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Energy Efficiency in Transport Logistics, Opportunities for ICT Research

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Content

- Some considerations on logistic industry sustainability
- ICT for energy efficiency in logistics
- Current approaches
- Opportunities for future research



Considerations on logistic industry sustainability (1/3)

- Logistics is crucial to environmental sustainability
 - Freight transport carbon footprint contributing to over 14% of global CO₂ emissions (source CD02, DHL GoGreen Team).
 - Trucks absorbing 35% of total road-fuel production with an expected increase to over 40% by 2030 (source “World Energy Outlook 2006”).
 - Cargo traffic demands on road infrastructure extension and upgrade, and consequent congestion problems.
- Road freight traffic is not decreasing on the short-term
 - (.. despite policy support and industry investments in favor of modal shift and inter-modal freight transport).
 - 44% of the goods are moved by trucks in EU, with a forecast of 47% by 2010 (source EC, DG Enterprise).



Considerations on logistic industry sustainability (2/3)

- Logistic operations have room for significant efficiency gains
 - Empty haulage rates are reported by EU countries as ranging between 40% and 60% (source European Environment Agency).
 - Several other inefficiencies: useless trips, unwanted stops, lack of synchronization between transport modes, lengthy administration processes.
- Logistics is a low-margin, highly competitive sector
 - Volatile road fuel prices, rising by over 70% between 1999-2005, by 40% between January '07 and January '08, now decreasing.
 - Public policy related risks, changing the business landscape (e.g., liberalization) or constraining operations (e.g., traffic limitations for environment protection).



Considerations on logistic industry sustainability (3/3)

- Freight transport has heavy societal implications
 - Essential to the life of citizens and to the operation of any business
 - Sector employs around 2,6 million people in Europe
 - The community pays for infrastructures
 - Citizens suffer pressures on fuel prices, congestion in cities and road safety problems.

The question is how to make logistics sustainable on the long term.

The answer cannot be limited to just waiting for trucks to be replaced by greener transport means.



