Framework architecture for maritime transport

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Content

• The MarNIS project
• The need for a maritime framework architecture
• The overall strategy
• The content of the framework architecture
• The establishment approach
• Use of related work
• Lessons learned
• Conclusions
The MarNIS project

- European project (DG TREN), 6th Framework Programme - Integrated Project
- 44 participants + 12 subcontractors from 13 countries in Europe
  - Ministries of Transport and Port Authorities
  - Branch organisations (Harbour masters, Pilots)
  - Industry & ICT companies
  - Universities & Research institutes
- November 2004 – October 2008 (4 years)
- http://www.marnis.org/
- Aiming new and improved practices and solutions for maritime transport and traffic in year 2012 and later on.
- Addressing
  - Safety
  - Protection of the environment
  - Efficiency
  - Security
  - Legal aspects
  - Organisational aspects
The MarNIS Project

Maritime Framework Architecture

Maritime information management

Port traffic management

Traffic measures at sea

Info services on board

Systems and technology

- Automatic ship identification
- Tracking
- Earth observations
- Navigation services
- Etc.

- Reporting to authorities and ports
- European coordination and information exchange

- Identifying high risk vessels
- Monitoring and remedial actions to avoid emergencies
- Emergency management

- Pilot decision support
- Port resource planning

- Voyage planning
- Emergency response on board
- Ship - shore information exchange

The focus of this presentation
The need for a framework architecture

• Support project execution through a common view and understanding
  – To bridge the gap between the different views of the work packages and their participants - representing many backgrounds, motivations and interests
  – Common terminology

• Support the representation of the MarNIS in a holistic view
  – To show how MarNIS fits into the traffic and transport sector
  – To show how maritime transport is a part of co-modal transport
  – To strengthen the maritime sector in inter European transport in competition with road transport

• Specification the project results - new and improved Pan-European maritime solutions and practices that arrange for
  – Safety, environmental protection, efficiency, etc.
  – Interoperability
The overall strategy

The challenge

- Pan-European solutions and interoperability despite of differences between regions, countries and ports in Europe
  - Different names on stakeholders
  - Different solutions
  - Different organisation

How?

- Focus on core responsibilities that are similar and present everywhere (e.g. responsibilities defined by international agreements)
- Use these responsibilities to abstracts away from local solutions and define Pan-European solutions by means of
  - Generic roles played by the stakeholders
  - Generic tasks related to the roles
  - Generic working procedures showing interactions between tasks/roles
- The architecture will by means of these generic building block in a generic way define requirements to local solutions - how to achieve Pan-European solutions
Architecture content
Focus on different aspects

Policy level
- Roles
- Reference model

Business level
- Tasks
- Processes
- Information

Technical level
- Technical solutions
Roles instead of stakeholders

Support abstraction and generalisation

Stakeholder 1
Role A
Responsibility

Stakeholder 2
Role B
Responsibility

Stakeholder 3
Role C
Responsibility

Role D
Responsibility
Architecture content – Tasks

Define what the roles are doing

Situational awareness

Role A

A cognitive process described by a control cycle
Architecture content – Processes

Define a logical execution of tasks

Information exchange

Role 1

Task

Role 2

Role 3

Tasks = the "building blocks"
Use of related work

- **Criteria**
  - Adherence to the maritime sector
  - Suitability for stakeholder involvement
  - Suitability for a focus on interoperability and Pan-European solutions
  - (Not important: Software architecture of (local) system components)

- **ARKTRANS**
  - The Norwegian framework architecture for multimodal transport
  - Common to all transport modes – sea included
  - Covers the whole transport sector
  - Focus on interoperability
  - Established as a joint effort among a wide spectre of stakeholders

- **The COMPRIS architecture**
  - Established by the European COMPRIS project
  - Architecture for River Information Services
  - Focus on traffic management in inland water ways and information services
The establishment approach

**Existing architecture initiatives**
- ARKTRANS
- COMPRIS architecture
- Others

**MarNIS results**
Deliverables etc. from work packages and activities

**Work package**
Evaluate and provide input (through discussions, comments, etc.)

**Architecture activity**
Harmonize and make/update the intermediate maritime framework architecture description

**Iterative Improvement process**

**Architecture activity**
Make current version of the framework architecture available to WPs
Lessons learned

• It took time and effort to get acceptance to the architectural work
  – They did not know what a framework architecture is
  – The maritime experts had to experience the need for an architecture by themselves
  – It took time to get used to the abstract and generic way of thinking

• The acceptance was triggered by needs for
  – Harmonization of terminology and solutions across work packages
  – Location independent and generic solution and procedure specifications that arrange for Pan-European interoperability

• The roles were essential for the acceptation
  – Different stakeholders and different solutions in European ports, countries and regions can be defined by means of generic roles and responsibilities
  – The roles and terminology defined by the architecture enabled harmonization between the work packages in MarNIS

• The architecture makes precise definitions of new solutions and practices

• The terminology used on roles, tasks, information etc. is a challenge
  – A balancing between the need for terms that are understood by the maritime stakeholders and the need for generic terms
Lessons learned

• The multimodality of ARKTRANS has proven to be useful
  – A flying start due to re-use of multimodal roles, tasks, processes
  – The multimodal specifications were to a large extent applicable to the maritime sector
  – Re-use of methodology for specification and stakeholder involvement

• The maritime results are useful in a multimodal context
  – Results form the MarNIS work on architecture is used to improve ARKTRANS
  – New and improved role definitions, new functional requirements, etc. that can be transferred to valuable specifications that are common to all transport modes.
Conclusion
The architecture establishment process

- It may take time to get acceptance to the architectural work
  - The abstract thinking is a challenge for most operational people
  - A maturation process is necessary
- The acceptance by the maritime experts was triggered by needs can be fulfilled by the architecture
- The acceptance is crucial as the architecture establishment process requires input and contributions from the maritime experts
- The architectural work is now highly accepted and appreciated in the MarNIS project!!
- The re-use of the multimodal ARKTRANS architecture showed that maritime transport is similar to other transport modes
Conclusion
The value of the architecture

• The architecture contribute to the improvement of maritime traffic and transport by providing generic and location independent specifications of new solutions and practices

• In the MarNIS-project the architecture is used for many purposes
  – Harmonisation of solutions between work packages
  – The description of new concepts and solutions for the maritime sector
  – Descriptions of demonstrators – e.g. how they fit into a context
  – Descriptions of generic solutions that can be mapped to local solutions
  – The evaluations of local solutions can more easily be “translated” to generic results

• Parts of the framework architecture have relevance to a broader audience than the MarNIS project, e.g.:
  – Maritime organisations dealing with the definitions of operational solutions and practices for the maritime world
  – Other transport modes and projects (the work has provided input to the multimodal ARKTRANS framework architecture)
Thank you for your attention!

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