EDI in Multimodal Transport Chains

PORT-NET Study 03-4

"EDI and cargo flows in the Mediterranean Sea"

Port Net

NORTH East South West INTERREG IIIC

Author: Fabrizio Fioravanti

EXITECH

Outline …

- Raw numbers as a starting point
- Some general concepts
- Intermodal Transport in pills
- ICT and EDI at European Level
- A proposal for ICT and EDI Architecture

Author: Fabrizio Fioravanti

EXITECH

Raw numbers as a starting point

- Analysis of Port Container traffic in the World, in the Mediterranean and in Italy
- Some data on Intermodal Nodes and Freight Villages in Europe and in Italy
- Some starting-point assumption to begin our discussion

Container ports in the world

PORTS IN THE WORLD: *unit is 1.000 TEU*	**2000**	**2001**	**2002**	**2003**	**2006**	**Mean Annual Grow Rate %**
Singapore:	17.087	15.520	16.800	18.410	24.800	7,52%
Hong Kong:	18.098	17.900	18.600	20.450	23.548	5,02%
Shanghai:	5.560	6.334	8.610	11.280	21.720	48,44%
Shenzen:	3.993	5.076	7.613	10.650	18.469	60,42%
Busan:	7.540	8.072	9.436	10.370	12.030	9,92%
Kaoshiung:	7.426	7.540	8.493	8.840	9.775	5,27%
Rotterdam:	6.268	6.102	6.515	7.143	9.690	9,10%
Amburgo:	4.248	4.689	5.374	6.138	8.862	18,10%
Los Angeles:	4.998	5.183	6.105	7.200	8.470	11,58%
Anversa:	4.082	4.218	4.777	5.445	7.019	11,99%
Gioia Tauro:	2.652	2.488	2.896	3.081	2.938	1,80%
Genova:	1.501	1.526	1.531	1.606	1.657	1,73%
La Spezia:	910	975	975	1.007	1.025	2,11%
Livorno:	520	521	536	592	659	4,46%

Source: elaboration of data of ISL (Istituto Shipping e Logistica) and Port Authorities

Port Net NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH

Mediterranean figures

Best performance in Mediterranean sea 2006

Port	2005	2006	Var. %
Algeciras:	3.179.614	3.244.640	2,00%
Gioia Tauro:	3.161.981	2.938.176	-7,00%
Valencia:	2.409.821	2.612.139	8,80%
Barcellona:	2.071.481	2.317.368	11,90%
Genova:	1.624.964	1.657.113	2,00%
la Spezia:	1.024.455	1.137.000	11,00%
Marsiglia:	908.000	941.400	3,70%
Cagliari:	631.435	690.392	9,30%
Trieste:	198.319	220.661	11,30%

Source: "Il Secolo XIX", 10/04/2007

Traffic in Mediterranean Ports

PORT	Container (TEU)	Solid Bulks	Liquid bulks	Ro-ro/gen Cargo	In container	Total/ Tonn
Rijeka	94.390	3.199.707	5.877.906		1.572.997	10.650.610
Ravenna	162.052	17.869.276	4.838.358	240.875	935.664	23.884.173
Thessaloniki	343.727	3.765.517	8.519.412	1.150.000	3.506.043	16.940.972
Napoli	444.982	4.000.000	6.000.000	8.500.000	3.600.000	22.100.000
Livorno	657.592	1.186.571	8.508.475	9.695.046	9.735.170	29.125.262
Cagliari	687.657	10.100.948	26.033.123			36.134.071
Marseille	916.000	16.190.000	67.466.000	7.090.000	9.320.000	100.066.000
La Spezia	1.133.700	1.529.000	3.055.000	851.000	11.000.000	16.435.000
Piraeus	1.349.512	191.000	21.000	711.472	13.363.513	14.286.985
Genova	1.657.113	6.797.321	21.640.834	9.198.618	16.546.974	54.183.747
Barcellona	2.318.239	4.107.582	10.536.375	9.189.575	22.572.587	46.406.119
Gioia Tauro	2.757.137	131.233	469.927		24.312.760	24.913.920
Algeciras	3.179.000	4.000.000	21.939.000	16.584.000	25.000.000	67.523.000