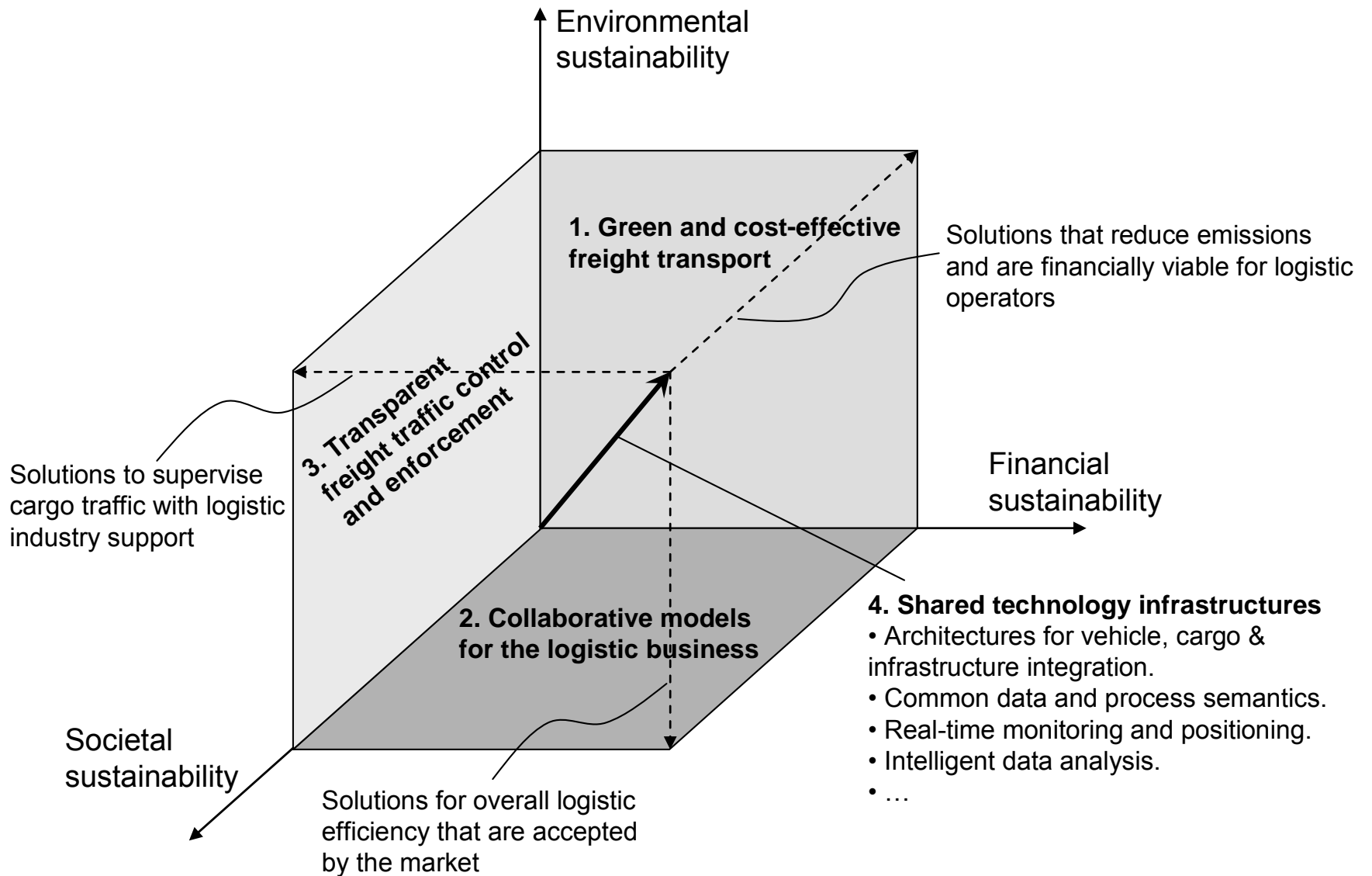
Efficiency recovery is the answer

It impacts the three dimensions of logistics sustainability:

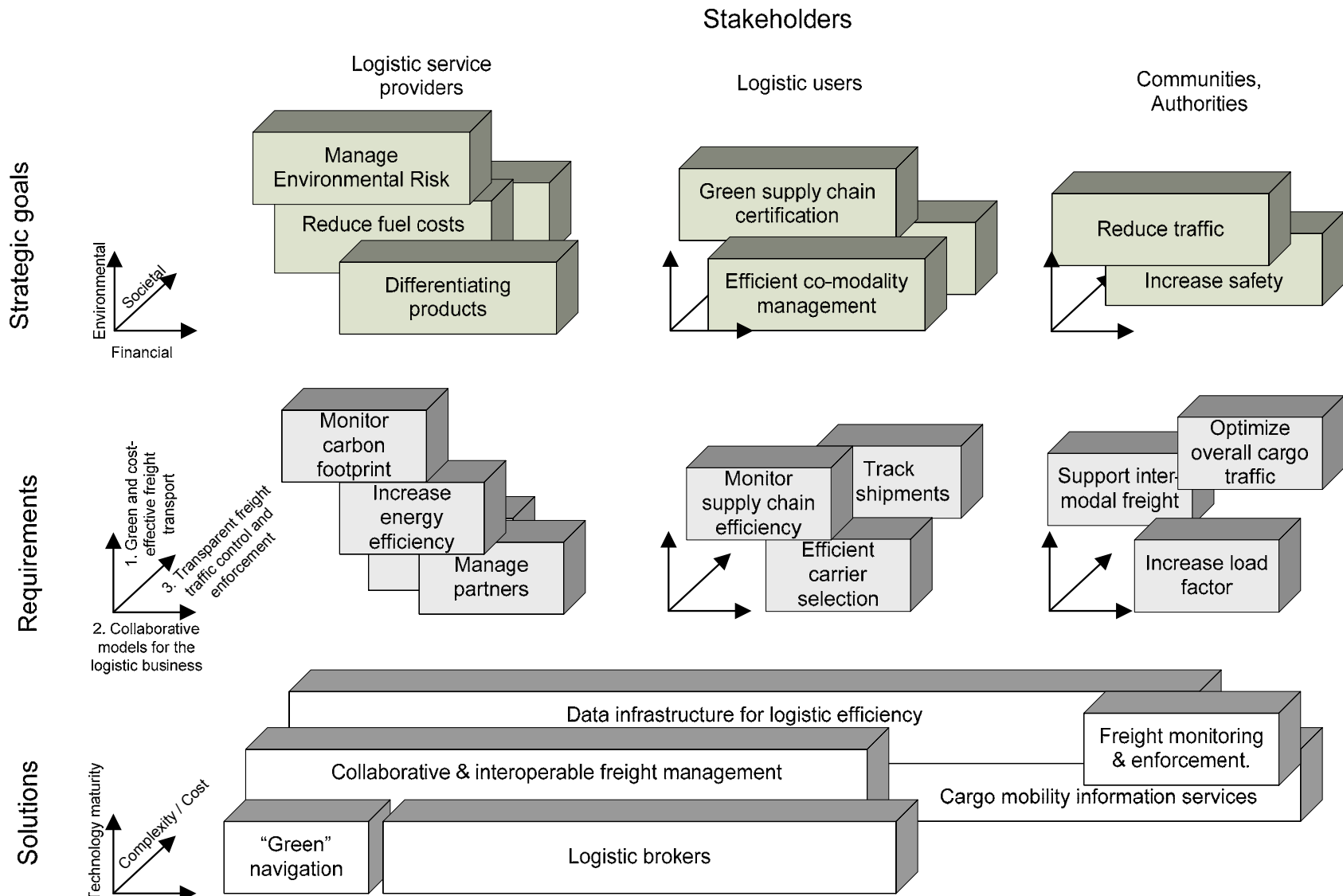
- *Environmental sustainability*
Reducing emissions and making freight transport more energy-efficient, with, e.g.: technologies for vehicle efficiency, ICT support for modal shift from road to rail, environment-aware route optimization solutions.
- *Financial sustainability*
Saving costs and protecting market shares of individual logistic firms, with, e.g.: improved planning and execution systems, e-business tools simplifying management of multi-modal door-to-door shipments.
- *Societal sustainability*
Reducing freight transport impact on the community and on citizens with, e.g., improved traffic management, more efficient infrastructure operation, enhanced security and safety control.



