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Shared-cost RTD and Demonstration Project

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NESTE(AR)	Nouveaux Espaces de Transport en Europe (Application Recherche)
UIC	Union Internationale des Chemins de Fer
SGKV	STUDIENGESELLSCHAFT FÜR DEN KOMBINIERTEN VERKEHR e.V.
ST	star/trac supply chain solutions GmbH
DB Systems	Transport-, Informatik- und Logistik-Consulting GmbH
TØI	Institute of Transport Economics
VR	Finnish Rail
VTT	Technical Research Centre of Finland

COMPETITIVE AND SUSTAINABLE GROWTH
(GROWTH) PROGRAMME

REPORT SUMMARY FICHE

SUMMARY

This document describes the user needs for the project and gives the synthetic view of existing systems in order to get a final selection for the demonstrator.

Warning : The annexes in the chapter “5.4 Other annexes” are imbedded documents in PDF format, in their original layout as produced by the contributors.

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1 Introduction

This document is based on several deliverables provided in the different tasks in WP 200 and addresses user requirements from all CroBIT customers. Careful attention was given to existing capabilities and future needs so that the CroBIT system can be scalable as new functionality is needed.

Customer interviews revealed two primary needs that the system must address:

- tracking and tracing information providing total shipment visibility for international service; and
- a unique interface with all transport providers that enables users to define their own information requirements and services provided by the CroBIT system (i.e. report generation, type of trace, etc.)

These needs were repeatedly pointed out by different organisations that represented rail freight customers. Annex 1 shows the evolution from the present stage to CroBIT.

1.1 Objectives

The objective of CroBIT is to monitor consignments, wagons and trains on the railway network in Europe. This system is used to provide a value-add service for railway customers but can also be an important tool for the different actors in the logistic chain, (i.e. Train Operating Companies, Infrastructure Managers, customs officials, subcontracting operators, terminal operators, service integrators, fleet managers, etc).

CroBIT is an information system that integrates and disseminates delivery management, transport location and status information. Primary users are European railways (both railway undertakings and infrastructure managers), logistics service providers, end-customers and possibly non-EU railways. Waybill information about railway wagons, multi-modal transportation and container consignments provided by these parties can be processed in CroBIT and disseminated globally by using the latest Internet techniques and information security solutions.

It is noteworthy that CroBIT should not require any new manual input, as it is based on existing data handling capabilities of different parties. On the other hand CroBIT is able to complete original consignment information by adding data received from various partners, such as reason codes for delays, trip plan information or actual arrival dates and times. Furthermore CroBIT is using best practice software already developed.

For a comprehensive explanation of existing systems and applications, refer to Chapter 6 ‘State of the Art’ and the associated annex.

CroBIT will form an essential bridge between material and information flows. Conventionally cargo moves as transport companies operate. Information flow (i.e. transport documents) follows either on board or electronically from application to application. But as goods leave the place of departure there is no exact information on the movement of goods until it arrives at final destination. CroBIT will fill this gap by providing on-line data about the location and status of transport equipment (e.g. railway wagon or container) and cargo.

CroBIT should NOT substitute any operational systems rail freight operators, infrastructure managers or logistics service providers already have. Instead it will serve as an interface between all actors,

customers and carriers and may also support their e-commerce development. CroBIT also provides an improved level of reporting based on event data retrieved during the journey.

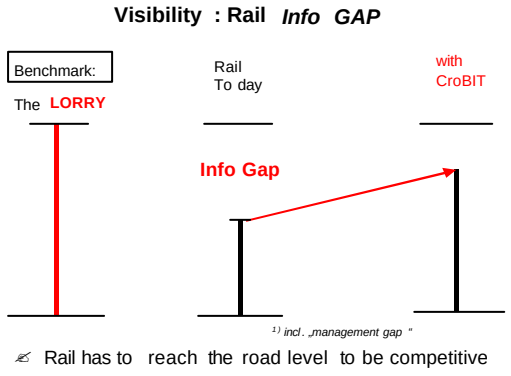
CroBIT will have the following results:

- full delivery chain monitoring of consignments from end-to-end rail points, including exception reporting
- more efficient planning of a) freight operations, b) wagon capacity and rotation, c) border crossing operations, d) other operations e.g. storage and terminal operations, etc.
- more efficient utilisation of infrastructure capacity
- seamless intra-EU rail freight transport
- easy-to-use and low-cost customer interface for all customers and parties wishing to utilise the system; the customers and logistic chain operators are kept informed about predicted arrival times
- improved information exchange between parties based on existing international freight information messaging standards (e.g. EDIFACT messages)
- Improved customer service and rail industry image

1.2 The CroBIT Advantage

In choosing a mode of transport, freight customers are looking for a combination of price and service reliability. As was pointed out in the SITA Airline IT Study of 2003, the application of information systems and data exchange services have shown that airline companies can dramatically increase their service reliability and lower their operating costs. Providing reliable, timely information to partners in the transport chain allows effective decision making in the case of service interruption. Information exchange is the key to total shipment visibility.

In international freight traffic, rail is not competitive compared to lorry in part due to the lack of shipment visibility between all partners in the transport chain. Lorries can provide real time information and ETAs from origin to destination. However international rail service is a network business and is prone to the “Information GAP”.



CroBIT, as a central site repository of shipment information, serves to bridge that gap. It will integrate information from the network partners, providing them with current information on the shipment. This will make it possible for the partners to provide revised ETA’s in the case of incidents in transit. It will

also provide a unique point of inquiry for CroBIT customers, a functionality which is particularly important for end-users.

The “Unique Selling Position” of CroBIT is based on the criteria that were defined in the call for tender (5. FP of the EU) which specifies two methodologies:

Bottom up Approach

CroBIT must be scalable, respecting existing capabilities of the network partners as well as providing for future functionality as needs develop. Therefore, best practice software and systems were analysed for applicability, along with the suite of existing standards and practices of data exchange which exist today. The advantages of building on existing solutions are:

- Quick migration of IT-Systems
- Quick adaption (open access Software)
- Quick demonstration capability by using:
    - Best practice systems, i.e. already operating, examples:
        - Railtrace (VR Cargo)
        - Topas (ICF)
        - Intelligrator (star/trac)
        - ORFEUS
        - HERMES
    - Checkpoints of existing software
        - For data initiation
        - For data retrieval
        - Integration of Third Parties (“agencies”)
    - Application of existing, standards
        - UIC Leaflet No. 404, 407 (Exchange rules for RUs and IMs)
        - ORFEUS (Waybill Exchange)
        - TSI (Technical Specification for Interoperability)
        - HERMES Applications (RU exchanges of events and consists)

Corridor Approach

A corridor approach will used to demonstrate the CroBIT system that is further detailed in deliverable D1. The corridor must be customer driven, have common participant objectives throughout the corridor and have a low rate of interdependency. The corridors evaluated were:

Corridor East:/West:

FC: VW, IKEA Rail N.N.

RU: DB,SNCF, RENFE / CP

IM: vice versa

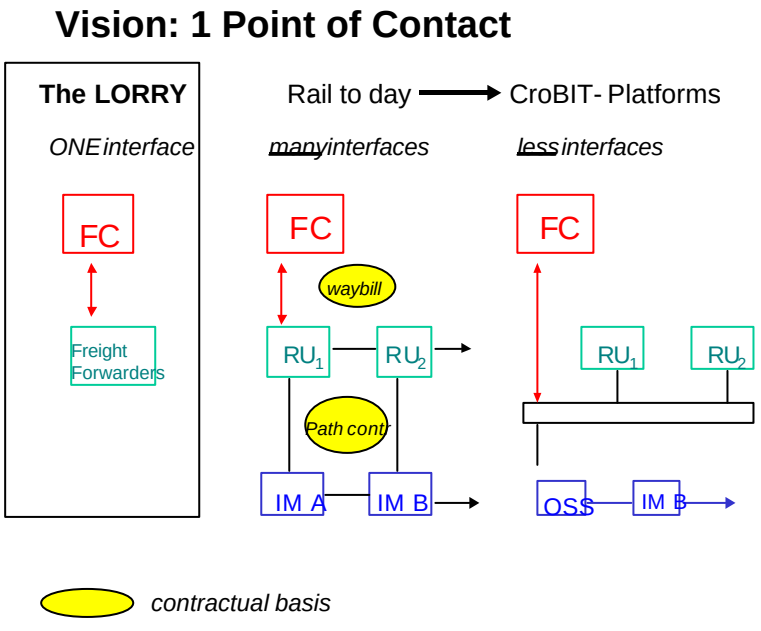
Corridor North/South:

FC: Storaenso, BASF, N.N

RU: tbd

IM: Europtirails with relevant IMs

Additionally, CroBIT will use road haul as the benchmark model concerning IT systems, which presents a single point of information for the user. Alternatively, international rail transport is a network business that necessitates many different interfaces to back office systems. This causes more burden on the customer to connect with various trading partners. The CroBIT advantage is that it will provide a single point of access for the customer and will also be internet enabled to provide additional flexibility.



