Université de Liège

ArGEnCo

Challenges for Capacity Building and Training in Intermodal Transportation and Inland Navigation

Mario Cools

University of Liège

- Founded in 1817
- More then 20.000 students
- 4600 foreign students
- 3300 lecturer-researchers
- 9 Faculties

FACULTÉ DES SCIENCES APPLIQUÉES
ÉCOLE D'INGÉNIEURS ET D'INFORMATICIENS

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Département d'Architecture, Géologie, Environnement et Constructions (ArGEnCo)

Président : Pr. Jacques Teller

Département de Chimie appliquée

Présidente : Pr. Angélique Léonard

Département d'Electricité, Electronique et Informatique (EEI)

Président : Pr. Louis Wehenkel

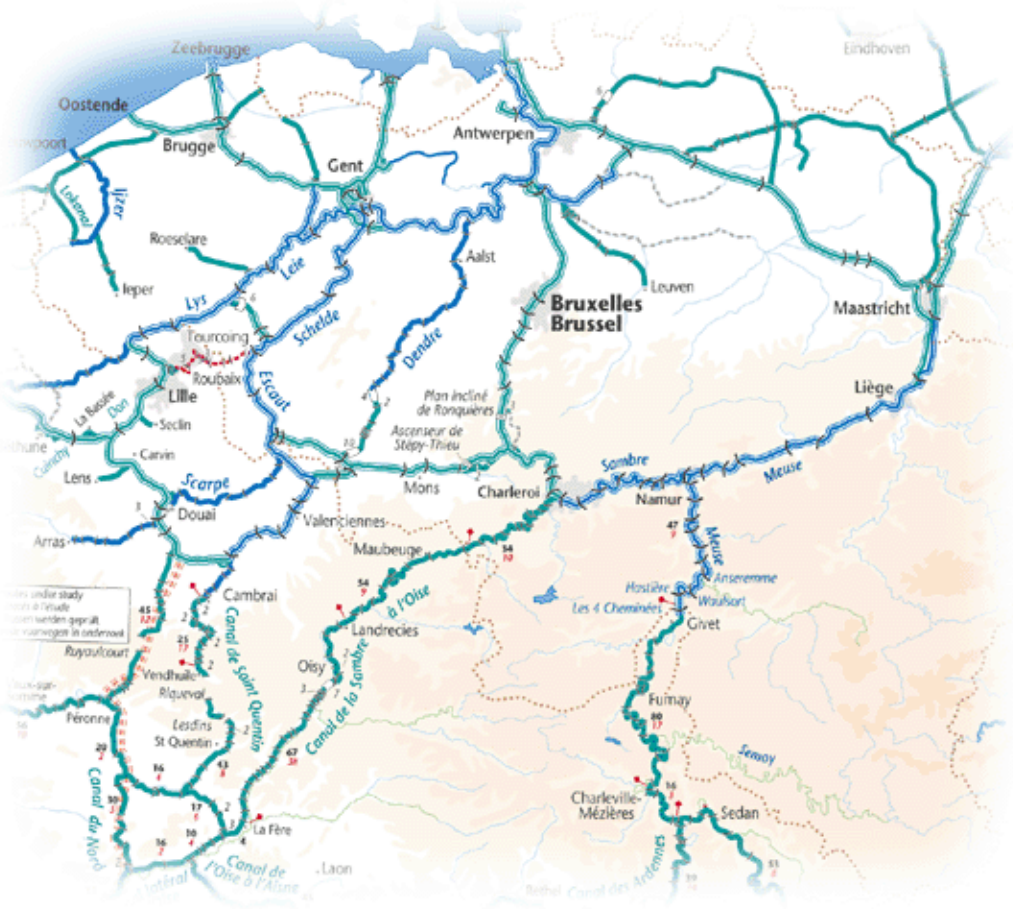
University of Liège

Sectors/Clusters:

