ICT systems and services for port operation and management:

The contribution of recent and on-going R&D

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MODERN PORT OPERATION CHARACTERISTICS

**Economies of scale**

**Container Vessel Tipology**

**Desired Port Operation Attributes:**
- Increasing throughput capacity
- Integration to efficient transport chains
- Increasing global logistics outreach
- Intensive use of integrated ICT solutions
Problems and Key Challenges

- Greater internal operational efficiency
- Difficulties of integration with the land networks
- Difficulties of integration with the global logistics networks and transport chains (different standards, lack of data exchange & interoperability, lack of “neutral” layers, business practices)
- Difficulties of integration between the port value system (stakeholders) due to:
  - Different levels of IT penetration
  - Low compatibility of IT systems used
  - Lack of systems integration.
Need to go beyond current state-of-the-art on three major fronts:

- **Improving the current “global Architectures”** for the collection, transmission, and utilisation of data and information for the operation of a port within global transportation and supply chain management.
- **Improving load unitization and “smart boxes”** for containers so that they become more power savvy, “intelligent”, and less costly, together with new innovative methods for data capture and transmission.
- **Improving the internal port operation** through **IT efficiency** coupled to new organisational models and processes, economies of scale and cost reduction.
- **Improving the internal port operation** through **legal and administrative simplification** while meeting the security and customs requirements (one-stop-shop, secure container green lanes, simplification of customs procedures through international accords and conventions).
The contribution of Research & Development (R&D)

- 4 Billion Euro to surface Transport Research in the current EU 7 year research Framework Programme (7th FP)
- 3-4 Billion from National transport research programmes in 5 EU member countries (D, FR, N, DK, S) over same period
- R&D effort through joint “research” and “industrial” actors consortia
- Demos of research results essential
- Dissemination and exploitation plans required
- Financial contribution of “industrial” partners to all R&D effort funded by EU or National public funding, mandatory.
Some examples related to port operation

- At least 20 successful R&D projects of the 5th, 6th, and now 7th FP have produced results applied in practice.

- Key R&D projects with Greek applications: EFFORTS, EURIDICE, FREIGHTWISE, MOSES, SMART-CM, ELOGMAR, REORIENT, CHINOS, GIFTS, TRANSLOGNET, MEDIGATE, CITYPORTS, IMONODE

- Results have been produced in Greece with practical applications that resulted in commercial systems. Examples:
  - FRETIS: transport chain monitoring and planning package (application in PROODOS SA)
  - FRETIS / IFT: Container Terminal management (application in port of Thessaloniki)
  - POD: Proof of delivery for road transport distribution fleets (application in PROODOS SA)
  - Train Management system: Monitoring wagons in rail transport (application in OSE)
EXAMPLE 1: The SMART-CM project philosophy and expected results

Create a **GLOBAL CONTAINER DOOR-TO-DOOR ARCHITECTURE AND SERVICE PROVISION**

based on the notion of a **ONE STOP_SHOP SERVICE**

Aiming at:
- enhancing clearance and exchange of information / documentation between actors
- Creating cooperation at wider global level

THE SMART - CM CONCEPT!!
The three level communication approach within the SMART-CM system architecture
Enhanced “intelligent” containers
EXAMPLE 2: The FRETIS system for Transportation chain monitoring and management

- Integrated transport chain planning and monitoring system
- Modular, flexible, extensible, scalable architecture
- Modules include:
  - Fleet Management (trucks)
  - Vessel Management
  - Rail management
  - Terminal management (e.g. ports for productivity and performance)
  - Overall transport chain management
Technologies used

• Software
  – EDIFACT
  – XML
  – Web services
  – GIS/GIS over web

• Communications
  – GPRS/WLAN
  – Security (SSL/PKI)

• Hardware
  – (D)GPS
  – RFID
  – Barcode
  – Smart card readers
  – CCTV
  – Handheld devices
  – On-board units
EXAMPLE 3:
The FRETIS/IFT system for Container Terminal operation

- Integrated Terminal planning and monitoring system
- Modular architecture
- Combines state-of-the-art technologies for data gathering and transmission in order to enhance Terminal productivity and performance, and increase security and cost-effectiveness
- Currently in operation for more than 2 years at the port of Thessaloniki.
FRETIS IFT modules

- E-document Submission
- Yard Planning
- Yard Inventory
- Geographic Information System
- Entry/Exit Control
- Central Information Management Platform
- Customer Service
- Administrative Support
- Loading/Unloading
- Invoicing
- Database
Intermodal terminal communication infrastructure
Innovation / Technology challenges

• Need to further pursue global standards so that data and systems are interoperable and open to all “actors” worldwide.
• Need to establish a global “framework architecture” (Service Oriented Architecture – SOA).
• Energy-efficiency and reliability issues for the equipment used (mainly in terms of the power supply for container monitoring devices and communication range).
• **Intelligent** use of available information and data.
• Need to further extend global uniform standards and rules for tracking the containers and the state of their contents all along the chain from door-to-door.
• Ability to *re-schedule* based on dynamic information and data.
Commercial & market problems

- Finding solutions which are not “industry” driven, but “market” driven.
- Integrating the intermodal (container) transport planning systems with the commercial environment of finding and concluding the business.
- Understanding better the various commercial characteristics of container line-haul and cargo handling operations.
Business / Organisational issues

- Further standardising the commercial or market related information in the container transport trade (e-documentation, and e-business transactions).
- The transport of containers is not sufficiently transparent
- Traditional business models do not correspond to the new ICT applications.
Legal / Security problems

- A large portion (approximately 50%-70%) of the containers that are inspected in both the United States as well as in Europe are inspected randomly - no risk profiling.
- The documentation that declares what is in a container is not always correct.
- Need to further standardise containers.
- Container seals should be applied in a standard way.
- Liability issues regarding the damage and/or interruption of the door-to-door supply chain.
- Alignment with the new security rules and regulations.
Annual GDP Growth Rate: +4-5%

Growing trade flows from/to Asia & China

The E. Mediterranean, a rapidly developing region: Crete is its natural center for Transhipment services