), and the Mid Term Report.

2.9.2 Findings

Project General Management Statement; The project lifespan

The CO-ACT project ran from January 2002 up to August 2003, with finalisation tasks (and managerial tasks) ending in October 2003. The project brought together a consortium of 25 groups from university, industry, and consultancy sectors. The project was aimed at exploring the possibilities for Europe to transport air-cargo and other time-critical cargo (which would normally be transported by either air or road) via rail, and developing concepts to make this possible. The link between Amsterdam and Fraport was used as the major study connection.

The project consisted of 9 dedicated work packages, each focussed on a specific area of the research, development, and consortium functioning. Each of the work packages had a designated group of parties who were specifically assigned to tasks in which they had expertise. In a consortium of 25 parties vested in different countries throughout Europe, the management function of is critical importance, and, due to the interconnectedness of the tasks and work packages and the array of parties undertaking work in the packages, effective communication and management was paramount.

In the 18 months of the CO-ACT project, the consortium worked well and was achieving the goals it set out to achieve. The parties were working hard to develop interesting and innovative ideas into concepts. The overall concept development was progressing steadily as the individual points were being carefully detailed. The consortium was striving for a high standard and a thorough coverage of the material presented, ensuring that all important aspects were pursued to full extent and that the concepts developed met the desired criteria, expectations, and requirements.

Communication between members was good, and numerous meetings were held, (as discussed below) with positive and highly fruitful results. Work package leaders were eager to complete the packages on time, however this was not always possible due to varying reasons. Delays on submission of reports and deliverables were however not excessive and reasons for delay have been valid.

The non-acceptance of the Mid Term Report in April 2003 was a major setback for the project. The progress was unfortunately slowed from this date onwards by the uncertainty that the consortium members felt in relation to the outcome of the discussions with the EC, and the associated financial reimbursement possibilities. This uncertainty meant that it was impractical for some parties to continue until some certainty is gained. These proceedings led directly to a three to four month delay for all parties. The implementation of the Project Support team at this stage to support the Management teams function was highly effective. The dissolution of the contract in August 2003 meant that many items of work remained incomplete. This stage served to be highly challenging for the management of the consortium. No major problems were however encountered within the Consortium or management structures and it was found that the parties worked well together and that management was adequate.

A major strength of the CO-ACT project was the consortium itself. The inclusion of many important and dedicated groups in the air- and time-critical cargo sector throughout Europe, provided CO-ACT with a unique opportunity to innovate in this area. It is therefore disappointing to have the project terminated prior to the completion of the work and the possibility to finalise, validate and disseminate all the results of the studies within the scope of CO-ACT. Plans are being made to validate and disseminate the results of the project via other channels. The project consortium will therefore be given a good opportunity to share the knowledge generated with other groups and projects so that they may learn from what CO-ACT found.

Meetings

The project saw an extensive number of meetings take place in order to exchange information and to make decisions. The meetings have included Management Team meetings, Project Support Team meetings, (including combined MT and PST meetings), individual Work Package meetings, Work Package leader meetings, and two day whole consortium meetings and workshops. The introduction of the Project Support team to assist the Management team at mid-term proved to be a positive step in the overall working of the project.

Whole Consortium meetings

The CO-ACT consortium held a number of whole consortium, 2-day meetings throughout the lifespan of the project. The first was held as the *kick-off* meeting, January 2001, held in Amsterdam, the second was held in Vienna, September 2001, and the third was held in Berlin at the mid-term phase, May 2003. The meetings were used to discuss the project, its aims and goals, its direction and progress. The meetings provided an excellent method of ensuring that all partners were clear on the goals and aims and were achieving results. The meetings also provided a great chance for people to work closely with the other partners in the consortium.

Management Team Meetings

The management team consisted of members from the major partners in the consortium (Schiphol, EveCo, Rups and Erasmus). Numerous management team meetings were held during the project lifespan to discuss work being achieved, requirements for the project, and the objectives of the individual work packages. The management team meetings were based around organisational and managerial tasks, and handled issues in broad outlines. The project support team was created to handle more in-depth (work package related) issues.