- A&U (Architecture and Urbanism)
- GeMMe (Génie Minéral, Matériaux et Environnement)
- GEO³ (Géotechnologies, Hydrogéologie, Prospection Géophysique)
- MS²F (Mécanique des Solides, des Fluides et des Structures)
- SE (Structural Engineering)

Presentation outline

1. Why? (Relevance)
2. What? (Content)
3. How? (Modalities)

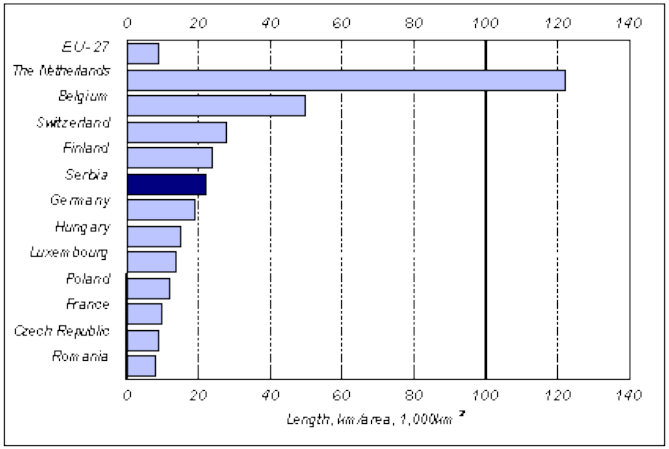


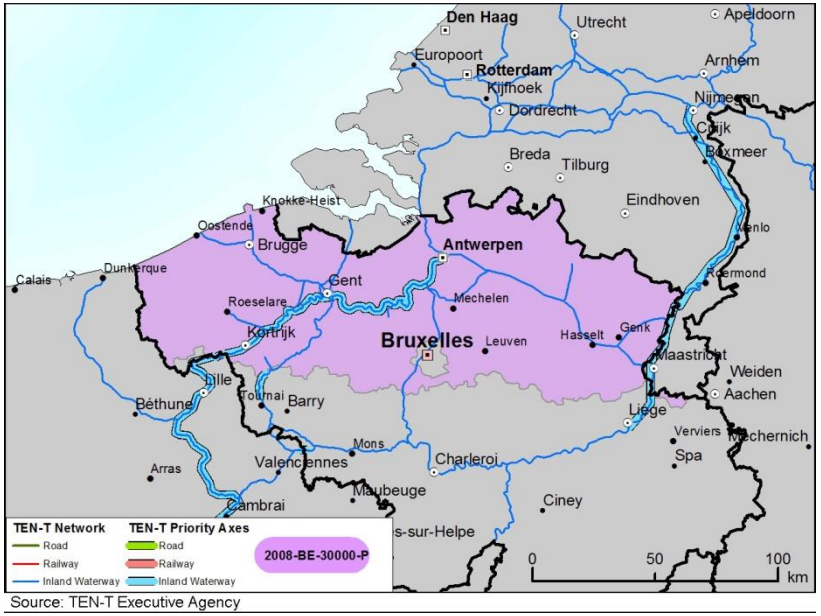
Why? (Relevance)

- Belgium:
  - Extreme congestion
  - Dense IWT network

Most Congested Metros: Top 25

		T12 Months	This Month	This Month LY
Milano	1	33.8	27.0	19.4
Bruxelles	2	33.3	31.5	32.9
Antwerpen	3	31.4	32.3	29.3
Honolulu	4	31.3	39.7	31.8
Los Angeles	5	31.2	28.5	28.8
London commut..	6	30.1	30.6	25.4
San Francisco	7	26.8	23.7	21.3
Gr. Manchester	8	25.9	28.7	24.4
Paris	9	24.2	19.4	22.5
Rotterdam	10	23.1	21.4	22.4

