Rol Haven in Wereldwijde Logistieke Ketens

“Hoe kunnen we duurzaam nieuwe toegevoegde waarde creëren door meer naar de lading in de containers te kijken?”

Rob Zuidwijk

rzuidwijk@rsm.nl

Erasmus University Rotterdam

Port of Rotterdam

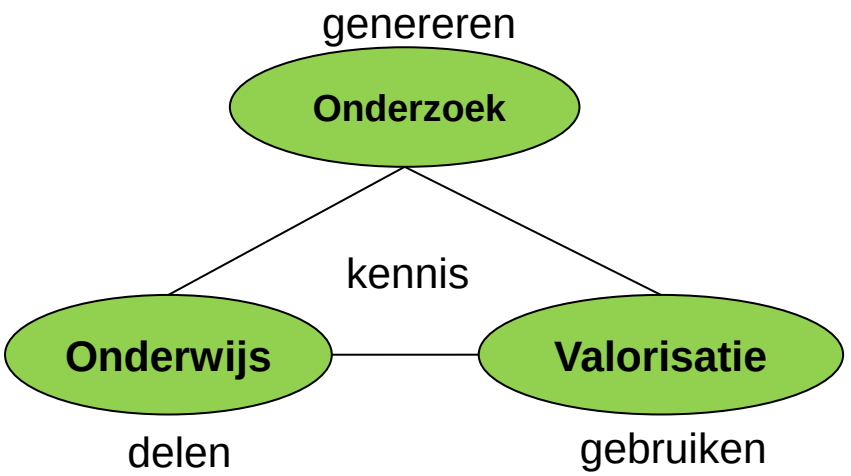
Deltalinqs

Gemeente Rotterdam
Ontwikkelingsbedrijf

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus Smart Port

- Gesteund door sponsoren
- Slanke organisatie
- Havenhoogleraren – vijf faculteiten
- 40+ onderzoekers



Port of Rotterdam

Deltalinqs

Gemeente Rotterdam
Ontwikkelingsbedrijf

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

Port Professors

Rommert Dekker
Professor of Operations Research

Erasmus School of Economics (ESE)

Frank Smeele
Professor in Commercial Law

Erasmus School of Law (ESL)

René de Koster
Professor of Logistics and Operations Management

Rotterdam School of Management (RSM)

Harry Geerlings
Professor of Governance of Sustainable Mobility

Erasmus School of Social Sciences (ESS)

Hercules Haralambides
Professor of Maritime Economics and Logistics

Erasmus School of Economics (ESE)

Hein Klemann

Professor in Social and Economic History, Erasmus School of History, Culture and Communication

Research Agenda

- Operational Excellence in Ports and Networks
- Drivers for Green Port Related Operations
- Governance for a Sustainable Port
- Ports as Nodes in Global Supply Chains
- Visibility for a Connected Port

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Contact

Dr. Bart Kuipers
Business Developer
bkuipers@ese.eur.nl

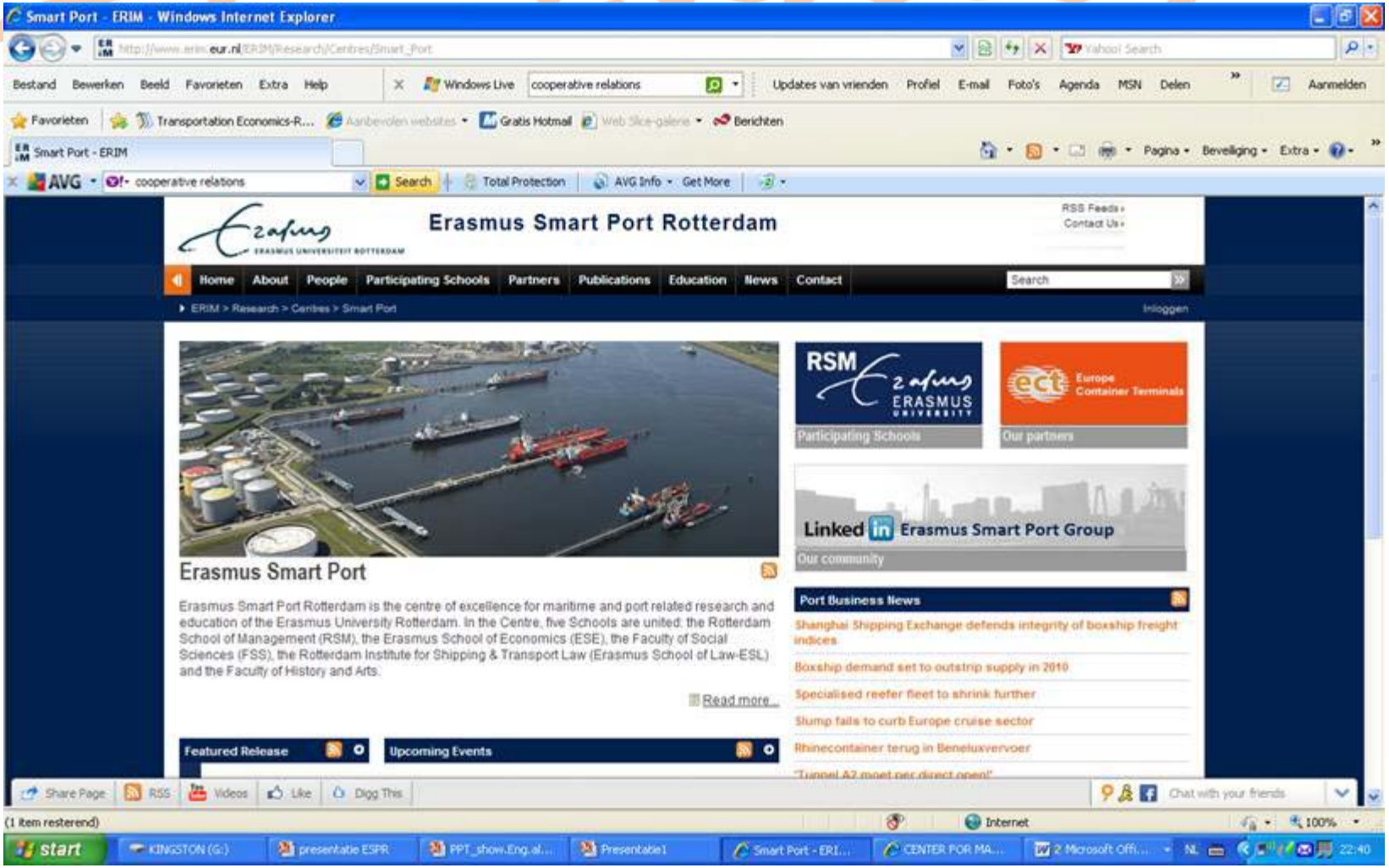
Prof. dr. Rob Zuidwijk
Academic Director
rzuidwijk@rsm.nl

