

GILDANET Business Process Modeling

Ravenna, April 5th 2006

GILDANET

Interoperability in intermodal Supply Chains



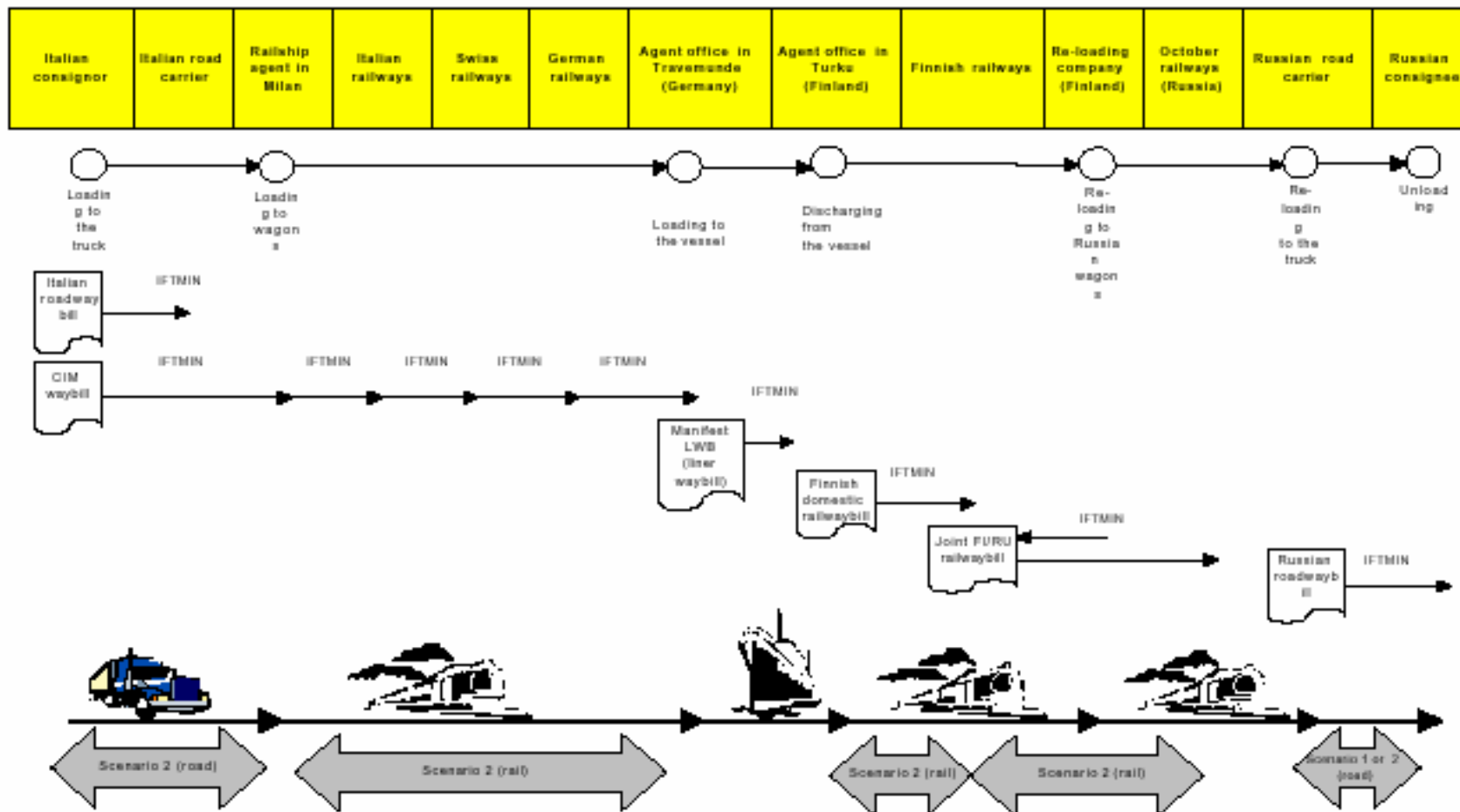
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- **GILDANET delivers interoperable IT systems in support of specific multimodal transport chains**
 - Transport in the automotive industry
 - Transport of perishables (fresh fruit)
 - Empty Container Cycle
- **International Consortium lead by the Regione Emilia Romagna, including partners from Austria, Italy and Greece**
 - Port authorities, logistic centers, logistic service providers, consultants.
- **GILDANET is a project that is co-funded by the European Union(INTERREGIIIb)**

Challenges of Multimodal Transport



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Source: MIST Report, TBG3

Challenges of Intermodal Transport



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- the needs for tracking and tracing are different for trading companies compared to transport companies
- there is no international or multi-modal tracking and tracing system available
- key reference numbers used by trading companies are different from those used in transport companies
- there are gaps in information flows the more players there are during the delivery chain, the more difficult it is to pass on key references
- there is a need for better tools for better delivery planning (i.e. estimated time of delivery)
- there is a need for better tools for exception reporting

GILDANET' s goals



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- **Multimodal chains made economically feasible - financially viable - through a reduction of the inherent complexity**
- **Re-use existing IT- resources by virtue of using interoperability standards (ebXML)**
 - Faster deployment, higher degree of flexibility
 - Expansion strategies and replication of best-practices
- **To enhance the transparency of the supply chain by focusing on the business process**
 - Increase the reliability of the transport chain
 - Strategic and tactical supply chain planning
- **Cost-effective set-up of transnational supply chains including SME's by adhering to international standards (UN/CEFACT, ISO, ...)**
 - SME: participation in more than one supply chain
 - decrease supplier dependency

GILDANET – Business Process Modeling



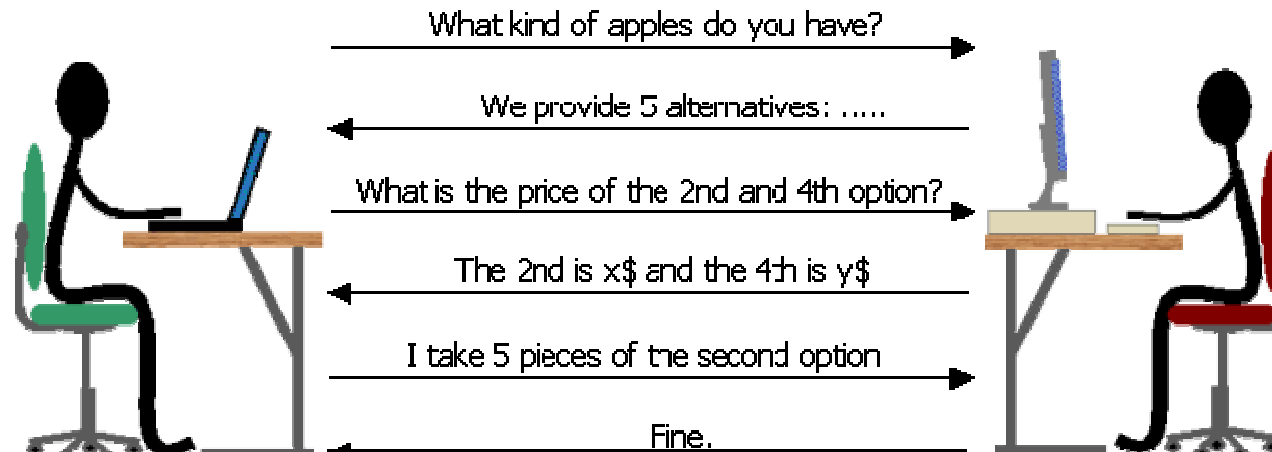
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- **Business Models of three supply chains**
 - Automotive Chain (current processes)
 - Perishable goods transport (new chain)
 - Empty container process cycle (existing chain, new services)
- **UN/CEFACT methodology used to model the processes**
 - Focus on information flows
 - Focus on collaborations between actors
- **Modeling results are used to support EDI exchange between actors in the supply chains**
 - Sufficiently detail interactions in advance to ensure efficient operation
 - Publication and use of Registry/Repository
 - Implement interoperable IT systems

WHAT IS A BUSINESS PROCESS ?



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A **Business Process** is a recipe for achieving a commercial result.

Each business process has: **inputs**, **methods** and **outputs**.