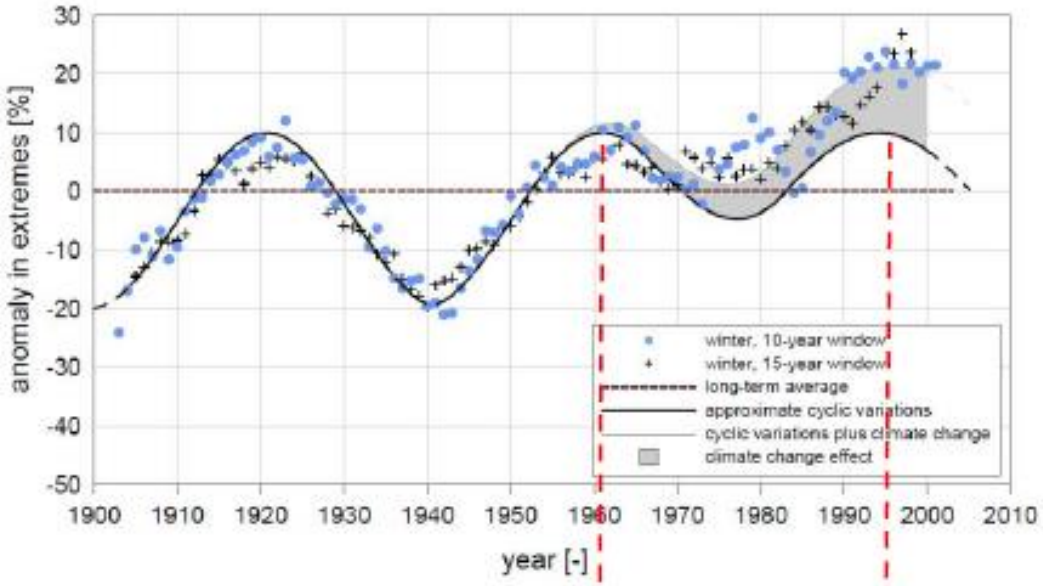




Source: TEN-T Executive Agency

Why? (Relevance)

- Climatological influences:
  - Disturbances in waterway hydrology:
    To allow fully loaded barges:
    - Water level: not too high (limited air draught)
    - Water level: not be too low (limited draught)



Why? (Relevance)

- Government policies aimed at stimulating IWT (environmental friendliness, connectivity of seaports, …)
- Stagnating tendency in IWT volumes
- Intermodal transport = chain of actors who supply a transport service

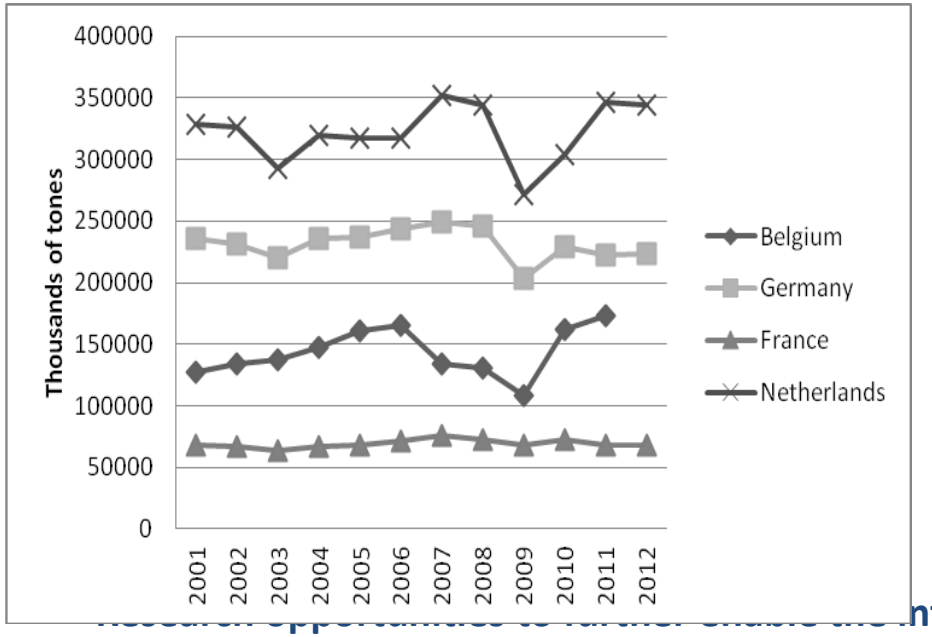


Figure : Goods transport by inland waterways in Europe (Figures for the four EU member states that have the highest amount of good transport in terms of thousands of tonnes) (Eurostat, 2013).

