University of Antwerp
TPR | Department of Transport and Regional Economics

BNP Paribas Fortis Chair on transport, logistics and ports

10de BNP Paribas Fortis Port Co.innovation café

14 juni 2024

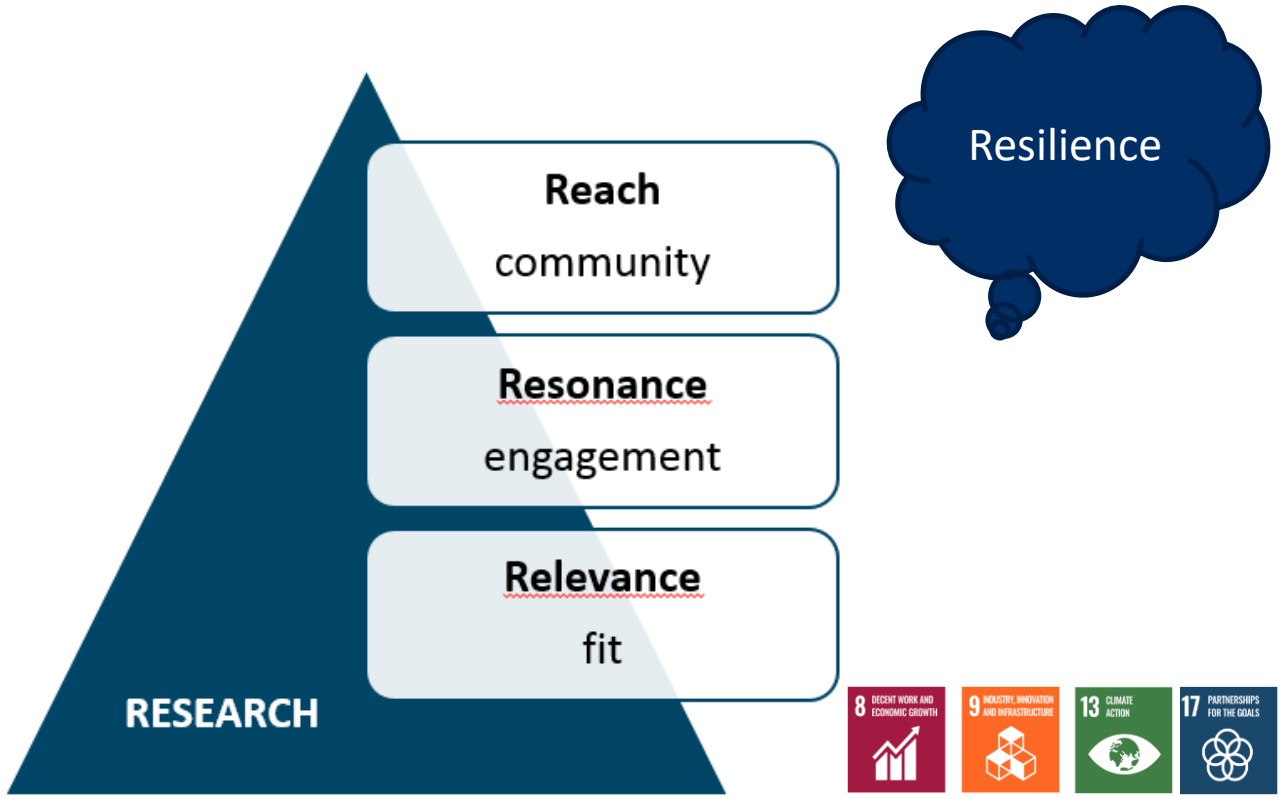
Prof. Dr Christa Sys

Houder leerstoel BNPPF

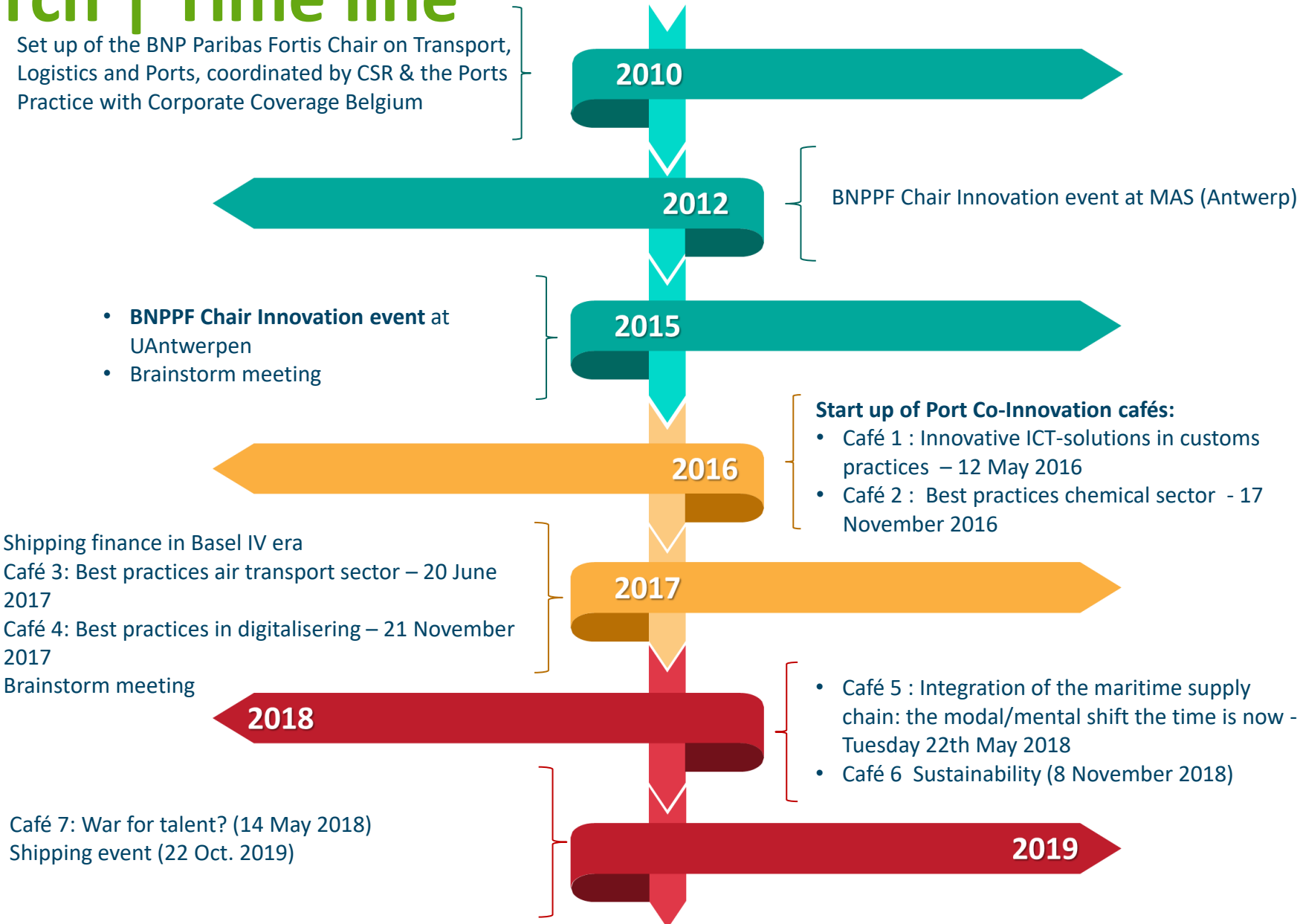
- Welkom
- Leerstoel
- Concept café
- Korte terugblik
  - Welke thema’s kwamen aan bod?
  - Status? Perceptie?

BNP Paribas Fortis chair Transport, Logistics & Ports

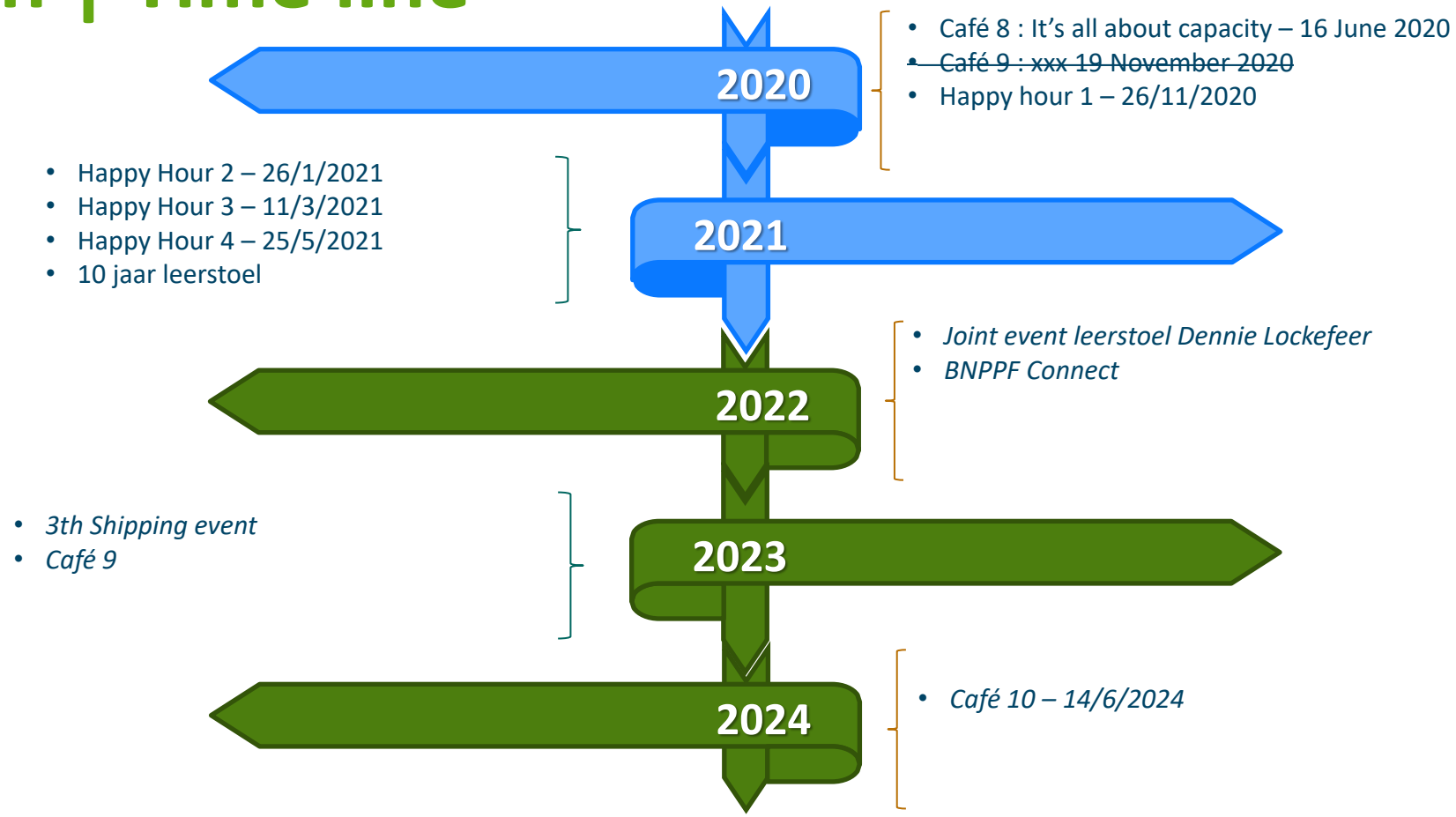
Theme: creating a sustainable maritime ecosystem