The CroBIT demonstrator will provide a central repository for information from all stakeholders in the transportation chain, allowing a global view of the movement. In addition, the CroBIT demonstrator will make the necessary linkages to provide information on various levels: Consignment, Wagon/ITU and Train, no matter how the information is reported.

CroBIT will demonstrate this information access based on specific corridors and controlled events.

1.3 CroBIT Requirements

Design of the CroBit Information System should fulfill end-users' needs for operational efficiencies and monetary savings achieved through system's installation and exploitation.

Therefore, the requirements for reduction of

- Overall freight delivery cycle, and
- Transaction and labour costs

have been recognised as basic parameters guiding the design of functionality delivered by CroBit Info-system.

CroBit Info-System's Functionalities Reducing	
Delivery Cycle Time	Transaction & Labour Costs
On-line incident reporting shall compress the time and enhance opportunity for more precise scheduling of border crossings	**Frequent updates on load movements between different RUs shall improve contingency planning, reducing costs and penalties caused by delays.**
On line link-up of interlining RUs shall enhance chances to trace and track load and empty units in motion and at rest	**Access to CroBit data base shall increase utilisation levels of available rolling stock and load carrying capacity. This can provide significant increases in fleet utilisation and loaded cycles**
On-line communication between infrastructure managers shall lower margins for scheduling and departure/arrival errors	**On-line communication between upstream and downstream interlining RUs and infrastructure providers shall reduce frequency of unwanted incidents and needs for extra resources to cope with higher costs of delivery**
Sending/receiving waybill or proof of delivery via internet shall create alternative to manual filling of consignment delivery documents	**On-line communications can reduce transaction costs by saving labour costs of handling paperwork, reduce paperwork errors and provide timely and accurate information.**
Communication between several RUs shall improve inter-rail interoperability and cut down the total haul-time	**Online incident reporting and traffic monitoring provides for more efficient planning of the upstream transportation providers.**

1.4 Main functions

Tracking and tracing of goods and vehicles form the core CroBIT service which can enhance the operational systems of the stakeholders. CroBIT follows the movement of cargo during the transportation chain from the departure station to the arrival station.

Incidents in transit and pre-defined events will be reported to the system and retained for operational support and post-trip analysis. Road haulers can also participate in this service and thus make it possible to include pre- and on-carriage visibility.

The system will provide automatic notifications of exceptional incidents, thus providing a higher element of control over the transport chain. If a consignment does not meet its estimated time of interchange or estimated time of arrival the system informs all agreed parties and recalculates the remaining timetable. This will give the upstream partners a better opportunity for contingency planning. These features enable users to better plan their internal operations.

Information will be provided by CroBIT partners who are European railway undertakings, infrastructure managers, wagon owners and operators, shipping line agents, container operators, terminals or freight forwarders on selected corridors. In order to facilitate data collection, the partners may transmit data automatically from their application or by using other technologies i.e. GPS positioning system or Automated Vehicle Identification (AVI). A limited amount of information may also be manually entered into the system. Information will be housed in a centralised database accessed only by authorised CroBIT users.

User access to the system is provided by an Internet browser; therefore no additional investments are required. Utilising user identification and password, the user will have access to allowed information relating to his transport transactions. As CroBIT serves as a repository, centrally updated by the partners, the data quality should be more timely and accurate than by using bi-lateral data exchange. Data will be edited for accuracy and timeliness prior to update. This provides a higher level of data quality than exists in bi-lateral communication.

Information security is of major importance. User identification and password identify each user and the connection will be protected by the application of encryption technologies to be identified in later work packages. It is essential that access authority to information is well defined to ensure a trusted service environment.

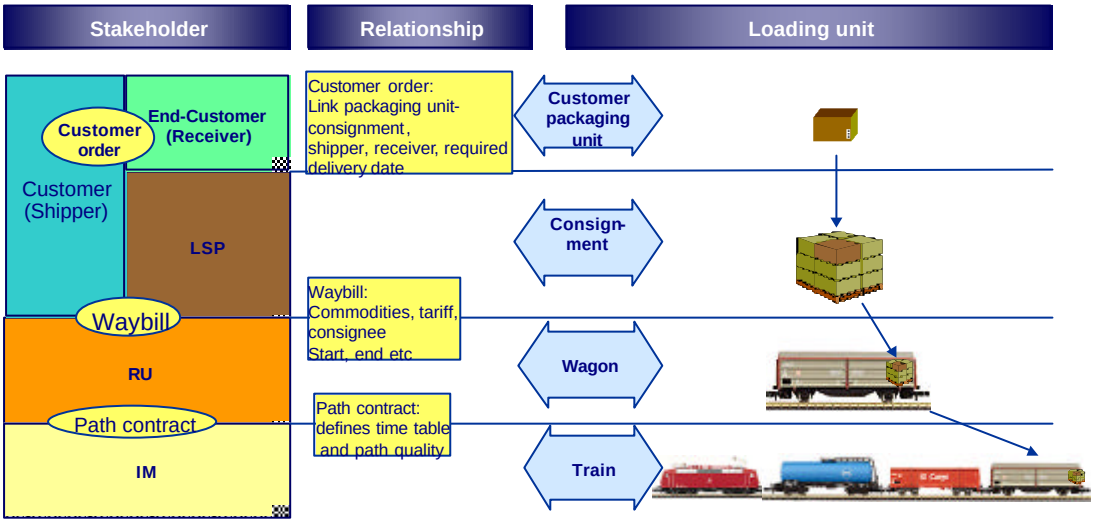
Other techniques for information access other than PC's may also be facilitated. As mobile technology and wireless applications become more mature it could be foreseen that various other devices may be utilised when using the system from remote locations.

1.5 CroBIT Users and their Information Needs

The primary CroBIT customers are European railway operating companies, infrastructure managers and other railway supporting logistics service companies such as train ferry companies, shipping line agents, container operators, general cargo operators, freight forwarders and border crossing authorities. CroBIT will contract with these companies/organisations to run the system on selected corridors.

These companies will also act as partners for CroBIT. They will provide CroBIT with waybill and status information and if required they will receive respective information in return.

Naturally, end-customers form an interesting user group for the service. Trading companies want to get better hold on their supply chain, and CroBIT substantially improves that control when goods flow on rail network. It is the users who have the power to influence their transport service requirements and how big a portion railway will gain.



As illustrated in the figure above, each category of CroBIT partner has different information needs and capabilities. Starting on the lowest layer, the IM will be reporting and receiving information on the Train level. The RU will be using information on the Wagon or ITU level and the Customer/LSP/Authority is normally interested in information on the consignment level. The CroBIT system will be able to integrate this information, using a combination of the Waybill and Event reporting and can provide appropriate information depending on the type of user. Each user of the system may rely on the linkages to integrate that information into their respective systems.

1.5.1 Defining User Requirements – User Forum A

The User Forum was organised to gain a deeper understanding of the needs of the users. These needs were identified from two distinct groups of users: End-customers and transportation providers in the logistics chain.