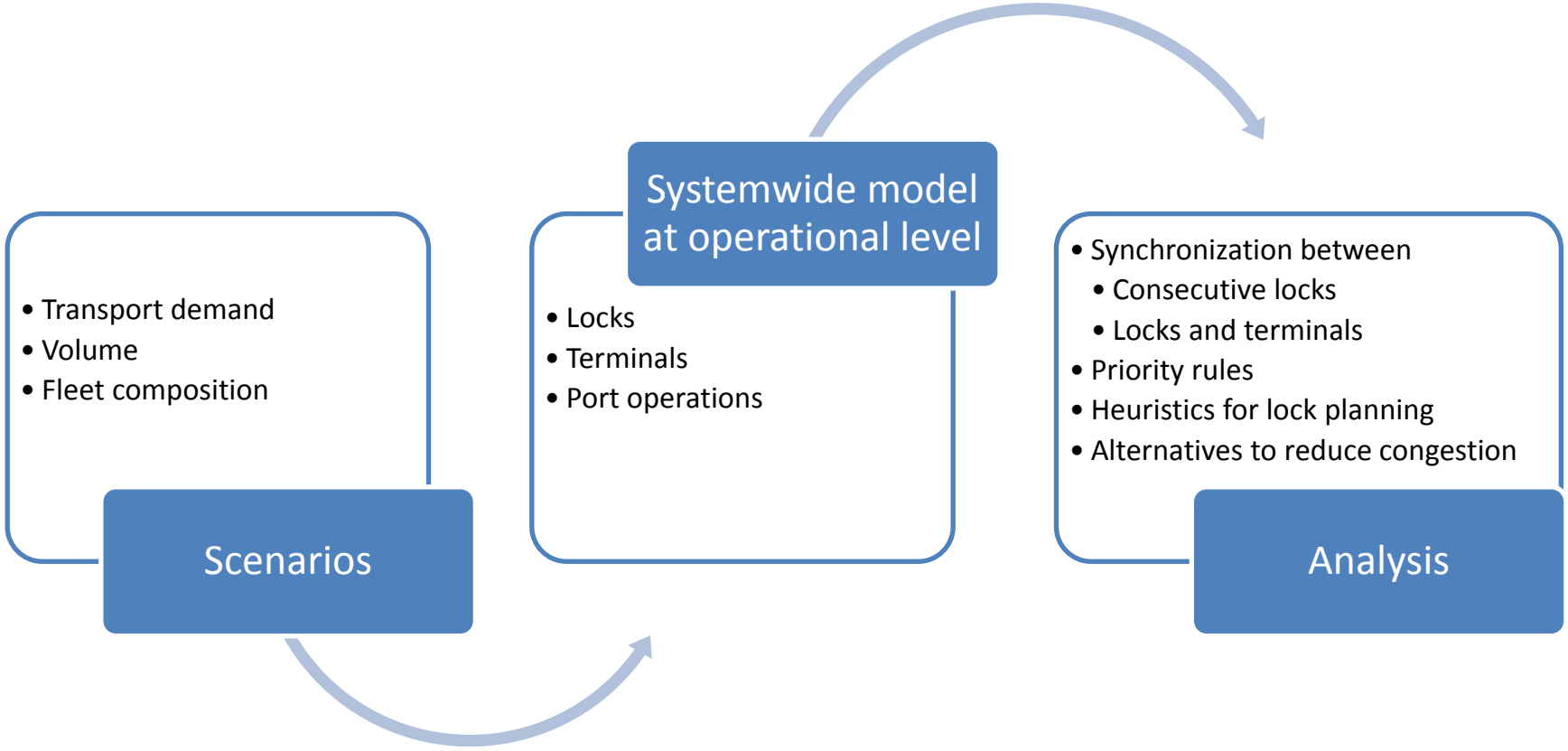
…ntegration of IWT in the intermodal supply chain and increase SC service performance

What? (Content)

- *Knowledge transfer & Research collaboration*
- Education & Training

What? (Content)

C1: System-wide approach for IWT



What? (Content)

C2: Integration of operational planning systems

Joint planning models for lock systems and quay handling in port area

- Inland vessels first queue for lockage and next queue for loading/unloading operations at sea terminals.