Research | Time line



Research | Time line



Terugblik

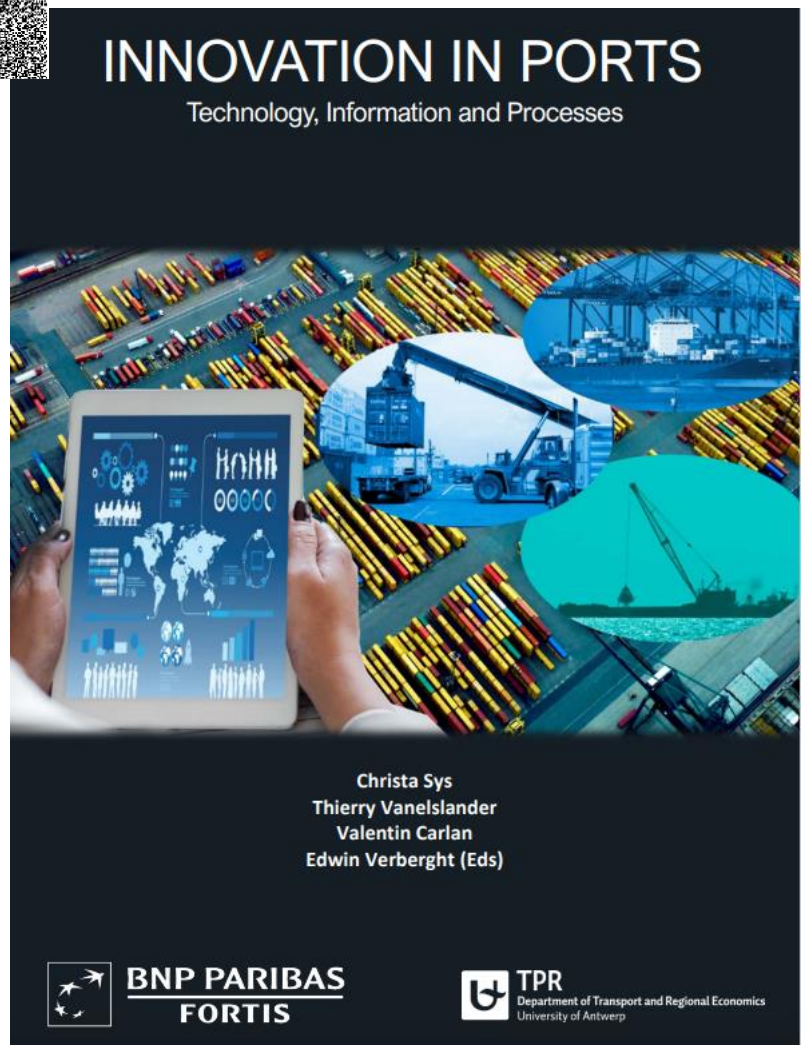
2015-2025

BNPPF innovation event (2015) > port co.innovation cafés

LESSONS LEARNED

- **Preliminary research: barriers:**
  - Lack of collaboration by other actors
  - Need for further integration along the maritime supply chain
  - Uncertainty about legislation
  - Drifting apart of the local needs and the strategic decisions made by headquarters as a result of globalization
- **Imitation, triggered by entry costs: if all-in from beginning, greater success!**
- **Role of innovation champion limited:**
  - Capabilities of all involved partners
  - Market demand
  - Avoiding lock-in effects on behalf of the innovation champion
- **Stimulating co-opetition: key to successful adoption of innovation + important objective**
- **If cost > benefit: no willingness to co-operate (comparable co-operation between ports)**
- **Benefits usually less visible than costs → game stops**

  → regulation against barriers to entry?



BNPPF innovation event (2015) > port co.innovation cafés

- **Digital innovation gradually moves to the maritime supply chain**
  - cost savings
  - increased quality of product (or service), and
  - further growth
- **The trend towards collaborative innovation in the maritime supply chain**
- **The speed at which digital innovation is reshaping the port sector is lower than in other industries**
- **Barriers**
  - Economic
  - Technological
  - Legal
  - Culture

Restricted access | Research article | First published online October 17, 2017

75
2215

Digital innovation in the port sector: Barriers and facilitators

Valentin Carlan, Christa Sys, [...], and Athena Roumboutsos +1 View all authors and affiliations

Volume 18, Issue 1-2 | https://doi.org/10.1177/1783591717734793

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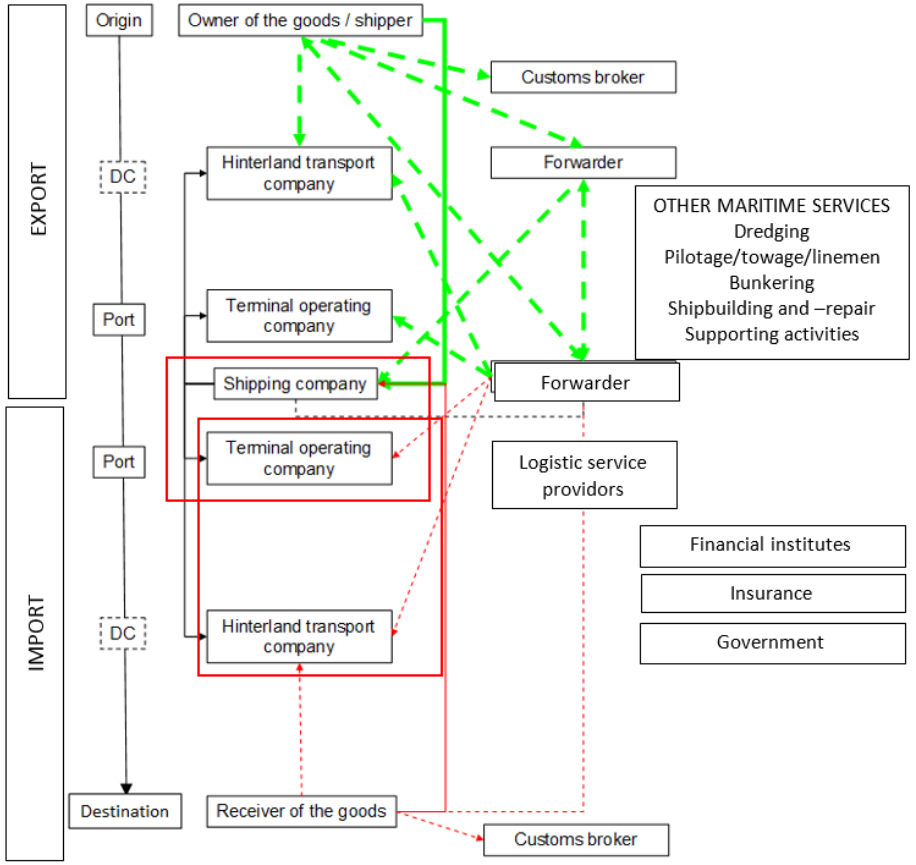
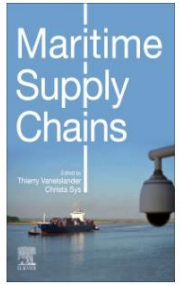
Abstract

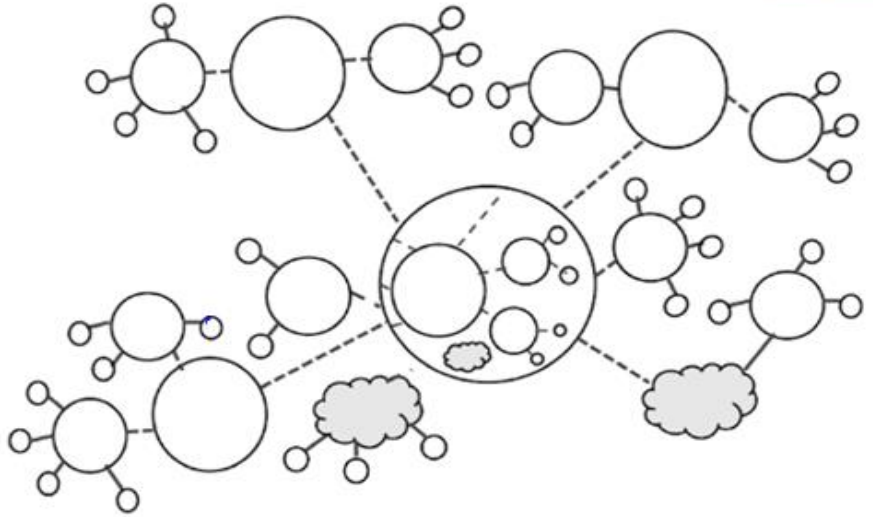
Digital innovation changes industry as a whole, and gradually also the port sector. The present article examines in detail 32 information and communications technology (ICT) innovation cases collected between autumn 2013 and spring 2015. Leading actors along the maritime supply chain were asked to indicate the importance and to assess the degree of the success achieved in each ICT innovation initiative, to identify the driving forces behind the adoption of innovation and to denote the associated costs and benefits. This input allows identifying the barriers of digital innovation from initiation through to implementation, as well as assessing the impact of facilitators of ICT innovation. To do this, the present research combines four quantitative instruments. The added value of this combined approach is a deeper understanding of the digital innovation process within the port sector. The research firstly indicates that alignment exists between company strategies and success degrees in the port sector, in contrast to non-ICT initiatives. The ICT innovation initiatives are also profit driven. Secondly, the port sector should be more open to disclose cost and benefit information and should conduct more such analyses. Next, there are conditions that improve the degree of success. Overall, terminal alignment with the right ICT infrastructure proves key. However, too many divergent interests among the stakeholders entail that digital innovation challenges the ability to cooperate. An important finding is regulation was not identified as a barrier nor as a facilitator.