Ingrid Waaijer
Office Manager
iwaaijer@rsm.nl

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

More info: www.eur.nl/smartport



SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

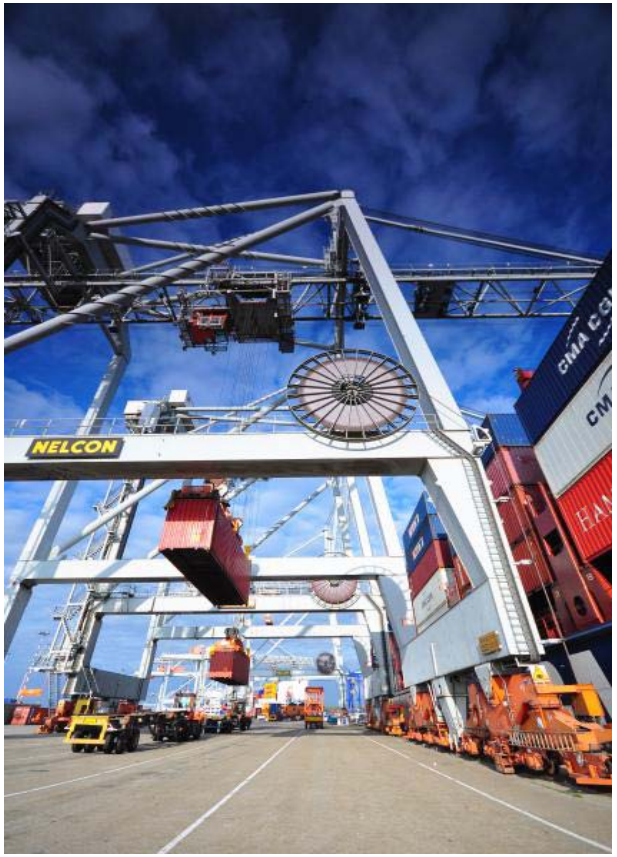
Begeleidende Vragen

- Hoe kunnen we informatie over containers benutten voor meer duurzame logistiek?
- Hoe kunnen we containerlogistiek aansturen op ladingniveau?

Succesverhaal Maritieme Container

bron: gemeentearchief Rotterdam

1963



bron: ECT

nu

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

Erasmus University Rotterdam

Begeleidende Vraag 1

“Hoe kunnen we informatie over containers benutten voor meer duurzame logistiek?”

Port of Rotterdam

Deltalinqs

Gemeente Rotterdam
Ontwikkelingsbedrijf

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

Research Topic

The deployment of various hinterland transport modes under uncertainty while considering the triple bottom line of sustainability

Rob Zuidwijk and Albert Veenstra (2010). The Value of Information in Container Transport: Leveraging the Triple Bottom Line. ERIM Research Paper ERS-2010-039-LIS, Erasmus University Rotterdam.

Port of Rotterdam

Deltalinqs

Gemeente Rotterdam
Ontwikkelingsbedrijf

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

INTEGRITY

SEVENTH FRAMEWORK PROGRAMME

Objective

Significantly improve reliability and predictability of door-to-door container chains.

Means

Development Shared Intermodal Container Information System (SICIS).

Motivation

Growing information needs from growth in global container transport, bottlenecks in European deep sea ports and hinterland connections, supply chains complexity, and new security regulations.

Source: www.integrity-supplychain.eu

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

SICIS Feature: Container Tracking

Erasmus University Rotterdam

SICIS - Windows Internet Explorer

https://www.sicis.integrity-supplychain.eu/sicis/HK.com.hit.integrity.sicis.SICIS/SICIS.html?locale=en#CONTAINER-JOURNEY-FUNC/RAW-CONTAINER-EVENT-FUNC

File Edit View Favorites Tools Help

People SICIS

V1.1 Built on 2009-09-23 at PRO

Welcome Aveenstra, RSM (Aveenstra@rsm.nl/SICIS) Help|Logout

INTEGRITY SICIS

Home > Container Journey > Raw Container Event (GMT+00:00)

- Reference
- User Maintenance
  - User Account
  - User Group
  - SICIS Company Type
- User Profile
  - User Profile
  - Tradelane Template
- Container Journey
  - Start Container Movem
  - Create/Update Contain
  - Complete Container M
  - Raw Container Event
- Query
- Company Profile

Raw Container Event Maintenance CN005

System Code: -- Please Select --
Event Location: -- Please Select --
Event Code: -- Please Select --
Container No.: TTN
Date Time From:
Date Time To:
Search Reset

Container Event List

		Container No.	Event Code	Event Date Time	Event Location	External Customer Code	System Code	Device No.	Longitude	Latitude	Security Status
1		TTNU3022932	Closing Container / Initate Tracking	21-09-2009 04:00	CMML WAREHOUSE (SHEKOU)		SICIS				
2		TTNU3022932	Gate In	21-09-2009 12:50	YICT Terminal		HDN				
3		TTNU3022932	Loading	23-09-2009 20:16	YICT Terminal		HDN				
4		TTNU3022932	Unloading	14-10-2009 08:59	ECT Delta Terminal East		HDN				
5		TTNU3022932	Gate Out	16-10-2009 03:17	ECT Delta Terminal East		HDN				
6		TTNU3022932	Container Opening / end Journey	16-10-2009 05:00	DHL GF WAREHOUSE	DHL-FP7-STC	SICIS				