Mathematical models for multiple locks

- Arrival rates at second lock similar to departure rate at first lock.
- Current literature: simulation models and derived metamodels to take interdependence in lock systems into account.

Combine priority rules for lock entering with lock placement models

- Priority rules: FIFO, shortest processing time first, fairness principle
- Lock placement: less-flexibility-first combined with group-FIFO
- Bi-objective planning problem: maximize system efficiency vs minimize individual waiting time

What? (Content)

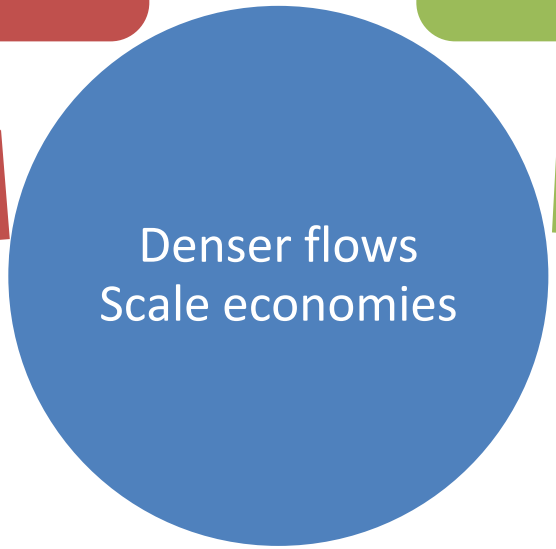
C3: Analysis of bundling networks

Service network design:

- Hub-and-spoke in port area + direct connections in hinterland
- Corridor networks

Business models:

- Manage cooperation
- Allocation of benefits



What? (Content)

C4: Supply chains involving inland waterways

- Integration in the SC
  - Value added services during modal transfer breaks
  - Coordination: each stage of the chain minds the effect of its actions on all others
- Intermodal routing
  - Efficient hinterland accessibility
  - Scale economies
  - External costs (non-linear models)
- Green SCM
  - Transportation is the most visible aspect of the SC
    → modal shift and energy efficiency
  - Environmental objectives (multi-objective models)
- City logistics
  - Consolidation centers
  - Design, evaluation, planning, management and control

What? (Content)

C5: Improvements in data collection

- Need for high precision data
  - Modelling and analysis (integrated logistic models)
  - Policy evaluation (ICT, RIS)

- Existing data sources
  - Do not reflect the complexity of supply chains and logistic services
  - Loose importance due to larger role 3PL

What? (Content)

C5: Improvements in data collection (C^{td})

- Directions in data collection
  - Collaboration with private sectors (knowledge base intermodal transfers)
  - Protocols for frequent data collections
  - Industry-level forecasts, sensitive for the particularities of the sector
  - Local (disaggregate) data
  - Accessible data bank including GPS device and other data providers
  - Development of a open-source multimodal databank

What? (Content)

Encourage efficient operations	Integrate intermodal transport decisions with SC decisions	External cost calculations
• Integrate operational planning systems • Assess network-wide impact • Define business models for bundling	• Intermodal routing / modal choice • Green SC	• New technologies and changes in vehicle fleet • Life Cycle Assessment
Barge, terminal, waterway and port	Shippers and consignees	

