

Baltic Sea Information Motorways



WP1

BaSIM Collaboration Architecture

Attachment 1

Architecture Inventory Report



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Attachments - Descriptions of studied architectures

Number	Title	Date	Version
1	ARKTRANS	8.12.2004	1.0
2	BOPCOM	14.12.2004	1.0
3	ITS Japan	14.12.2004	1.0
4	KAREN	9.12.2004	1.0
5	MeriArkki	13.12.2004	1.0
6	RosettaNet	23.12.2004	1.0
7	Supply Chain Operations Reference model (SCOR)	14.12.2004	1.0
8	TARKKI	13.12.2004	1.0
9	TEDIM	9.12.2004	1.0
10	TelemArk	13.12.2004	1.0
11	US ITS Architecture	9.12.2004	1.0
12	Pan-Asian Alliance	22.12.2004	1.0
13	NATO Consignment Tracking / Logistics Integration	22.12.2004	1.0
14	WCO Kyoto ICT Guidelines and WCO Data Model	22.12.2004	1.0
15	ALSO Danube	22.12.2004	1.0

1. Goal of the architecture inventory

Purpose of this architecture inventory is to check and assess the suitable existing groundwork for Baltic Sea Motorways Interoperability Architecture. Each architecture or concept is described in separate attachment. Chapter 3 compares the assessed architectures from the BaSIM Interoperability Architecture Viewpoint.

This report does not make specific statement on how to utilise any of the assessed architectures in the BaSIM Interoperability Architecture, but merely points to useful areas and constructs within them.

Detailed information about the evolving architectures describe the situation in 2005.

2. Overview of studied architectures

This is a short overview of each of the studied architectures.

ARKTRANS

The Norwegian System Framework - Architecture for Multi-modal Transport. System framework architecture that provides a framework for the design, implementation and operation of ITS for multi-modal transport of freight and personnel. The ARKTRANS reference divides the transport domain into manageable sub-domains of Transport Demand, Transport Service Management, On-board Assistance and Control, Transport Network Management and Terminal Management.

BOPCOM

Baltic Open Port Communication. Telematics concept for the port and transport area including the support of SMEs offering low-cost solutions. Contains services for: booking, dangerous goods information handling, berth management, hinterland connection, localisation of units, statistics, confidential information handling and system interconnection.

System Architecture for ITS in JAPAN

The System Architecture for ITS aims to build an integrated system efficiently, to secure expandability of the system, and to promote national and international standardization. The System Architecture defines User Services, Logical Architecture, Physical Architecture and Standardization Candidate Areas along with guidelines for constructing and applying the System Architecture. The Architecture divides the content into Development Areas that are: navigation systems, electronic toll collection systems, assistance for safe driving, optimisation of traffic management, road management, support for public transport, commercial vehicle operations, support for pedestrians and support for emergency vehicle operations.

KAREN

The European KAREN Architecture is a high level architecture designed to serve as a tool for the creation of national, local or sector specific architectures, which in turn provide a basis for planning ITS projects and applications. The KAREN Architecture is technology independent, and predominantly covers road-based ITS.

MeriArkki

Maritime ITS architecture (MeriArkki) describes the commercial traffic actors of vessel traffic system and the tasks of these actors, the data used and transmitted by them and the recognised possibilities for telematics application. MeriArkki describes it's content in terms of main tasks/processes, actors/roles and information objects. The processes covered are related to vessel traffic control, sea transport and IMO ISPS related safety and security.

RosettaNet

RosettaNet is an industrial standard XML-format to exchange product specific information (change, availability, status etc.) and information on payment terms and

methods. RosettaNet enables straight through processing concept in money logistics. It introduces standard way to exchange information in many to many value chains. Currently RosettaNet covers the Information Technology, Electronic Components and Semiconductor Manufacturing Supply Chains.

SCOR

The Supply-Chain Operations Reference-model (SCOR) is a process reference model that has been developed and endorsed by the Supply-Chain Council as the cross-industry standard diagnostic tool for supply-chain management. SCOR-model covers all supplier / customer interactions, order entry through paid invoice, all physical material transactions, all market interactions and returns. The model describes the main business processes (SCOR Level 1) of planning, sourcing, making, deliver and some enabling processes.

TARKKI

TARKKI is the Finnish National Freight Transport Telematics Architecture. The viewpoint of the architecture is the freight and related information flowing through the logistics chain from sender to receiver. The architecture focuses on the processes that are directly related to the transport of goods and on the information flows of these processes. The architecture covers the different modes of transport including road, rail, water and air. The process description is independent of transport mode, so that the process components can be combined in many ways to form all the transport chains that exist in real life.