Source: exitech - analysis of available data from Port Authorities statistics

Sum is About 13.5 MTEU

Hong Kong or Singapore alone are more that 20 MTEU

PORTS IN THE WORLD: *unit is 1.000 TEU*	2000	2001	2002	2003	2006	Mean Annual Grow Rate %
Singapore:	17.087	15.520	16.800	18.410	24.800	7,52%
Hong Kong:	18.098	17.900	18.600	20.450	23.548	5,02%
Shanghai:	5.560	6.334	8.610	11.280	21.720	48,44%
Shenzen:	3.993	5.076	7.613	10.650	18.469	60,42%

Port Net NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH

Italian Ports

Porti	2000	2002	2004	2005	2006	2005-06
Gioia Tauro*:	2.652.000	2.896.835	3.261.034	3.161.000	2.938.200	-7%
Genova:	1.500.632	1.531.252	1.628.594	1.624.964	1.657.113	2%
La Spezia:	909.962	975.005	1.040.438	1.024.200	1.133.700	11%
Taranto*:	3.400	471.570	763.318	716.900	892.300	24%
Cagliari-*Sarroch:	21.631	47.000	501.194	659.100	726.100	10%
Livorno:	501.339	546.882	638.586	657.600	658.400	0%
Salerno:	275.963	375.000	412.000	358.000	418.200	17%
Napoli:	396.562	446.000	347.537	445.000	373.100	-16%
Venezia:	218.023	262.667	291.000	293.000	316.641	8%
Savona:	36.905	54.796	83.891	219.900	231.500	5%
Trieste:	206.134	185.301	174.729	201.300	215.500	7%
Ravenna:	181.387	161.000	169.432	168.600	162.100	-4%
Ancona:	83.934	94.315	85.969	73.900	64.200	-13%
Civitavecchia:	12.617	35.000	36.301	32.800	33.500	2%
Catania:	12.851	12.984	11.751	14.700	13.900	-5%
Palermo:	17.128	10.000	24.040	27.500	13.700	-50%
Trapani:	17.357	17.000	n.d.	9.900	8.900	-10%
Marina di Carrara:	10.635	10.000	7.917	6.200	4.500	-27%
Bari:	1.373	13.000	20.000	10.000	n.d.	
Brindisi:	6.922	1.235	3.815	n.d.	n.d.	