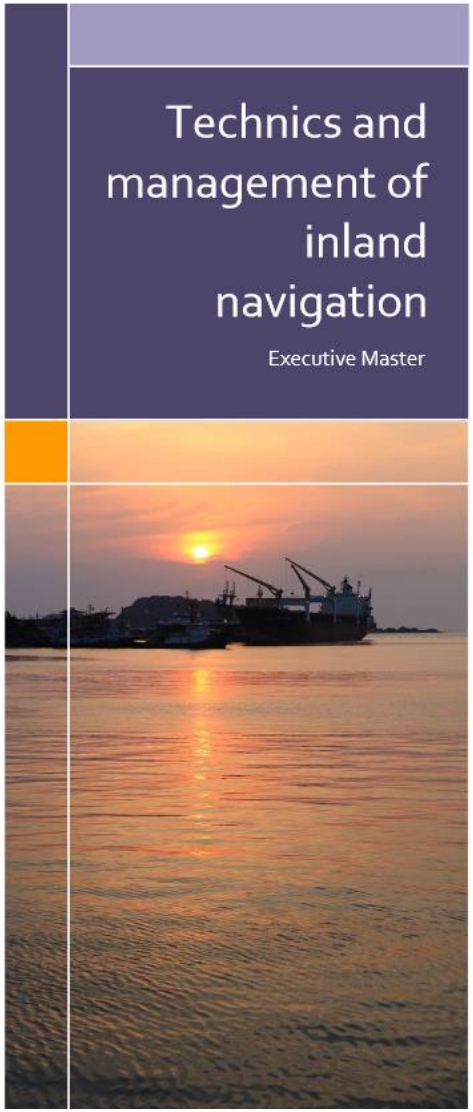
Detailed freight data: freight flows and underlying logistic decisions taken

What? (Content)

- Knowledge transfer & Research collaboration
- *Education & Training*

What? (Content)

- EDUWAT (EU-COST)
  - Lack of courses/programmes on inland waterway transport
  - Needs investigation
  - Construction of programs
- FLUDURAMS executive master
  - Unique program
  - Managerial and technical components



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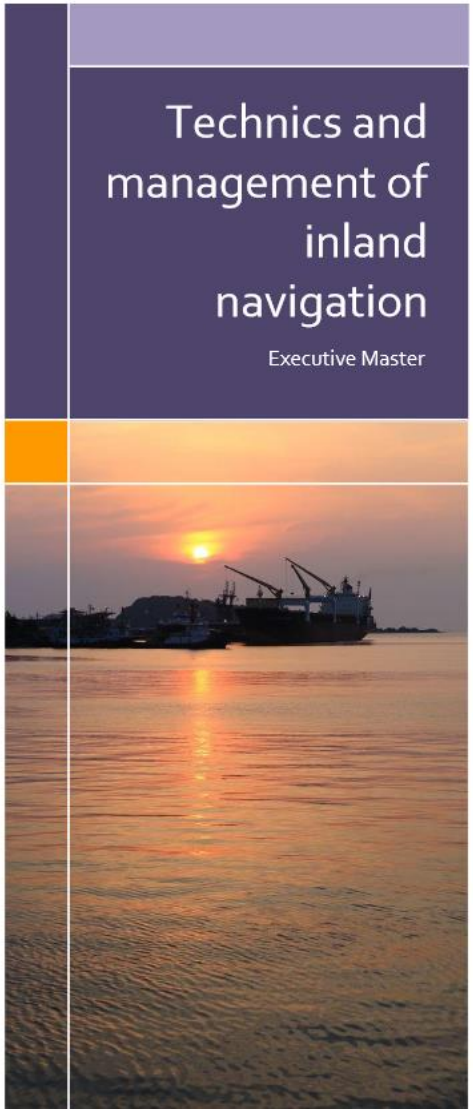
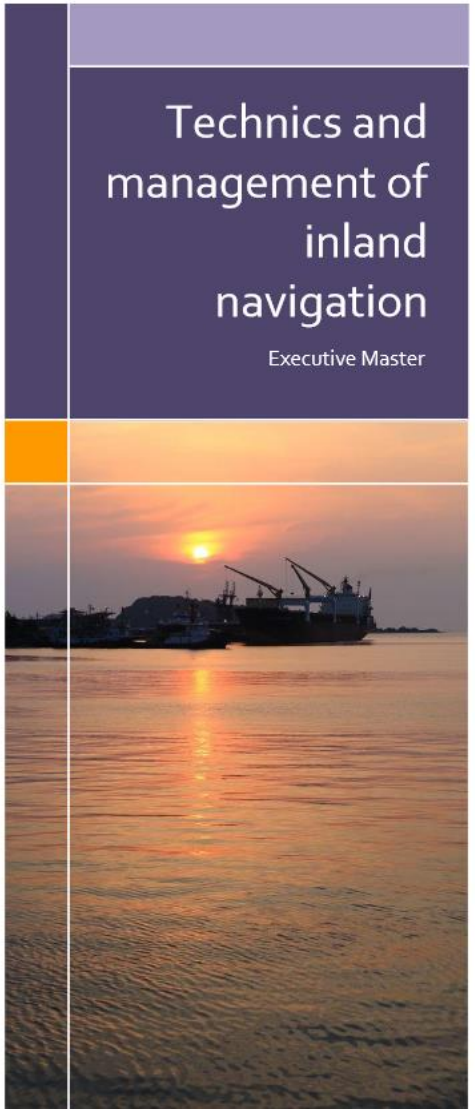


