Impact assessment study on Intelligent Cargo

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ECITL, Venice, 29-30 October 2009

Motivation (I)

- Transport logistics today is highly optimized and more efficient than ever before
- The development of cleaner and more efficient transport vehicles is very important as it leads directly to significant environmental negative impact and cost reductions due to the huge number of vehicles circulating
- Freight consolidation – more an organisational issue – leads as well to considerable efficiency gains
- How about making transport logistics e.g. the planning, the execution or even the cargo and its environment more “intelligent” by ICT ?
    - Which impacts are to be expected ?
    - Shall efforts be strengthened towards intelligent freight ?

Motivation (II)

Logistics

- Freight Transport Logistics Action Plan: “Advanced ICT can contribute to a more efficient freight transport system”
- eFreight

Transport infrastructure management

- Intelligent transport systems (ITS)
- Cooperative systems

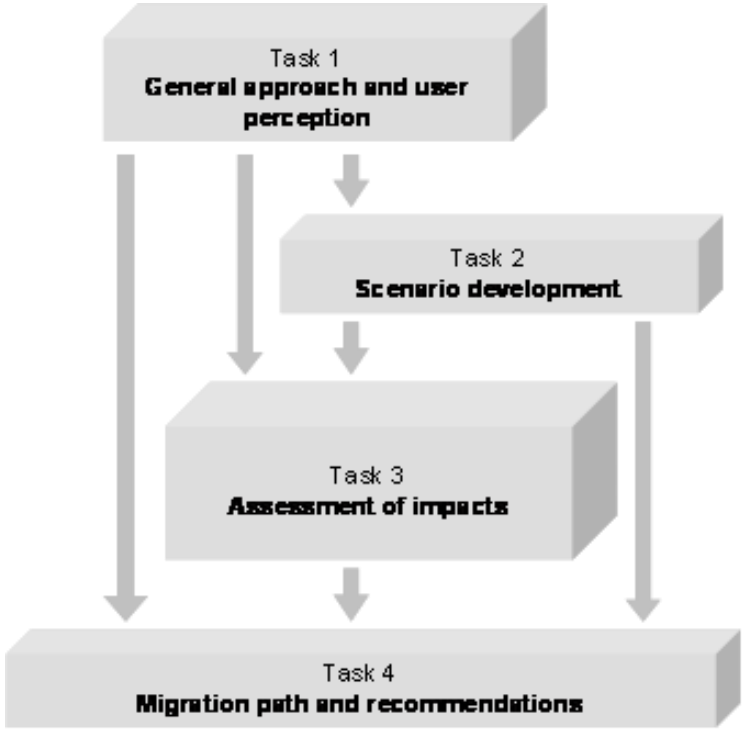
Information systems

- ICT for mobility services for goods
- Intelligent cargo

Impact assessment study

Working steps

- Identify Intelligent Cargo applications & technologies
- Survey relevant studies and initiatives
- Interview freight transport experts
- Work out a vision on intelligent cargo by means of scenarios
- Assess the impact (efficiency, sustainability, safety, security)
- Develop a potential migration path towards the vision
- Formulate recommendations for policy makers and innovation programme managers



Intelligent Cargo

- Autonomous, self and context aware cargo units
- Ubiquitous data availability
- Paperless documentation
- Standardisation, open accessible systems
- Bi-directional communication and secure information access

Intelligent Cargo related projects (35)

- Intelligent container (e.g. track and trace) (7)
- RFID applications (7)
- Dangerous goods applications (6)
- Freight/Cargo architecture / frameworks (5)
- Sensor related applications (4)
- Intelligent agent / mesh network applications (2)
- Web based applications / platforms (2)
- Other applications/ projects which are connected to intelligent transport systems (2)

Allocated criteria to projects	
SME compatible	34
Stakeholder inclusion (industry, public, administrative..)	27
Standard data formats	17
Bi-directional communication	16
Paperless documentation	12
Self/ context awareness	11
Secure Information access	10
Ubiquitous data availability	10

Interviews (I)

- In total 15 interviews (40 – 70 minutes each)

Group	Interviews per group
LSP*	2
Industry	1
IT-Expert/company	3
Branch organization	1
Consultancy	3
Researcher	2
Other (e.g. ports)	3

Some reactions

- Complex regulations in sensitive fields require paper documents, therefore the security standard in eDocumentation will rise
- Paperless transport processes can be achieved with available technologies – focus on changing regulations and organisational processes
- Standardization will be a key factor, but “who sets standards”?
- Main barriers are several different standards and requirements of different user groups and actors
- Global business needs global standards