TEDIM TEN

The TEDIM (Telematics, Education, Development and Information Management) is an international development forum with several development projects. TEDIM projects have included development of some conceptual and logical level architecture descriptions but as such there is no overall architecture.

TelemArk

The Finnish National Architecture for Transport Telematics consists of Architecture Description and Development Plan. The Architecture is modelled in 11 primary processes: public transport information to passengers, information to drivers on traffic conditions, routers and auxiliary services, park & ride, demand-responsive public transport and travel broking, access control, payment for transport and road toll, road traffic management, hazardous goods management, incident management and traffic law enforcement and monitoring. The TelemArk Development Plan identifies several barriers of implementation and suggests remedies to solve them.

US ITS Architecture

The U.S. National ITS Architecture provides a common framework for planning, defining, and integrating intelligent transportation systems. The architecture consists of user services, logical architecture, physical architecture and standards.

Pan-Asian Alliance / ebXML

The Pan-Asian Alliance (PAA) was formed in 1999 by five e-commerce service providers. Combined membership of the parties now exceeds 120,000 organizations, representing almost all active trading enterprises in the Asian market. Pan-Asian

Alliance builds technical architecture based on ebXML. In the first phase, PAA decided to adopt 3 components of ebXML (transport, routing and packaging (TRP), TP, Registry). In addition, Security is adopted using XML Signature and Secure Transport. In the next phase, they plan to adopt BP and CC components to support full specification of ebXML.

NATO Consignment Tracking and NATO Architecture Framework

NATO recognises the importance of supply chain visibility and has set a target for NATO countries to have interoperable National Consignment Tracking Systems established by 2006. The goal is related to the US Department of Defence RFID-enabled Total Asset Visibility (TAV) network.

ALSO Danube

ALSO Danube project's objectives were promoting use of inland waterways as a key mode within inter-modal door-to-door transport chains on the Danube axis. Furthermore, the objective was to develop and implement an advanced European concept to manage inter-modal transport chains with inland navigation as key mode. Project also included setting up and running of integrated logistics networks and operational platforms. In ICT, the project aimed at creating of Common Source Logistics Database.

World Customs Organisation

The purpose of Kyoto ICT Guidelines is to focus the attention of Customs administrations on the impact of Information and Communication (IC) technologies on their business. It outlines how Customs can use these technologies to enhance program delivery and plan improvements in their services to clients and trading partners. They do not provide hardware and/or software solutions. In addition to the Guidelines, WCO provides a Data Model as sets of class diagrams and detailed class specifications containing references to WCO specifications and Data Sets.

3. Characterisation of studied architectures

The architectures are compared from three major viewpoints. Firstly, the level of each of the architectures is compared. The level indicates the breadth of the architecture as overarching, multi-domain, single-domain or single solution architecture. The second viewpoint is a subject matter comparison. The subject matter covered in the architectures is divided into business, logistics, sea transport, other transport modalities, security and authority functions. The third viewpoint is aspect area comparison that divides the architecture content by types of documents contained. The aspect areas included are Domains, Actors/Roles, Services, Processes, Information Architecture, Information System Architecture, ICT Infrastructure Architecture, Interface/Message Formats, Physical Standards, Security.

3.1 Level of architecture

An *Overarching Architecture* is one that is designed to be the root of a tree of architectures. Best example of such is the NATO Architecture Framework. To some extent, the US ITS Architecture, TelemArk and System Architecture for ITS in Japan are also overarching architectures.