Project Support Team Meetings

The Project Support Team was created in April 2003 to allow better control and insight into the project work packages, and in general was designed to focus more on technical aspects. The team consists of two separate groups, focussing on work packages 2, 5, and 6, (consisting of members from Logitech, TX Logistik, Jan de Rijk, Fraport, and Lödige) and work packages 1, 3 and 4, (consisting of members from Erasmus University, TU Berlin, AUEB, and Universität Hannover) respectively. The project support teams aimed to combine work packages which had interrelated goals, and therefore allowed a better technical understanding of issues within groups and a better representation of issues at meetings. The project support team frequently met together with the management team in order to ensure all knowledge and achievements were effectively communicated.

Extra-Ordinary Meetings

Two extra-ordinary meetings were held at very short notice with the Management Team and the Project Support Team present following the notification of the Mid Term Report rejection. These impromptu meetings were aimed at discussing the continuation options for the consortium after the disapproval. These meetings were found to be highly effective.

Work Package Leader Meetings

The project has 7 work package leaders, each responsible for one of the work packages, or in the case of EveCo and Schiphol, two packages. The work package leaders were Erasmus University, Rups, TU Berlin, AUEB, EveCo, Fraport, and Schiphol. The leaders met at numerous times during the project to dicuss directions and and interrelations, exchange ideas, and update information on how the project was progressing.

Work Package and Task Meetings

Apart from the more formal meetings listed above, the members of the various work packages met on a frequent basis in order to discuss work packages and particular tasks. These meetings formed the basis for work being done and ensured that everyone was up-to-date with allocated tasks and was actively involved in the project.

In General

Attendance at the meetings has been exemplary. The meetings have ensured that work was continuing at the required level and pace, and that all members were well informed about the status of the project. The members who were unable to attend certain meetings ensured that they had been excused prior to the meeting, in some instances meetings were rescheduled to ensure a positive attendance. Not all meetings were carried out face-to-face, some of the meetings were organised through telephone conference facilities. E-mail and telephone were extensively used for communication purposes.

Agendas and minutes of meetings can be found on the internal website of the CO-ACT project. These formed part of the managerial role of the project and were regularly updated.

Project Results and Future Use

The progress made in the project has concluded a number of important results, and the knowledge generated during the project is vast. The team members have attained a wide variety of insights into the creation and innovativeness of the project and will in future be able to use this knowledge for further work into the subject.
Major results of the project which have been submitted in a formal report (complete or not) include;

- Deliverable 3: Production and Demand Analysis;
- Deliverable 4: Solutions for Compatibility and Interconnection;
- Deliverable 5: Development of Inter-modal Air/ Rail Cargo Transport Concepts;
- Deliverable 6: Validation Methodology;
- Deliverable 8: Generic Solutions for Interconnection.

Other results obtained include;

- Insight into running a test trial, and into the requirements;
- Examples of possible test trial scenarios, including all necessary data, calculations and requirements;
- Insight into what is necessary for such an innovative network;
- Insight into the bottlenecks and hurdles for such a network;
- Insight into possibilities for future cargo transportation;
- Insight into the logistical background of cargo transportation;
- Insight and experience into the management and functioning of a large project consortium.

It is expected that these results, observations, studies and analyses will be disseminated through a number of activities being planned by the consortium, including a final symposium to be held on the afternoon of the 16th of December 2003, at Schiphol Airport.

3 Conclusions

In conclusion, a number of observations can be made;