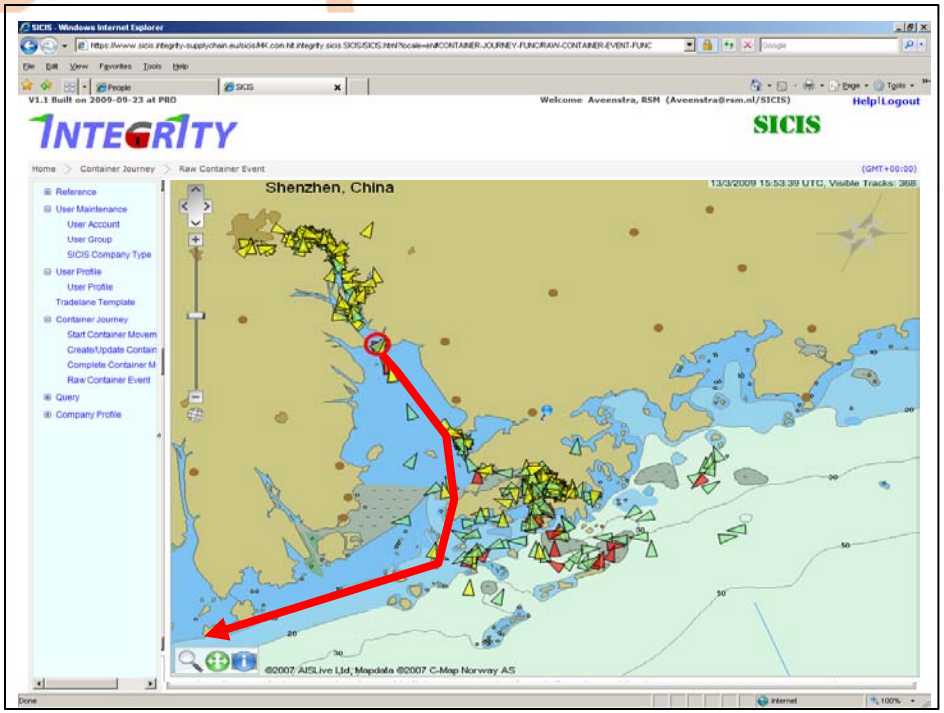
1 / 1

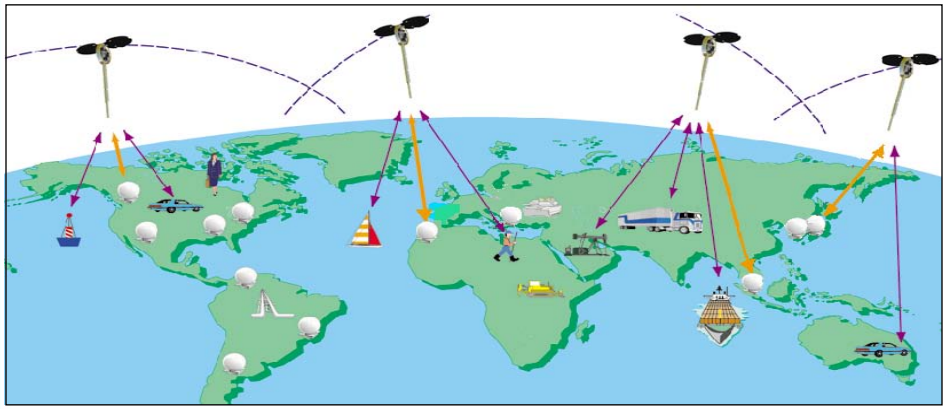
Milestones

Security Status

Done Internet 100%

SICIS Feature:
Vessel Tracking & Ship Arrival Predictions





Multiple data sources

Container tag (GPS)

Vessel tracking system (AIS)

Vehicle board computers

RFID readers at the terminal

Use of quality tracking data

Monitor and control of container position

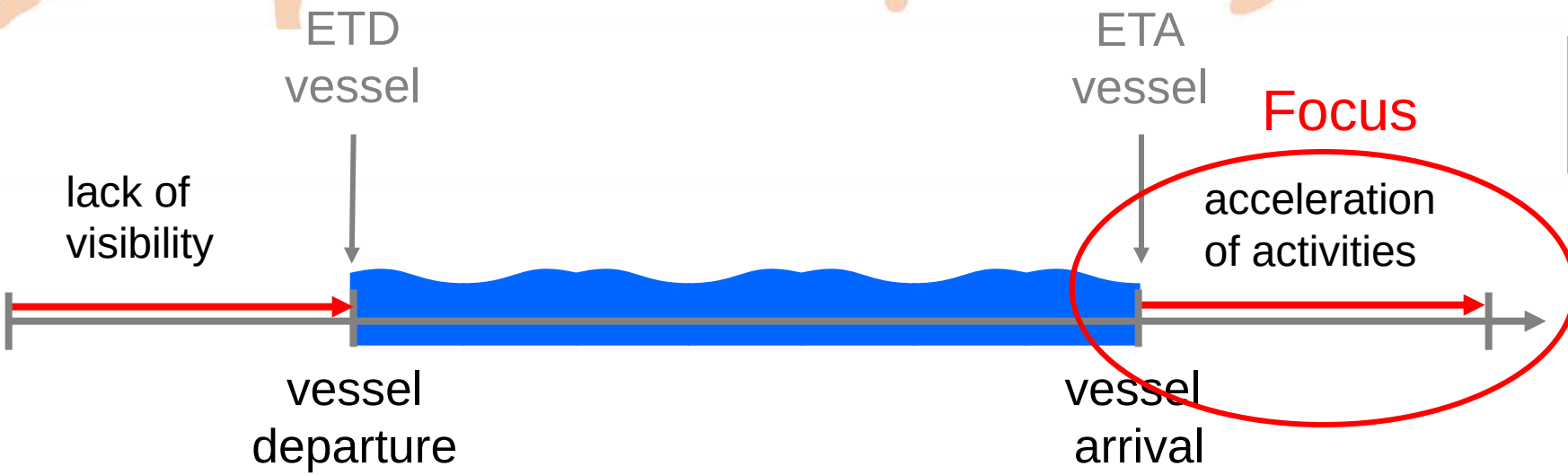
Forecasts of events (arrival times)

Erasmus University Rotterdam

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Global Supply Chain



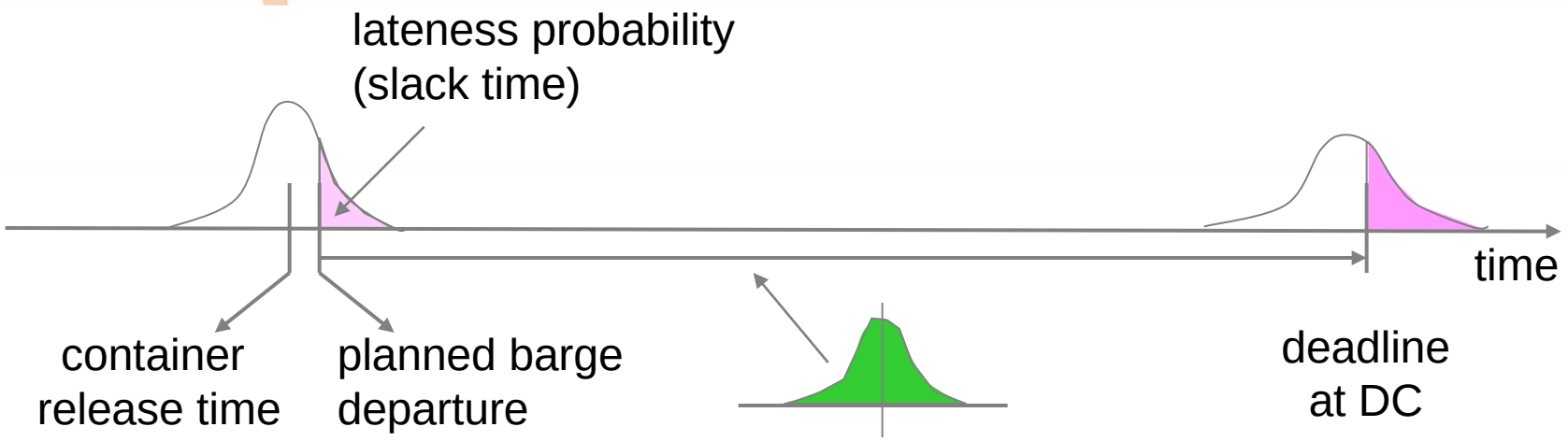
‘Decoupling points’ departure and arrival deep sea vessel