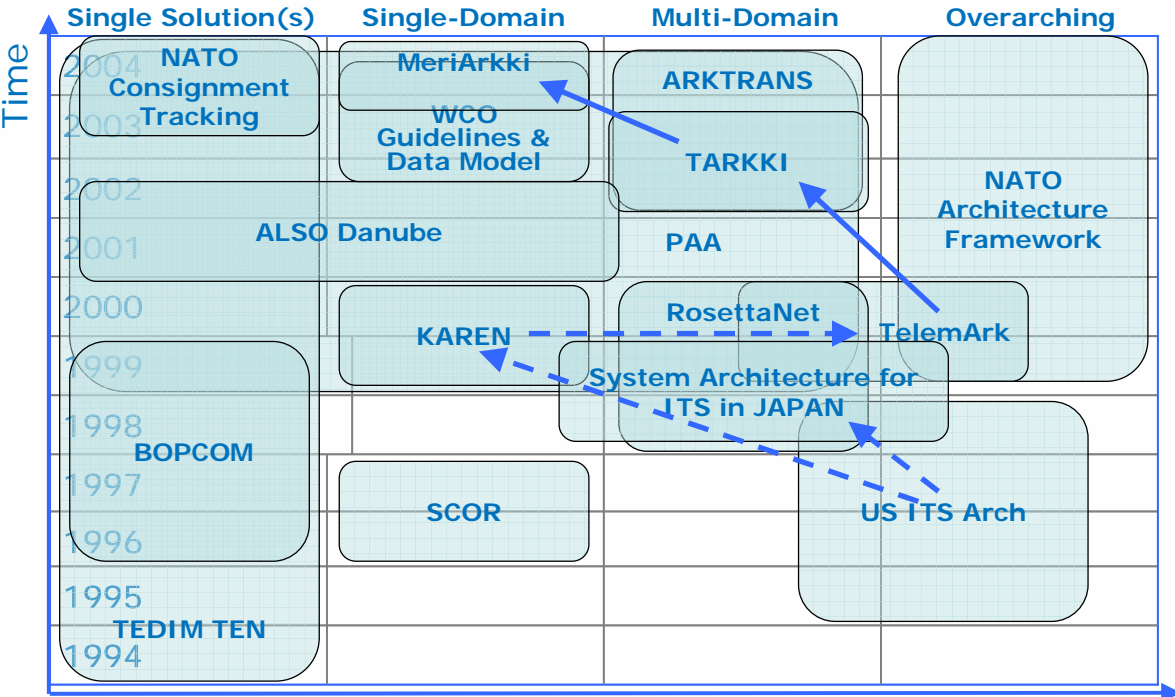


Figure 1 Architecture level comparison

Multi-Domain Architectures are more detailed than overarching architectures but still cover more than one functional business domain or transport mode. The TelemArk, ARKTRANS, TARKKI, RosettaNet and System Architecture for ITS in Japan are such. Also the Pan-Asian Alliance implementation of ebXML framework can be considered multi-domain. Main difference between overarching and multi-domain architectures is that the latter describes actual processes and structures, whereas the former gives domain structure, but does not describe the domains in detail.



Single-Domain Architectures cover single functional business domain or transport mode. They are not always more detailed compared to multi-domain, but are specific to the domain. Such architectures are the ACOR, KAREN, WCO Guidelines and Data Model, MeriArkki and partly the ALSO Danube.

Single Solution Architectures are detailed solution architectures. They often take thinner view on the business level models that describe the business reasoning and processes used. Instead they aim to support service and system implementation by giving detailed structural guidance in the format of interface descriptions, standards and solution blueprints. The NATO Consignment Tracking, BOPCOM, TEDIM TEN and ALSO Danube are such architectures/solutions/programmes. Also the projects implemented within the Pan-Asian Alliance can be considered as Single Solution Architectures.

Some of the covered architectures have influenced other architectures informally or formally. The arrows in Figure 1 illustrate such relationships. Both the European KAREN and the System Architecture for ITS in Japan have been influenced by the US ITS Architecture. TelemArk in turn was partly based on the KAREN list of telematic functions, but did not follow the same structure. TARKKI and MeriArkki follow the notation and conventions of TelemArk.

3.2 Subject matter of architecture

The subject matter comparison aims to analyse which architectures cover best the sea transport, security and roles of authorities. Coverage of other transport modalities along with logistics and business perspectives are useful to connect the BaSIM Interoperability Architecture to relevant surrounding constructs.

	Business	Logistics	Sea transport	Other Modalities	Security	Autorities
ARKTRANS				Yes		
BOPCOM			Partly			
System Architecture for ITS in JAPAN				Partly		
KAREN				Partly		Yes
MeriArkki			Yes	Partly	Yes	Yes
RosettaNet	Yes	Partly				
SCOR	Partly	Yes		Partly		
TARKKI		Partly		Yes		Yes
TEDIM TEN			Partly	Partly		
TelemArk				Partly		Yes
US ITS Arch				Partly		
PAA / ebXML	Yes	Partly	Partly	Partly		
Nato		Yes	Yes	Yes	Yes	Yes
ALSO		Partly	Yes	Partly		
WCO			Partly	Partly	Yes	Yes

Figure 2 Architecture subject matter comparison

Business is the main focus of RosettaNet and Pan-Asian Alliances ebXML framework implementation. They can be used to enable direct linking of sea transport processes to the business generating the need for transport.