* transhipment port

Sources: Il Corriere Marittimo, Il Secolo XIX, Port Authorities

Port Net NORTH East South West INTERREG IIIC

Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007

EXITECH

Some data on Freight Villages

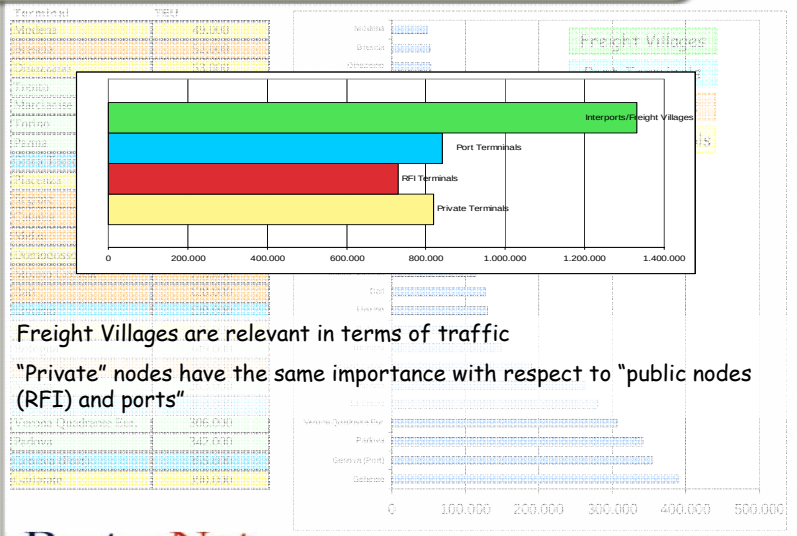
Country	Transport area	Capacity 2015	Total volome 2015	Rate of employment	Probable capacity gap 2015
AT	Graz	130.000	137.000	105%	33.000
	Villach	110.000	121.000	110%	33.000
	Wels	132.000	181.000	137%	75.400
	Wien	300.000	282.000	94%	42.000
BE	Antwerpen	940.000	614.000	65%	
	Genk	122.000	150.000	123%	52.400
	Zeebrugge	365.000	306.000	84%	14.000
CH	Basel	390.000	238.000	61%	
CZ	Praha	200.000	288.000	144%	128.000
DE	Bremen/Bremerhaven	1.060.000	813.000	77%	
	Duisburg	318.000	166.000	52%	
	Hamburg	1.200.000	1.222.000	102%	262.000
	Koeln	300.000	517.000	172%	277.000
	Luebeck	140.000	101.000	72%	
	Muenchen	320.000	283.000	88%	27.000
	Neuss	140.000	146.000	104%	34.000
	Nu?rnberg	320.000	195.000	61%	
	Mannheim/Ludwigsha	346.000	443.000	128%	166.200
DK	Taulov	120.000	130.000	108%	34.000
ES	Barcelona	348.000	307.000	88%	28.600
	Madrid	192.000	140.000	73%	
	Valencia	236.000	288.000	122%	99.200
FR	Le Havre	39.000	127.000	(a)	(a)
	Paris	658.000	270.000	41%	
HU	Budapest	300.000	263.000	88%	23.000
IT	Bologna	235.000	155.000	66%	
	Milano	1.057.925	1.130.000	107%	283.660
	Novara	805.000	478.000	59%	
	Verona	780.000	551.000	71%	
NL	Rotterdam	1.400.000	993.000	71%	
PL	Gliwice	32.000	57.000	178%	31.400
	Poznan	65.000	53.000	82%	1.000
	Warszawa	60.000	79.000	132%	31.000
SI	Ljubljana	150.000	87.000	58%	
Total terminals		13.271.925	11.184.000	84%	

Port Net NORTH East South West INTERREG IIIC

Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007

EXITECH

Intermodal Nodes in Italy



Freight Villages are relevant in terms of traffic

"Private" nodes have the same importance with respect to "public nodes (RFI) and ports"

Some analysis of data …

- Probably the whole Mediterranean is a "terminal" of Hong Kong in terms of TEU
- The fragmentation in Mediterranean is a weak and a strength point
- Grow rate of Ports at European and World level are good (also if Italy is performing not so well)
- Infrastructure (i.e. node such as Freight Villages) can be optimized but are sufficient to face the improvement

… what can we do?

- Enforce the strength point of Mediterranean sea by:
  - Using Intermodality: nodes can support us
  - Using ICT: let see the whole Mediterranean as a single ICT community
  - Using EDI: more paperless structure are needed
  - Improving performances of SME in cooperation with large operators: adoption of open standards and enforcement of interoperability

Outline …

- Raw numbers as a starting point
- Some general concepts
- Intermodal Transport in pills
- ICT and EDI at European Level
- A proposal for ICT and EDI Architecture

General concepts

- The cargo flows in the Mediterranean Sea are undergoing strong development. It is expected that a tenfold increase of the trade volume will occur within 20 years (strong development)
- The world's top 10 freight forwarding companies command less than 4% of the global market (market fragmentation)
- Goods are moving together with information and the quality of information could represent one of the factors of success of a chain, a certain attention has been paid in the area of ICT and EDI

Aim of the study

- Identify added value technologies
  - EDI: Electronic Data Interchange, part of ICT, that is e-document and protocol/format agreement
  - ICT: Information and Communication Technologies, that is infrastructure, services, architecture
- Proposal of an interoperable architecture
  - Open Architecture
  - International Standards
  - Service Oriented Architecture