- Departure and arrival times are uncertain (days)
- Present-day visibility requirements export low
- Acceleration of supply chain activities import upon arrival

Decision Problem

- Container arrival destination port
- Co-modal transport mode inland (barge and truck)
  - Departure barge less flexible
  - Recourse shipment of late containers by truck
- Decision variables:
  - fraction of containers planned by barge
  - probability container not on time for barge

Decision Model



Decision variables
planned barge departure or
lateness probability
mode choice (truck or barge)

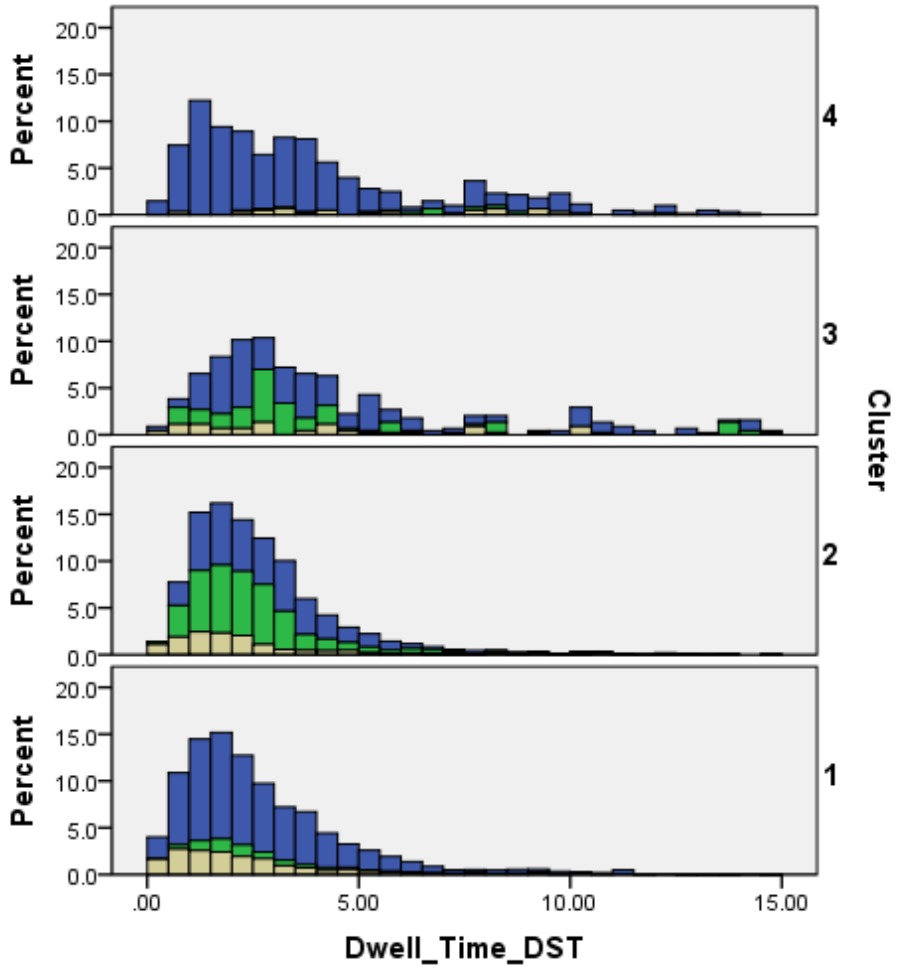
Recourse action
recourse truck
shipment

Stochastic parameters
container release time
transport times

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

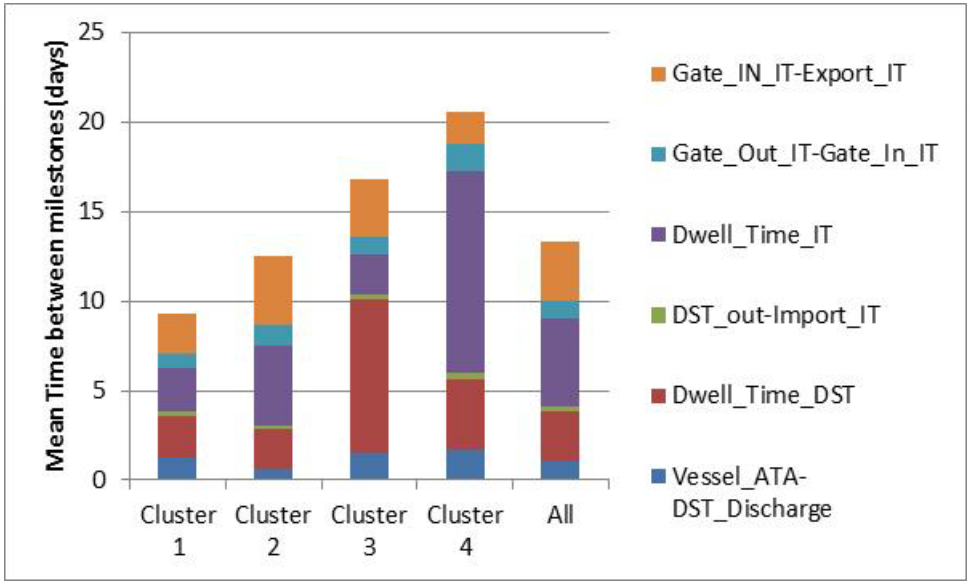
Erasmus University Rotterdam

Dwell Time Clustering: Customers



Container Dwell Times

Erasmus University Rotterdam



	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Clients	91	28	6	5
Containers	6788	7306	394	700
Containers per client	74.59	260.93	65.67	140.00

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Information Scenarios

Erasmus University Rotterdam

1. **No information**

   All containers are shipped by recourse truck

2. **Distributions container arrivals and transport times**

   Fraction is planned to be shipped by barge, late arrivals are shipped by recourse truck. Remainder is shipped by planned truck