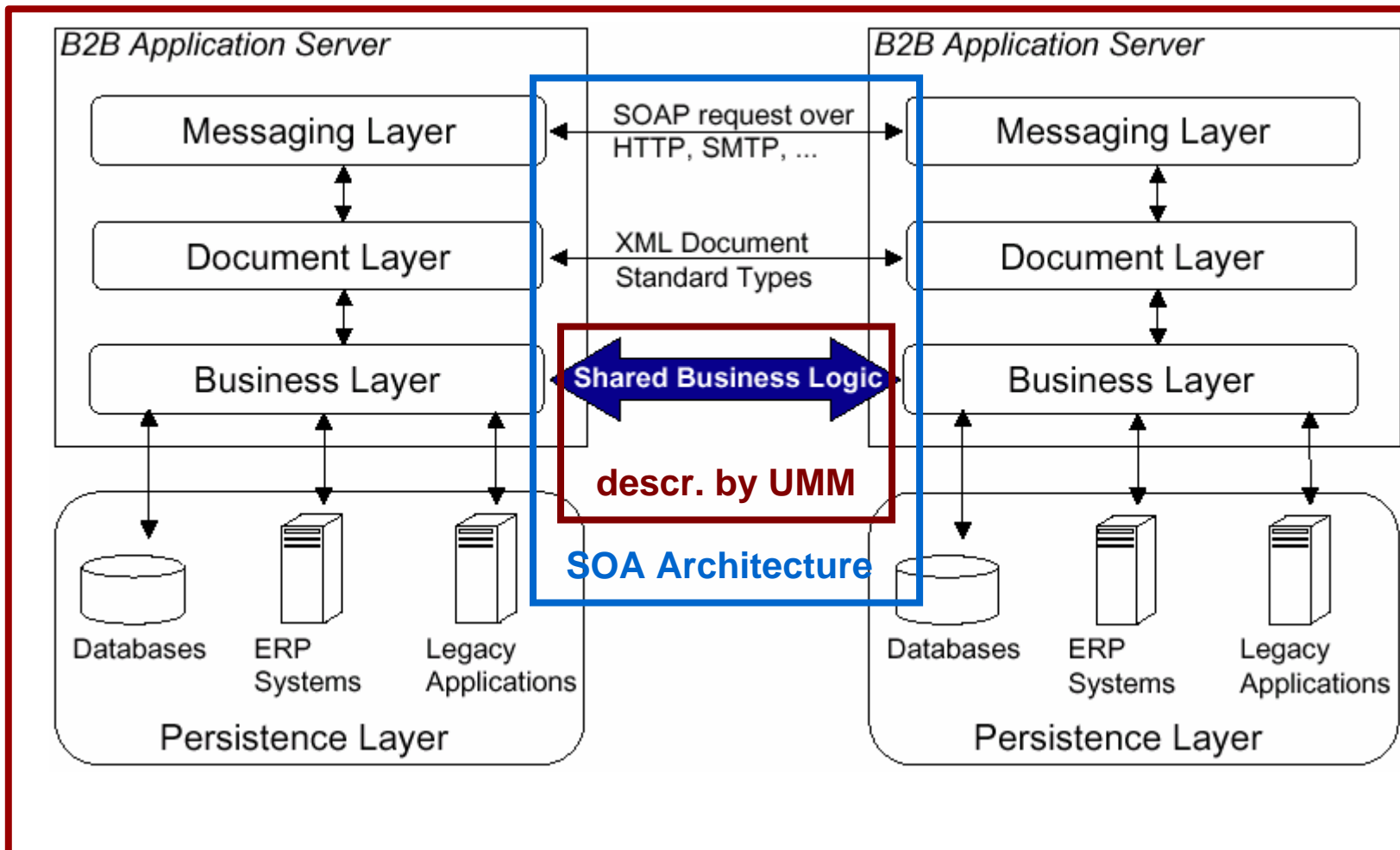
The **inputs** are a pre-requisite that must be in place before the **method** can be put into practice. When the method is applied to the inputs then certain **outputs** will be created.

So, a business process is a collection of related structural activities that produce a specific outcome for a particular customer. It can also be part of a larger, encompassing process and can include other business processes that have to be included in its method.

GILDANET's interoperability concept based on ebXML



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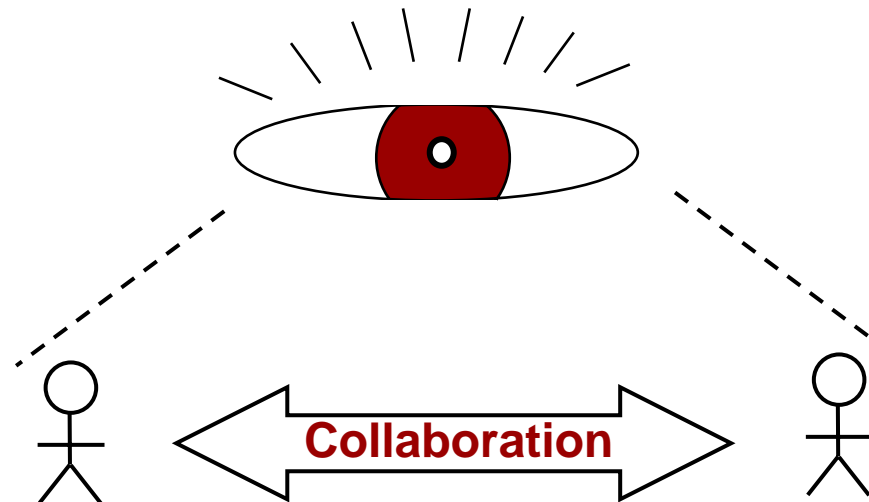


Describing shared B2B processes



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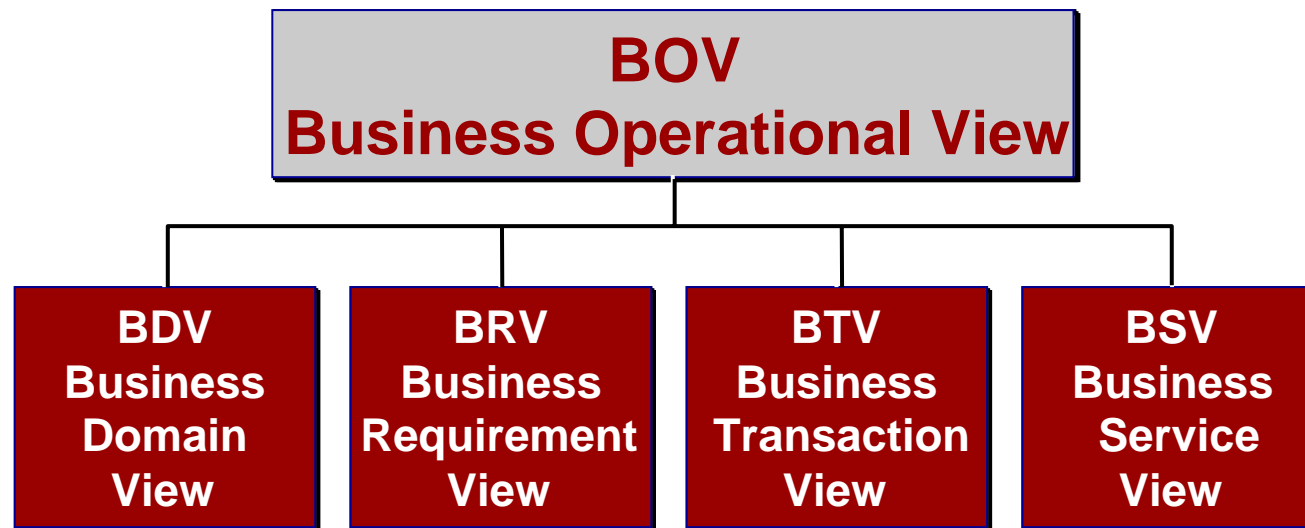
- If each partners describes a shared B2B process from its point of view the descriptions will not match
- A method is needed to define a shared process from a common point of view
 - UN/CEFACT's Modeling Methodology (UMM)



UN/CEFACT's Modelling Methodology (UMM)

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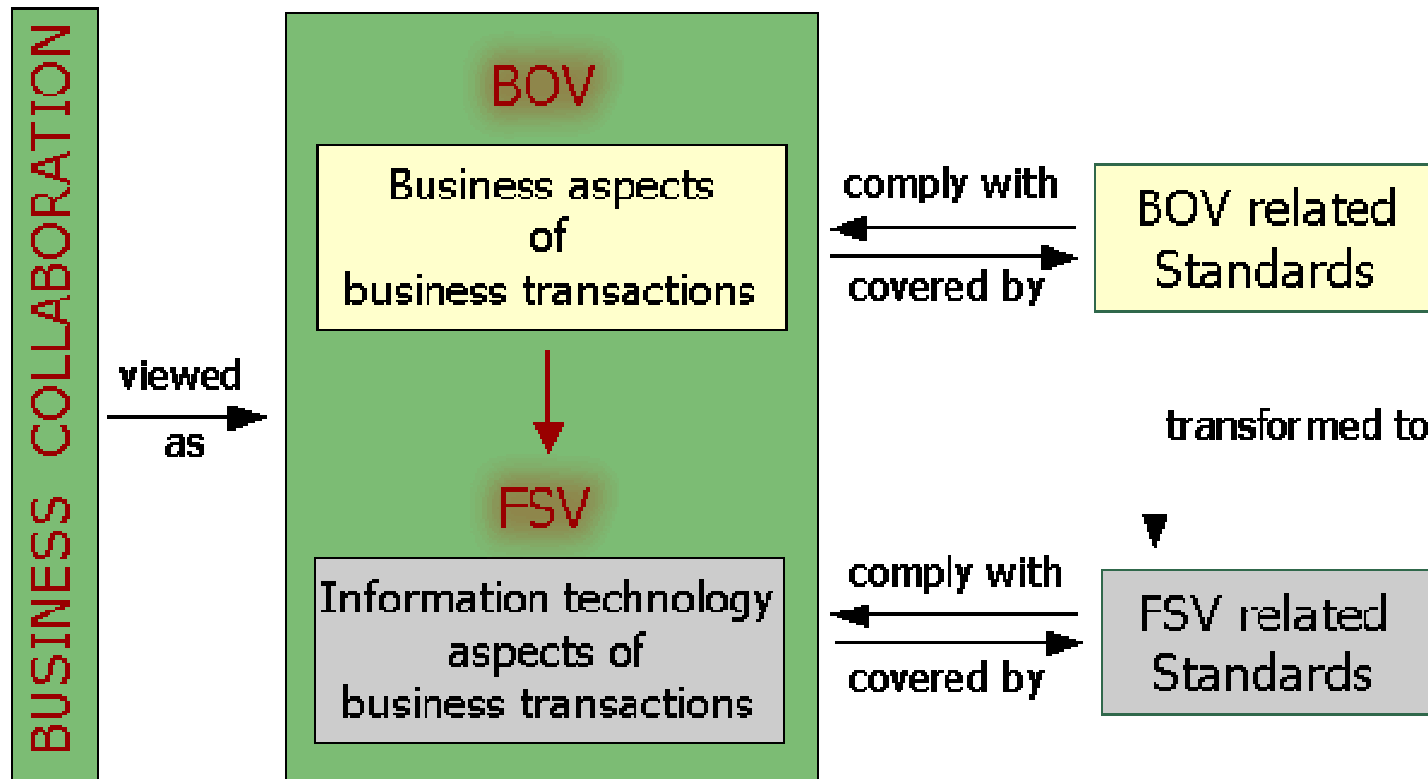
- UML-based description technique for describing B2B scenarios
- Concentrates on business semantics
- UMM Meta Model (UML Profile)
- Provides a procedure similar to a software development process