From ‘actor’ to ‘maritime chain thinking’ …

- **No longer optimal (i.e. the most efficient and the cheapest) > rethink existing maritime supply chain structures**







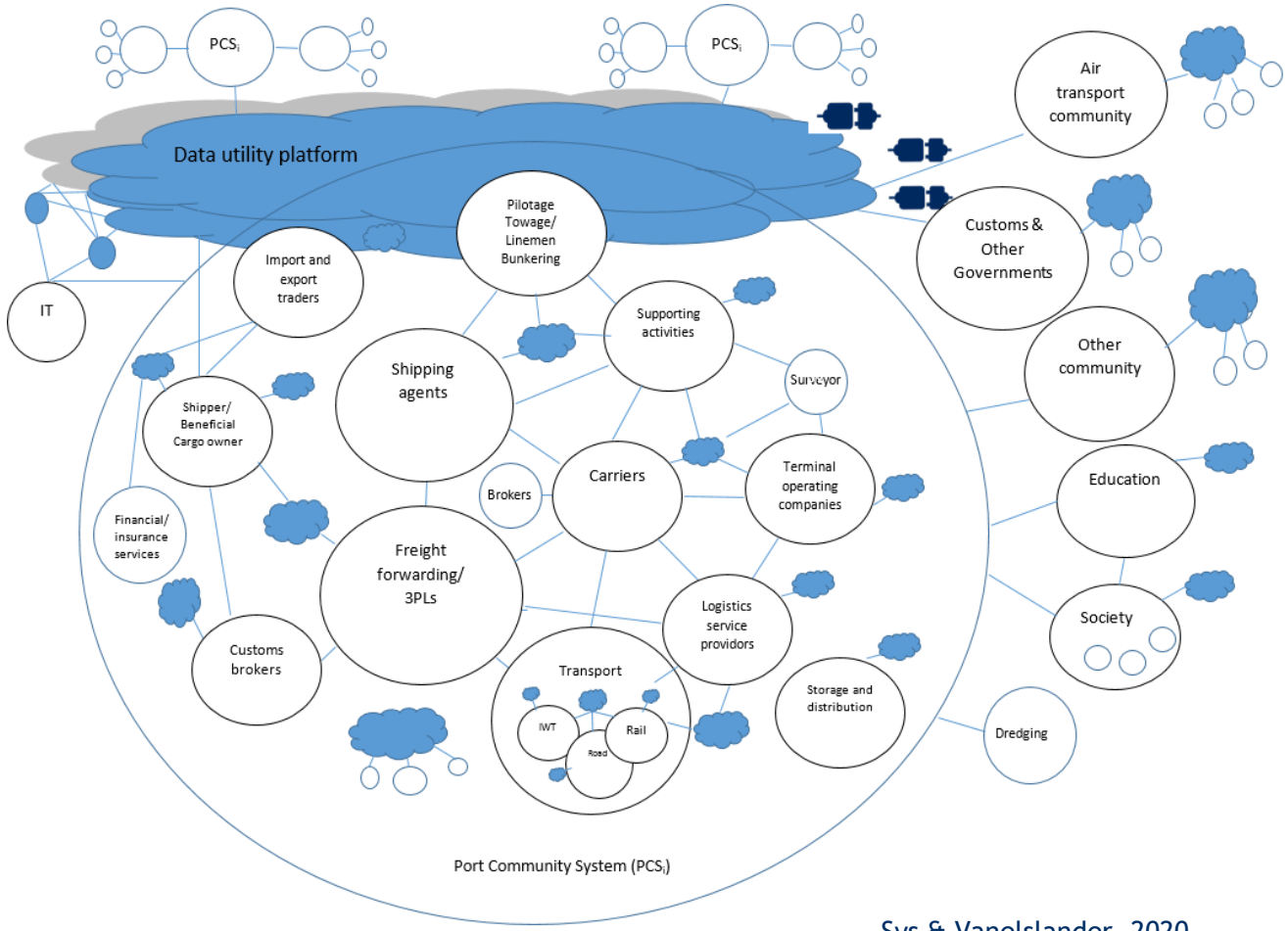
Millar (2015)

Own compilation based on Meersman et al., 2010

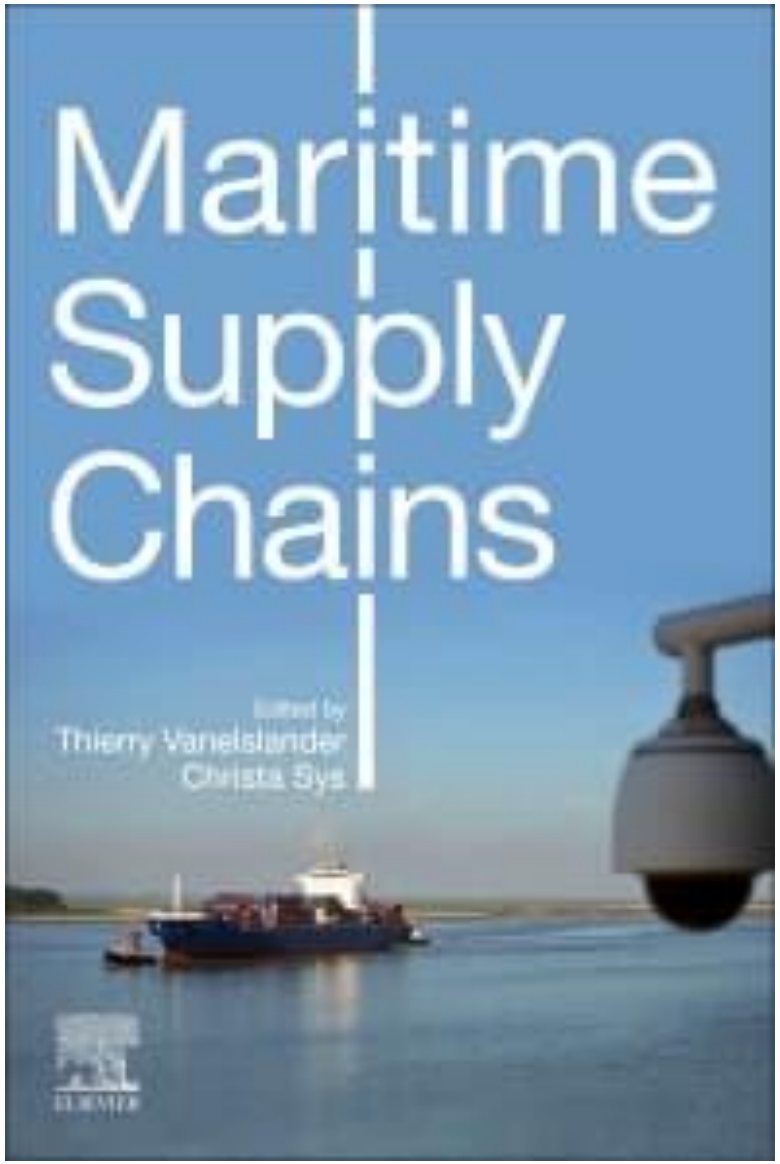
...to maritime ecosystem

the notion of networks as '*the products and information flows that travel within and between nodes in a variety of networks that link organizations, industries, and economies*'. (Christopher, 2016)

- **Leverage the strength**
- **Create new opportunities for innovation**



Sys & Vanelslander, 2020



Maritime ecosystem: definition

'to match supply and demand globally, efficient and effective cargo, information and financial flows are **interconnected in a variety of multi-layered networks linking all actors** (B2B, B2G) (living components) and infrastructure (e.g. port, hardware,…) (non-living components) whilst reducing costs, improving (operational) efficiency, ensuring sustainability, complying with regulation and simultaneously improving customer satisfaction (e.g. reliability) to retain or increase market share. (Sys & Vanelslander, 2020)

The problem is that a lot of companies **lack the support for (external) collaborative interactions with other/all actors in the maritime ecosystem**. (Sys & Vanelslander, 2020)

- Diversity of ideas and perspectives, learning through interaction, consensus building, and implementation commitment. (Callens & Verhoest, 2022)
- Collaborative innovation strongly and positively correlates with firms' innovation performance (Xuemei Xie, Xiaojie Liu, Jialing Chen, 2023)

Reshaping the maritime supply chain > ecosystem challenges

DATA ISSUES

- Standardization
- Set-up update data governance, security and privacy models > open data directive EU2019/1024

REGULATION ISSUES

- Reduce level of uncertainty, create stability > policy maker
- Innovation support
- Bundling, pooling, clustering, sharing = norm

POLICY AND LEGAL ISSSUES

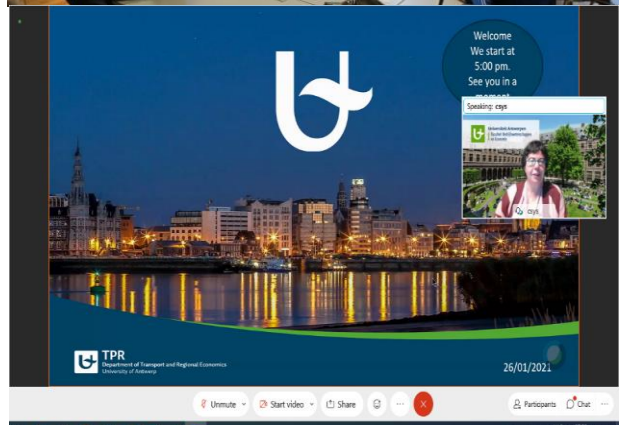
- Incentivize the development of new innovative business model
- Aalign policies
- Uniform scheme of external cost charging

Vertrekken van een definitie

- Waar draait co-innovatie om?
- De definitie is duidelijk: een nieuwe vorm van innovatie waarbij het doel van de actoren is:
  - samen nieuwe kennis te verwerven
  - nieuwe mogelijkheden voor samenwerking te creëren binnen het maritieme ecosysteem
- Innovatieve (ICT) oplossingen passen daar (theoretisch beschouwd) perfect in
- Maar volgt de praktijk? Fragmentatie? Community-vorming? Beschikbaar stellen van data?