Interviews (II)

Further reactions

- Better information and more transparency can have impacts on business models – e.g. regarding the modal preferences or liabilities
- An overall Intelligent Cargo system cannot be reached in short term
- Efficiency gains definitely above 10% are expected (load factor increase, less empty running, error reduction, increase of transport speed, etc.)
- Acceptance of technologies will be a key factor
- “Intelligent Cargo” units (autonomous, sensor and communication equipped) are presently of low interest (too many open issues, difficult to predict etc.)
- Important is to define business cases for “intelligent applications”
- Moving towards a decentralized planning would be an interesting approach, however needs for a new IT architecture and partner roles, presently they do not work on it

Scenario building

- Definition of 2 future scenarios
    - Main assumptions per scenario
    - Few use cases and several impact chains

Realistic Scenario (RS)

- Expected by the experts
- Current developments are in line

Visionary Scenario (VS)

- Intelligent cargo characteristics are in place
- Paradigm shift (centralized → decentralized)

Realistic Scenario (RS)

Characteristics

- Standard formats and interfaces
    - Agreed business logic
- Paperless documentation

- Backend systems are still the main units for data processing and planning
- Central control and decision taking
- 2D Barcode is standard for identification

- Intelligence at cargo level in specific fields only
    - High value goods
    - Hazardous freight

Visionary Scenario (VS)

Characteristics

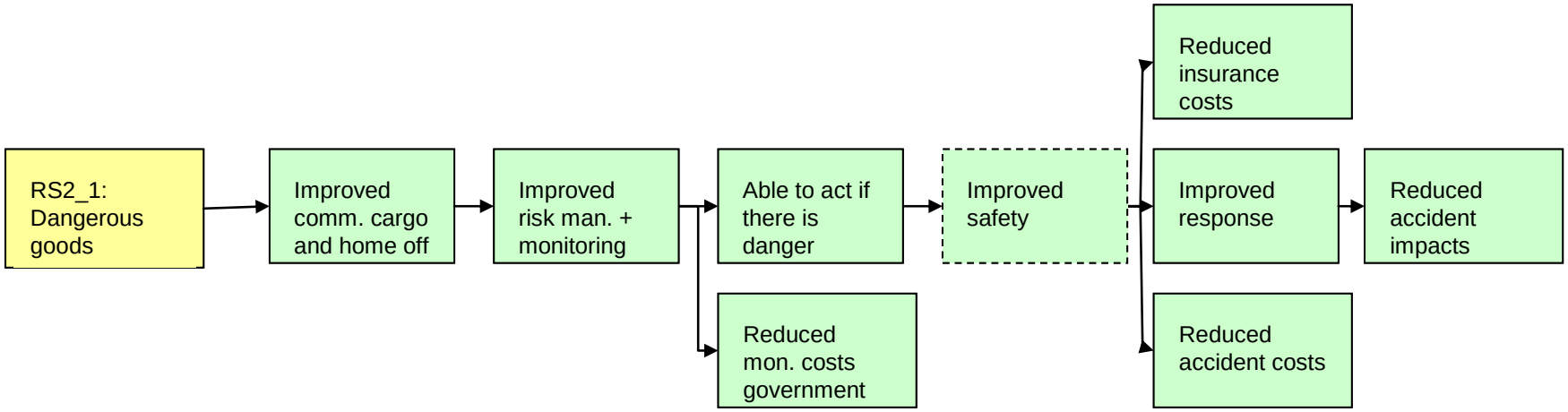
- Intelligent Cargo units operating in a network of „open“ transport services, steered by software services in a cooperative way
- Bridging the gap between real world/physical flow and information flow by means of intelligent cargo units
- Ubiquitous data availability throughout entire supply chains

- Standard formats and interfaces
    - Paperless documentation
    - Secure information access
    - Agreed communication channels

- Decentralized concept along the full supply chain

Assessment of impacts – Process

- Description of impact chains
- Assessment of the impacts
    - Efficiency, Sustainability, Safety and Security
- Qualitative description of the impacts
- Approach of exemplary effect calculation and key figure analysis where possible
- Possible extrapolation to EU level based on the scenarios



Assessment of impacts – Results

- Efficiency and sustainability

Impacts	Realistic scenario (2020)	Visionary scenario (2035)
Km reduction (Billion km)	**4 – 8**	**7 – 13**
CO2 emission reduction (Million tonnes)	**3 – 5**	**5 – 9**
Monetarized impacts (Billion euro)	**11 – 21**	**20 – 38**