- WP 1 showed that there is definitely a market potential for fast train transport of cargo, and that facilities throughout Europe can be developed to serve as multi-modal transhipment points;
- WP 2 showed that transhipment is a key friction area in the multi-modal chain and that through harmonisation of load units, transhipment equipment and administrative procedures and technology this friction can be lessened;
- WP 3 produced a number of interesting concepts for terminals and overall systems which would fulfil the requirements of the system, the characteristics set by WP's 1 and 2, and the requirements set by the users;
- WP 4 produced a detailed procedure for the validation of concepts and showed that both qualitative and quantitative results can be included in the multi-level assessment of concepts;
- WP 5 demonstrated that the realisation for fast cargo transport by rail is possible with the right approach, and details the important areas of focus and procedural approach for such development;
- WP 6 developed a concept design scenario based on a case study for Fraport, hence producing a platform on which to build development scenarios for other inter-modal terminal situations;
- WP 7 developed a simulation model specifically tuned for such networks as CO-ACT, and allows the implementation of the model for the design of effective and efficient networks within Europe.
- WP 8 produced some useful items for communication purposes and ensured that communication was sufficient throughout the project lifespan. Final dissemination of results will take place at a later stage.
- WP 9 effectively managed the large and widely spread consortium through the lifespan of the project.

4 Documentation List

This section has been included to show a list of documents created by the work packages and used to compile this report;

Deliverable Document	Output from WP	Subject	Comments
1	9	Reference Framework	Submitted and Approved: Month 2
2	8	Communication and Dissemination Plan	Submitted and Approved: Month 2
3	1	Production and Demand	Submitted and Approved: Month 12 Extension: Month 21
4	2	Compatibility and Interconnection	Submitted in Draft: Month 21 Submitted as Final: Month 22
5	3	Inter-modal Concepts	Submitted: Month 22
6	4	Validation	Submitted: Month 22
7	5	Test Trial 1 Report	Submitted: Month 22
8	6	Generic Solutions	Submitted: Month 22
9	6	Frankfurt Scenario	Submitted: Month 22
10	6	Smart Inter-modal Node Trial Report	Submitted: Month 22
11	7	NEMO model	Submitted: Month 22
12	7	Network designs	Submitted: Month 22
13	9	Final Synthesis Report	Submitted: Month 22
PR1	9	Progress Report 1	Submitted and Approved: Month 7
PR2	9	Progress Report 2	Submitted and Approved: Month 18
MR1	9	Management Report 1	Submitted and Approved: Month 13
MR2	9	Management Report 2	Submitted and Approved: Month 18
MTR	9	Mid Term Report	Submitted and but not Approved: Month 14 Resubmission: Month 18

5 Annexes

The following Annexes have been included for additional reference.

Annex 1: CO-ACT Communication Brochure / Leaflet
Annex 2: CO-ACT Communication Flier / Fact-Sheet
Annex 3: Internal Website Homepage
Annex 4: External Website Homepage

CO-ACT: Creating viable concepts for COmbined Air/rail Cargo Transport
An EC project of the Competitive and Sustainable Growth Programme

CO-ACT

CO-ACT is an international project under European Commission's Fifth Framework Programme for Research, Technological Development & Demonstration, Competitive and Sustainable Growth Programme, Key Action 2 "Sustainable Mobility and Intermodality", co-ordinated by the Directorate-General for Energy and Transport (DG TREN). Within the project there are two central issues: researching how fast cargo-trains and networks should be developed within Europe and experiencing in several test trials how fast cargo-train concepts should be exploited.

Fast cargo-trains

International fast cargo-transport by rail isn't comparable with traditional rail transport of bulk, chemicals and containers. Fast transport is a new concept, primarily focused on relatively light merchandises: consumables on their way from factories and distribution centres to outlets; mutual deliveries of semi-manufactured articles, parcels and time critical palletised cargo. The main transport takes place by train, the pre- and end-transport by truck.

Fast rail-transport of air freight and other time critical cargo can use dedicated cargo-trains or combined passenger/cargo-trains. Whatever the choice may be: it is important to synchronise with the driving characteristics and dwell times of the dominant trains on the rail network, because of the lack of capacity on the rail network. The dominant trains are the passenger trains. Fast cargo-trains for air cargo and other time critical freight will drive under a fixed schedule. The synchronised driving characteristics and the fixed schedule are necessary conditions to fit in a high frequent service into the already crowded rail network.

On international origin-destination connections, it becomes more and more difficult to realise fast transport by truck at acceptable costs. National governments make this happen by raising costs and sharpening rules for the use of infrastructure. Besides, the backbone of Europe's road network becomes more and more congested. As an interesting alternative to road-transport, fast rail-transport of air freight and other time critical cargo is expected to become a big player on a European scale. Therefore the presence of a backbone for a European rail network is taken into account by planning distribution and production locations.