The CroBIT concepts were validated by both user groups and the primary needs identified were:

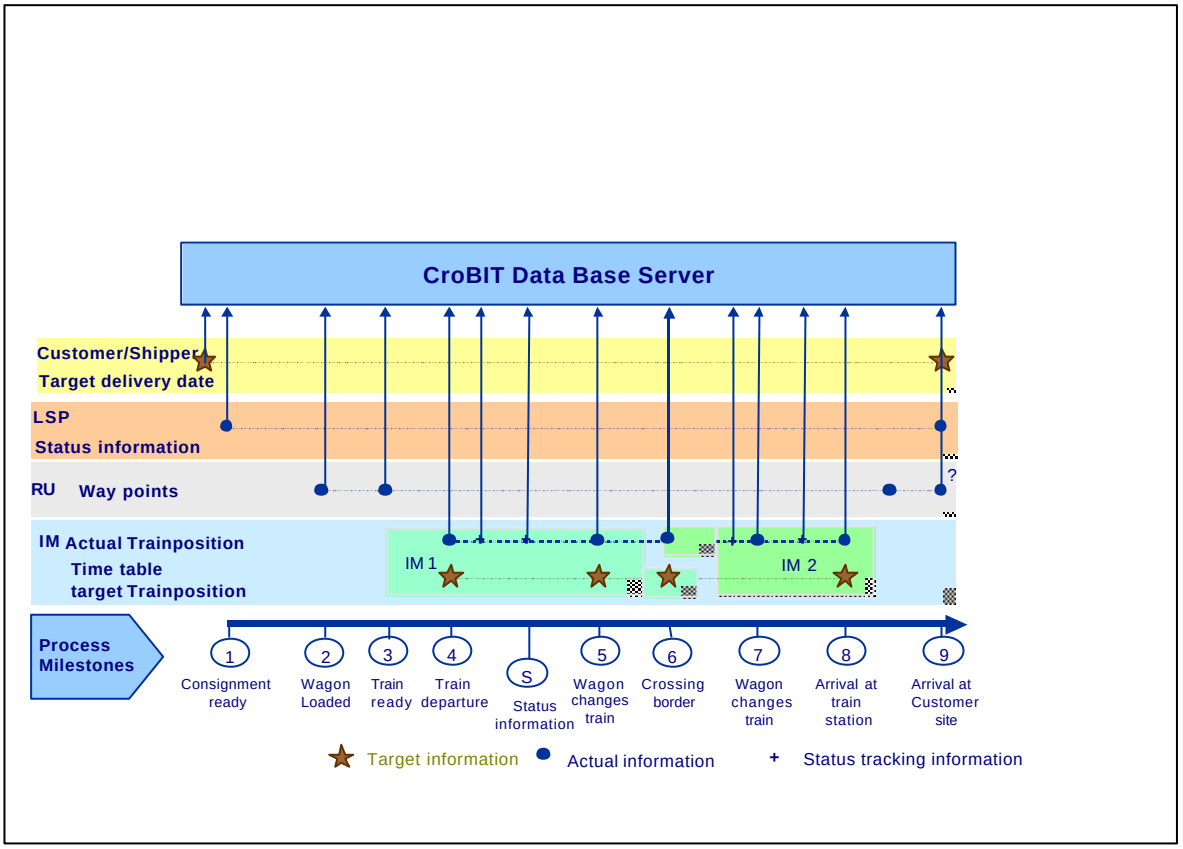
- ?? Provide one source for shipment visibility
- ?? ETA functionality
- ?? Visibility on consignment, wagon and train level
- ?? Well defined system security and access
- ?? Ability to connect with existing systems for data capture
- ?? Utilisation of existing ‘best practice’ systems and software.

1.6 Event Reporting to the CroBIT System

The Stakeholders above perform specific functions in the transportation chain and have corresponding data handling responsibilities. The Process Milestones and data handling responsibilities are shown graphically in the figure below.

As illustrated, Interfaces or manual update functionality will be provided for Customers, RU's and IM's. The specific process milestones for the RU's will be reported on a Wagon/ITU level, those of the IM's will be reported on a train level. The CroBIT system will make the match in order to provide visibility on all levels of the movement.

For each movement, the scenario must be described with the responsibility of each actor and system involved.



Once CroBIT receives the relevant data, the value-added processes of the system are apparent. The server will deliver specific data output, customised for the specific needs of the individual stakeholders.

2 System principles

CroBIT is a centralised database where status and location information of trains, wagons and consignment are entered. Information is transmitted and updated each time when e.g.:

- Consignment departs the place of departure
- Consignment crosses either national or organisational borderline
- Consignment crosses other agreed monitoring places
- Consignment arrives to the place of destination
- Consignment is reloaded to other equipment (e.g. from damaged wagon)
- Consignment is damaged and the movement of cargo is halted for any reason

Please refer to Annex 3 for a more detailed set of Set of data with data handling responsibilities for both the consignment and event reporting.

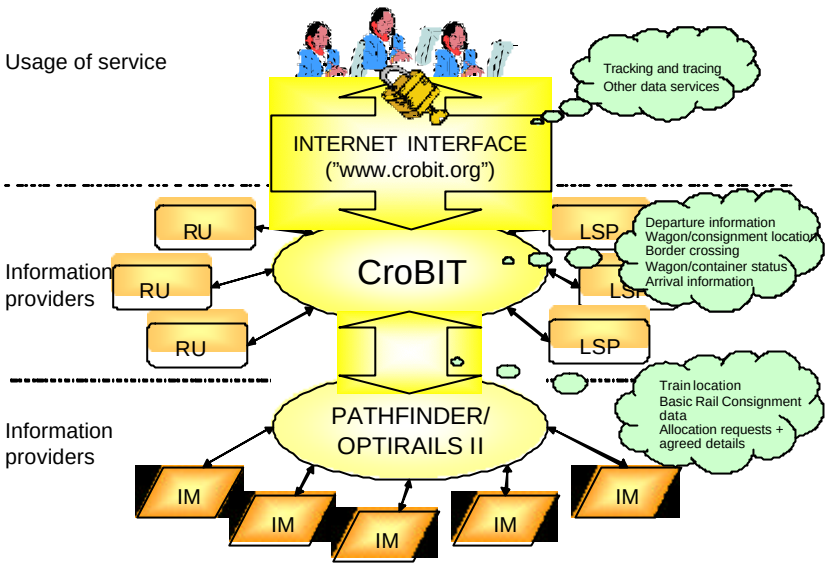
Efficient data exchange between CroBIT and the RU and IM operational systems is necessary. Information such as wagon status and location data is fed from each operational database to the Common IT system, which in turn processes it. In addition, CroBIT validates user rights by applying security profiles and has the intelligence of monitoring the movement of cargo. The system may automatically notify responsible carriers if something exceptional occurs during the journey.

The system could also act as a technical message broker between various companies. Whenever there is a need for companies to transmit data, the message broker provides data format conversions, transmits those messages to the proper parties and controls the overall exchange of electronic information.

Railway undertakings and infrastructure managers may have different user rights to the system than customers. These companies may get more information about rail operations and use this as a supporting tool for internal operational systems. The user rights are defined within the security profile according to the role and needs of each CroBIT subscriber.

Security issues have a special focus in CroBIT. User identification and password identify each user. Based on this information user rights are given to each subscriber and in this way each company and individual user may ensure that no other person may have access to confidential information other than that to which he is entitled on a movement. The secure connection over the Internet is encrypted by using encryption methodologies such as SSL (Secure Socket Layer) or MAC (Message Authentication Code).