3. **Distribution container arrivals per category**

   Same, fractions planned to be shipped by barge can differ among categories

4. **Container arrival times known in advance**

   Containers can now be selected based on their arrival time, no recourse trucks required

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Performance Measures

Erasmus University Rotterdam

distance = 170 km	**barge**	**truck**	**rctruck**
costs (euro)	70	200	220
time (hours)	12	4	5
CO2 emissions (kg/ton)	6	23	25

Sources: personal communication LSP;
CO2 Emissions from Freight Transport in the UK (2007)

Normalized

transport cost efficiency

emission efficiency

fraction containers shipped as planned (security)

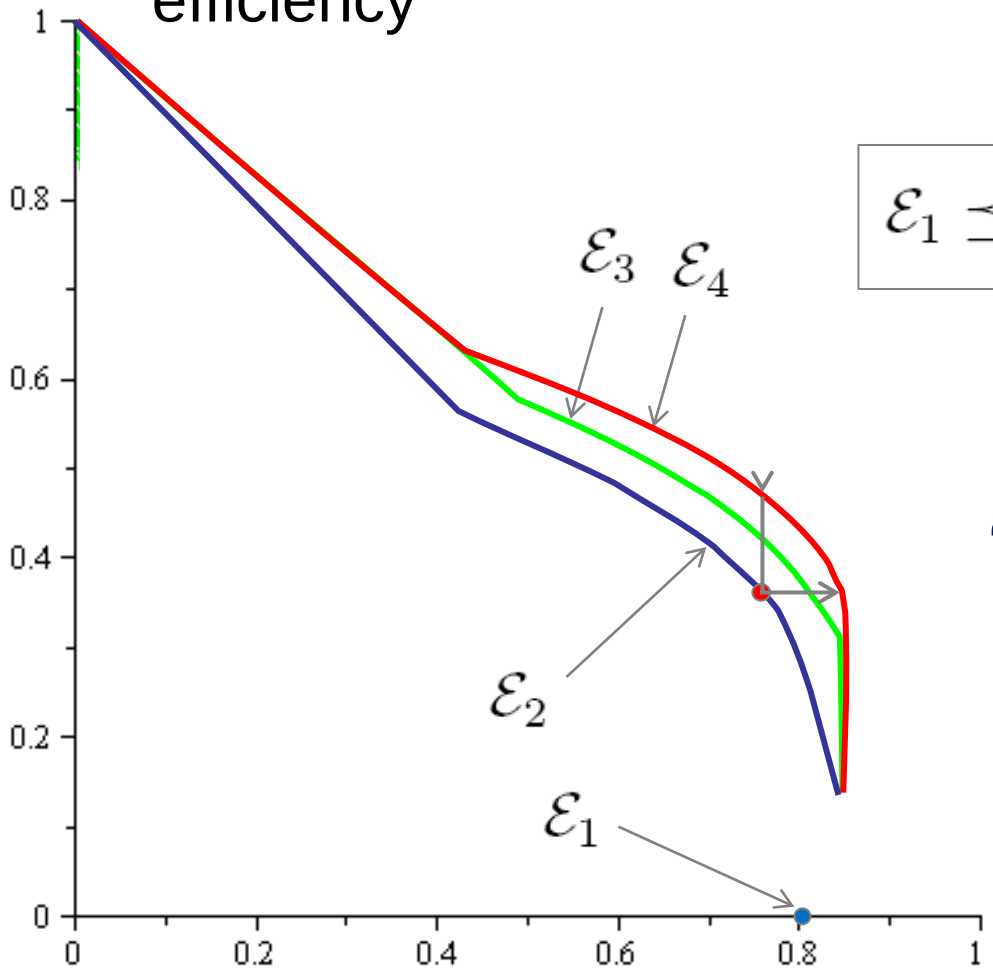
fraction containers on time at DC

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

“Value of Information”

Erasmus University Rotterdam



$$\mathcal{E}_1 \preceq \mathcal{E}_2 \preceq \mathcal{E}_3 \preceq \mathcal{E}_4$$

“collateral benefits”

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Discussie

Erasmus University Rotterdam

Meer informatie over de container:

- Meer gedifferentieerde behandeling
- Toegevoegde waarde al bereikt bij bescheiden detailniveau

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

Begeleidende Vraag 2

“Hoe kunnen we containerlogistiek aansturen op ladingniveau?”

Port of Rotterdam

Deltalinqs

Gemeente Rotterdam
Ontwikkelingsbedrijf

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

Research Topic

Cargo Driven Intermodal Transportation

Cargo Driven Intermodal Transportation Proposal for Dinalog R&D Project, May 2012.

Port of Rotterdam

Deltalinqs

Gemeente Rotterdam
Ontwikkelingsbedrijf

SmartPort
ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam

Motivation

- The need to further enhance the competitive position of the PoR and its hinterland;
- The need to better utilize containers and transport means;
- The need to establish a considerable modal shift;
- Stimulate and reap the benefits of containerization;
- The opportunities to balance (import-export) and combine (maritime-continental) cargo flows.

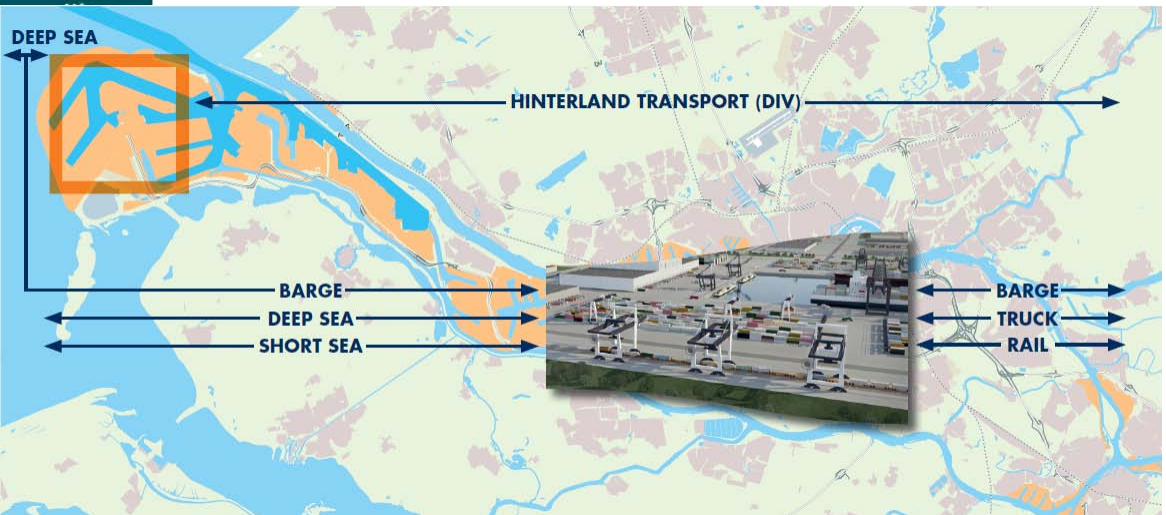
SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Rotterdam Cool Port

Source of inspiration for the project

- Response to containerization of perishable product
- Relocation of hub for perishables in the port
- Centralized handling and storage of conditioned cargo, including cross-docking, quality inspections, customs procedures;
- Consolidation of volumes enables frequent intermodal connections deep sea terminals and hinterland;
- Connectivity European import and export flows via short sea;
- Facilitates repositioning of empty (reefer) containers.