Logistics is the main focus of Supply Chain Operational Reference (SCOR) Model and NATO Logistics Integration efforts. These architectures are useful for looking at the BaSIM Interoperability Architecture from a logistics network point of view.

Sea transport is the most relevant subject matter area for the BaSIM. MeriArkki seems to cover this area best. Also the ALSO Danube provides extension of the sea transport to inland waterways transport. BOPCOM and the TEDIM TEN programme contain some specific solutions for the sea transport area.

Architectures covering *other modalities* are useful for connecting the BaSIM to hinterland transportation. ARKTRANS and TARKKI are both transport modality neutral architectures. The NATO Consignment Tracking related programme covers also all transport modes.

Some of the assessed architectures also cover *Security* aspects. MeriArkki describes an IMO ISPS related process. The NATO and WCO models cover ICT security issues.

For BaSIM, it is also relevant to describe the interaction between different authorities and businesses. Roles of *Authorities* are included in MeriArkki, TARKKI, NATO and WCO architectures.

The KAREN, System Architecture for ITS in Japan and TelemArk do not seem like having very relevant content for BaSIM Interoperability Architecture.

3.3 Content of architecture

The content comparison looks at the actual documentation that the architectures consist of. The more content types a given architecture covers, the better and thorough it can be seen. Besides a good coverage of architecture content types, the linkage and trace ability of content relations from business level via information, systems and infrastructure to physical interfaces, standards and security is important. This level of assessment was impossible to do due to resource constraints and is not crucial to this inventory.

	Domains	Actors/Roles	Services	Processes	Information Architecture	Information System Architecture	Infrastructure	Interface/Message Formats	Physical Standards	Security
ARKTRANS	Yes	Yes	Yes		Yes			Partly		
BOPCOM						Yes		Yes	Yes	
System Architecture for ITS in JAPAN		Yes	Yes		Yes	Yes			Partly	
KAREN	Yes	Yes	Yes		Yes	Yes	Partly	Yes		
MeriArkki	Yes	Yes	Yes	Yes	Partly					
RosettaNet		Yes	Yes	Yes				Yes	Yes	
SCOR		Yes		Yes				Partly		
TARKKI		Yes		Yes	Yes	Yes		Partly		
TEDIM TEN			Partly	Partly	Partly	Yes		Yes	Partly	
TelemArk	Yes	Yes	Yes	Yes	Yes	Yes		Partly		Partly
US ITS Arch		Yes	Yes	Yes	Yes	Yes		Partly	Partly	
PAA / ebXML		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partly	Yes
Nato		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ALSO				Partly	Yes	Yes		Yes		
WCO			Partly		Yes			Yes	Yes	Yes

Figure 3 Architecture content comparison

As can be seen from x the overall best coverage of various architecture documentation types id by the combination of NATO architectural documents, Pan-Asian Alliances ebXML framework implementation. The overall ITS architectures of US, Japan, EU and Finland along with the more specific ARKTRANS, MeriArkki, TARKKI and RosettaNet have good coverage at the business related content types. ALSO Danube, BOPCOM and TEDIM TEN are more focused on the implementation oriented architecture content.

4. Recommendations for BaSIM Interoperability Architecture

These recommendations do not aim to specify exactly how to utilise each of the architectures when designing BaSIM Interoperability Architecture. They serve as description of the WP1 core team intent. This documentation enables other BaSIM work packages to comment and give feedback on the usage of earlier architectures.

Based on the architecture inventory we recommend that the MeriArkki sea transport process part is used as core starting point of BaSIM Interoperability Architecture.

Other architectures should be utilised for following aspects:

1. Linkage to other transport modalities should note the content of TARKKI, ARKTRANS and NATO Architectures.
2. Role of authorities within the BaSIM should note the WCO, NATO, MeriArkki and TARKKI architectures.
3. RosettaNet and the Pan-Asian Alliance ebXML framework implementation should be used as a reference point to the business processes creating the need for sea transport.
4. Security related aspects should note the WCO, NATO and MeriArkki architectures. Also the work to be done by the BaSIM work package 2 BSR Port and Supply Chain Security supported by Telematic Solutions should be considered.

It is also recommended that the User Requirements and ICT Readiness study includes a question on other architectures used by the partners. Any additional architectures coming up via the questionnaire are assessed as part of the architecture work.