Potential for time critical rail-transport

A number of market developments indicate an increasing potential for inter-modal time critical cargo- / rail- transport. Currently, transport for time critical cargo is mostly entrusted to trucking companies.

These trucking companies integrate flows and create own networks in order to decrease costs and improve service levels. Both the trucking and integrator networks could offer non-airline based freight for time critical and fast rail-transport of air freight and other time sensitive cargo within Europe.

The integrator market will see a fast development in the coming years influenced by the growth of European integrators out of the express and postal organisations, the accelerating growth in the use of e-commerce (internet purchases) and the penetration of some integrators into the traditional airport-to-airport market. As a consequence, it can be expected that the integrators will generate an impressive demand for new integrated inter-modal ground-transport services (especially high speed).

In the context of these developments and the extensive rail network available, inter-modal cargo-transport for time critical cargo by rail will become an interesting alternative to trucking. Different initiatives are taken to start these developments and make it commercially viable. CO-ACT is one of these initiatives.

Developing new distribution networks

The time critical cargo and air transport sectors will not shift to rail-transport, unless the rail sector will provide it with services that seamlessly fit into the logistics chain in which airlines have part. Rail connections should be provided at a high frequency of 2 to 4 connections per day at regular intervals, to become integrated in the networks of airlines, integrators, industries and retail distributors. Given the relatively small demand for capacity from individual companies, these frequent train services can only be provided through consolidation or combinations, such as:

- Combining air cargo with other time critical and high value cargo (e.g. express cargo);
- Combining time critical freight and passenger trains.

In the long term, one can consider the development of an extensive rail network between airports being the 'main ports for time critical shipments'. Main connections with fast cargo-trains or combined passenger/cargo-trains do not have possibilities to proceed on local rail tracks to access individual plants and distribution centres. Thus, large transhipment terminals and innovative forms of local feeder transport will develop.

CO-ACT's general objectives

Main objectives of CO-ACT are the development of concepts for fast cargo-trains at a European level and the development of inter-modal transhipment systems, improving sustainable mobility. This will result in:

- An overview of the most promising innovative concepts for fast rail-transport of air freight and other time critical cargo in the EU. Concepts will be validated on the basis of their economical, commercial, organisational and technical viability.

- Insight in the most promising technologies for transport and transhipment.
- Recommendations for the harmonisation of ULD's.
- Practical experience out of a pilot train between Amsterdam Airport Schiphol and Fraport.

Project elaboration

CO-ACT is focused on research as well as on test trials. On short term the test trials are leading within the project and will therefore steer the research part. With respect to the long term developments within the CO-ACT project, the research part will use results out of the test trials.

The three pilots are the following:

- Test Trial 1: testing a timetable-driven operation of a fast cargo-train between the airports of Amsterdam and Frankfurt under commercially viable conditions: offering higher door-to-door transport speed against competitive costs compared to truck-only transport solutions.
- Test Trial 2: case study for Frankfurt: examining how to develop an inter-modal air freight terminal with scenarios for a time horizon up to 2015. This case study will provide clues on how to put the realisation of rail freight terminals at airports as future nodal points. The case study should be a basis for the development of generic concepts for the integration of full-service rail-based freight centres with other facilities at airports.
- Test trial 3: the evaluation of different approaches and chances of a successful network for fast rail-transport of air freight and other time critical cargo by simulating rail-transport strategies, taking into account information on demand and production, as a management tool for operators and their clients to design and evaluate viable inter-modal transport concepts.