OPEN EDI – ISO Standard



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UMM Characteristics



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- **document the business process**
- **specify interfaces with partners and/or customers**
- **provide technical specifications for IT**
- **follows the idea of "divide et impera"**
 - i.e. break down a complex collaboration into simple "patterns" of transactions

UMM – Expected Benefits



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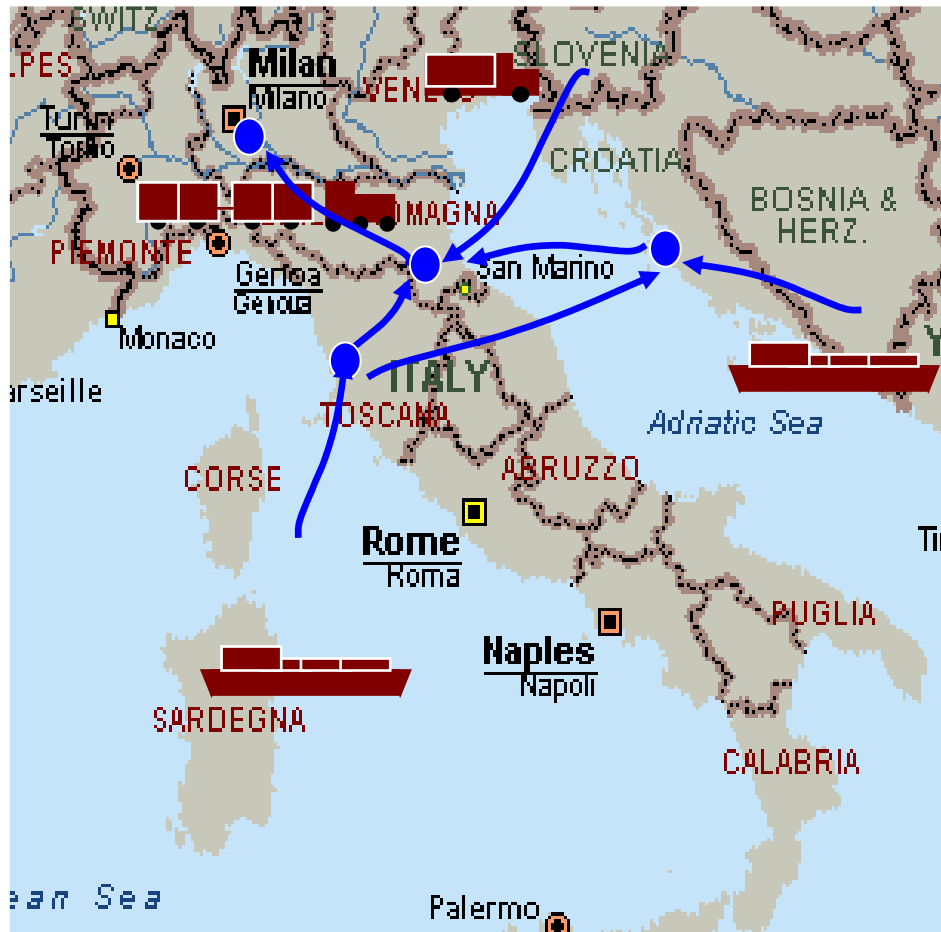
- **retains business acumen that is reusable over generations of implemented technology**
- **focuses on collaboration, especially the data exchanged and dependencies of transactions**
- **reuses core process components (patterns) und data elements (core components)**
- **provides reusable, standardized models in specific contexts**
- **is an incentive to adapt processes frequently and on demand**
- **enables the simultaneous development of consistent interfaces across actors**
- **supports a single adaptation of legacy systems using one method instead of designing an interface for every different collaboration partner**

Empty Supply Chain

A GILDANET demonstrator



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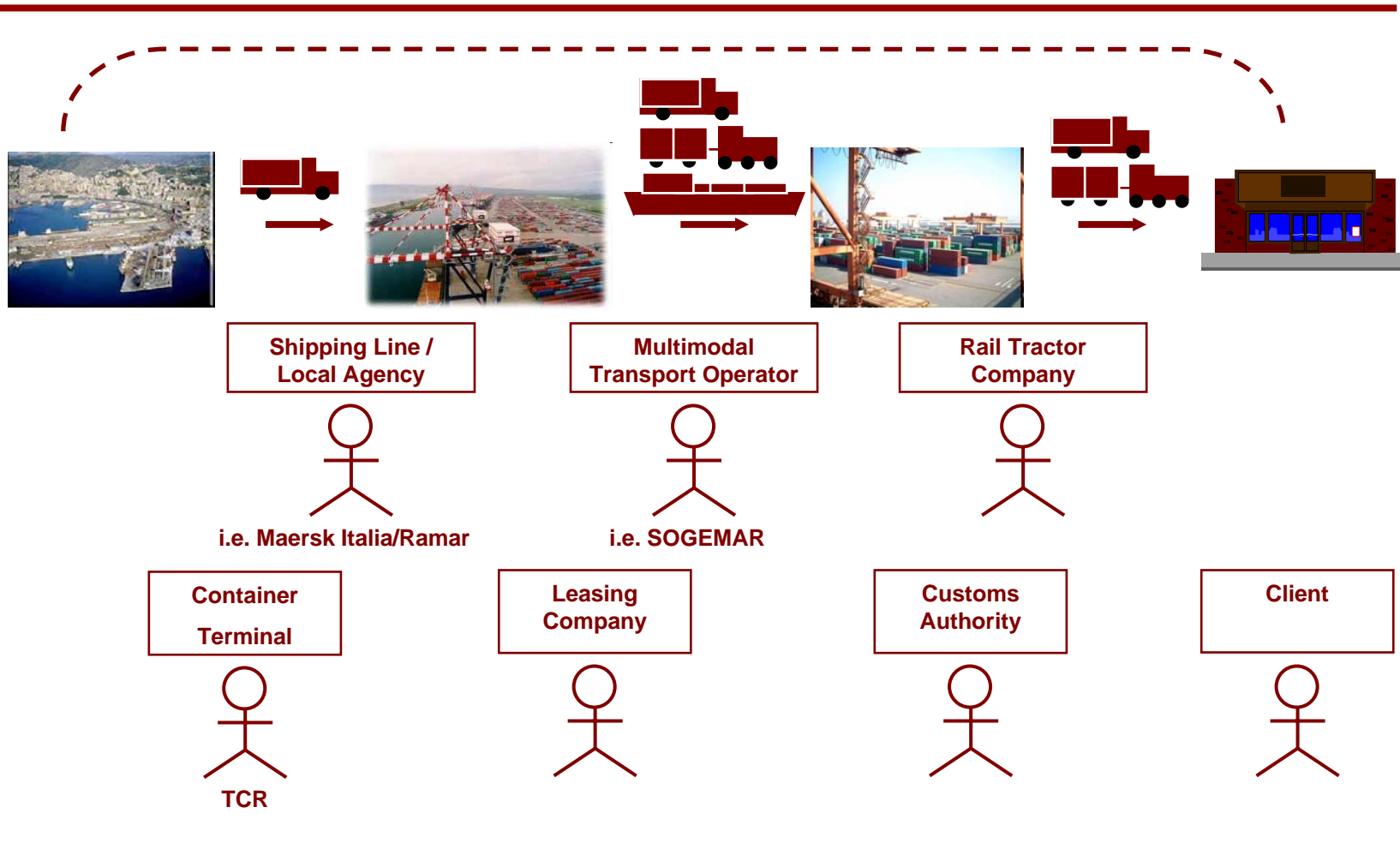


- Repositioning and maintenance cycle of containers
- Emphasis on the requirements of the container terminal and the Multimodal operator
- Proof-of-concept WebServices implementation