Executive Master

- Focus:
  - Policy
  - Strategic planning
  - Management issues
- Skills:
  - Transport management
  - Roles of Public Administration and Private Sector:
    - Provision of infrastructure
    - Funding, operation and maintenance of transport networks
    - Contemporary modelling techniques and data collection procedures
    - Impact management of future trends in inland and seashore navigation

Executive Master

- 3 managerial courses
- 3 technical courses
- 1 manuscript (thesis/dissertation)



3 managerial courses

- Transport system analysis, traffic management and modelling
  - Focus: analysis of transportation systems
  - Passenger and freight modelling frameworks
  - Modelling of multimodal goods transport

- Logistics, Quality and supply chain management tools for waterborne transport and shipyards operation
  - Basics of operation research (location, distribution and assignment problems)
  - Basics of production management
  - Logistics & supply chain management
  - Quality management tools
  - Integrated logistics and performance assessment

- Evaluation and decision making tools and strategies for waterborne transport and shipyards operation
  - Introduction to multi criteria decision making
  - Integrated socio-economic & environmental assessment tools
  - Use of specific decision making software

3 technical courses

- Waterways Infrastructures
  - River engineering techniques to maintain the navigation channel
    - River bank and bed protection
    - Flow control,
    - Control of erosion and sedimentation
  - Large infrastructures
    - River navigation weirs (to guaranty a relevant water depth)
    - Navigation locks
    - Flood protection

- Shipyard layout and organization
  - Organization of a typical shipyard (planning and organization)
  - Techniques for dry-docking (slipway, etc.)
  - Typical construction activities and the required equipment
  - Typical maintenance and inspection activities
  - Logistics inside shipyard (simulation techniques)

- Concept Design of navigational equipment and navigation aids
  - Navigational equipment
  - Concept design of the new equipment according to existing rules
  - Navigational aids (AIS and RIS)

Manuscript

- Integration of
  - Professional experience
  - Knowledge acquired in executive master

- Valorisation:
  - Application of methodological frameworks
  - to Brazilian case study

Discussion topics

- Combination technical and managerial aspects conceived valuable? Shift of focus needed?

- Subjects? Which subjects/topics to you conceive as essential which are not currently covered?

How? (Modalities)

- At the present:
  - 6 courses + manuscript
  - 1 week ULg lecturer + 2 weeks Brazilian lecturer
  - Courses taught during evening hours

- Future ideas:
  - Residential blocks (2 x 2 weeks full time)?

Discussion topics

- How to organise the courses practically? Which location? What about the idea of residential blocks and the potential location of these blocks?

- Self-study versus courses at university? What balance is preferred?

Q&A

Questions, remarks, thoughts?

More information ?

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