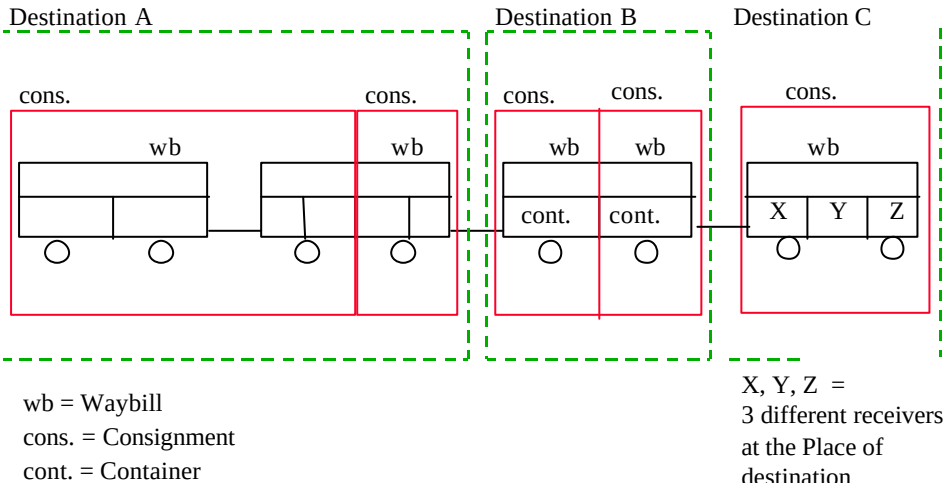
Information is retrieved from various partners such as forwarding agents, infrastructure managers and railways that have access rights to the movement. Message exchange principles follow the rules defined in various TSIs.



See also Annex 2.

2.1 Creating and maintaining a consignment in CroBIT

A consignment is a shipment of goods to be transported from one consignor to one consignee.



A consignment and its' "transport schedule", with checkpoint stations and dates and times, is registered in CroBIT when the system receives rail waybill (i.e. consignment note), providing all primary key information. Primary key information in CroBIT includes waybill number, place of original

departure, place of ultimate delivery and wagon number. For the demonstrator, the initial RU will provide the itinerary information to build the proper transport schedule.

CroBIT forms the planned transport schedule based on pre-defined waybill information. This schedule is updated each time when a partner (RU, LSP or other) sends information on wagon / container / waybill handling concerning the shipment. If update information is received too late according to the planned timetable, or it is missing after certain period of time, CroBIT sends exception reports to all authorised parties.

The consignment cycle is closed when notice of arrival is received at the destination station. The system may also terminate consignments that have exceeded certain time out limit. Various kinds of transport documents (e.g. CIM waybill or domestic waybills) are linked to the original consignment by equipment numbers and previous waybill numbers.

2.2 Tracking and tracing process

The CroBIT tracking and tracing process is initiated by receipt of the rail consignment note as provided either by the consignor, forwarding agent or railway. For the CroBIT demonstrator, the initial RU provides the information. Basic consignment note information is sent electronically to CroBIT in any electronic format (flat file, EDIFACT etc.) where it will be used to build the transport schedule and estimated timetable for the journey. This information will be provided to the system by the initial RU in the consignment note, and is used to open the cycle.

Thereafter, every time the wagon or train crosses a national or organisational border, or the wagon is reloaded for any reason, the corresponding railway undertaking or infrastructure manager sends respective status information about the transaction to CroBIT.

Based on this status, CroBIT monitors the movements of cargo and reports any deviations against the original estimated timetable. After the goods have arrived at their final destination, the last responsible railway undertaking reports the arrival to CroBIT (or IM in case of train) and the CroBIT cycle is completed.

During the transport process, CroBIT Partners send information to the centralised database where basic consignment note information is complemented with status information about the cargo.

At the first stage of the CroBIT project, where only limited number of transport corridors is demonstrated, the tracking and tracing covers only railway transport stage i.e. station-to-station. However, if trucking companies are included at the later stage, there is no reason why tracking and tracing functionality could not be extended to door-to-door services.

The easiest way to get CroBIT tracking and tracing information is through the Internet. Each company involved in the delivery chain (consignor, carrier and consignee) may have access to the CroBIT service and make queries about the movements or status of wagons or consignments. By entering user identification and password user may get information such as location of consignments or wagons, wagons due to arrive at certain locations or various statistics and reports.

However, the CroBIT message broker will be able to interface with other existing data exchange systems, in addition to the Internet, to facilitate application to application interchange.

2.3 CroBIT functions

The basic functions of CroBIT are described in this chapter. These functions will be specified in detail later during functional planning. For example, query, reporting and statistical needs of different parties are to be specified when planning the user interface and reports of CroBIT.

2.3.1 Schedule exception handling

CroBIT follows the transportation chain of a consignment on the basis of a transport schedule that is created simultaneously with the CroBIT consignment. The departure station, end station and checkpoint stations are all pre-defined in the system, as well as all routing details. When a waybill is received by CroBIT a specific transport schedule is created.

If a consignment has not reached a checkpoint of its transport schedule within scheduled time limits the system notifies the responsible the consignment transport service provider by e-mail or other means.

If a consignment is late, its scheduled dates and times of arrival to future checkpoints are corrected to meet the present situation. This is based on the next input of wagon movement, i.e. the wagon has passed the next checkpoint station.

The original transport schedule is stored for statistical purposes.

Transport schedules may be obtained from various sources that are determined at that point.

2.3.2 Consignment information query

Queries about consignments can be made to CroBIT either by using

- waybill number
- train
- wagon number
- transport unit number
- consignment reference
- location

CroBIT users are given a user profile depending on their role and access rights to CroBIT information. Such roles may be ‘Exporter’, ‘Importer’, ‘Wagon owner’, ‘Train operating company’, ‘Infrastructure manager’ or any other. User’s query rights are limited by user profile information that is connected to user ID.

Detailed CroBIT queries should be defined only after user needs are fully analysed. However, the system could provide for the following queries:

- Consignment query – ‘Where is my consignment, which waybill number/container number/order number/wagon number is xxx?’

- Incoming wagons and consignment they carry – 'Which consignments/wagons are due to arrive to place Y?'
- Location of wagons – 'Where is wagon number Z?'
- Wagons in a certain location – 'What wagons are at place Y?'
- ETA of wagon to a location – 'What is the ETA for wagon Z to place Y?'

In case there is more than one simultaneous consignment with exactly the same waybill number and query is made with on that basis, the user must enter additional criteria for the query, such as the country and place of departure or the country and place of delivery.

2.4 Other functionality

2.4.1 Wagons

Wagon owners or equipment owners may query information on a wagon/all their wagons from CroBIT. Queries will be constrained to location information and sensitive consignment-level information will be suppressed from the response.

2.4.2 Transport Units

Transport Units (i.e. containers) can be used to query consignment information from CroBIT.

2.5 User rights

Access to the CroBIT system through an Internet user interface or in any other way requires a valid user ID and a password. Changing of passwords and related issues will be defined during functional analysis.

The User ID is linked with profile information defining the scope of user and query authorities.

The operator of the CroBIT system is responsible for the maintenance of CroBIT user profiles. Each information provider maintains their own users' information and forwards the information to the operative party responsible for user information updates.

The company operating the CroBIT system must be a "neutral trusted company" and a third party should be foreseen for audit purpose.

2.5.1 User Rights for Specific Data

The user rights will be based on specific profiles for each type of user. The confidential information is on the waybill level so each field must be identified with specific read and update rights for each user. The basic user rights are outlined in the table below. Each field, with specific rights is identified in Annex 3.

Profile ID	Actor	Accessible Information	Rights
P1	IM	Participant in the itinerary - Departures, Transit, Interchanges and Arrivals	All in own territory
P2	Lead RU	Responsible on overall transportation	All
P3	Active RU	Participant in the itinerary - Departures, Transit, Interchanges and Arrivals	All in own territory
P4	Customer	Must be identified as Consignor or Consignee in the Waybill	All
P5	Freight Payer	Must be identified in the Waybill	All
P6	Third Party	Must be identified in the Waybill	All
P7	Wagon Owner	Must be identified as owner of the wagon in the Waybill	Only Status and position information
P8	Authorities	Must be a recognised authority (i.e. Customs) from a country identified in the itinerary	All

2.6 Wagon register

Wagon register information needs to be obtained from various railway undertakings' systems and maintained in CroBIT. The wagon information is needed to identify the wagon owner so that they may query the movements of their equipment. Necessary information includes wagon number and wagon owner. In light of the fact that no central repository of wagon information exists on the European fleet, this information must be populated from the systems of the RU's who are participating in the route.