10 year of port co.innovation

BNP Paribas Fortis Port Co.Innovation Cafés/Happy hours	Findings
DEMOGRAPHIC CHANGES	
What can we learn from air transport?	Flexible matching of demand and supply
It's all about capacity!	Aligning capacity along the chain
War for talents	Attracting sufficient and skilled labour
Economic risk (online)	Nearshoring as an option
Geopolitical risk (online)	Regionalisation of trade flows
SUSTAINABILITY	
Modal/mental shift	Awareness and the right incentives
Customs	Ethics and security in supply chains
Environmental risk	Climate: turning challenges into opportunities
DIGITIZING	
What can we learn from chemical industry?	Digitalising data into a pipeline
Data	Sharing for competitiveness
Technological risk	Digitalisation needs security!
Supporting services	Cooperation increases efficiency



Bijna 10 jaar later…

- **No best practice on port co.innovation to pitch. Reason?**
- **Need for sustainable maritime ecosystem?**
- **Status digitization?**

Creation of a sustainable/resilient maritime ecosystem: necessary, but not sufficient

- Knowledge of the complexity, including network competition
- Knowledge of ICT in the (virtual) ecosystem
- Reduction of bottlenecks hampering the evolution from collaboration processed to (maritime) supply network
- Resilience of what/at what and who's cost?

➔ Long term vision/plan (priorities) > a conceptual framework for managing complex systems

Succesvol maritieme ecosysteem van de toekomst?

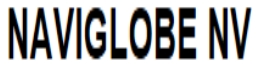
Kennis delen

Oplossingen zoeken

Netwerking

10de BNPPF Port Co.innovation Café

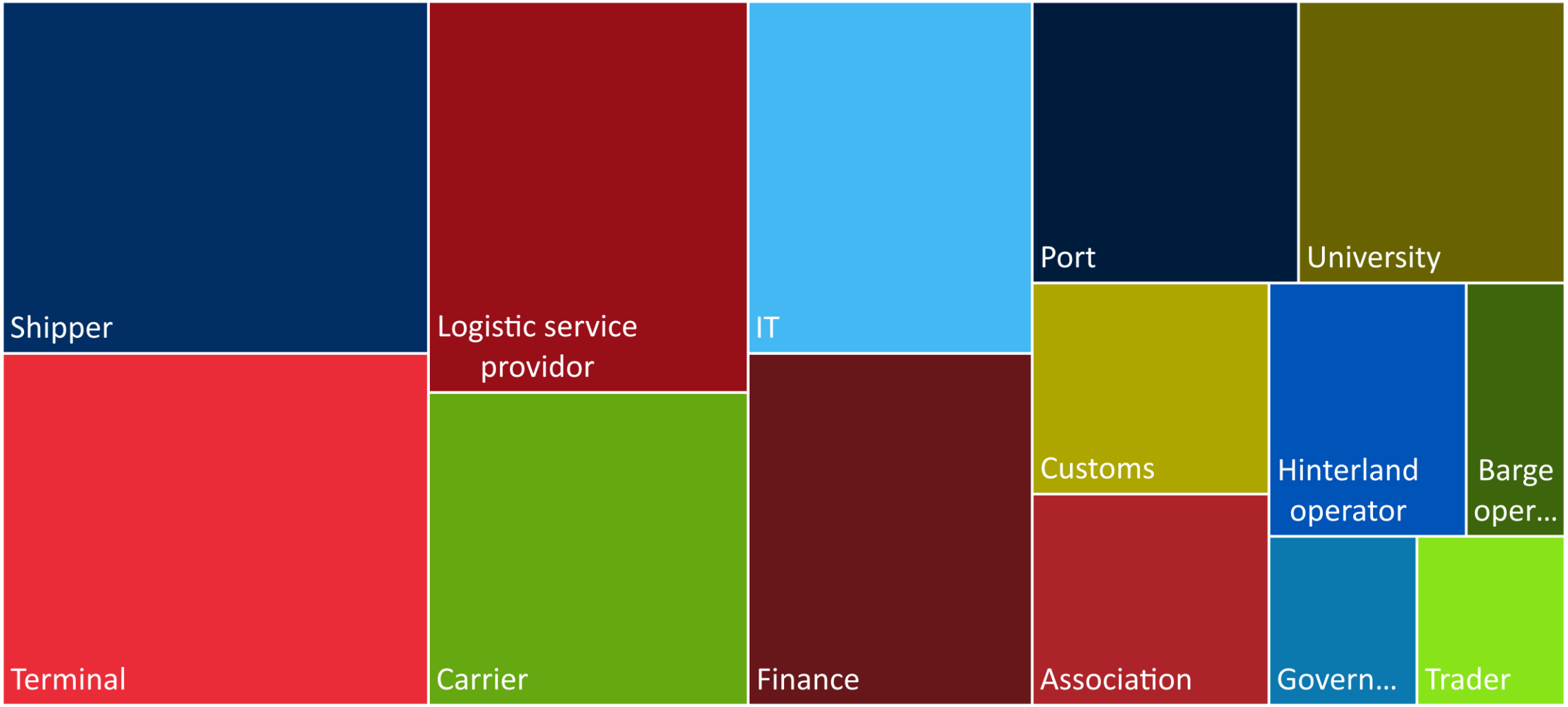
Reach | Community | 10de BNPPF port co.innovation café



Barging Solutions

Customs Support

Profiel participanten (42)



Doel

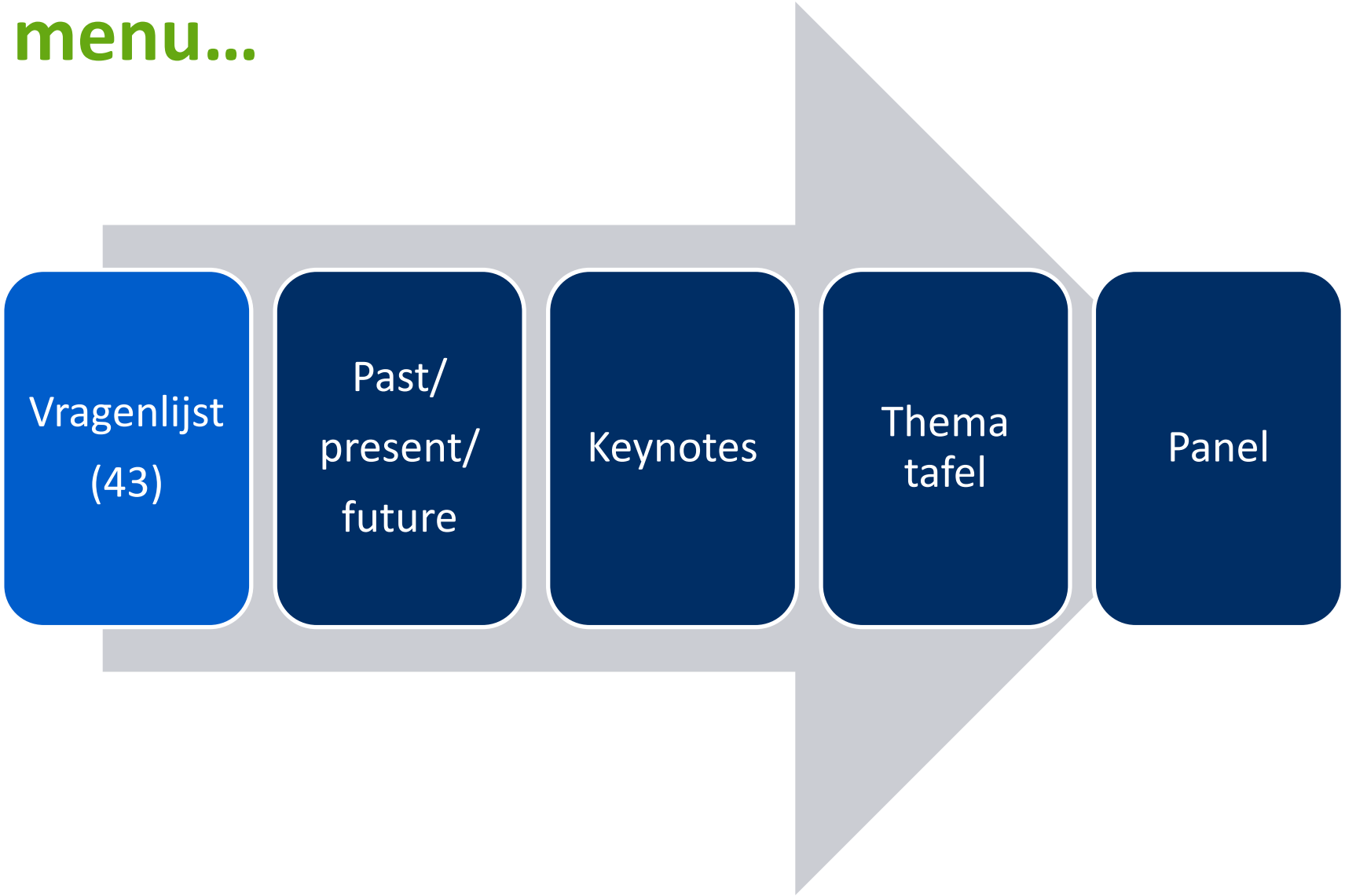
Creatie van een duurzaam maritiem ecosysteem

- Helpt verdere integratie van de verschillende actoren bij het creëren van een duurzaam maritieme ecosysteem?
- Welke (ict) innovaties ontbreken om zo'n duurzaam ecosysteem te bewerkstelligen?

Aanpak

- **Vragenlijst**: Algemene vragen, vragen m.b.t. maritiem ecosysteem/m.b.t digitalisering

Op het menu…


Vragenlijst (43)
Past/ present/ future
Keynotes
Thema tafel
Panel

Programma

13u30 Registratie

14u00 Verwelkoming door Prof. dr. Christa Sys, houder leerstoel BNP Paribas Fortis Transport, Logistiek en Havens

14u20 Keynote ‘Een duurzaam maritiem ecosysteem en innovatie: de volgende stap(pen)?’ door Dr. Jan Blomme, Gewestelijke Havencommissaris Vlaamse Overheid

14u45 Re-evaluation of Maritime Supply Chains: Creating a Sustainable Maritime Ecosystem door Dr. Raimonds Aronietis, Universiteit Antwerpen (ENG)

15u00 Digitalisation in maritime ecosystem: accelerate or not? door Dr. Valentin Carlan, Universiteit Antwerpen

15u15 BREAK

15u45 Thema tafel (mobiliteit, duurzaamheid, ecosysteem, digitalisering)

16u45 Pitch moderators (Prof. Dr. Vanelslander, Dr. Aronietis, Dr. Carlan, Prof. Dr. Sys)

17u05 Panel (An Moons, DP World, Wouter Bassier, MSC, Yves De Lariviere, AET, Jan Blomme, Nico Wauters, T-Mining, Steve Declerq, Port of Oostende)

18u00 Receptie

Keynote speakers

Dr. Jan Blomme

Een duurzaam maritiem ecosysteem en innovatie: de volgende stap(pen)?