CO-ACT's research activities concern:

- A production and demand analysis, indicating the operational opportunities and restrictions and logistic requirements for initiating time critical cargo concepts in the current situation within Europe:
  - Analysis of current operations in the classical air cargo and integrator chain
  - Availability of transhipment facilities and infrastructure
  - Existing rail concepts for co-loading opportunities and stand alone applications
  - Air/rail concepts that already have been developed (realised or not)
  - An indication of commercial opportunities and operational requirements for concepts of combined air cargo-transport
- An analysis concerning compatibility and interconnection, developing solutions towards the standardisation or harmonisation of air/rail/road ULD's and accompanying (time) efficient (and potentially also value adding) transhipment facilities, administrative procedures and information systems.
- The development of concepts, using the information of the previously described research activities, in order to develop a number of potentially viable concepts consisting of origin-destination pairs, technical and operational characteristics and types and roles of actors involved.
- A validation of concepts as defined in previously described research solutions. The most promising concepts will be identified. An industry validation group and an advisory board will constitute the quality control regarding practical usefulness of the validation results.

The CO-ACT Consortium

CO-ACT started on January 1, 2002 and will terminate at the end of March 2004. The project will be carried out by a consortium of 25 European partners The following companies and research institutes are the consortium members:

Industrial partners:

Coordinator: Amsterdam Airport Schiphol (NL);
Fraport (D);
Jan de Rijk (NL);
Air-/Rail Cargotransport – Lödige (NL);
Netlog Netzwerk-Logistik (D);
Lufthansa Consulting (D);
Danzas Euronet (D);
Aalsmeer Flower Auction (NL);
S-Rail Europe (D);
Österreichische Bundesbahnen (A);
KLM Cargo (NL);
SNCF (F);
Cargonaut (NL);
ANA-Aeroportes (P).

Research partners:

Erasmus University Rotterdam (NL);
Hannover University (D);
Technical University of Berlin (D);
Athens University of Economics & Business (EL);
Technical University of Delft (NL).

Advisors and consultants:

Rups Consultancy (NL);
EveCo Software (A);
Kessel + Partner (D);
Triangle Management Services (UK);
TIS.PT (P);
Logitech (NL).

Information

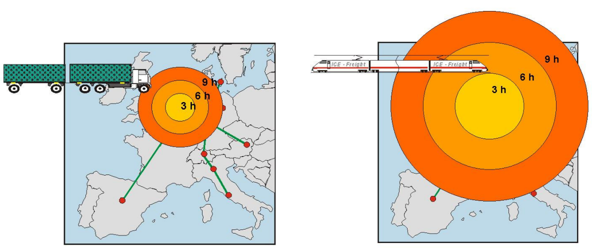
For more information, please contact us through the project website : www.CO-ACT.org creating viable concepts for **CO**mbined **A**ir **C**argo **T**ransport

Developing a fast cargo train network for time-critical freight transport in Europe

Fast cargo trains

The demand for international fast cargo transport by rail is far from comparable to that of traditional rail transport of bulk, chemicals and containers. The fast cargo train as we envision it is a new concept, primarily focused on relatively light and high value merchandise: consumables, parcels and time critical palletised (air) cargo.

Speed of service will be comparable to that of regular passenger trains, enabling the use of track slots previously only available to passenger trains. In this way, throughput time will better competitive present solutions: fast cargo services by road.



Strategic importance of fast cargo trains

Main ports depend on their catchment area and connectivity. On international origin-destination connections however, it becomes increasingly difficult to realise reliable and fast transport by truck at acceptable costs. As a result, the catchment area of airports is diminishing.

As an alternative, a network of fast cargo trains could provide the backbone for a fast, efficient and reliable transport system for time-critical goods transport. To secure their catchment area, airports in future need to be connected to this high-speed rail freight network that connects airports to other logistical nodes.

Currently, the connection of airports to (high-speed) passenger rail networks is considered a strategic advantage, placing them in the centre of the transport system.

In the medium to long term, being connected to future fast cargo train networks will be of similar importance. It will guarantee the position of the main airports as freight hubs and support the attractiveness of airport regions as centres of high-value logistics-based activities.

Developing new distribution networks

The time critical cargo and air transport sectors will shift to rail transport if the rail sector will provide it with services that seamlessly fit into the logistics chain of which airlines are part. To become integrated into the networks of airlines, integrators, industries and retail distributors, rail connections should be provided at a high frequency of 2 to 4 connections per day at regular intervals. Given the relatively small demand for capacity from individual companies, these frequent train services can only be provided through consolidation or combination, i.e. combining air cargo with other time critical and high value cargo, such as express cargo.