Future ICT solutions should consider the different dimensions of logistics sustainability



Need for requirements and solutions mapping



Current approaches:

Logistic brokers

- Asset-less logistic services providers acting as brokers between transport demand and supply.
- Centralized load optimization and route planning, pursuing business *and* environmental goals:
 - reducing empty haulage
 - transferring freight towards environmentally friendly transport modes.
- Target of several initiatives in the last decade:
 - EU/National projects: CITRO, GIFTS, D2D, INTRARTIP, GILDANET
 - Real businesses, in Italy (<http://www.mo.brokerlogistica.net/>) and in Germany (www.clickapoint.de).
- Issues/Challenges:
 - ICT to enable process outsourcing, where some critical function (e.g., collection of orders, trip planning, reservation) is centralized and assigned to the third party operator.
 - Solutions and business models for overall optimization of freight transport demand/supply in ways that are compatible with the actual reality of the logistic business, made in its largest part by SMEs.



Current approaches:

Collaborative and interoperable freight management

- Spontaneous integration of the different supply chain actors, driven by common goals of higher efficiency and improved customer service.
- Shippers, logistic service providers and authorities collaborate to remove disconnections in their planning and execution processes.
- Target of several initiatives in the last decade:
 - Tens of EU projects in DG INFSO, DG TREN, Growth, ..
 - Several logistic “hub” systems proposed on the market.
- Issues/Challenges:
 - Spontaneous collaboration hard to achieve in a mature, highly competitive sector.
 - Interoperability cost and burden too high for small players.