Dr. Raimonds Aronietis

Re-evaluation of Maritime Supply Chains: Creating a Sustainable Maritime Ecosystem

Dr. Valentin Carlan

Digitalisation in maritime ecosystem: accelerate or not?

“Een duurzaam maritiem ecosysteem en innovatie: de volgende stap(pen)?“

10de BNPPF Port Co.Innovation Café

Jan Blomme

Gewestelijk havencommissaris

Vlaamse overheid

Inhoud

- Een maritiem ecosysteem?
- Innovatie? Welke innovatie?
- Hoe innovatie(-proces) duurzaam inbedden in de havengemeenschap?

Vraagstelling

- De ecosysteem-paradox: samenwerken met concurrenten?
- “*je innoveert toch om beter te concurreren”*?

Basisvraag:

Moeten we innoveren rond het innovatiebeleid?

Hoe <u>concreet</u> aanpakken en rol havengemeenschap?

Vier deelvragen:

- Bestaat er een maritiem ecosysteem ? JA, maar …
- Is het verder zetten van innovatie-beleid wenselijk? JA, maar welke innovatie?
- Hoe havengemeenschap organiseren om breder te innoveren? = Voorwerp van DEBAT
- En, zo ja, welke relatie overheid – private sector? = Voorwerp van DEBAT

Een maritiem ecosysteem bestaat toch al?

Beroepsverenigingen STHIL **Overheid**

- Havensector: Alfaport Voka ⟷ Havenbestuur/clustermanager: POAB

KVBG 1872/1997

Kamer van Koophandel Antwerpen-Waasland Alfaport

A.B.A.S.

cepa voor een haven die samenwerkt

Koninklijke Belgische Redersvereniging

FORWARD BELGIUM

Port of Antwerp Bruges

- Vlaamse Overheid

Vlaanderen | DEPARTEMENT MOBILITEIT & OPENBARE WERKEN

Maritieme Toegang

Toegepast Mobiliteitsbeleid

AGENTSCHAP MARITIEME DIENSTVERLENING en KUST

De Vlaamse Waterweg nv

VLAIO

- Havenindustrie: platform industrie Voka (niet exclusief havenindustrie)

- Federale Overheid

FEDERALE OVERHEIDSDIENST MOBILITEIT EN VERVOER

En nog vele anderen: binnenvaart en spoor, universiteiten, POM's, transportfederaties, EC, …

Maar, … er is niet één maar er zijn vele maritiem gebonden ecosystemen

- Grote fragmentatie; vele maritiem-gerelateerd ecosystemen met eigen agenda en tijdslijn.
- Soms/vaak gescheiden werelden: ieder is de expert in zijn domein. Moeilijk om over muurtje te kijken. Vaak staan belangenbehartiging en “service” centraal.
- Vaak relatie van ‘klant/leverancier’ in plaats van ‘partner’
- Beschikbare mankracht/middelen voor kennisuitbouw en innovatie(verspreiding) verschillen sterk. Tussen overheid en privé maar ook tussen grote en kleine bedrijven.
- Wel overlegplatformen maar vaak informatief en (louter) adviserend
- Antwerpse ‘gemeenschap’ onder druk van internationalisering havenbedrijven: beslissingscentra elders (+ lange(re) procedures)
- Concurrentieomgeving: soms “*Ieder voor zich en god voor allen*” (“*waarom zou ik mijn concurrent helpen*?”). Haven is vrijemarkt omgeving. Innovatie kan concurrentievoordeel opleveren.

Innovatie: welke innovatie?

- Innovatie is vaak gerelateerd aan technologische vooruitgang

- Maar innovatie slaat ook op een aantal niet-technische veranderingen in een wijde range van toepassingen: “institutioneel”, “operationeel”, “sociaal”, “cultureel”, “economisch”, … dat op vele wijzen de havenorganisatie kan veranderen.

  We kunnen dit omschrijven als “proces-innovatie”.

Innovatie: welke innovatie? (II)

Technologische innovatie is globaal

- Technologische innovatie is "*for sale*": het kan makkelijk op de markt worden gekocht (of gekopieerd)
- Het voordeel van technologische innovatie is tijdelijk: nieuwe technieken verspreiden zich razendsnel over de wereld
- "*To early, to quick*": het risico de eerste innovator te zijn

"Proces"-innovatie is lokaal

- Proces-innovatie is moeilijk om te kopiëren
- Bijgevolg is proces-innovatie vaak blijvend en een sterke differentiator t.o.v. andere havens
- Maar de snelheid van proces-innovatie is trager en dus minder riskant

Stelling: Innovatie op het niveau van een havengemeenschap is allicht meer gekoppeld aan proces-innovatie dan aan zuivere technologische vernieuwing

Gebaseerd op discussie met A. Weynen vele jaren geleden

Wanneer innoveren op ecosysteem-niveau?

- Overheid: "Het **innovatiebeleid zelf moeten we innoveren**. We moeten op lange termijn kijken, want de beslissingen die je nu neemt, werpen misschien pas binnen 5-6 jaar hun vruchten af. Een **duidelijke toekomstvisie** gekoppeld aan concrete doelstellingen dringt zich op." (Lieven Danneels, VLAIO). Maar hoe realistisch is een roadmap voor de toekomst ("kristallen bol")?

- Leiderschap één partij: risico van "top down", eerder samen aan de kar trekken?

- Proces-innovatie dient door de gemeenschap te worden geïdentificeerd om voldoende realistisch en marktconform te zijn. Oplossingen dient door velen te worden gedragen.

- Speltheorie: proces-innovatie dient in het voordeel te zijn van alle (of de meeste partijen) partijen , zij het niet noodzakelijk voor allen in dezelfde mate. Wanneer voldoende kritische massa om een business-proces aan te passen en fundamenteel te veranderen?

NxtPort en ‘The Way Forward’: ‘*Is this the way to go*’? Een voorbeeld van een geslaagd huwelijk tussen het maritieme eco-systeem en IT-innovatie?

Historiek NxtPort: een moeizaam proces van “*vallen, opstaan en weer doorgaan*”	Vergelijk met Portbase (“top down”), Nxtport: overwegend “bottom up” Portbase: overheidsinitiatief, NxtPort: oorspronkelijk groepsinitiatief Vergelijking Porbase en Nxtport/Apics = +/- gelijk aantal use-cases
In IT-domein afgelopen tien jaar aantal grote stappen gezet:	C-point (EDI) + CCS Nxtport (Platform, API’s) ‘Digital Pact’ (december 2021) ‘The Way Forward’
Is ‘*project in progress*”. Verder in de diepte uitwerken:	‘wie doet wat? Wie draagt kosten ontwikkeling nieuwe toepassingen/beheer platform? Waarvoor betalen en waarvoor niet? Welke ‘governance’? Principe van overheid zorgt voor basisinfrastructuur (hardware) (NxtPort) en private sector voor de toepassingen (software). en gebruik van systeem = co-financiering zolas bij gebruik andere basisinfrastructuur!
Resultaten! Twee belangrijke toepassingen	CPU (‘Certified Pick Up’: aangestuurd door overheid omwille van veiligheidsaspect): wordt uitgerold! IRP (‘Inbound Release Platform’, aangestuurd door private havensector): bijna afgewerkt

Rol Overheid?

Overheid kan omgeving creëren voor (technologische) innovatie.

Maar invulling blijft op niveau ondernemingen.

Hoe vanuit gemeenschappelijke visie van de havengemeenschap thema's aanreiken en concreet invullen?

Proces-innovatie: overheid kan via steunprogramma's risico's voor sector mitigeren (pre-financieren, …)

VLAIO

Dank u voor uw aandacht

Keynote speakers

Dr. Jan Blomme

Een duurzaam maritiem ecosysteem en innovatie: de volgende stap(pen)?

Dr. Raimonds Aronietis

Re-evaluation of Maritime Supply Chains: Creating a Sustainable Maritime Ecosystem

Dr. Valentin Carlan

Digitalisation in maritime ecosystem: accelerate or not?