Roles and Actors



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The Empty Container Chain Cycle: Business Domain View



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UNSTUFFING

- From Client or Port

TRANSPORT

- Transport by truck or train

RE-POSITIONING

- Repair and maintenance
- Repositioned container

TRANSPORT

- Transport by truck, train or vessel

RE-POSITIONING

- Repair and maintenance
- Repositioned container

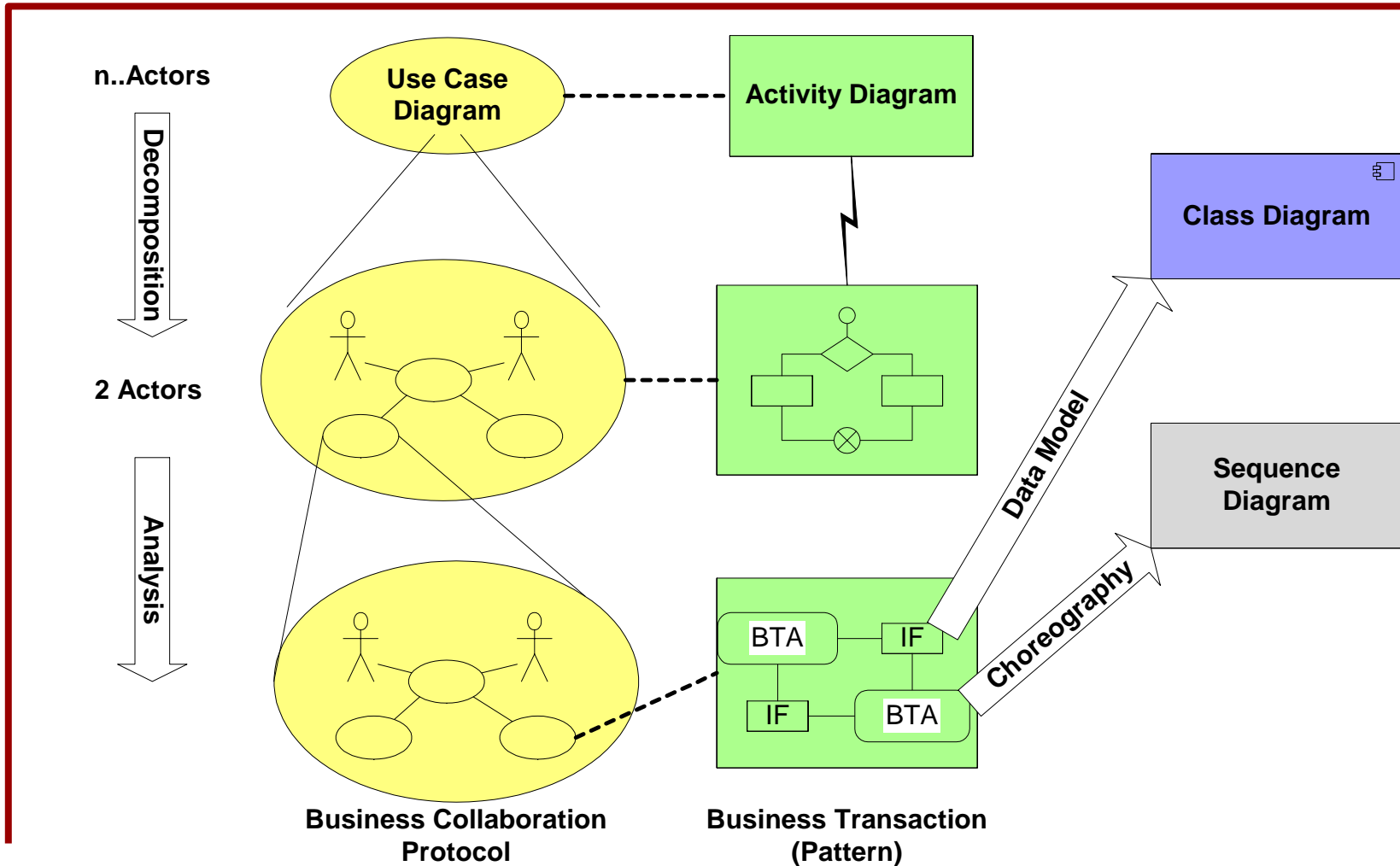
TRANSPORT

- Transport by truck or train

STUFFING

- Stuffing at client

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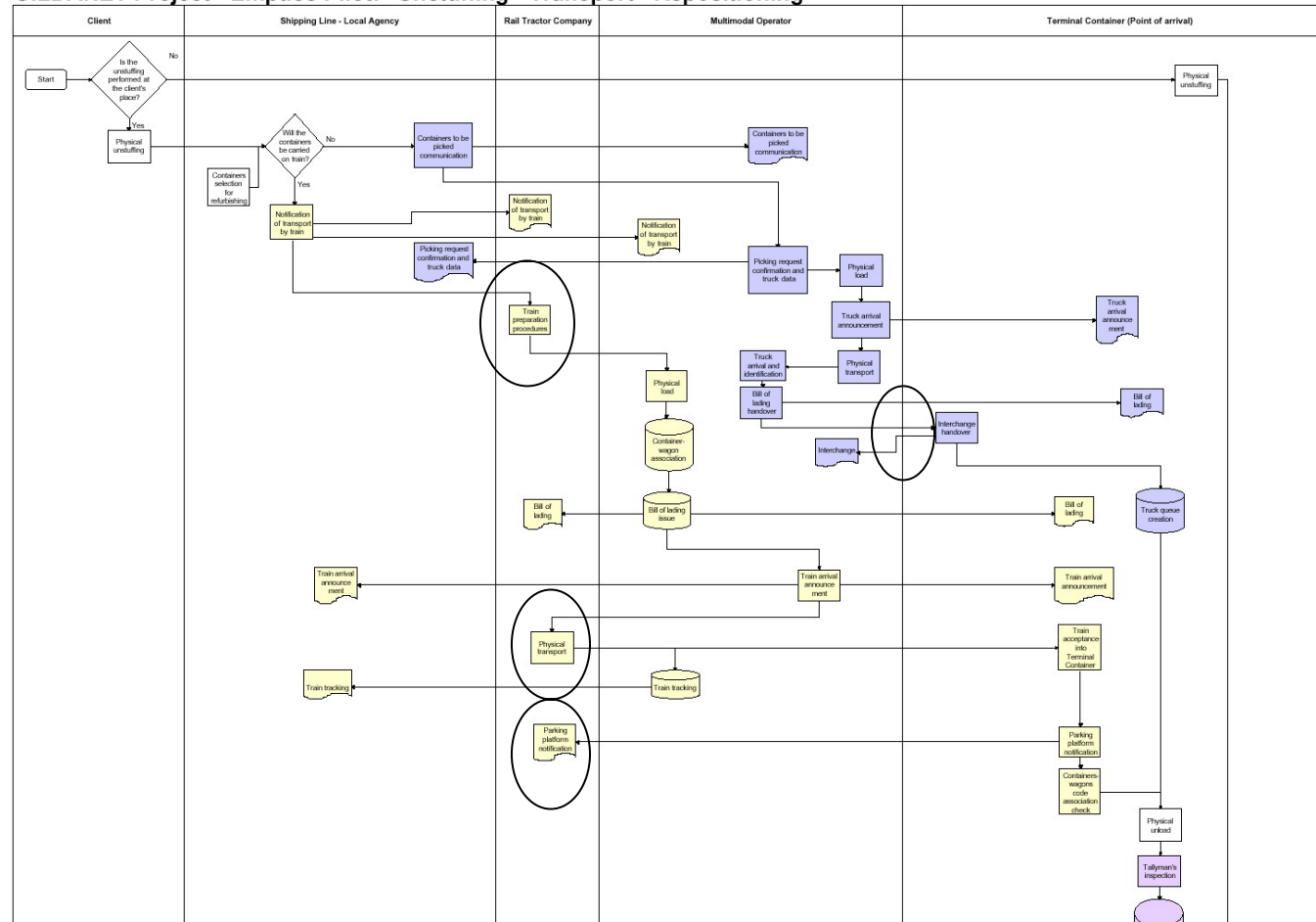


Internal processes



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GILDANET Project - Empties Pilot: "Unstuffing - Transport - Repositioning"



UMM Worksheets (excerpt)