Current approaches: Freight monitoring & enforcement

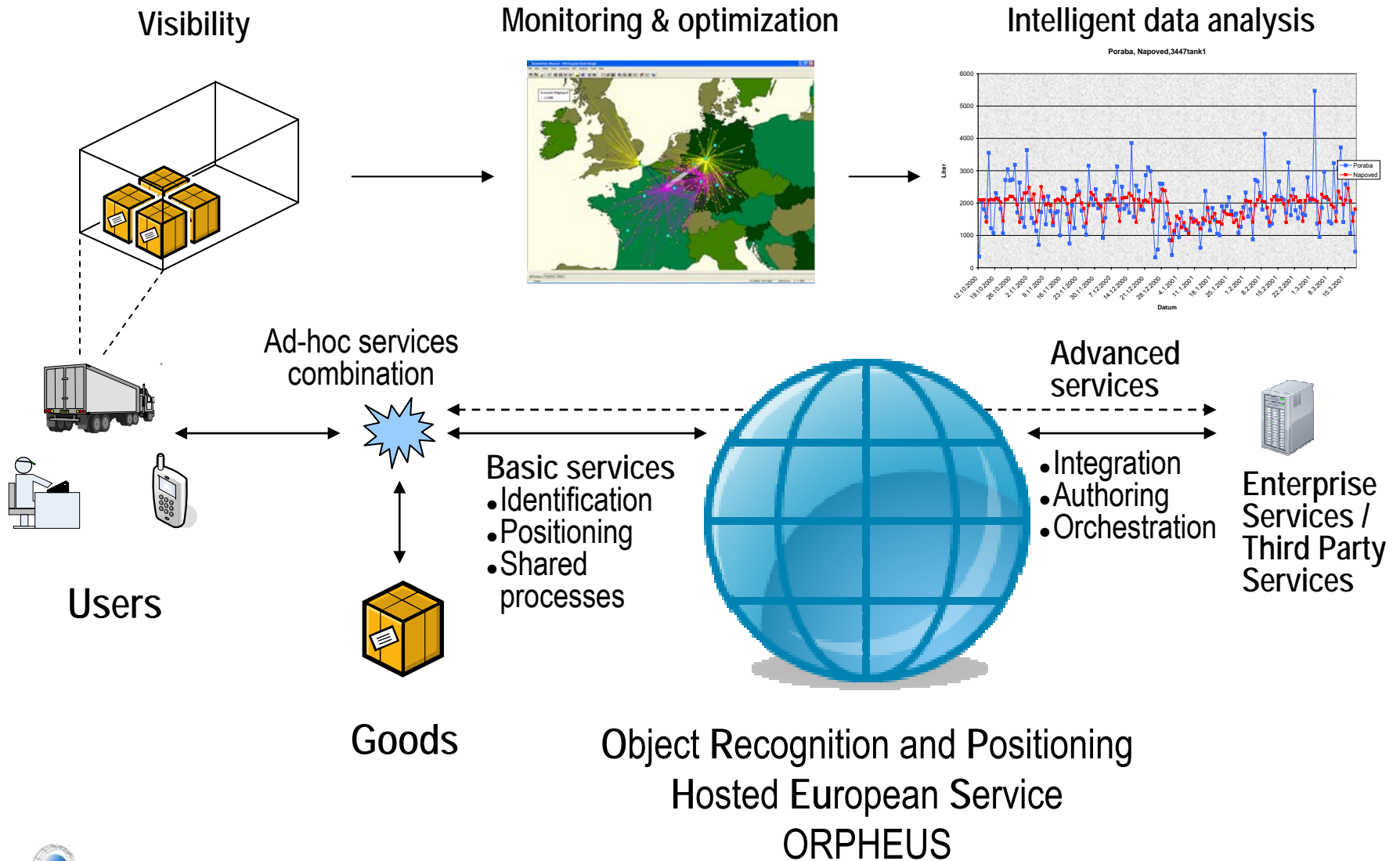
- Solutions for authorities and infrastructures to supervise the flow of goods for:
 - security and safety control,
 - enforcement of environment protection laws (e.g. in cities).
- Target of several initiatives in the last decade:
 - EU research projects (e.g., CityPorts, Good Route, Smart Freight)
 - Several pilot implementations of dangerous goods and city logistics.
- Issues/Challenges:
 - Current technologies support proactive, real-time approaches to traffic management that, in the case of cargo, necessarily demand logistic companies willingness to cooperate.
 - This can only be achieved if the proposed solutions are transparent in the acquisition and use of data, and are not in any way disruptive of logistic operations efficiency.

Research opportunities: Information services for energy efficiency in logistics

- Cargo mobility real-time services
 - Visibility of moving goods via cargo-vehicle-infrastructure interaction.
 - Monitoring and optimization tools for reducing empty haulage even across different logistic operators.
- Intelligent analysis of efficiency related information
 - Collection of historical data from vehicles, infrastructure and cargo-related sources.
 - Cross-referencing with environmental data and other relevant sources from public and private stakeholders.
 - Providing analytical insight on the collected information
 - Carbon footprint estimation,
 - Evaluation of environmental impact reduction policies,
 - Sustainability from the business perspective,
 - ..



Example: use of “intelligent cargo” to support energy efficiency



Conclusions

- The current scenario poses a question of logistic industry sustainability on the long term.
- Sustainability is not limited to environmental aspects.
- ICT can be an enabler of relevant efficiency recoveries.
- The ICT landscape on the subject is rather fragmented.
- ICT research should build upon relevant approaches tried in the past, aiming at an integrated platform of information services for energy efficiency in logistics.

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