- Safety

Impacts	Realistic scenario (2020)	Visionary scenario (2035)
Km reduction (%)	**2,1 – 4,2**	**3,7 – 6,9**
Reduction fatalities attributed to HGV	**135 – 271**	**238 – 445**
Reduction slight injuries attributed to HGV	**1.519 – 3.037**	**2.676 – 4.990**
Reduction serious injuries attributed to HGV	**435 – 870**	**766 – 1.429**

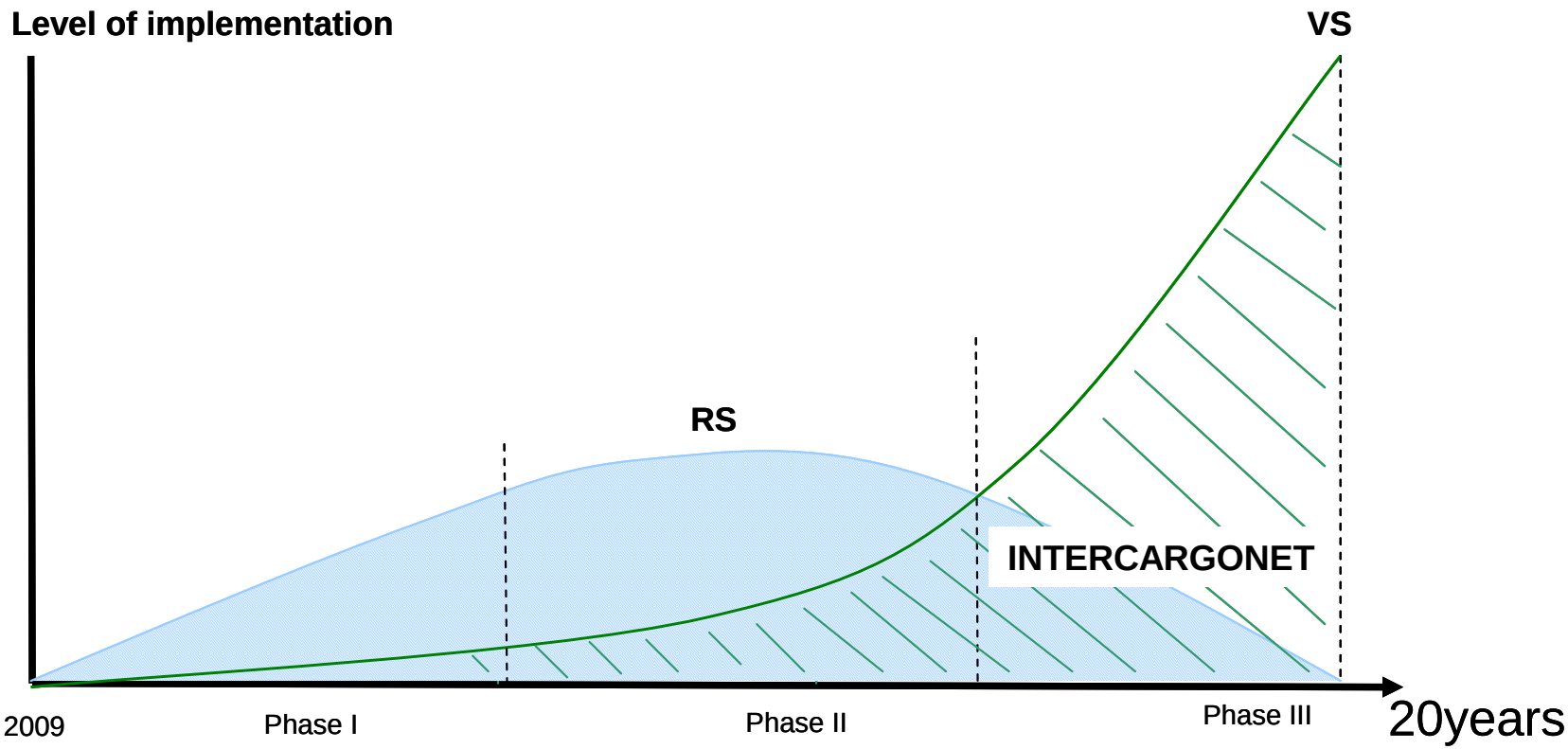
Target name

- How to name the visionary scenario ?