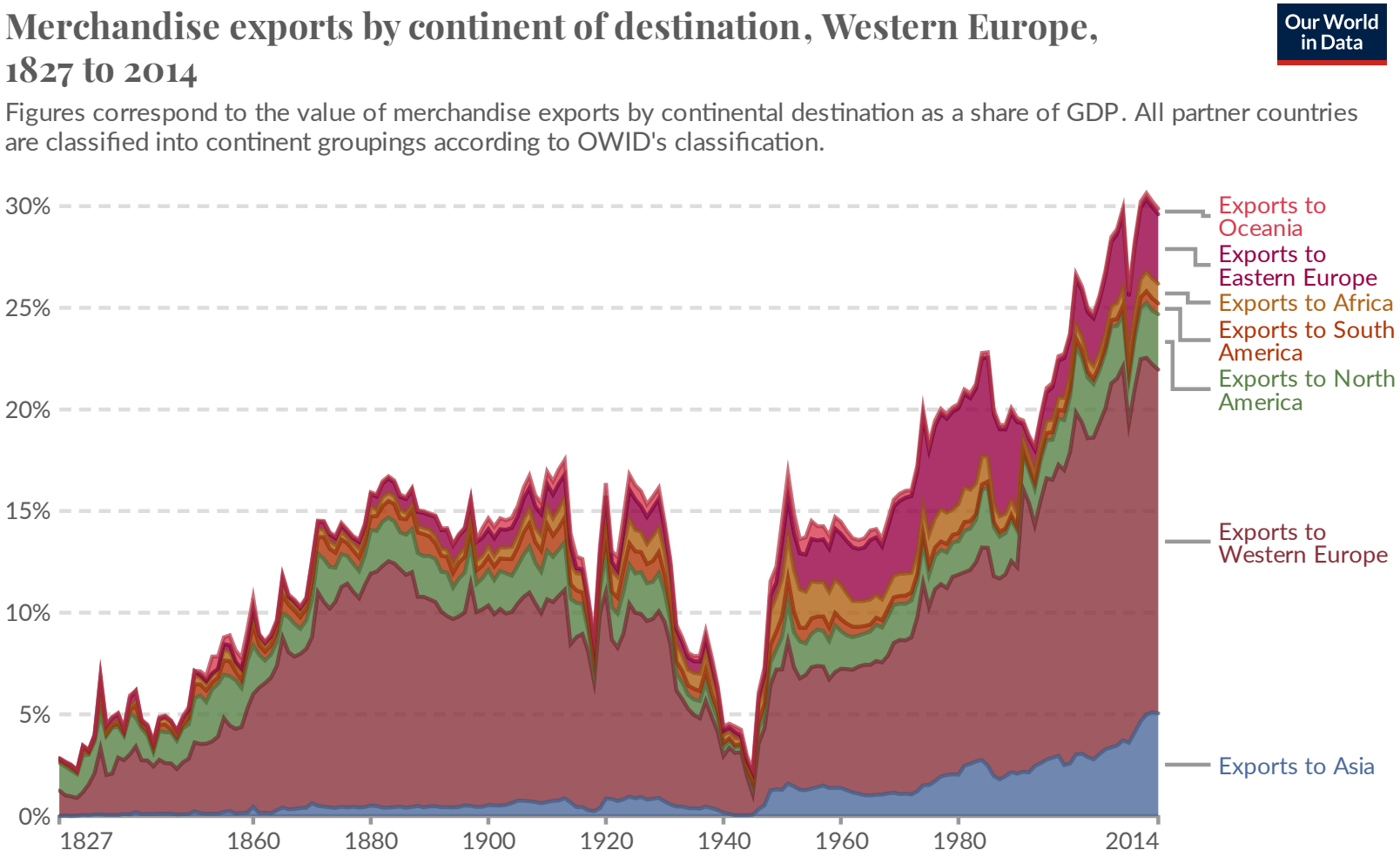
University of Antwerp
TPR | Department of Transport and Regional Economics

Re-evaluation of Maritime Supply Chains: Sustainability and Resilience of the Maritime Shipping Ecosystem

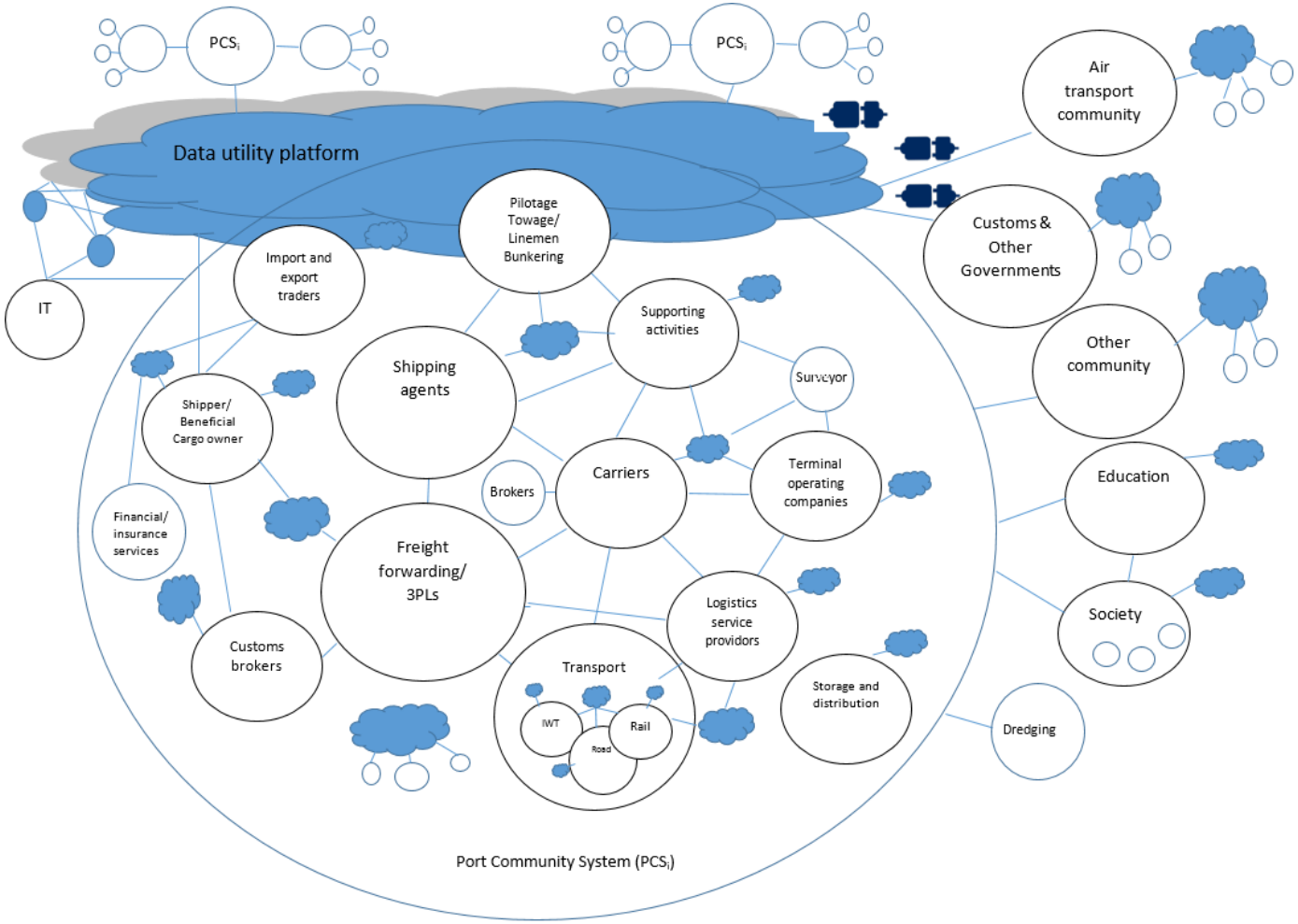
Dr. Raimonds Aronietis

14 June 2025

History: two waves of globalisation



Actors in the Maritime Shipping Ecosystem



Sys, Christa and Thierry Vanelslander. 2020. "Future Maritime Supply Networks: Key Issues in and Solutions." In *Maritime Supply Chains*, 261–82. Elsevier. doi:10.1016/B978-0-12-818421-9.00013-6.

Characteristics of actors

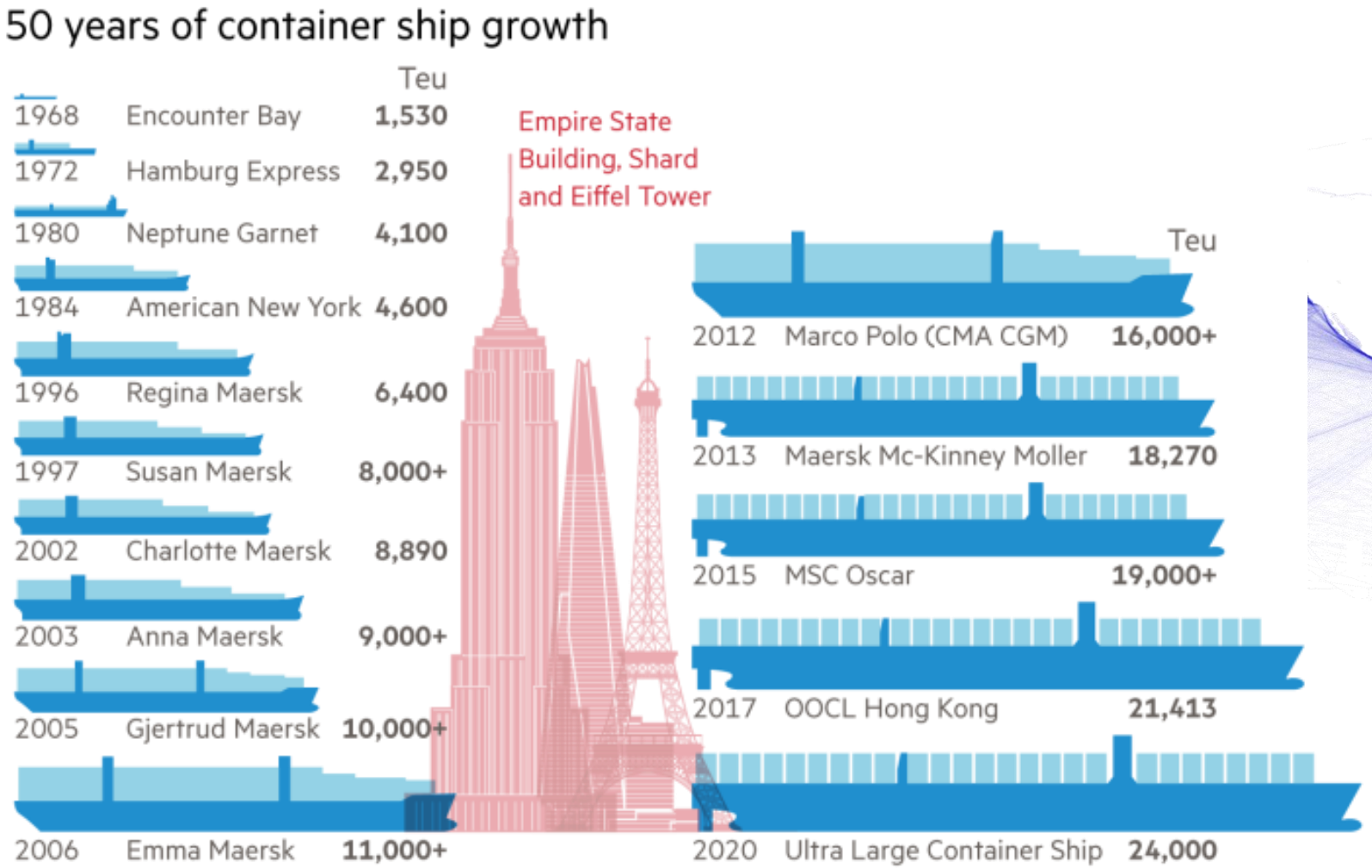
- **Actors are profit-driven entities**
  - Strategies are aimed at achieving profits