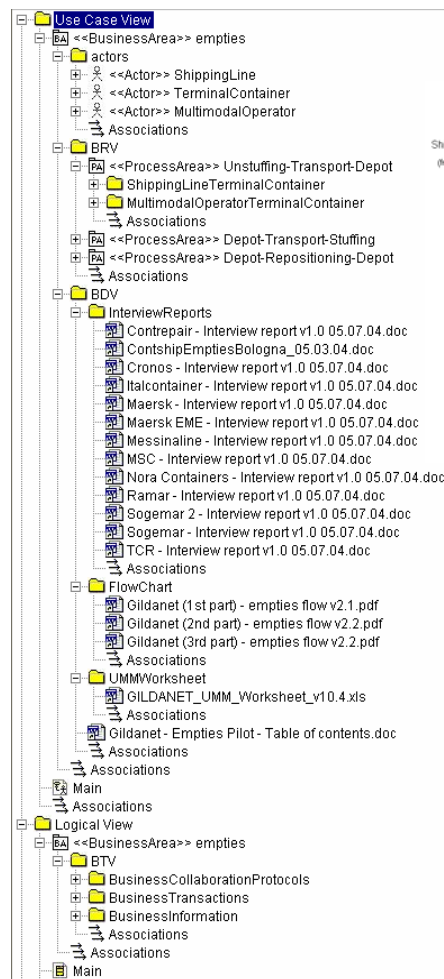
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	 Global Management Solutions		
Form: Business Collaboration Specification			
Business Collaboration Specification Name	[Provide a name for the Business Collaboration]	ShippingLineContainerTerminal	MultimodalOperatorShippingLine
Business Collaboration Specification Type		BCP	BCP
Participants	[List the type of partners involved in the Business Collaboration, e.g. manufacturer, supplier, customer.]	Shipping Line, Container Terminal	Multimodal Operator, Shipping Line
Definition	[A set of simple sentences that state the actions performed as part of the business process.]	Is the set of all possible collaborations among a Shipping Line and a Container Terminal .	Is the set of all possible collaborations among a Shipping Line and an Multimodal Operator.
Description	[A plain text explanation of the purpose and behavior of the Business Collaboration Specification]	Shipping Line and Container Terminal collaborate for all the activities, which should be done on empty containers from when they arrive in the Container Terminal, to when they leave from the Container Terminal.	Shipping Line and Multimodal Operator collaborate for all the activities, regarding the transport of empty containers from the point of departure to a point of destination.
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this process is conducted within. These rules are constraints that must be satisfied before instantiating or initializing the Business Collaboration thus ensuring that the proper context for the process has been established.]	Arrival of a certain number of empty containers of a shipping line into a Container Terminal.	A need for the Shipping Line to send empty containers from one point to another (via truck/train).
Begins When	[Identifies the event(s) from that start this Business Collaboration.]	Begins with the containers arrival in the Container Terminal.	Begins when the Shipping Line gives an order to a Multimodal Operator for the transport of empty containers.

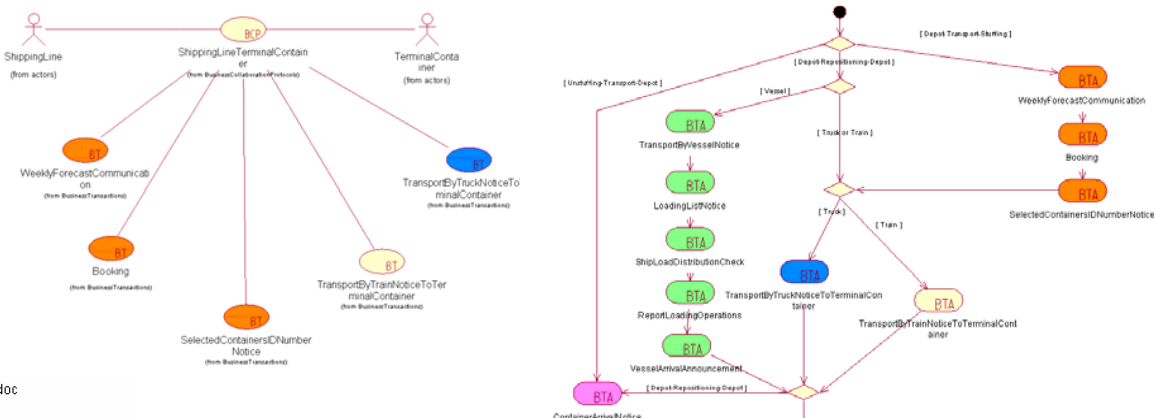
UMM Business Operational View



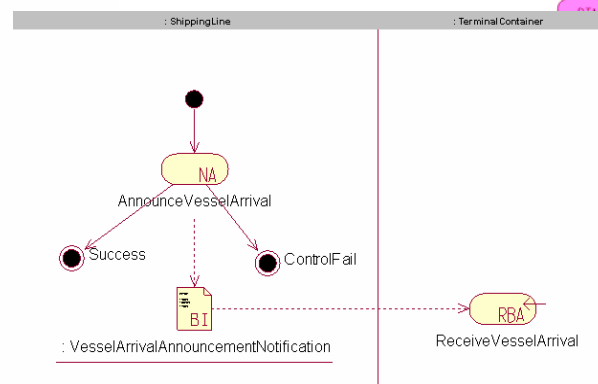
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Business Collaboration Business Collaboration Protocol



Business Transaction

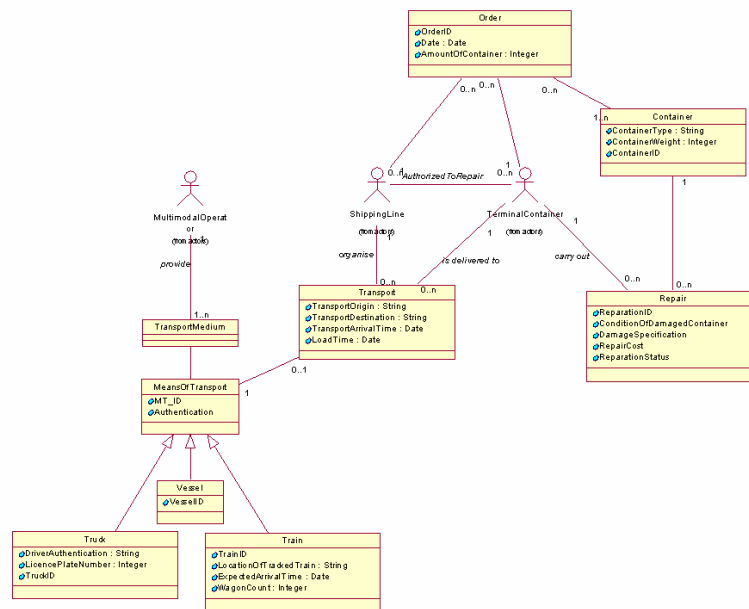


UMM Class/Sequence Diagram

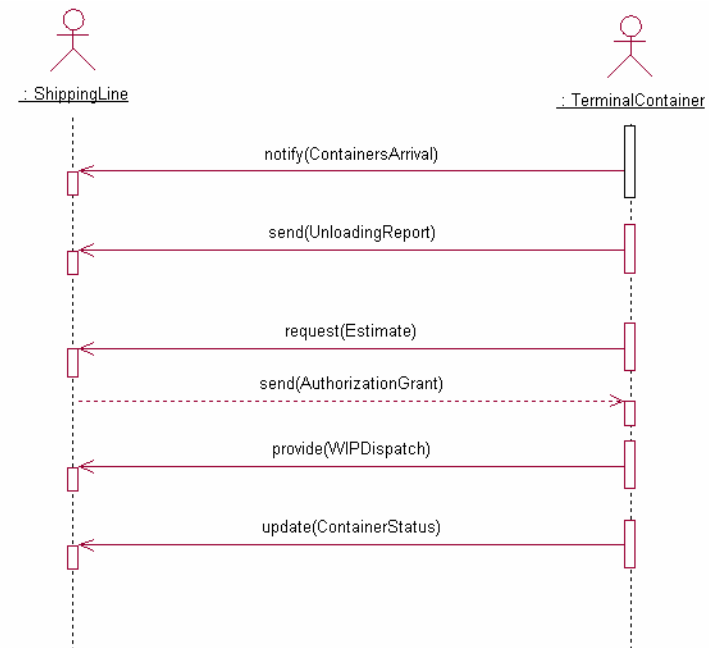


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Class Diagram



Sequence Diagram



Discovered Potential for Improvement



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■ Inconsistencies discovered:

- Apparent Confusion between Notification and Order
- ContainerID (SL-MTO) and TruckID (MTO-CT) are not mapped
 - CT never gets the ContainerID?
- Who uses weekly forecasts by SL/LA ?
 - Are MTO's responsible for repositioning ?

■ Process Assumptions (to be verified)

- SL selects a particular MTO to provide Containers for a specific load operation
- MTO organizes necessary repositioning under his own responsibility
- SL assumed to have the most current information on Container status
- Resulting dispositions assumed to be erroneous

Model Elements Corresponding to Empties BC Document



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Rose Model (AS-IS)

- **TransportByTruckNotice (SL-MTO)**
- **TruckArrivalAnnouncement (MTO-CT)**
- **ContainerArrivalNotice**
- **ContainerStatusUpdate (both CT-SL)**

Empties BC (TO-BE)

- **Transport Order (reverse logistics virtual marketplace)**
- **Container Arrival Notification (identical)**
- **Web service providing container status information (hosted by CT)**

Model Driven Architecture

The MDA defines an approach to IT system specification that separates the specification of system functionality from the specification of the implementation of that functionality on a specific technology platform.

To this end, the MDA defines an architecture for models that provides a set of guidelines for structuring specifications expressed as models.