PortNet NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH

Some Logistic Concepts …

- Freight Transport Logistics: covers the planning, organisation, management, control and execution of freight transport operations in the supply chain.
- Co-modality: means the efficient use of transport modes operating on their own or in multimodal integration in the European transport system to reach an optimal and sustainable utilisation of resources.
- Multimodality: is the carriage of goods by two or more modes of transport, irrespective of the types of freight, within a single transport chain.
- Third-party logistics: means that an organisation uses external logistics providers that supply all or a considerable number of its logistical activities.

… and some ICT concepts

- SOA: Service-Oriented Architecture expresses a business-driven approach to software architecture that supports integrating the business as a set of linked, repeatable business tasks, or "services";
- Web Service: a software system designed to support interoperable Machine to Machine interaction over a network. Web services are frequently just Web APIs that can be accessed over a network, such as the Internet, and executed on a remote system hosting the requested services;
- XML: The eXtensible Markup Language is a general-purpose markup language. XML's primary purpose is to facilitate the sharing of data across different information systems, particularly systems connected via the Internet. It is designed to be relatively human-readable.

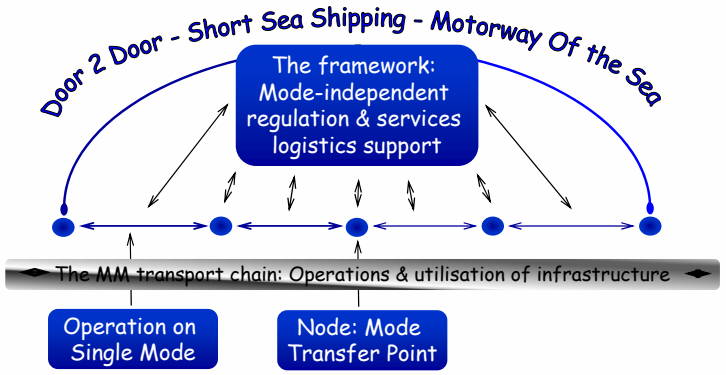
Outline …

- Raw numbers as a starting point
- Some general concepts
- Intermodal Transport in pills
- ICT and EDI at European Level
- A proposal for ICT and EDI Architecture

Author: Fabrizio Fioravanti

EXITECH

Intermodal Transport



PortNet NORTH East South West INTERREG IIIC

Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007

EXITECH

Intermodal Transport benefits

- Integration of the various transport modes
- Continuous door-to-door services
- Enables better use of modes to guarantee the service
- Liberalising the transport market
- Developing the trans-European networks
- Promoting fair, efficient pricing
- Bringing the information society to the transport industry

Mode change problems …

- A change of mode during a journey is more a change in system than a simple transhipment operation
  - higher prices;
  - longer journeys, more delays or less-reliable deadlines;
  - lower availability of quality services;
  - restrictions on the type of goods;
  - a greater risk of cargo damage;
  - more complex administrative procedures.

PortNet NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH

Infrastructure and transport equipment

- The lack of consistent networks and interconnections, forces transfer costs onto the operators;
- Each mode within the current system is financed and managed separately. The responsibility for strengthening the links between those modes is thus difficult to establish;
- Inability to operate between modes and in the same mode (i.e., different railway signalling systems);
- Difference in sizes of load-carrying unit among modes

Operations and infrastructure use

- Certain services such as vehicle identification are unavailable in intermodal situations;
- The various transport modes give unequal performance and service quality;
- Commercial information and practices are not always coordinated among the various modes;
- Terminals cannot always adapt to train and ship timetables that are operated round the clock (i.e., the working hours of drivers and crews do not always fit to intermodal operations);
- Timetables for various modes are not harmonised;

PortNet NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH

Services and regulations aimed at modes

- Absence of harmonised electronic communication systems among the various operators within the intermodal sequence prevents adequate scheduling;
- If cargoes are damaged the responsibility is difficult to establish since the various transport modes involved are governed by different international conventions;
- Administrative bottlenecks impair the competitiveness of intermodal transport