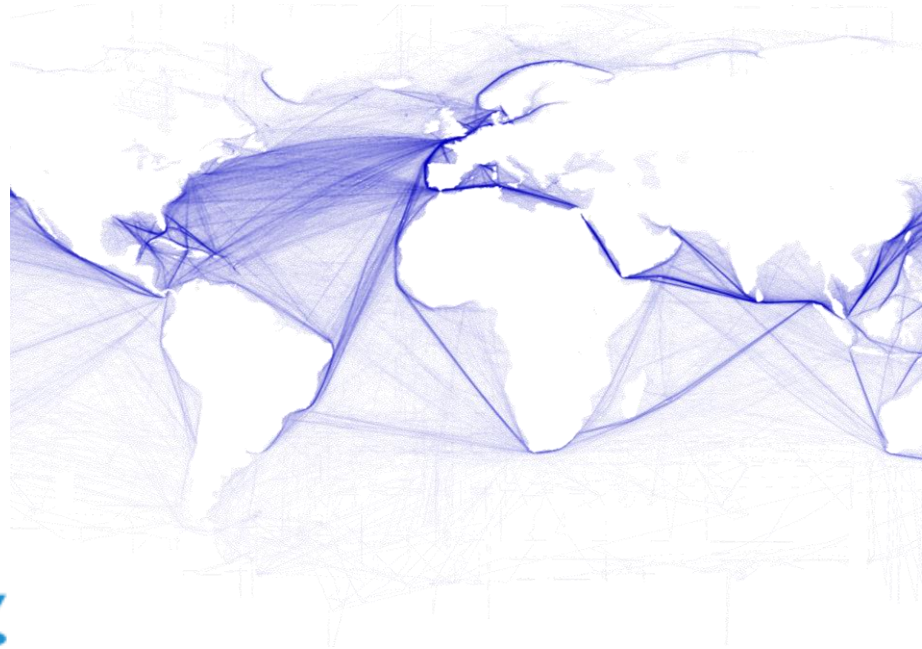
  - Operational decisions aimed at profit maximisation

- **Benefits capped → cost minimisation**
  - lowering the cost in transport per unit of transported cargo
  - lowering the number of goods in chain
  - lowering warehousing capacity
  - minimization of the volume of goods stored in own warehouse

- **Issue: this lowers the resilience**

Optimisation: size, network, speed,…





Sustainability: definitions, relations

- **In 1987, the United Nations Brundtland Commission defined sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”**

Resilience:

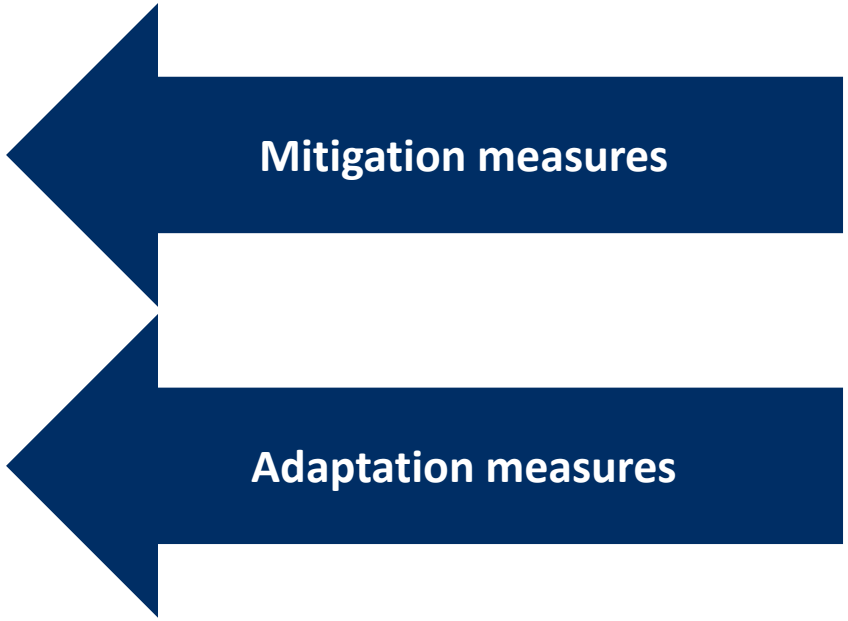
- **Cambridge Dictionary resilience is defined as the “the quality of being able to return quickly to a previous good condition after problems”.**
- **Linkov et al. (2014) based on National Academy of Sciences, resilience can be viewed in the broader context of a system’s ability to plan for, recover from and adapt to adverse events over time.**
- **Masten A. S. (2015) define resilience as the capacity of a dynamic system to adapt successfully to challenges that threaten the function, survival or future development of the system**

- Linkov, Igor; Todd Bridges; Felix Creutzig; Jennifer Decker; Cate Fox-Lent; Wolfgang Kröger; James H. Lambert; Anders Levermann; Benoit Montreuil; Jatin Nathwani; Raymond Nyer; Ortwin Renn; Benjamin Scharte; Alexander Scheffler; Miranda Schreurs and Thomas Thiel-Clemen. 2014. “Changing the Resilience Paradigm.” *Nature Climate Change* 4 (6): 407–9. doi:10.1038/nclimate2227.
- Masten, Ann S. 2015. *Ordinary Magic: Resilience in Development*. Paperback Edition. New York, N.Y.: Guilford Press.

Resilience:

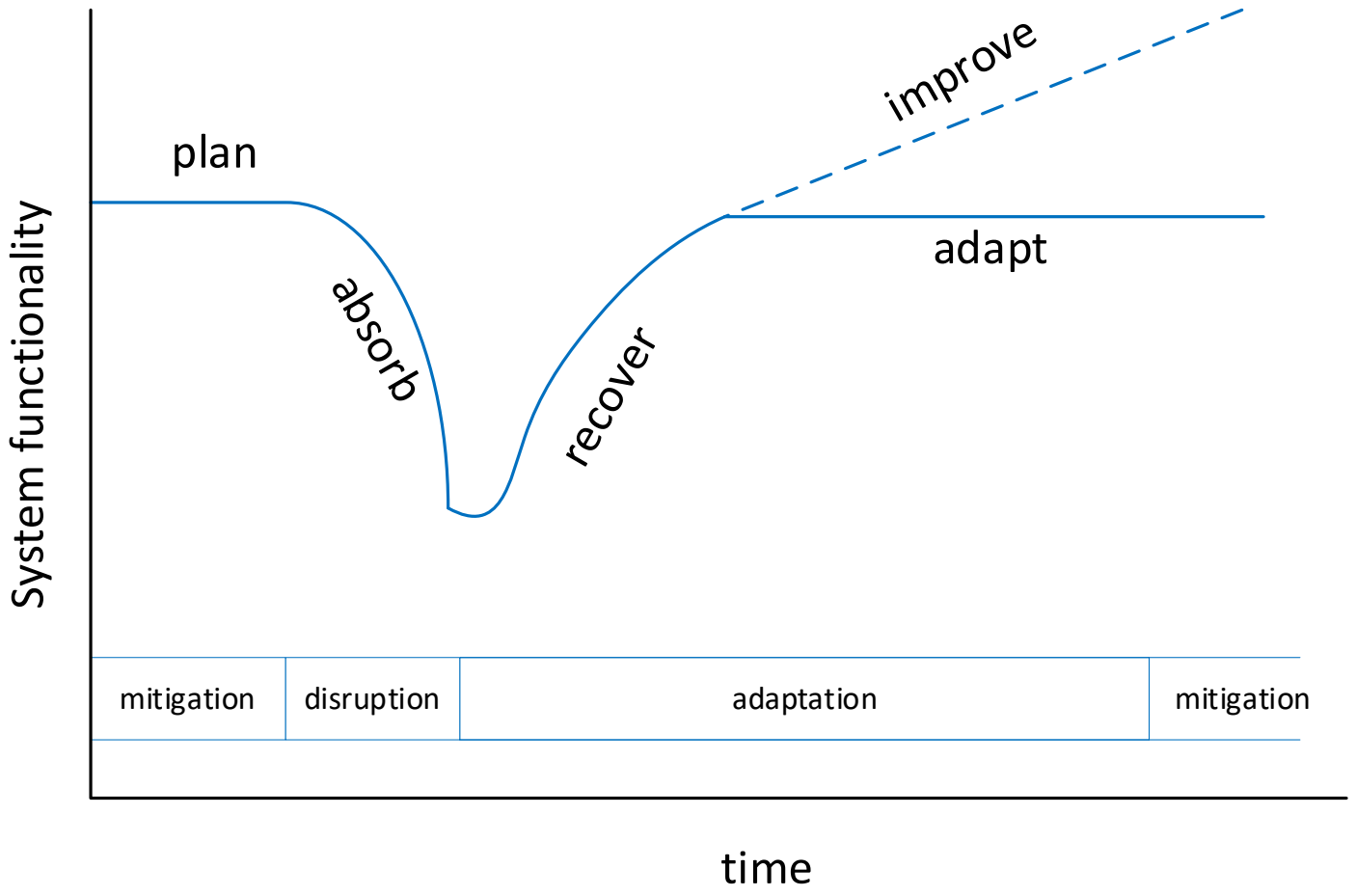
- **International Transport Forum / OECD define characteristics of resilience:**
  - **robustness**, which is a characteristic of the system to retain its operational performance by absorbing the impacts of a disruption
  - **speed of recovery**, which is the time needed for a transport system to return to prior level of operations

Measures:



International Transport Forum. 2024. *Transport System Resilience: Summary and Conclusions*. Text 194. ITF Roundtable Reports. Paris, France: OECD Publishing. https://www.itf-oecd.org/transport-system-resilience.