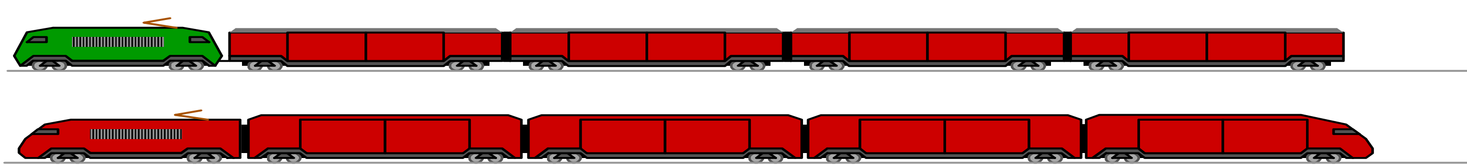
Introducing CO-ACT

A network of fast cargo trains cannot be established overnight. In the CO-ACT project, a consortium of industry partners and research institutes works together to study the development of fast cargo trains and networks within Europe.

The project has a two-fold strategy. On the one hand, it takes a long-term perspective by researching the issues, including:

- the demand for fast rail services
- compatibility and integration within existing transport concepts
- network and transhipment technology

On the other hand, CO-ACT is working on a test trial, testing in practice a scheduled fast cargo train operating between the airports of Amsterdam and Frankfurt under commercially viable conditions.



creating viable concepts for

CO mbined A ir C argo T ransport

Developing a fast cargo train network for time-critical freight transport in Europe

The test trial train

The test trial train will run between the airports of Amsterdam and Frankfurt for a period of one week. In determining the train concept, user requirements are of prime importance. To comply with the overriding objective of transport time, the key requirement identified by the test trial team was an elapsed time for train loading, transport and unloading of the first 4 'swap bodies' on the train of less than 7 hours.

The specification for the service provider has not yet been completed. There are currently two highly critical elements to be addressed:

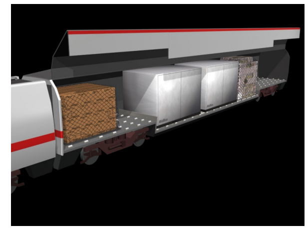
- Finding train paths that match the desired timetable
- Selecting the best possible terminal in the vicinity of Amsterdam Airport.

In co-operation with the relevant parties, the test trial team is working towards solving these and other challenges.

Who is involved in CO-ACT?

CO-ACT is an international project under the European Commission's Fifth Framework Programme for Research, Technological Development & Demonstration, co-ordinated by the Directorate-General for Energy and Transport (DG TREN).

CO-ACT started on January 1, 2002 and will terminate at the end of March 2004. The project is carried out by a consortium of 25 European partners.



The consortium consists of the following companies and research institutes:

Industrial partners
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Jan de Rijk (NL);
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Cargonaut (NL);
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Technical University of Berlin (D);
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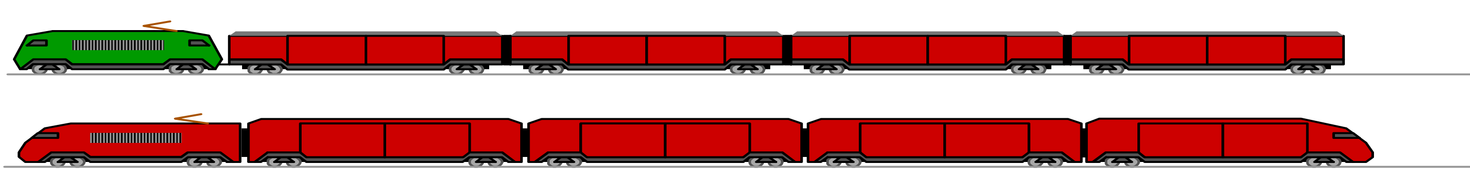
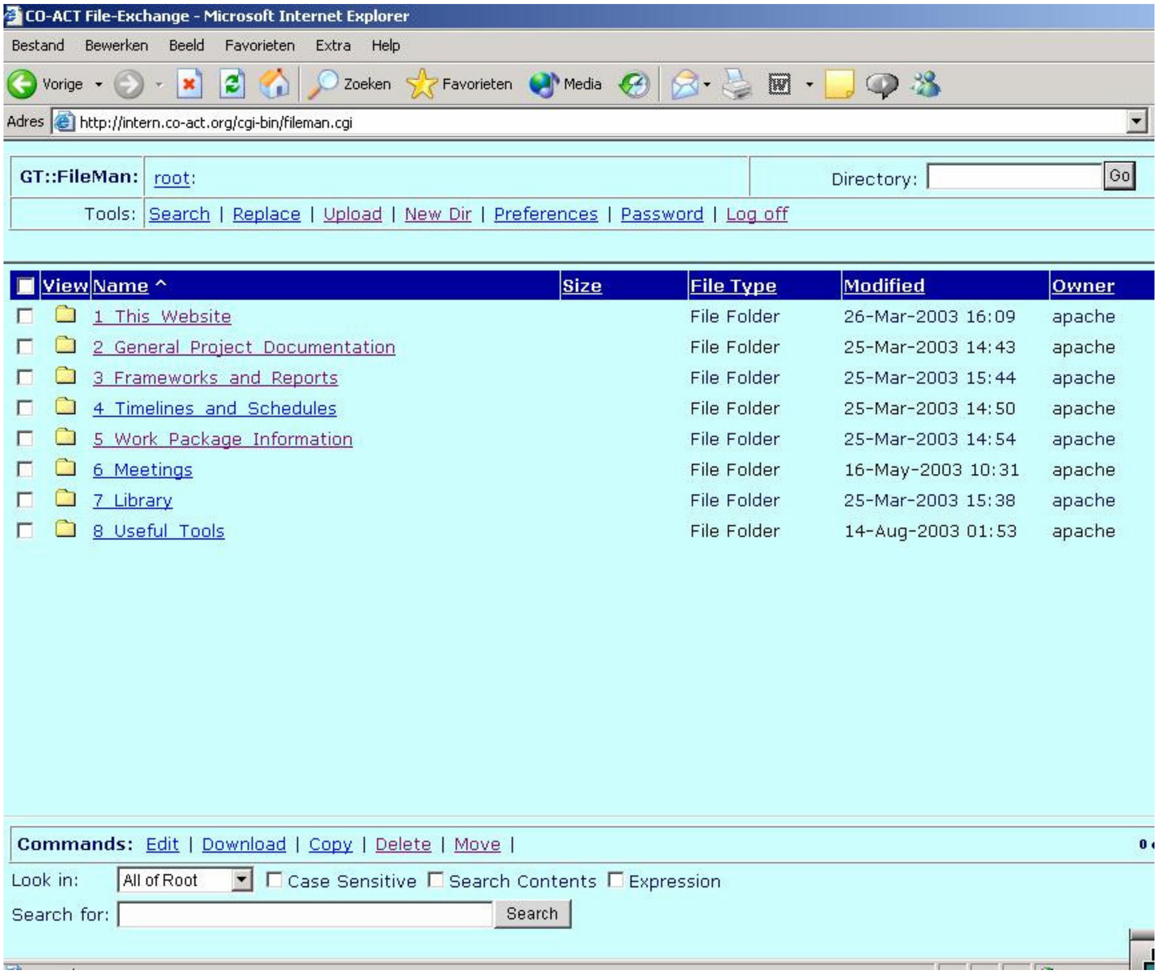
Triangle Management Services (UK);
TIS.PT (P);
Logitech (NL).

Information

For more information about CO-ACT, please feel free to contact the project coordinator Mr. Jan Katgerman on +31 (10) 246 26 06, or contact the CO-ACT management team via the project website: www.CO-ACT.org



Annex 3: Picture of Internal Website Homepage



Annex 4: Picture of External Website Homepage