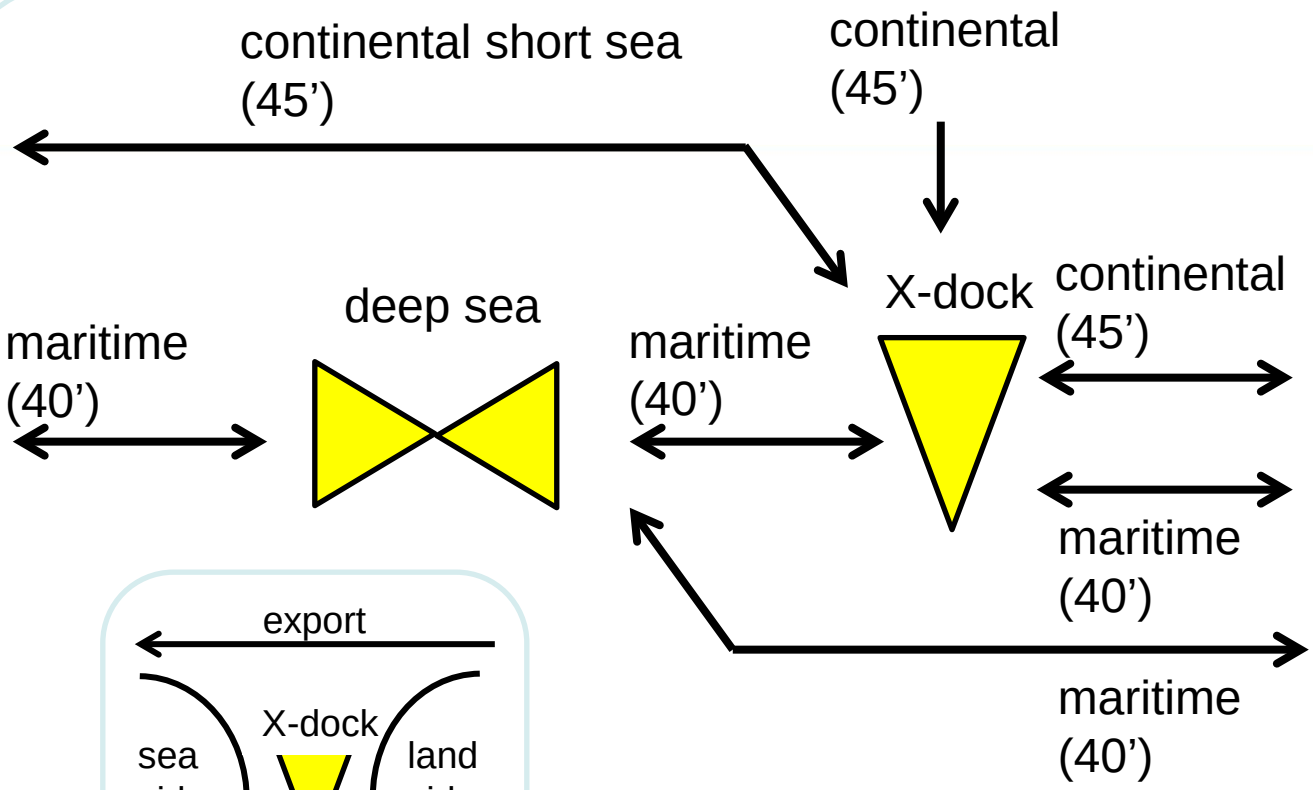
SmartPort

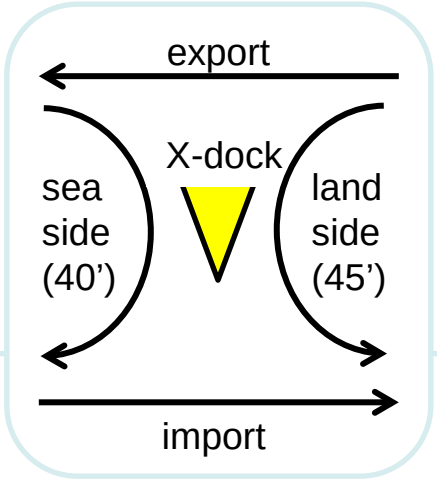
ERASMUS UNIVERSITEIT ROTTERDAM

Related Business Cases

- **Kloosterboer:** Selection and further development and of efficient compact storage and cross-docking concepts in an intermodal network, at least 15% energy consumption reduction;
- **Markiezaat Container Terminal:** Further development of LCL distribution and container repositioning and re-use concepts (> 70%);
- **Visbeen Transport Groep:** Development of intermodal solutions for new product-market combinations; also cross-dock (daily fresh).