The MDA approach and the standards that support it allow the same model specifying system functionality to be realized on multiple platforms

- **through auxiliary mapping standards, or**
- **through point mappings to specific platforms**

and allow different applications to be integrated by:

- **explicitly relating their models**
- **enabling integration and**
- **interoperability and supporting system evolution as platform technologies come and go.**

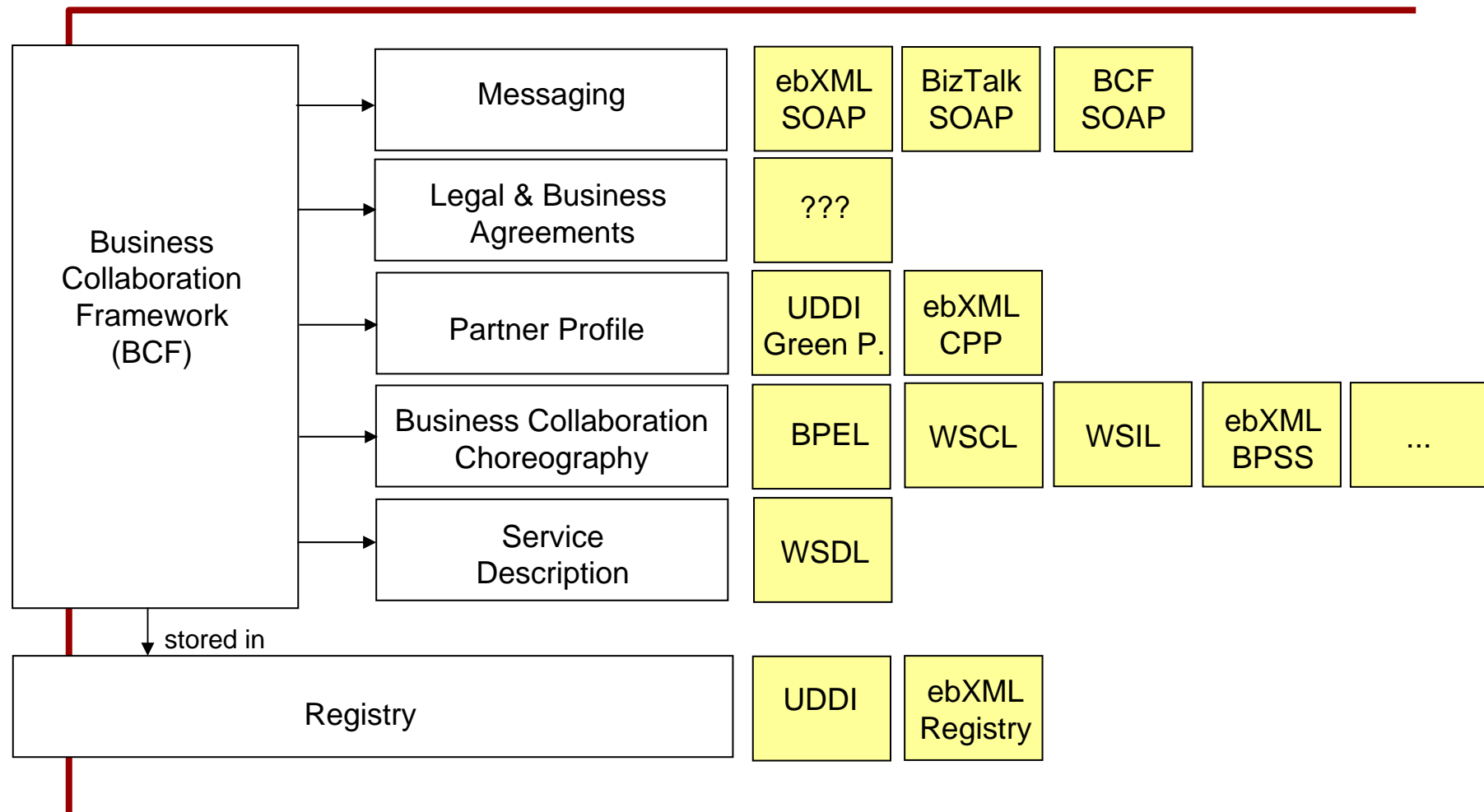
Steps:

- 1.Specifying a system independently of the platform that supports it**
- 2.Specifying platforms**
- 3.Choosing a particular platform for the system**
- 4.Transforming the system specification into a specification for a particular platform**

UMM Components & Realizations



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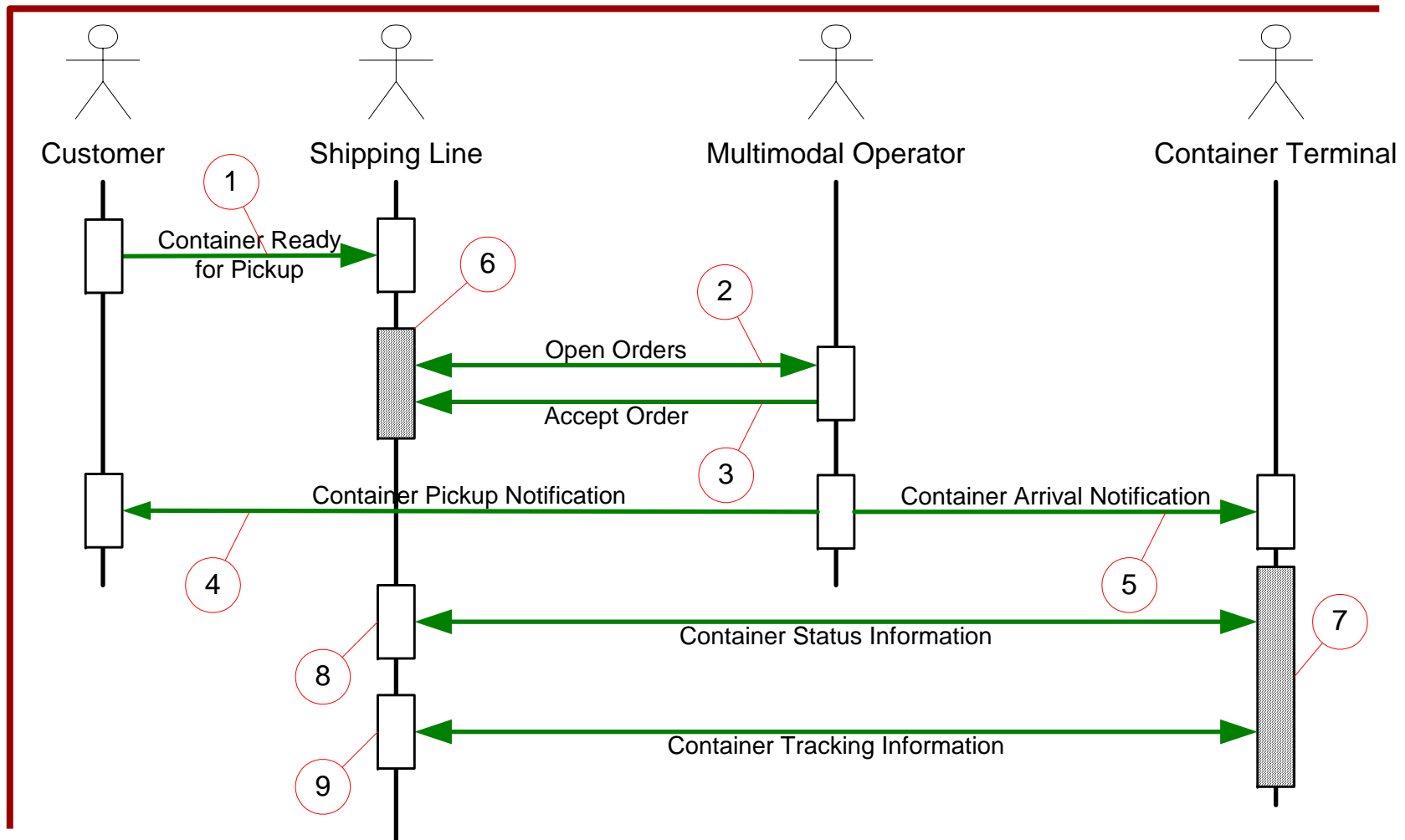