2.7 Transport schedules

Route and schedule information of different transport schedules needed for consignment schedule control are maintained in CroBIT. The transport schedule information is maintained by the party responsible for transportation. This should be done by each RU. As a basis some basic transport schedules are created in the system: for example, country level routes like Italy to Finland or place level routes like Milano to Mannheim. Schedules should be based on current trip plans and reflect each RU's best understanding of the delivery time from the place of departure to the place of arrival.

In case no transport schedule exists between the place of departure and the place of delivery in CroBIT when a consignment is created, the system alerts the party responsible for transportation by e-mail or other means. The responsible party may then add a transport schedule between two locations either for a single consignment or as a pattern.

In case the party responsible for transportation does not enter a transport schedule into CroBIT when they receive an alert, there will be no consignment schedule control from the beginning to the end of the transport of a consignment.

2.8 Registering of queries

Queries to CroBIT through an Internet interface are registered for each organisation ID, user ID and query type.

CroBIT does not include invoicing and, at least in the preliminary stages, transfer of invoicing information into another system.

2.9 Reports

CroBIT can provide users with various levels of reports, such as:

- Consignment statistics (e.g. number of consignments, delayed consignments)
- Transport schedule statistics (e.g. average transit time, quickest transit time)
- Transport exceptions (e.g. number of delays, average delay time)
- Query statistics (e.g. number of queries, most used queries, average query time of day)

3 State of the Art

It is important to assess the functionality of State of the Art Systems that can either provide or use the CroBIT information platform. A detailed analysis is provided in Annex 4, where the following systems were evaluated for required functionality.

- Cesar (UIRR) – An intermodal shipment visibility system
- TIPAS (ICF) – An intermodal logistics system
- Intelligrator (Star/Trac) – A GPS technology based tracing system
- RailTrace (VR Cargo) – An integrated tracking and tracing system

3.1 Existing systems, providing information:

In addition to the four systems mentioned above, there are legacy applications which exist in the industry that can provide information to the CroBIT system. A brief explanation is provided in the table below.

Application / Project	Description	Applied by	Status
Hermes application: International block trains	A block train is a group of wagons which is transported without any modification (in- or exclude of wagons) from the originating customer to the destination customer. Purpose of the application is to facilitate the exchanges of data among the participating railways concerning this traffic of block trains. Four steps are to be distinguished: determination of the technical conditions, determination of the general transport plan, the introduction of the train and monitoring of the trip.	CFL, SNCB, SNCF	Operational
Hermes application: pre-advice	For each train (or each group of wagons) crossing a boarder, the transferor RU sends a preadvice message to the transferee Railway as soon as the train has left the last station before the boarder at which the train is marshalled.	CFL, DB, DSB, EWS, Gysev, ICF*, MAV, Railion-Benelux, SBB*, SJ, SNCB, SNCF, ZSR (13)	Operational
Hermes application: wagon search	The purpose of this function is to enable a wagon to be located abroad by means of its wagon number. The wagon search facility also allows customers to mitigate the effects of disrupted transits.The railway making the enquiry sends a request message to the railway on whose network the wagon is expected to be located (the frontier crossing message helps to identify this railway). The railway receiving the enquiry processes the wagon data on its own system to locate the wagon and sends a reply prepared from the data available in its system in the form of a standard message which is designed to cope with all eventualities. Particular rules for confidentiality apply. The are two versions, a simple answer and a more extended one	CD, CFL, DB*, EWS*, FS, ICF*, MAV, NS*, ÖBB*, SBB, SJ*, SNCB, SNCF, SZ*, ZSR (15) (* = only input)	Operational
Hermes application: frontier crossing	The purpose of this function is to inform the destination railway, the forwarding railway (if desired) and the home railway of a P-wagon (if desired) that a wagon has crossed the frontier. Frontier crossing messages are complementary to the pre-advice message and enable the railways to provide customers with better information.The message deals with privately-owned freight wagons and loaded railway-owned wagons The message is sent by the transferor railway (or by the Hermes railway in case of a border with a non–Hermes railway). The message is sent to the destination railway for the consignment and optionally to the forwarding railway and/or the home-railway (for a P-wagon).	CFL, EWS, FS, ICF*, SNCF (5) (* = only input)	Operational

Application / Project	Description	Applied by	Status
Hermes application: incidents in transit	The main purpose of this function is to inform the consignor, consignee and 'P' wagon owner, via the railways concerned, that a wagon is stopped (or, in the case of crippled wagons covered by Model K labels, that they are not fit for immediate re-use) so that they can take the necessary steps to mitigate the effects of such stoppages: - on their commercial and industrial activities (consignor or consignee),- on the vehicle fleet.Because the need to send this kind of information as rapidly as possible, messages for this function must be transmitted as soon as the information is available, i.e. as close as possible to the event to be reported (at the latest 24 hours after the event).	CFL, ICF*, SNCF (3) (* = only input)	Operational
Hermes application: advice of dispatch	The purpose of the « advice of dispatch » function is to inform the destination railway and the home railways of privately owned wagons about any international or domestic consignment that concerns them. They may in turn and at their discretion pass on this information to the consignee or the owners of the private wagons. It is thus a means of improving customer information. An "Advice of dispatch" message may also be sent to the transit railways for internal monitoring purposes.An advice of dispatch message should be sent by the originating railway to the railway to which the consignment is destined. In case of non-Hermes railways the first transit-Hermes railway should take this up. It shall also be sent to each transit railway and to the home railway in case op P-wagons.	EWS, FS, ICF*), SNCB, SNCF (5) (* = only input)	Operational

Application / Project	Description	Applied by	Status
UNCTAD Application: Railtracker	RailTracker is a railway tracking system designed, developed and implemented by the United Nations Conference on Trade and Development (UNCTAD). It monitors all the movements of both locomotives and wagons on a railway network; it is a very useful tool to improve management. But even more important, it also monitors the movement of a railway client's goods. This novel and unique feature enables registered customers, from any part of the world, to access the network they are interested in, find out where their cargo is and what has happened to it so far whilst in the custody of the railway. RailTracker can also give you the history of the cargo. A web extension to the RailTracker system that allows access via the Internet is planned. RailTracker comprises basic sub-modules for equipment and cargo tracking and "technical" sub-modules. All these modules share the same database master files and they are supported by a set of software modules. RailTracker application software is highly customisable to all sorts of railway sizes, contexts, and is particularly adapted to difficult physical environments.The core of Railtracker comprises following modules: - RailTraffic, the main sub-module of RailTracker, tracks rolling stock and consignments. It records all operations on wagons and locomotives, trains and consignments. Every operation is "stamped" with the date, time and station at which it occurs.- Marshalling Yard Management monitors operations at sidings, giving clearance to traffic on the cycle. This enables the monitoring of demurrage and the listing of all loaded/empty wagons waiting for re-use.- RailInterchange manages the movements of goods and equipment at borders.- RailReporting is a collection of pre-defined queries and standard reports including exception reports derived from RailTracker database and is produced automatically or on request. - Empty Wagon Distribution facilitates the re-allocation of empty wagons to the next client according to need.- RailCommercial provides a commercial package to produce billing of services. It edits consignment notes based on the applicable tariff Railtracker software is free - installation and customisation are to be paid - typical installation cost are 100.000 - 500.000 EUR	African railways: KRC, TRC, Tazara, URC, ZR, RC, CZ, MR, RM, MN, RS, SRAsians railways: BR (Bangladesh) and SRT	Operational