Intermodal players

- Ports: complex community of enterprises, public facilities, shipping and storing companies, etc
- Freight Villages: a defined area within which all activities relating to logistics are carried out by various operators;
- Freight Integrators: are transport service providers who arrange full load, door-to-door transportation by selecting and combining without prejudice the most sustainable and efficient mode(s) of transportation
- Short Sea Shipping or Motorway of the sea: movement of freight along coasts and inland waterways that accounts for roughly 40% of all freight moved in Europe

PortNet NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH

Accessibility in Intermodal Chain

- Physical level (infrastructures, technological devices and organisational aspects):
  - Infrastructures at local and European level
  - Connections with main corridors
  - Nodes (ports, freight villages, airports and railways)
  - The concept of Door 2 Door
- Virtual level (the organisational/technological support necessary for obtaining transport services):
  - ICT support for accessibility
  - Planning systems, tracking and tracing, etc
  - Interoperability among ICT systems at European level
  - Access to value added ICT services

Outline …

- Raw numbers as a starting point
- Some general concepts
- Intermodal Transport in pills
- ICT and EDI at European Level
- A proposal for ICT and EDI Architecture

ICT and EDI Framework in Europe

- Intelligent Transport Systems (ITS) are systems for:
  - Traffic and Mobility Management
  - Public Transport Management
  - User Information
  - Advanced Vehicle Control
  - Emergencies Management
  - Fleet and Goods Transport Management

TEMPO framework

Several ITS projects have been working within the TEMPO framework, which was a multi-annual indicative programme spanning the period 2001 to 2006.

ICT Framework: some proposal

- ACTIF: French proposal for ICT framework
- ARTIST: is the Italian Answer to the need for a common ITS language
- FRAME: was created in order to provide guidelines and a common approach to the planning, development and implementation of ITS throughout Europe

ICT in EU founded projects (1/2)

PROJECT ACRONYM	*PROJECT TITLE*
ARTEMIS	Advanced Road Transport Electronic Management Information Systems
BOPCOM	Baltic Open Port Communication
CESAR	Co-Operative European System For Advanced Information Redistribution
COMETA	Commercial vehicle Electronic and Telematic Architecture
D2D	Demonstration of an integrated management and communication system for door-to-door intermodal freight transport operations
EFFORTS	Effective Operations in Ports
FREIGHTWISE	Management Framework for Intelligent Intermodal Transport
GILDANET	Global Integrated transport Logistic DAta NETwork (www.gildanet.net)
INFOLOG	Intermodal Information Link for Improved Logistics
INTACT	Integrated Telematics for Advanced Communication in Transport
INTERBALTIC	Baltic Sea Intermodality
INTERPORT	Integrating Waterborne Transport in the Logistics Chain
KAREN	Keystone Architecture Required for European Networks
LOBSTER	Location Based Services cluster
MATAARI	Improvement of Accessibility to Transport and Logistic Services among Urban Areas and Intermodal Centres

Port Net NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH

ICT in EU founded projects (2/2)

PROJECT ACRONYM	*PROJECT TITLE*
PLATFORM	Computer controlled freight platforms for a time-tabled rail transport system
POSEIDON	European Project On Integrated VTS, Sea Environment and Interactive Data Online Network
PRECISE IT	Precise Automatic Location System for the Management of ITUs and Vehicles inside Intermodal Terminals
PROMIT	Promoting Innovative Intermodal Freight Transport
PROSIT	Promotion of Short Sea Shipping and Inland Waterway Transport by use of modern Telematics
RETRACK	Reorganization of Transport network by advanced Rail freight Concept
SITS	Simple Intermodal Tracking and Tracing Solutions
THEMIS	Thematic Network in Optimising the Management of Intermodal (Freight) Transport Services
TRACAR	Traffic And Cargo supervision system
TRIM	Transport Reference Information Model
WATERMAN	Waterborne Traffic And Transport Management - Technical Secretariat