From UMM to WEBSERVICES

Empties Business Case



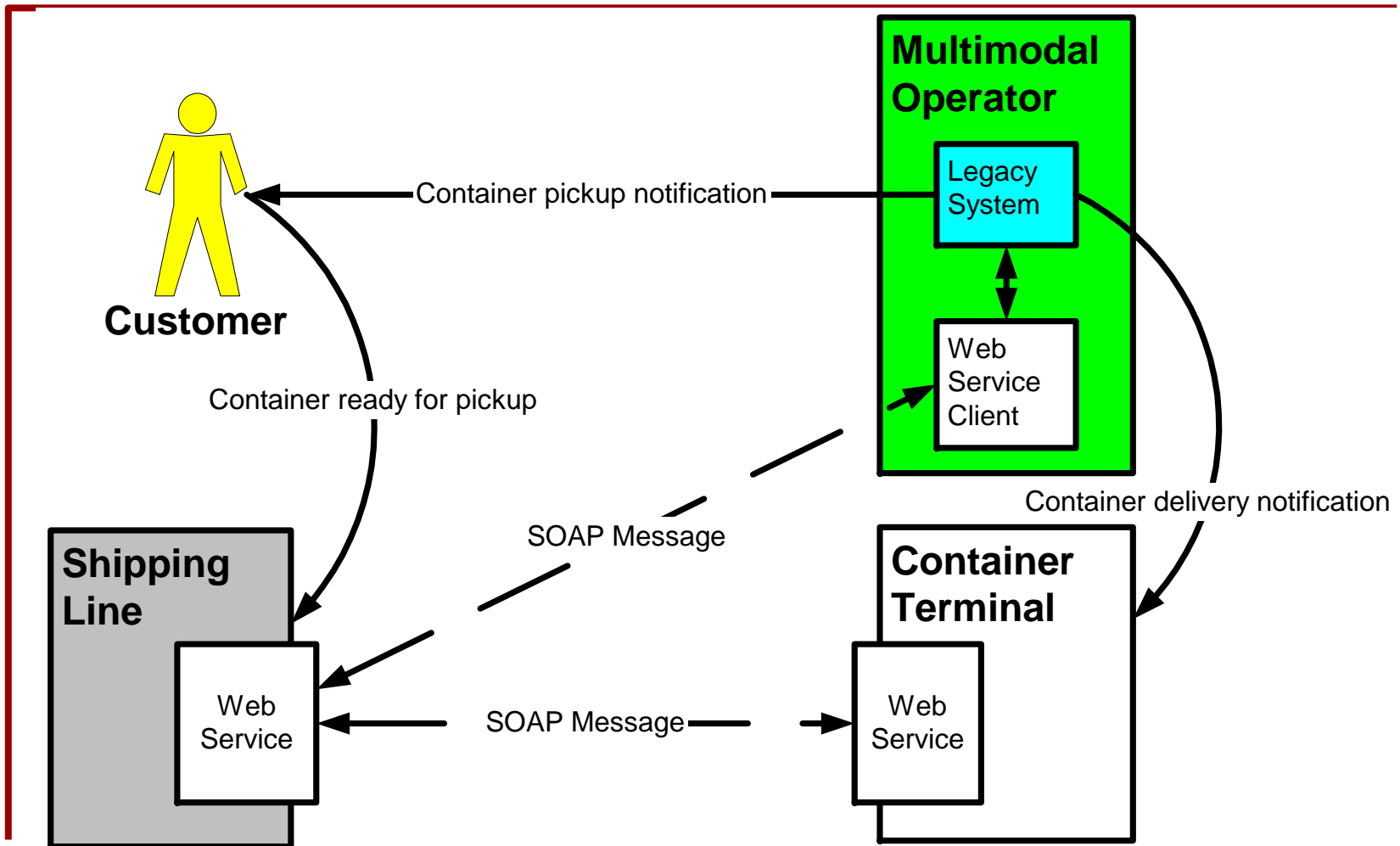
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Empties Logical Architecture



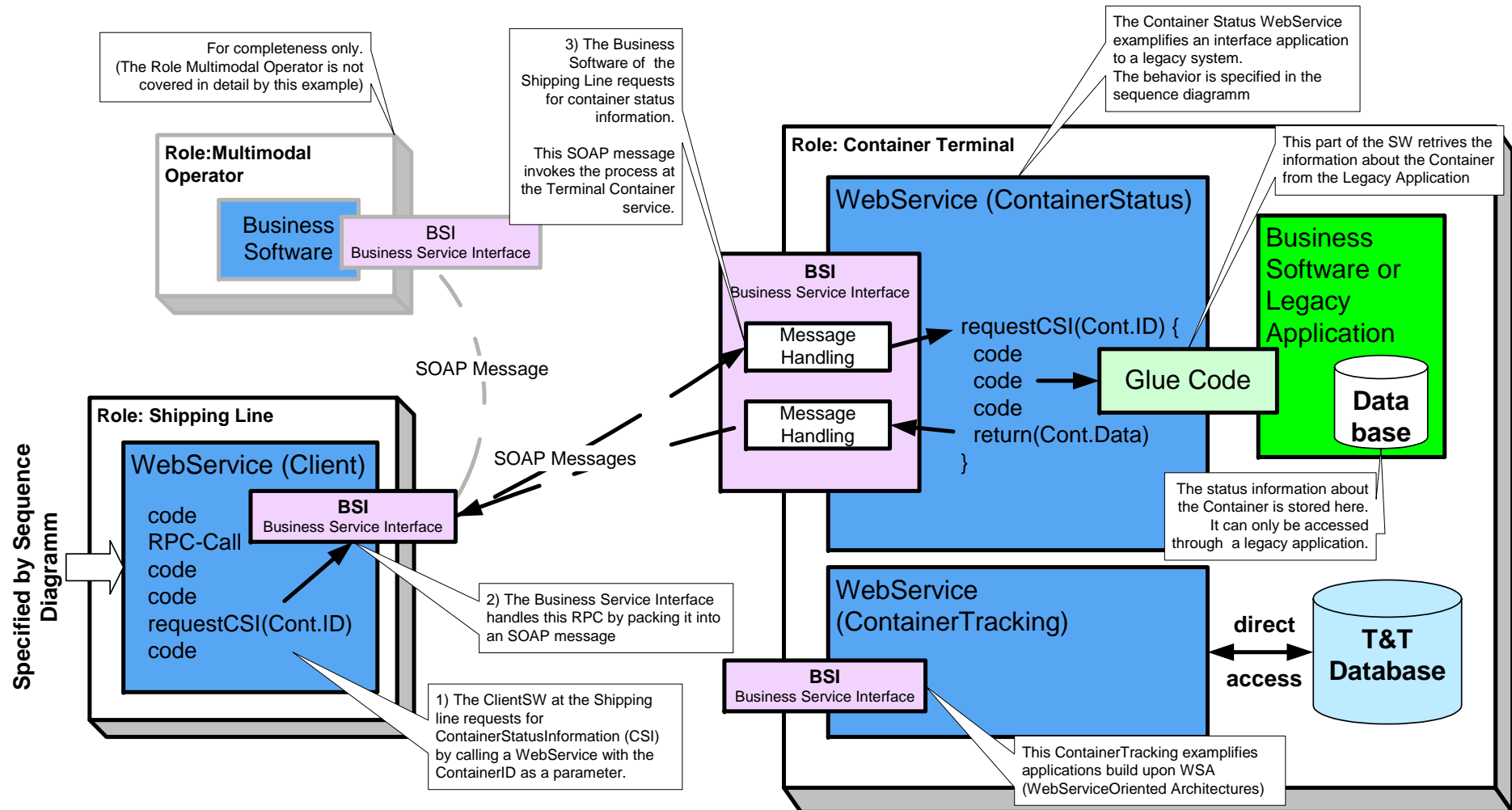
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Empties Physical Architecture



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Empty Container Prototpe (webservices)



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Home2.jsp - Microsoft Internet Explorer

Indirizzo: http://151.99.165.9080/GildaDatabaseClient/sample/GildaSessionSIPProxy/Home2.jsp

GILDAnet

Location: Venice

GildaNet WEB Services

[main menu](#)

User: rparatore

Login

wsdl

Containers Management

List Empty Containers

List Damaged Containers

Status Container

Move Containers

Update Movements

Delete Movements

List Movements

Repair Containers

Make Offer

Delete Offer

List Offer

Approve Offer

Find Offer

Coarri

ETA/ETD Containers

List Container by Voyage

List Voyages

List offer							
ID OFFER	IDCONTAINER	COMPANY	DAMAGE	COST	OFFER DATE	AUT.	AUT.DATE
2705200514484969	GCNU4606811	ACME riparaz. container spa	verniciatura	500.0	Fri May 27 00:00:00 CEST 2005	Y	Fri May 27 00:00:00 CEST 2005
2605200543694889	PELU2122325	ACME riparaz. container spa	ROTTA	1234.0	Thu May 26 00:00:00 CEST 2005	-	-
1305200566023627	GSTU4436066	ACME riparaz. container spa	Rotta il coperchio a sx	123.98	Fri May 13 00:00:00 CEST 2005	Y	-
3105200562450795	CRXU4088322	ACME riparaz. container spa	CHIUSURA DIFETTOSA	18.0	Tue May 31 00:00:00 CEST 2005	-	-
3105200559412505	CRXU4088322	ACME riparaz. container spa	porta rotta	24.0	Tue May 31 00:00:00 CEST 2005	-	-
1805200522422824	12	ACME riparaz. container spa	gsgsh	123.0	Wed May 18 00:00:00 CEST 2005	-	-
1805200538590322	1134	ACME riparaz. container spa	FGGH	123.0	Wed May 18 00:00:00 CEST 2005	-	-
1805200512030799	1134	ACME riparaz. container spa	FGGH	123.0	Wed May 18 00:00:00 CEST 2005	-	-
1805200526597743	1134	ACME riparaz. container spa	FGGH	123.0	Wed May 18 00:00:00 CEST 2005	-	-
1805200518736852	1134	ACME riparaz. container spa	FGGH	123.0	Wed May 18 00:00:00 CEST 2005	-	-
1805200580591310	123	ACME riparaz. container spa	we	123.0	Wed May 18 00:00:00 CEST 2005	-	-
		ACME riparaz.			Wed May 18		

Expected Positive Impacts of WebServices



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- **Webservices following a pull principle instead of a push principle, offer economies (savings)**
 - WebServices can reduce administrative overhead by providing Information in one single format than per Partner
 - Efforts to administrate and maintain data are incurred only once by the originating party
- **Early, reliable provision of information enables planning and optimization**
 - More accurate information, obtained on demand
- **Potential to create new value added services ...**

Experiences with UMM in GILDANET



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- **The modelling of the internal Business Processes have already resulted in first improvements in the specific supply chains**
 - Simplifications have been identified (Automotive)
- **Modelling discipline encourages the planner to consider potential problems early in the cycle**
 - Minimizing disruptions during operation (Freshlog)
- **First steps for further work and improvement**
 - Identify those collaborations that will be supported by electronic documents (Empties)
- **Depth and breadth of the modeled chains can be easily expanded**

Advantages of UMM and business process modeling



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- **Comprehensive view of the modelled supply chains**
 - Sufficiently modular to allow detailed inspection
 - Comprehensible documentation
- **Complex, time-critical dependencies can be modeled and planned in advance**
 - Contingency planning, exception handling
- **Ability to analyze potential efficiency gains**
 - Utilizing early information
 - Utilizing tracking and tracing
- **Supports the subsequent automation of processes and information exchange**
 - Re-use of modelling artefacts and implementations
 - Reduced complexity in software development
 - Portability of applications to existing and future technologies

Exploitation Path ...