Application / Project	Description	Applied by	Status
Hermes application: ORFEUS	ORFEUS is an international information exchange system for freight rail transport. The basic aim of ORFEUS is to allow data exchange of the railway consignment notes (CIM) between the railway companies. ORFEUS is the most important central information system focusing on freight. It presents base for Electronic Commerce for European railway companies. Handling with paper documents is very costly and brings serious technological limitations for the transport of the loaded wagons. ORFEUS opens possibility to reengineer the freight logistics and makes the first step for the paper-less technology. The main goal of the project is to allow significant cost savings and to improve the speed and reliability of the international rail transport. ORFEUS is a distributed system, composed of a central part (the CDS=Central Data-management System) and various railway specific decentralised parts (NIS= National Information System). The central application (CDS) acts as a switch for the collection and distribution of data. Also specific logic and verifications are assured there. A NIS is a common name for an information system of a freight railway, which covers both commercial and operational functions. The CDS exchanges data with the NISes via (railway specific) Edifact messages.For the transmission of the messages the FTP protocol and the railway Hermes-VPN data network are used. Planned developments are geographical extension of ORFEUS with other railways like SNCF, SNCB and ÖBB. Also functional expansion of ORFEUS on behalf of intermodal transport is planned.	DSB, DB, FS, SBB, SJ	Operational
Hermes application: advice of arrival	The purpose of the « advice of arrival » function is to inform the originating railway and the home railways of privately owned wagons about the arrival of any international or domestic consignment that concerns them. They may in turn and at their discretion pass on this information to the consignee or the owners of the private wagons. It is thus a means of improving customer information. An advice of arrival message should be sent by the destination railway to the originating railway and to the home-railway in case of P-wagons. The first one receives all the information, the latter only those on their P-wagons.	EWS, FS, ICF*, SNCB, SNCF	Operational

Application / Project	Description	Applied by	Status
Hermes application: Wagon kilometres (GOETHE)	GOETHE (Group Organisation for Exchanges on Trade Wagons by HERMES for Europe). The objective of GOETHE is to improve the estimation of revision intervals and by that to reduce revision costs of freight wagons. Revision of freight wagons can be based on calendar (fixed intervals) or on actual utilisation. Utilisation is generally measured in kilometers traveled. For a better calculation of the usage details could be added (load, weight, speed, marshalling). Some RU's in Europe use this principle for their wagon maintenance schemes. However in order to calculate the usages of their wagons run abroad, these railways need information from their railway partners on run kilometers. This information can be provided by the GOETHE function.	SNCF, FS*, DB, SNCB, CFL, NS* (* = only outbound)	Operational
Europtirails	Europtirails is a project under the TEN-T Program. It is based on the results of the earlier Optirails projects. The project is scheduled to run from October 2002 - October 2004. Project costs are 10 M€. The deliverable is basically a pilot system over one international freight corridor (Mannheim - Milano). Following functions will be provided:- path assembling: Europtirails ensures an path for a train by (effectively and efficiently) combining the paths offered the individual IM's along the corridor in particular in case of disruptions- on-line central information to all partners involved on request (like position of a train, estimate times, routes etc.)- Railway network monitoring. Europtirails is fed with IM-data (see TMS-leaflet 407). In case of deviations (delay, revised plans), a new ETI will be calculated. In case this new ETI breaks the "corridor" path, Europtirails will launch the calculations by the various IM's for new train paths. Europtirails will integrate these individual train paths to a new corridor train path by dialoguing with IM's and adjusting their proposals.	DB-Netz, SNCF, SBB, FS/RFI, RFF, ÖBB, ProRail	Operational
TMS - leaflet 407	The UIC 407-leaflet defines 9 applications (scenario's) making use of 71 defined data messages to be exchanged between IM's or between IM's and RU's dealing with train operations. The messages are all formatted according to the UIC proprietary rules (leaflet 912). Today only (a part) of one scenario is put into operation: the data exchange for the execution of train operations between IM's (see also Europtirails). The application currently covers the exchange of following information between neighboring IM's:- train running forecast: upon departure or movement past agreed reporting points (cp) or prior to reaching the first cp if train is delayed - running advice: generally upon arrival, departure or run-through an agreed cp and/or in case the delay exceeds a predefined threshold- failure of a train: when a train is cancelled	DB, FS, ÖBB, Renfe, SBB, SNCF, SNCB, NS	Operational

Application / Project	Description	Applied by	Status
Pathfinder	From the Pathfinder specification:Pathfinder is an international internet based timetable planning service – a communication system for the optimisation ofinternational path negotiation. Pathfinder supports the harmonisation of the offers, the creation of train-protocols and downloadingof central database timetables to national planning systems. Pathfinder offers benefits for: - IM's: faster, more reliable and simpler process handling, less transactions for harmonisation, shorter reply times to train path requests, use of common need forecasts in international timetable planning and a higher accuracy of forecasts. - RU's: more flexibility in the reaction to client needs, optimisation of the product offer, faster reply times to train path requests and orders and possibility for simple, anonymous requests - Clients: higher product and market transparency, client- and need-oriented product development in the area of international (system-) train paths, quick access to reliable information, simpler access to international train path capacities, higher service quality, specially in provision of information, faster reply times to train path requests or orders, more transparency in international timetable preparation, shorter throughput times and less process costs, higher service quality, particularly in the preparation of information.Pathfinder is planned to be in production by the beginning of 2003. From a technical point of view Pathfinder is a central databaseoffering access to all kind of users (IM's, RU's etc.). via a VPN (Internet) and XML messages. Communication will be secured and eventually anonymous. The project is ordered by FTE (Forum Train Europe) and managed by SBB-Infrastructure	Potential users: BS, DB AG, FS SpA, ÖBB, Railned, RFF, SBB, SNCF	Development / Operational
ISR (International Service Reliability)	The first application of the ISR-initiative is a central database, hosted by Cap Gemini in Villepinte (Fr) and connected to the VPN-Hermes network where railways can store there pre-announce messages (which are sent in parallel to involved railways downstream). Subscribers can consult the database (via the ISR-Website) with inquiries on "their" transports. So today, ISR doesn't provide more information than can be provided by Hermes. The added value is the ability to respond on selective requests (only empty wagons etc.).It is planned to expand ISR with event reports on dispatch and arrival of wagons as well as intermediate handling (marshalling). In 2004 the database will also be enriched with consignment data (Orfeus).ISR is a service provided by the ISR-railways (today DB, SNCF and FS)	DB-Cargo, SNCF, FS	Operational
Use-it	Design and development of an IT system which will enable customers to track-and-trace their trains (block trains for international combined transport) in real time via internet or through data automatically inputted into their own systems.	GTC	In study

Application / Project	Description	Applied by	Status
F-MAN	The asset management of freight cars in cross border traffic is not possible, as there is no real time process information. The solution for that problem the EU-financed project sees in creating three modules:- Tracking Module- Data Processing Module- Asset Management ModuleWith those Modules the future Fleet Manager is a able to manage „his wagons" internationally. Additionally to that the F-MAN Pool will additionally reduce the number of empties		In study

4 The CroBIT Demonstrator – Summary

In summary, the CroBIT demonstrator will provide shipment visibility for an entire shipment cycle from rail point to rail point. It will be based on a corridor with pre-defined partners and provide users with the essential functionality has been identified through interviews and analysis of best practice systems. The demonstrator will provide users with the following benefits:

- full delivery chain monitoring of consignments from end-to-end rail points, including exception reporting
- single point of contact for shipment visibility
- notifications of incidents in transit for contingency planning
- visibility on multiple levels – consignment, wagon/ITU and train
- easy-to-use and low-cost customer interface for all customers and parties wishing to utilise the system; the customers and logistic chain operators are kept informed about predicted arrival times
- improved information exchange between parties based on existing international freight information messaging standards (e.g. EDIFACT messages)
- improved customer service and rail industry image

The demonstrator will provide the bridge between the various actors (and information platforms) in the transport chain and integrate the information for use by the stakeholders.

Furthermore, user functionality will support:

User Queries

Users may query the system online using customised parameters to trace shipments. These parameters can be defined according to the needs of the user and include locations, wagon/ITU identification, waybill number, consignment identification,

Reports

Reports can be generated to provide essential statistics that prove important for future planning. These reports will be provided on consignments, transport schedule statistics (transit times, etc), transport exceptions (delays, average delay time) and queries.