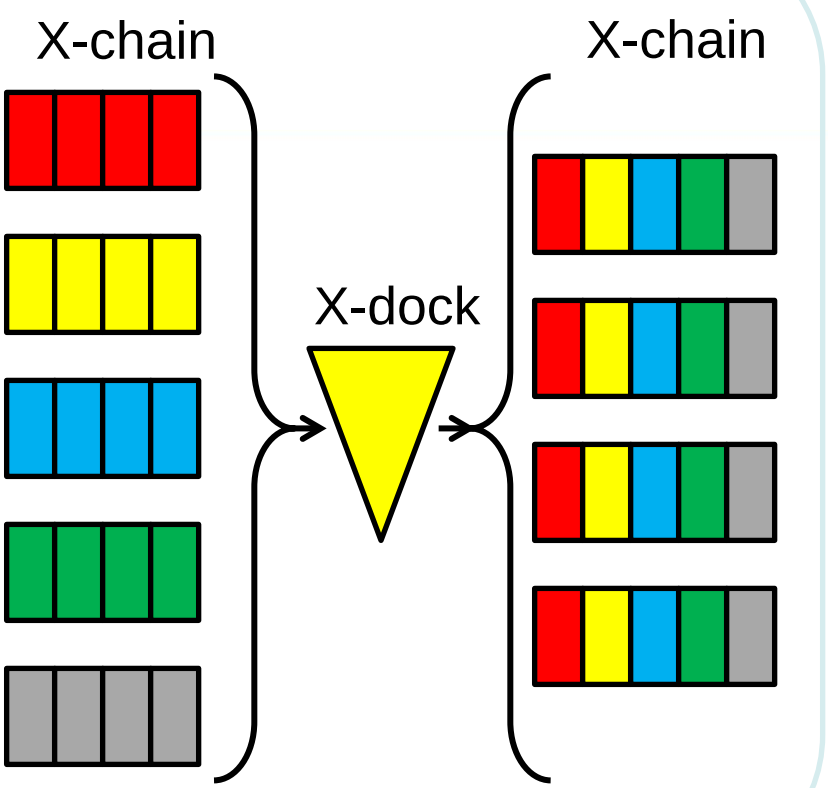
Flow Balance & Consolidation

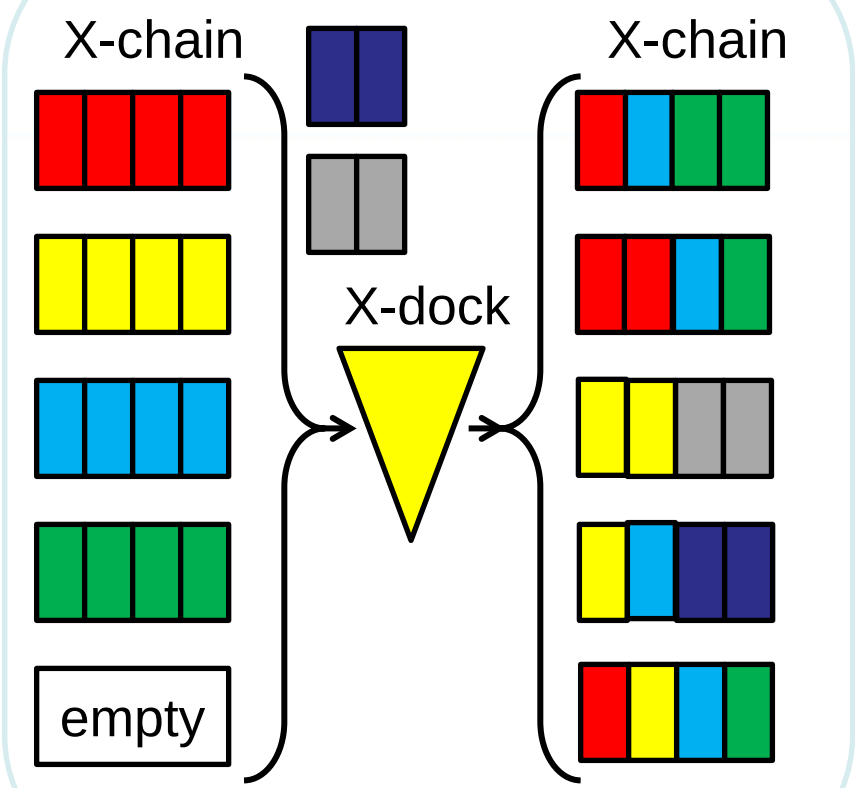




X-dock both on–dock and hinterland

Better Utilization





Expected Benefits

- On dock distribution provides opportunity to combine efficient storage in container stack with cargo VAL and cross-docking;
- On dock hub and hinterland network may mitigate trade imbalance by synchronizing deep sea import and short sea export;
- On dock hub and hinterland network enables further containerization and modal shift;
- Planning and control at the cargo level provides better utilization of containers;
- LCL distribution system may help create an extensive Short Sea network that improves the competitive position of the port.
- Etc.

Erasmus University Rotterdam

Research Contributions

1. **Managing cross-dock operations at the cargo level:** Tools that optimize the design and operation of handling and compact storage facilities in an intermodal environment;
2. **Managing container flows at the cargo level:** Tools to determine where to (de)consolidate, cross-dock and trans-load cargo flows under various product and operational conditions;
3. **Creating value with information flows at the cargo level:** Tools to determine the value of information at the cargo level in intermodal network planning in terms of revenues and costs, reliability, security, and environmental impacts.

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Feasibility Study Network

- Opportunities for added-value activities such as cross-docking: identification of product-market combinations that require LCL and allow for consolidation;
- Location of cross-docking and bundling: port of loading or port of discharge, near dock or more inland;
- Exploration of product-market combinations other than fresh product.

Challenges Perishables

- Product variety
- Shelf life
- Conditioned container chain
  - handling
  - storage
  - transport
- Seasonal patterns import & export volumes