INTERCARGONET

- The freight transport network for Intelligent Cargo based on
    - Internet of Things
    - Internet of Services

INTERCARGONET migration path (I)

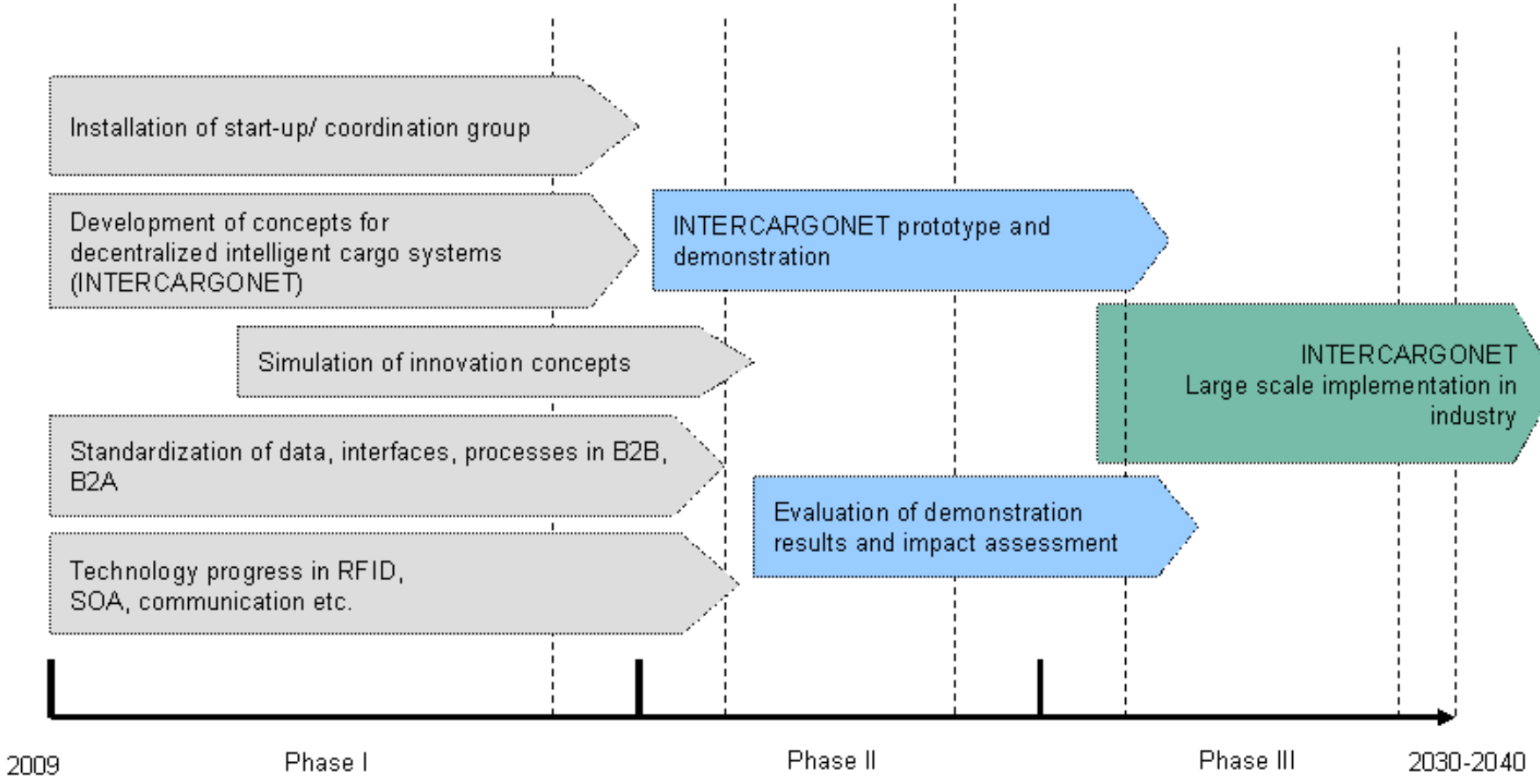


INTERCARGONET migration path (II)

Recommendations

- Initiate the transfer of innovative ICT developments from computer science to transport logistics
- Start with demonstrations where cargo units can use either own computation power or services via local mobile interfaces
- Push the development of innovative concepts for decentralized planning and control solutions for intelligent cargo
- Further structure the „ICT for mobility services for goods“ domain in order to strengthen the research focus
    - Vehicle and traffic
    - Transport logistics processes and intelligent cargo
    - City logistics and society
- Implement a start-up/coordination group observing developments, accompanying the development streams and recommending corrective actions at early stage

INTERCARGONET migration path (III)



Conclusions

The impact assessment study shows

- That ICT innovation will further increase the efficiency of freight transport and leads to more sustainable, safe and secure transport systems

Furthermore,

- Stimulation and research efforts are highly appreciated, as this would speed up the implementation of the *INTERCARGONET* and strengthen European industries

Thank you !