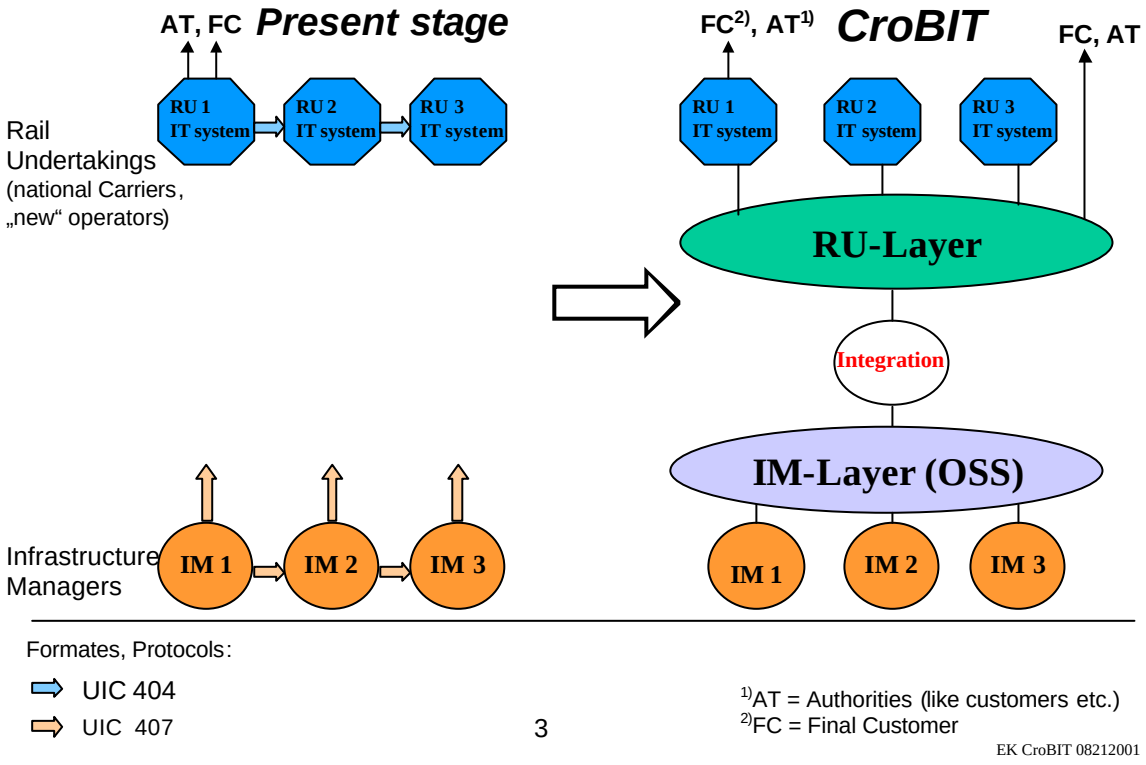
Exception Notifications

The CroBIT system will provide exception notifications to authorised parties in order to aid effective contingency planning.

5 ANNEXES

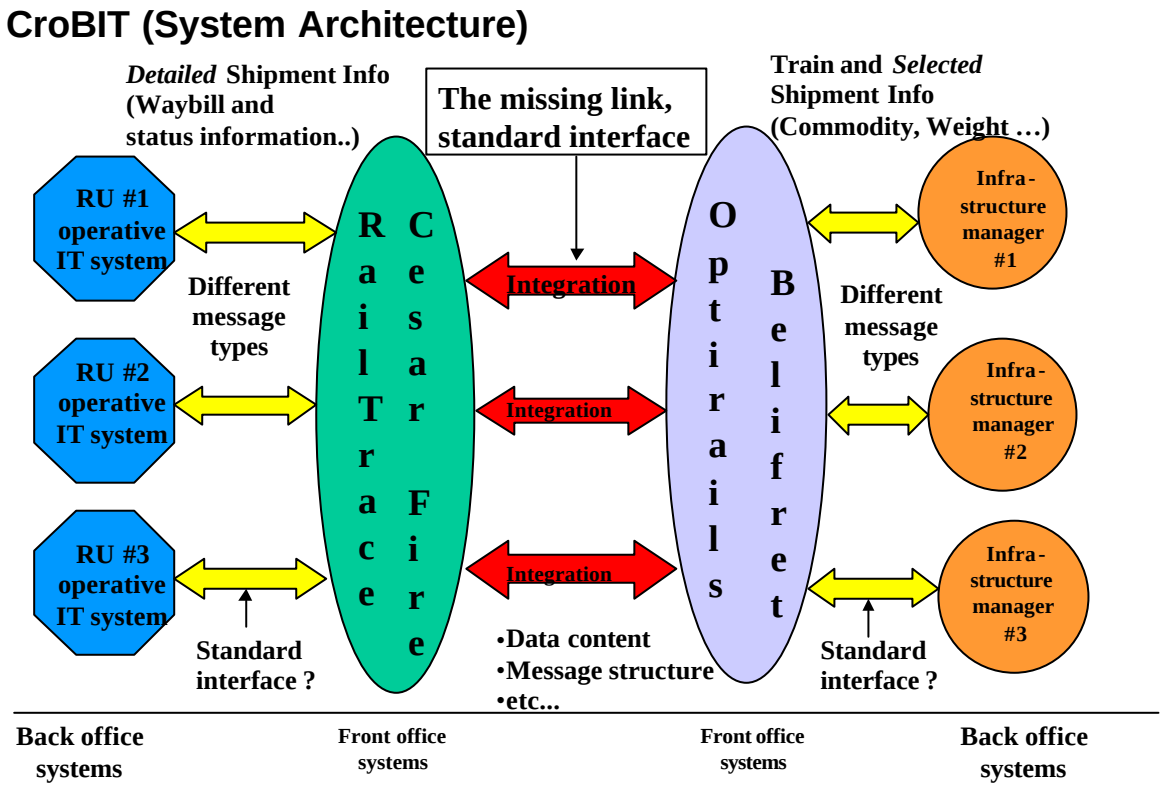
5.1 ANNEX 1 : From Today to CroBIT

Data exchange: Transfer from Present stage to CroBIT (2)



3

5.2 ANNEX 2 : Architecture



5.3 Annex 3 : Data description

5.3.1 Data Requirements for CroBIT System

5.3.1.1 Opening the Cycle (Consignment Note)

The following information is required to open a cycle within the CroBIT system. This information will be taken from the Waybill (Consignment Note) and used to populate the records. The information is given by the initial RU. Different messaging formats may be used; however there are currently seven Railway Undertakings using the ORFEUS message based on the UN/EDIFACT IFTMIN message. The specific application is the Create Transport Dossier.

Data	Provider	Cond	User Rights	Timing
Consignor ***Party which, by contract with a Service Integrator, consigns or sends goods with the carrier, or has them conveyed by him***.	Initial RU	M	P1, P2, P3, P4, P5, P6, P8	Before Departure
Consignee ***Party by whom the goods are to be received***	Initial RU	M	P1, P2, P3, P4, P5, P6, P8	Before Departure
Contract Identification ***Contract of carriage between Consignor and Service Integrator***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Consignment Identification ***Commercial reference agreed by the consignor and consignee***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Routing Instructions ***The geographical way to be taken from a starting point to a point of destination. Shall include carriers and interchange points***	Initial RU	M	P1, P2, P3, P4, P5, P6, P7, P8	Before Departure
Waybill Number ***Reference number assigned to a waybill. Equal to Voyage number when used for maritime stage.***	Initial RU	M	P1, P2, P3, P4, P5, P6, P8	Before Departure

Data	Provider	Cond	User Rights	Timing
Waybill Type ***Reference to the type of waybill or consignment (i.e. CIM, Domestic, etc)***	Initial RU	M	P1, P2, P3, P4, P5, P6, P8	Before Departure
Previous Waybill Number ***Reference number assigned to a previous waybill for a consignment that has been rebilled during the transport.***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Previous Waybill Type ***Reference to the type of waybill or consignment (i.e. CIM, Domestic, etc)***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Date of Departure ***Date (and time) of departure of means of transport from a rail point.***	Initial RU	M	P1, P2, P3, P4, P5, P6, P8	Before Departure
Freight Payer ***Party responsible for the payment of freight.***	Initial RU	M	P1, P2, P3, P4, P5, P6, P8	Before Departure
Goods Description General description of the nature of the goods. ***Examples: paper, pulp, board, plywood, timber, etc.***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Volume/Quantity ***The volumetric or quantity of the goods in the consignment.***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Dangerous Goods ***Indication that the consignment is dangerous according to the RID regulations.***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure

Data	Provider	Cond	User Rights	Timing
Wagon Identification ***Identification of a freight wagon in accordance with UIC Leaflet 438-2***	Initial RU	M	P1, P2, P3, P4,P5, P6, P7, P8	Before Departure
Transport Unit Identification ***Identification of a transport unit. (ISO 6346 in the case of ISO containers*** ***A Transport Unit which can be transported by different modes e.g. Container, Swap Body, Semi-Trailer, Trailer***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Rail Departure Location ***The identification of the departure station as defined in ENEE.***	Initial RU	M	P1, P2, P3, P4, P5, P6, P7, P8	Before Departure
Rail Departure Country ***The country of origin of the shipment either expressed by UIC railway code or ISO 3166-1***	Initial RU	O	P1, P2, P3, P4, P5	Before Departure
Rail Destination Location ***The identification of the destination station as defined in ENEE.***	Initial RU	M	P1, P2, P3, P4, P5, P6, P7, P8	Before Departure
Rail Destination Country ***The country of final destination either expressed by UIC railway code or ISO 3166-1***	Initial RU	O	P1, P2, P3, P4, P5	Before Departure
Requested Date of Arrival ***Date/time when the customer requests goods to be delivered (handed over) to the delivery party at the place of delivery.***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure

Data	Provider	Cond	User Rights	Timing
ETA/ETI ***Estimated Time of Arrival of wagons at the customer side*** ***Estimated Time of Interchange of wagons from one RU to another***	Initial RU	O	P1, P2, P3, P4, P5, P6, P8	Before Departure
Responsible Carrier ***Lead Carrier or service integrator in the route for the physical transport of the consignment.***			P1, P2, P3, P4, P5, P6, P7, P8	
Responsible RU ***Lead Railway Undertaking in the route for the physical transport of the consignment***		M	P1, P2, P3, P4, P5, P6, P7, P8	Before Departure
Mode of Transport ***The type of transport for the consignment (rail, ocean, road, combined transport, etc)***		M	P1, P2, P3, P4, P5, P6, P8	Before Departure
Train ID ***Train Identification based on UIC 419-2 « Analytical numbering of international freight trains »***		M	P1, P2, P3, P4, P5, P6, P8	Before Departure
Vessel name ***Identification of the Vessel for a maritime move. As defined by the Lloyds Register of Vessels***		M	P1, P2, P3, P4, P5, P6, P8	Before Departure

5.3.2 Event Reporting

5.3.2.1 Status Messaging

Events must be reported by both all of the Railway Undertakings and the Infrastructure Managers in the pre-defined route of the shipment. The reporting shall take place within one hour of the Event being

reported. The Infrastructure Managers will be reporting on the train level, while the Railway Undertakings will be reporting on the Wagon, ITU or consignment level. The CroBIT system will match the reporting.

Event Reporting

Data	Provider	Cond	User Rights
Event (Train, Wagon and ITU) ✍ Consignment Loaded ✍ Departure ✍ Arrival ✍ Interchange ✍ Passing Event ✍ Transload ✍ Incident in Transit ✍ New ETA ✍ *The wagon, train or transport event to be reported by the responsible parties in the route.*	IM – Train RU – Wagon, ITU	M	P1, P2, P3, P4, P5
Train Identification ***Train Identification based on UIC 419-2 « Analytical numbering of international freight trains »***	IM	C	P1, P2, P3, P4, P5
Train Event Location ***The physical location of an event based on a train level, to be reported by either an IM or RU***	IM	M	P1, P2, P3, P4, P5, P6, P7, P8
Train Event Country ***The country of an event based on a train level, to be reported by either an IM or RU***	IM	M	P1, P2, P3, P4, P5, P6, P7, P8
Train Origin Location ***Identification of the origin station of the Train as defined in ENEE***	IM	M	P1, P2, P3, P4, P5, P6,P7, P8
Train Origin Country ***The country of origin of the shipment either expressed by UIC railway code or ISO 3166-1***	IM	M	P1, P2, P3, P4, P5, P6, P7, P8

Data	Provider	Cond	User Rights
Train Event Date ***Date of the train event being reported***	IM	M	P1, P2, P3, P4, P5, P6, P7, P8
Train Event Time ***Time of the train event being reported***	IM	M	P1, P2, P3, P4, P5, P6, P7, P8
Incident Reason ***Code identifying the type of incident in transit as reported by the IM or RU***	IM or RU	O	P1, P2, P3, P4, P5, P6, P7, P8
Incident Status ***Status of the incident in transit as reported by the IM or RU***	IM or RU	O	P1, P2, P3, P4, P5, P6, P7, P8
Incident ETA ***ETA for resolution of the incident reported by the IM or RU***	IM or RU	O	P1, P2, P3, P4, P5, P6, P8
Wagon/ITU Identification ***Identification of a freight wagon in accordance with UIC Leaflet 438-2*** ***Identification of a transport unit. (ISO 6346 in the case of ISO containers*** ***A Transport Unit which can be transported by different modes e.g. Container, Swap Body, Semi-Trailer, Trailer***	RU	M	P1, P2, P3, P4, P5, P6, P7, P8
Previous wagon/ITU Identification ***Identification of prior wagon/ITU in case of transload during shipment***	RU	O	P1, P2, P3, P4, P5, P6, P8
Wagon/ITU Event Location ***The physical location of an event based on equipment level, to be reported by RU***	RU	M	P1, P2, P3, P4, P5, P6, P7, P8
Wagon/ITU Event Country ***The country of an event based on equipment level, to be reported by RU either by UIC Railway Code or by ISO 3166-1***	RU	M	P1, P2, P3, P4, P5, P6, P7, P8

Data	Provider	Cond	User Rights
Wagon/ITU Origin Location ***Identification of the origin station on equipment level as defined in ENEE***	RU	M	P1, P2, P3, P4, P5, P6, P7, P8
Wagon/ITU Origin Country ***The country of an event based on equipment level, to be reported by RU either by UIC Railway Code or by ISO 3166-1***	RU	M	P1, P2, P3, P4, P5, P6, P7, P8
Wagon/ITU Event Date ***Date of the Wagon or ITU event being reported***	RU	M	P1, P2, P3, P4, P5, P6, P7, P8
Wagon/ITU Event Time ***Time of the Wagon or ITU event being reported***	RU	M	P1, P2, P3, P4, P5, P6, P7, P8
Wagon/ITU Incident Reason ***Code identifying the type of incident in transit***	RU	O	P1, P2, P3, P4, P5, P6, P7, P8
Wagon/ITU Incident Status ***Status of incident in transit being reported***	RU	O	P1, P2, P3, P4, P5, P6, P7, P8
Wagon/ITU Incident ETA ***ETA for resolution of the incident reported***	RU	O	P1, P2, P3, P4, P5, P6, P8
Waybill number ***Reference number assigned to a waybill. Equal to Voyage number when used for maritime stage.***	RU	M	P1, P2, P3, P4, P5, P6, P8
Consignment Identification ***Commercial reference agreed by the consignor and consignee***	RU	O	P1, P2, P3, P4, P5, P6, P8

5.4 Other annexes

The details of the state of the Art are described in different documents:

5.4.1 Annex 4 : Existing systems providing information


P:\Projets\CroBIT\
WP200\WP210\factsl

5.4.2 Annex 5 : Dataflow between existing systems


P:\Projets\CroBIT\
WP200\WP210\datafl

5.4.3 Annex 6 : Comparison between existing customer oriented systems


P:\Projets\CroBIT\
WP200\WP210\Comp

5.4.4 Annex 7 : Existing standards


P:\Projets\CroBIT\
WP200\WP250\WP25

5.4.5 Annex 8 : Comparison with other modes


P:\Projets\CroBIT\
WP200\WP210\Comp