Discussie

Erasmus University Rotterdam

Aansturing container transport op ladingniveau

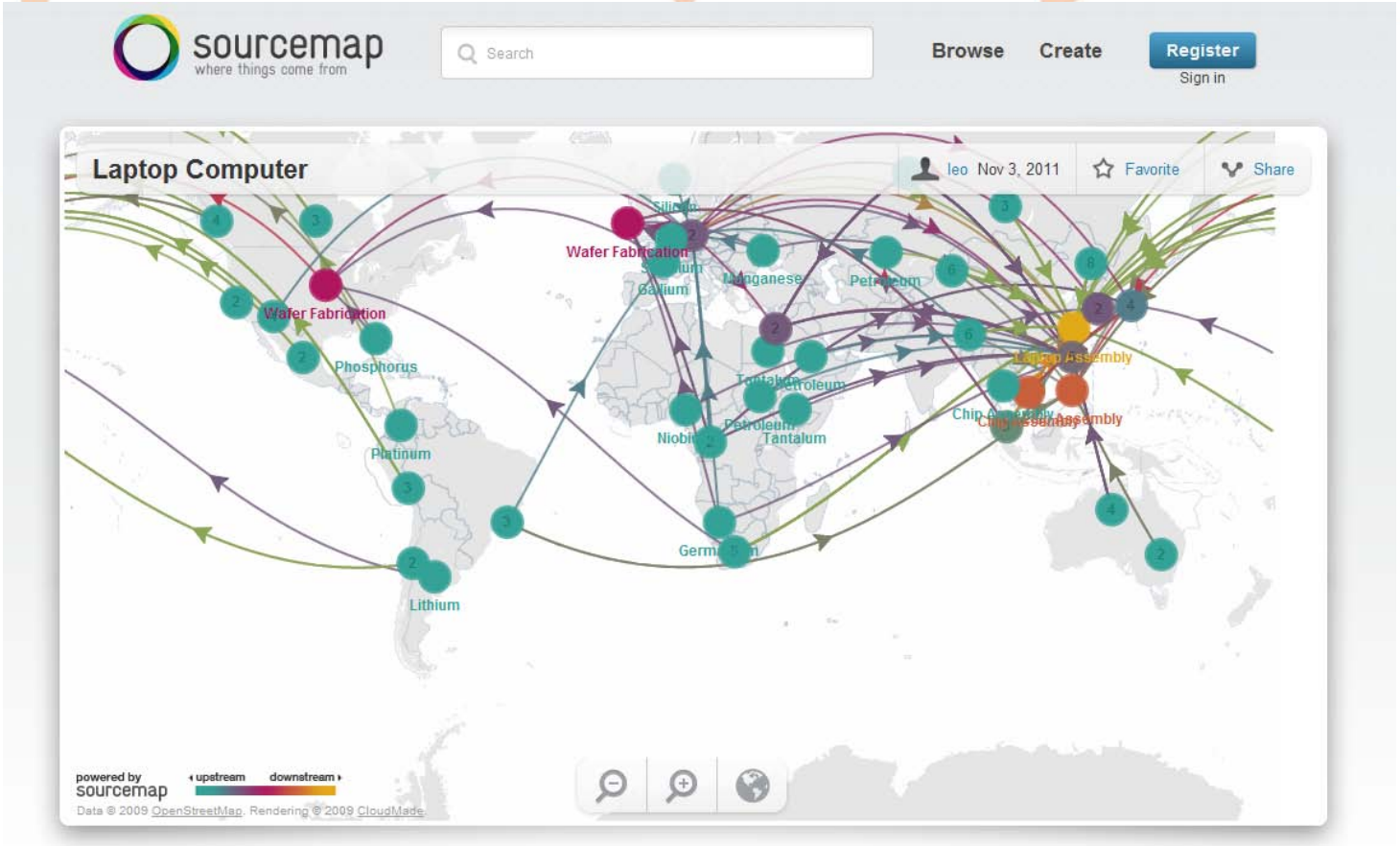
- Mogelijkheden om stromen te combineren
- Mogelijkheden om containers te benutten
- Mogelijkheden om toegevoegde waarde activiteiten te combineren
- Aandachtspunten?

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM

Rol Havens in Wereldwijde Ketens

Erasmus University Rotterdam



Laptop Computer

leo, August 22, 2011

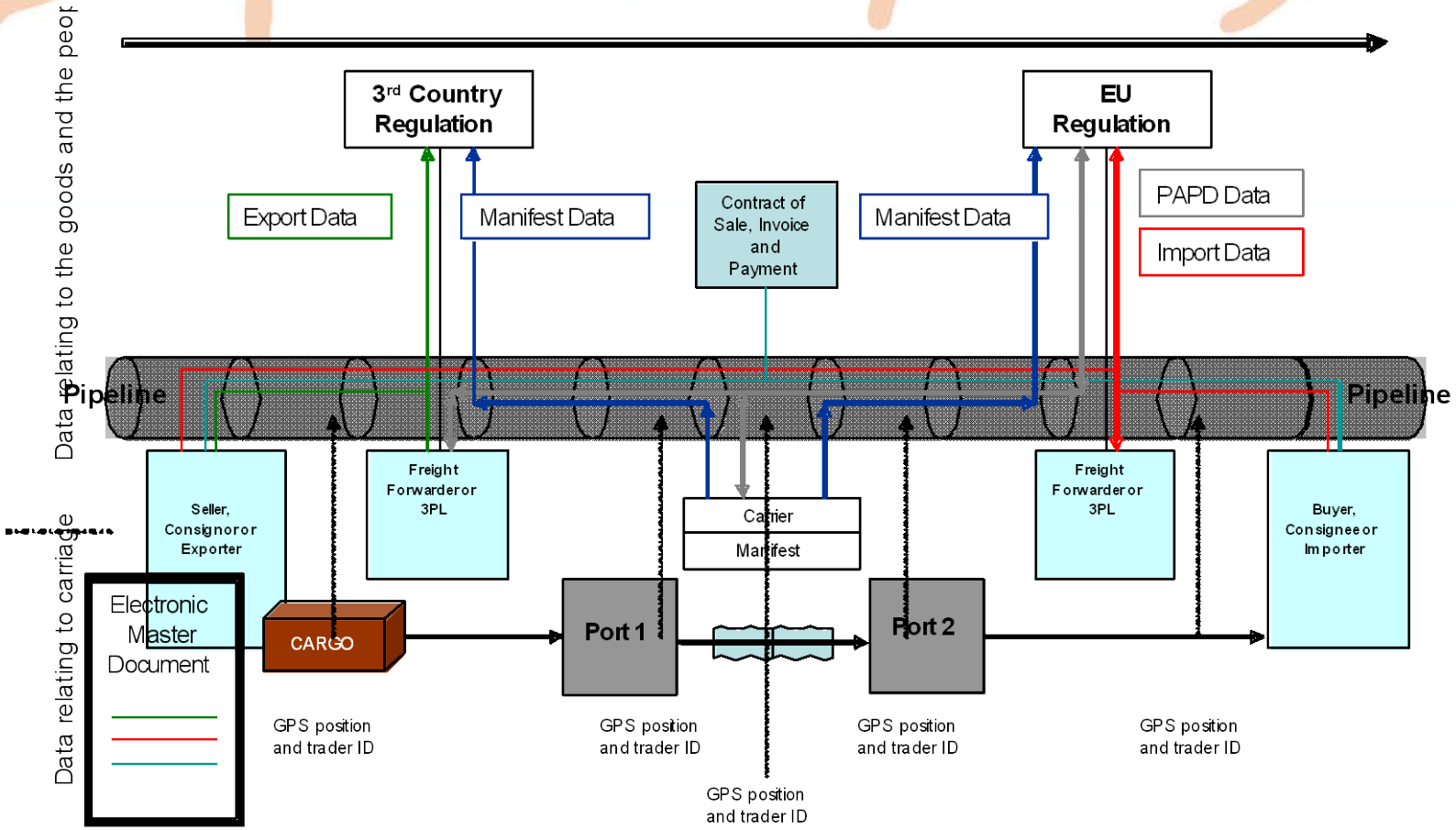
in Electronics & Computers

Share this Sourcemap

http://srce.mp/ouv2kr

<iframe width="640px" height="480

Transparantie Ketens



Source: David Hesketh (2009)

Erasmus University Rotterdam

SmartPort

ERASMUS UNIVERSITEIT ROTTERDAM