Analysis of existing portals

- More than 100 portals have been analyzed, among them a subset has been selected for comparison
  - Independent Portals
    - Portal providing Logistic Services
    - Information Portal
    - IT Solutions Portal
  - Logistic Operator Portals
    - Logistic Services Provider (LSP) - Forwarder
    - IT Solutions / Products Providers
    - Research Operators

Independent portals

Independent Portals	Track & Trace	e - documents	Transport management	e-booking	Marketplace	Others
Portal providing Logistic Services						
FreeCargo					✓ (trucks/loads marketplace)	✓
GIFTS	✓	✓	✓			✓
intermodal Portal		✓	✓	✓		✓
INTTRA	✓	✓	✓	✓		✓
					✓ (broker's exchange)	✓

Port Net NORTH East South West INTERREG IIIC

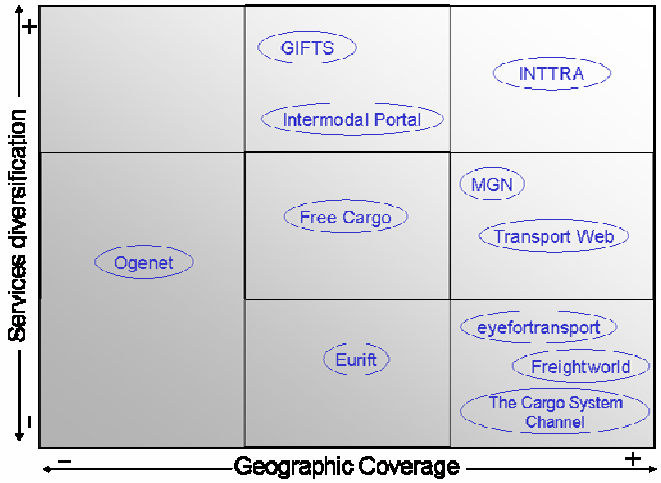
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007

EXITECH

Logistic Operator Portals

Operators' Portals	Track & Trace	e - documents	Transport management	e-booking	Schedules	Others
Logistic Services Provider (LSP) - Forwarder						
Agility	✓					✓ (reports on cargo)
Kuehne + Nagel	✓	✓		✓		✓
M. Ward Group	✓					
JEURO				✓ (sea freight booking)		
MAERSK LOGISTICS	✓		✓		✓ (sailing schedules)	✓ (rate request)
ace Logistics	✓			✓		✓ (rate request)
BEWESHIP	✓			✓		✓ (warehouse system)
SDV	✓					✓
eleugro	✓					
DHL	✓	✓	✓	✓		✓
KUEHNE + NAGEL				✓		✓ (rate request)
SCHENKER	✓			✓	✓	✓ (rate request)

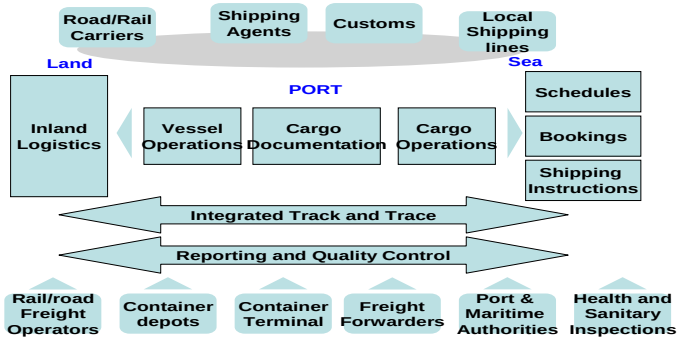
Independent portal: geographical coverage



Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007

Some examples of real architectures

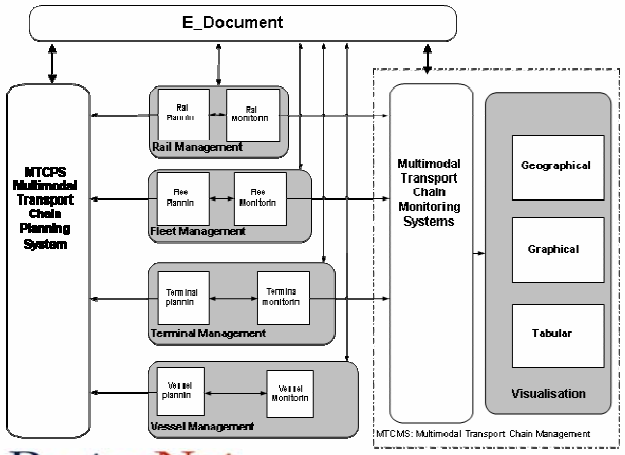
Valencia Port



Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007

Some examples of real architectures

GILDANET



Some preliminary conclusions

- Portal and services are present
- Existing services offer a partial coverage
  - Level of node (or not covering all nodes)
  - Single services
  - Services bound to a single operator
- There is the need to unify what stated at EU level in term of framework with real service by interoperability

Port Net NORTH East South West INTERREG IIIC

Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007

EXITECH

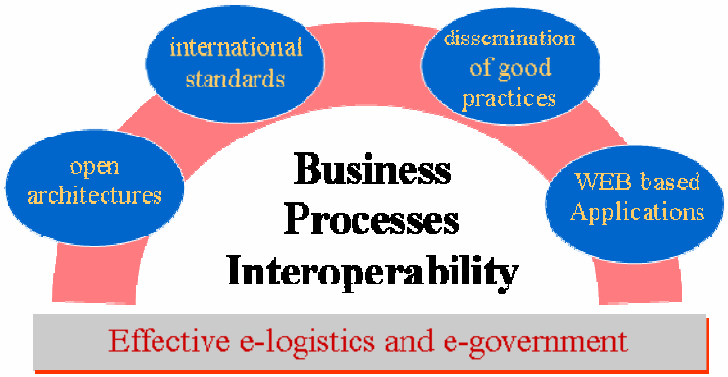
Outline …

- Raw numbers as a starting point
- Some general concepts
- Intermodal Transport in pills
- ICT and EDI at European Level
- A proposal for ICT and EDI Architecture

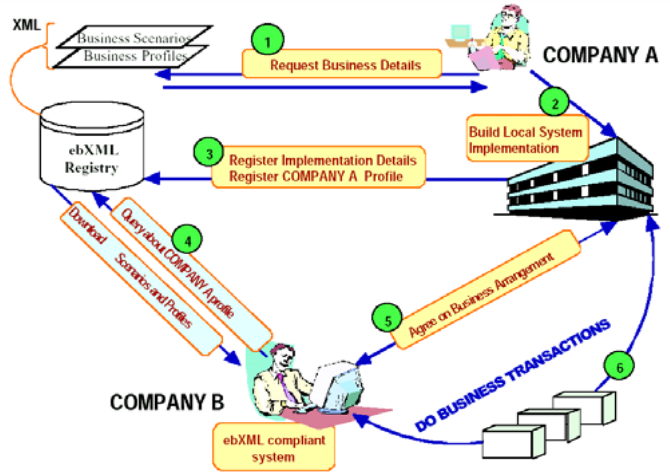
EDI for Multimodal chain: short history

- Around 1980, TRADACOMMS were largely developed in the UK and conformed to the UN GTDI syntax
- In 1986, the new UN/EDIFACT standard was launched, adopting the best aspects of the earlier standards
- More recently: "Web EDI", interchange of EDI formatted messages using Internet messaging protocols, principally SMTP or HTTP, though sometimes FTP is also used
- XML seems to be the path for the future …

Interoperability components



E-document interoperability



A proposal for an ICT Architecture

… The End …

Thanks for you attention!!!

Port Net NORTH East South West INTERREG IIIC
Author: Eng. Fabrizio Fioravanti, Ph.D.
Bologna 07/05/2007
EXITECH