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- **Review of the model with business professionals of MTO, SL and CT**
 - Complete missing elements
 - Eliminate inconsistencies
- **Focus the empties business process model on areas with potential for improvement**
 - Interfaces between CT/MTO and SL ?
- **Identify and implement corresponding Web Services**
- **Develop decision support system for MTO/SL more efficient container routing**

Current Standardization Initiatives



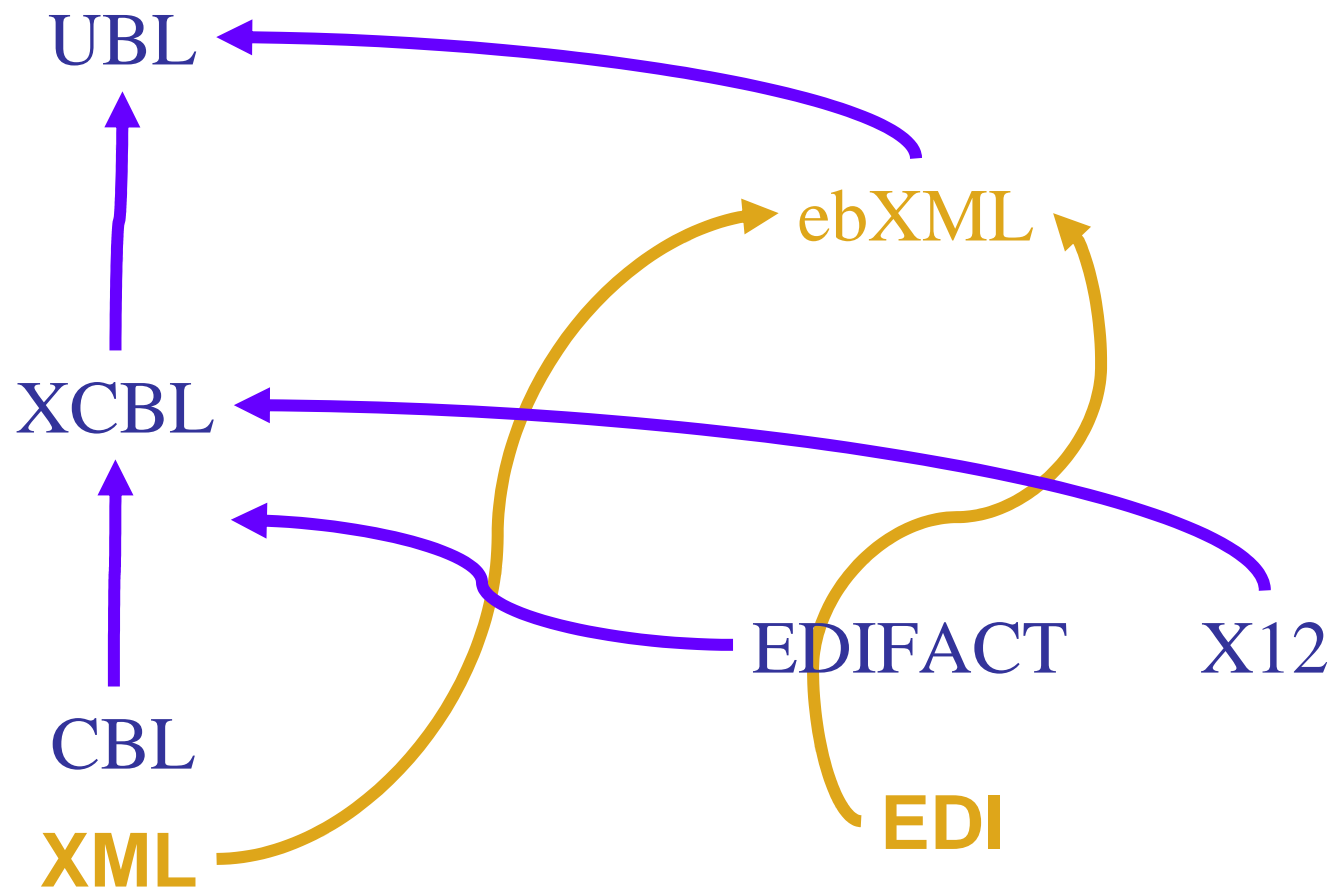
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- **Core Component definitions by UN/CEFACT working groups**
 - Rapprochement between OASIS (UBL) and ebXML (CC)
- **UNeDocs development by UN/ECE**
 - Harmonize, map to WCO Model 3.0
- **Business Process Modeling within UN/CEFACT using UMM**
 - UN/CEFACT and OASIS will announce that BPSS 3.0 will be a joint effort.

UBL's Ancestry



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Standard Business Documents

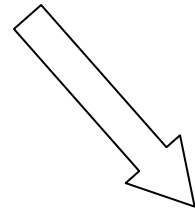


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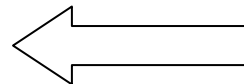
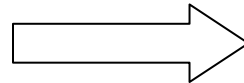
UN Layout Key



EDIFACT



UNeDocs



**Core
Components**

Current Standardization Initiatives

eBusiness, Interoperability



PARADIGMA

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WCO Framework of Standards To Secure and Facilitate Global Trade



WCO established the Framework as a minimum set of standards; members expected to implement the framework; 129 members have signed letter of intent

Harmonizes the advance electronic information on inbound, outbound and transit consignments based on employing the **WCO Customs Data Model for electronic Customs messaging**

Application of risk management approach to address security threats

Outbound inspection of high-risk consignments being exported, preferably using non-intrusive detection equipment

Customs will provide benefits to businesses that meet minimal supply chain security standards and best practices

WCO Data Model v2



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Business Process Models with Use Cases, Activity, Sequence and Class Diagrams

Revised EDIFACT Customs UNSMs and Message Implementation Guidelines (MIGs)

XML schema guidelines

WCO CDM version 2.0 has incorporated the UCR to provide continuity of the audit trail from source to destination

Partial alignment with CEFACT Core Component Technical Specification (CCTS), United Nations Trade Data Elements Directory (UNTED) WCO Data Model takes into account the Single Window Concept

Customs Administrations of UK, US, Canada, India, Japan, Australia, Chinese Taipei have already begun to fully implement the WCO Data Model and others will follow



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WCO Data Model ↔ TBG2 UNeDocs

Both Data Models:

- Reflect **Regulatory and Conventional** requirements
- Are based on **UNTD**
- Are based on the **UNECE Recommendation 1 (UNLK)**
- Are aware of the requirement for paper to electronic (**Digital Paper**) migration paths via UNLK to **eUNLK**

Alignment of UNeDocs and WCO Data Set into one model will meet the requirement for flexible document structures for **Single Windows across TBG domains of trade, transport, customs, finance and OGA requirements**

WCO Data Set is a sub-set of UNeDocs with TBG cross-domain data inter-relationships

Traders will be able to exchange Customs Data electronically using UNeDocs XML transactions e.g. to develop UNeDocs National Customs declaration document structures

Electronically processed, consignee known (security related benefits)

Drawbacks: customs authorities sometimes demand a negotiable bill-of-lading, banks, insurance demand it when „documentary credit“ is involved.

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- **Tracking & Tracing (RFID)**
 - COSEAL (containers seals msg)
 - ISO TC204 RF-Tag architecture for tracking & tracing
- **IMO ship and port facilities security requirements (ISSP code)**
- **UN/ECE Recommendations**
 - UN/ECE's single window initiative
 - DG TAXUD – revised customs code (eCUSTOMS)
 - Measures to Facilitate Maritime Transport Documents Procedures (Rec 12)
 - Replace negotiable bill-of-lading by „non-negotiable sea-way bill“

Summary



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- **The adoption of international standards is continuing**
 - Recent initiatives focus on ebXML
- **Driven by influences external to the transport sector**
 - Multimodality
 - Security Concerns
 - Globalization & Harmonization
- **Consequences, Benefits**
 - Changes in the competitive structure
 - Expansion of business opportunities for adopters
 - Process cost reductions