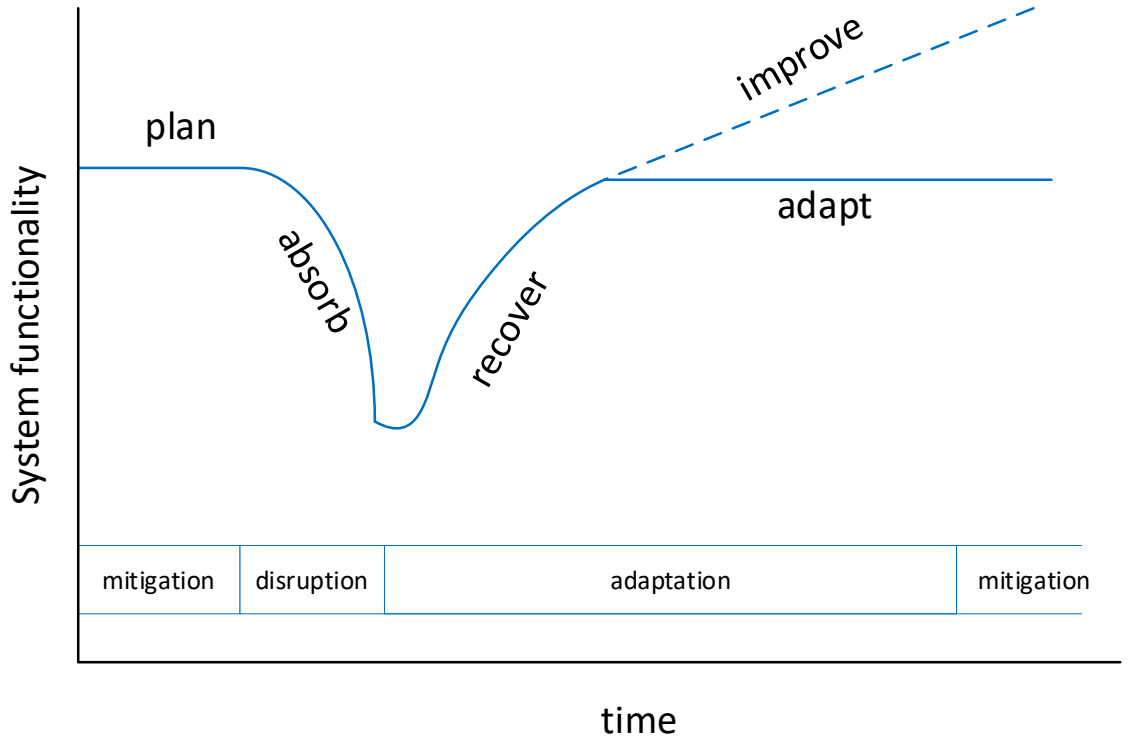
Resilience of a system



Source: adapted with changes from Linkov et al. (2014)

Sustainability and resilience: the link

- **Resilience is needed to ensure sustainability of maritime supply chain**
- **It ensures:**
  - robustness – absorption of the impacts
  - recovery



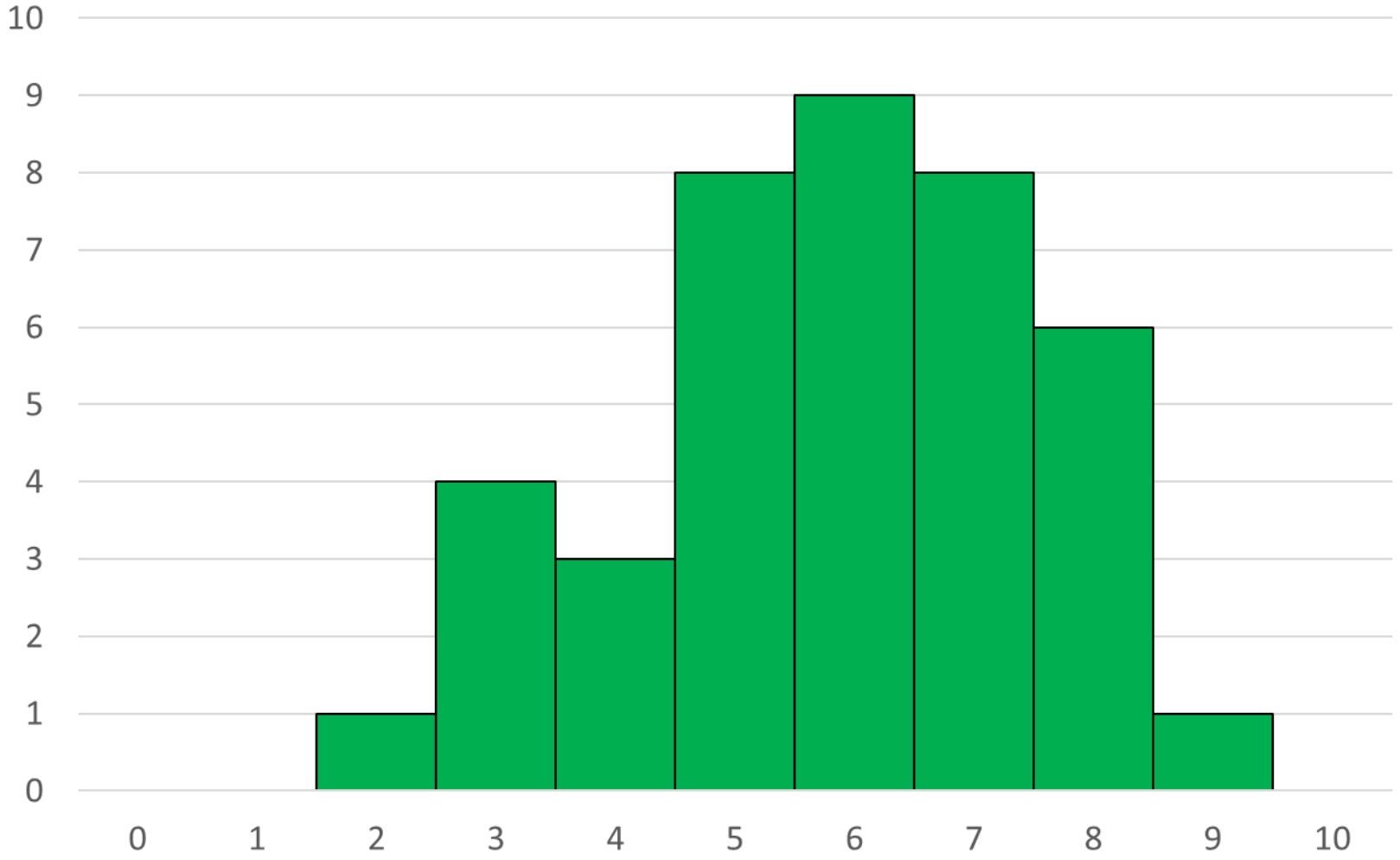
Questions to ask…

- **How to create a resilient maritime supply chain and what is required for doing that? Is this goal economically feasible and should this be pursued?**
- **The supporting research sub-questions are the following:**
  - Q1: What is the current status of the maritime supply chain resilience and is it satisfactory?
  - Q2: Is there a need for a more resilient maritime supply chain? Is this need justified differently from the perspective of different stakeholders and how?
  - Q3: Can it be that creation of a resilient maritime supply chain is sub-optimal? And for which stakeholders may this be true? How to avoid this?

How would you assess the resilience level of maritime shipping?

5,83/10

How would you assess the resilience level of maritime shipping?



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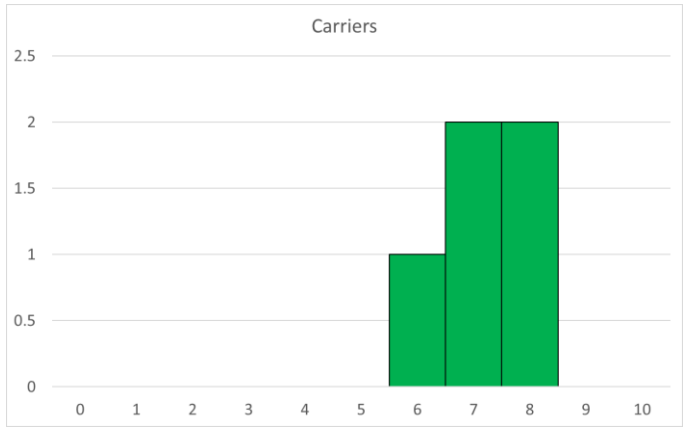
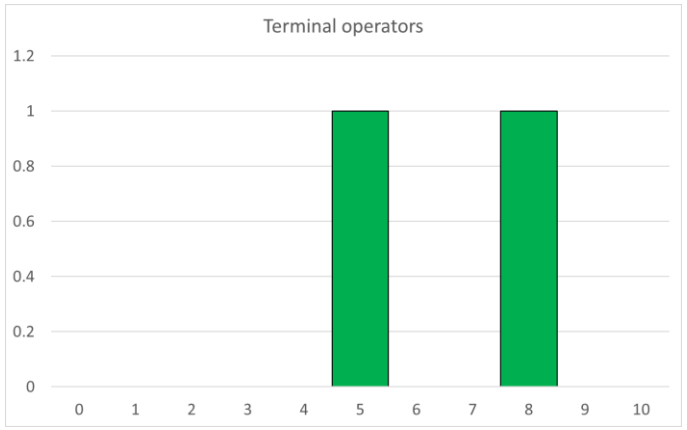
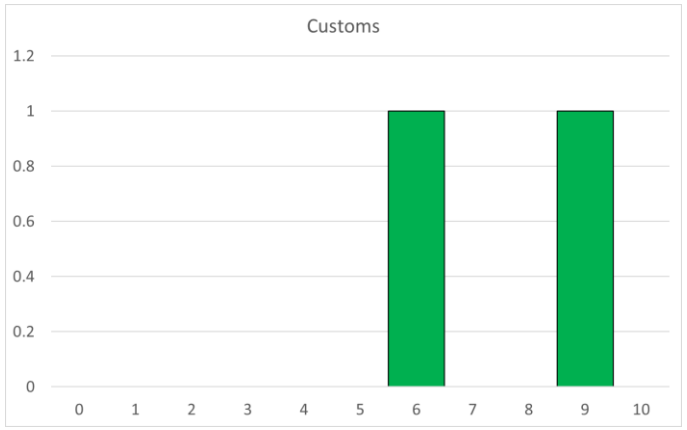
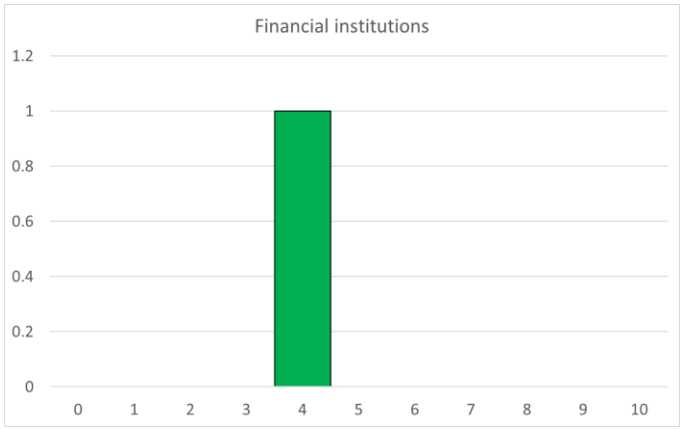
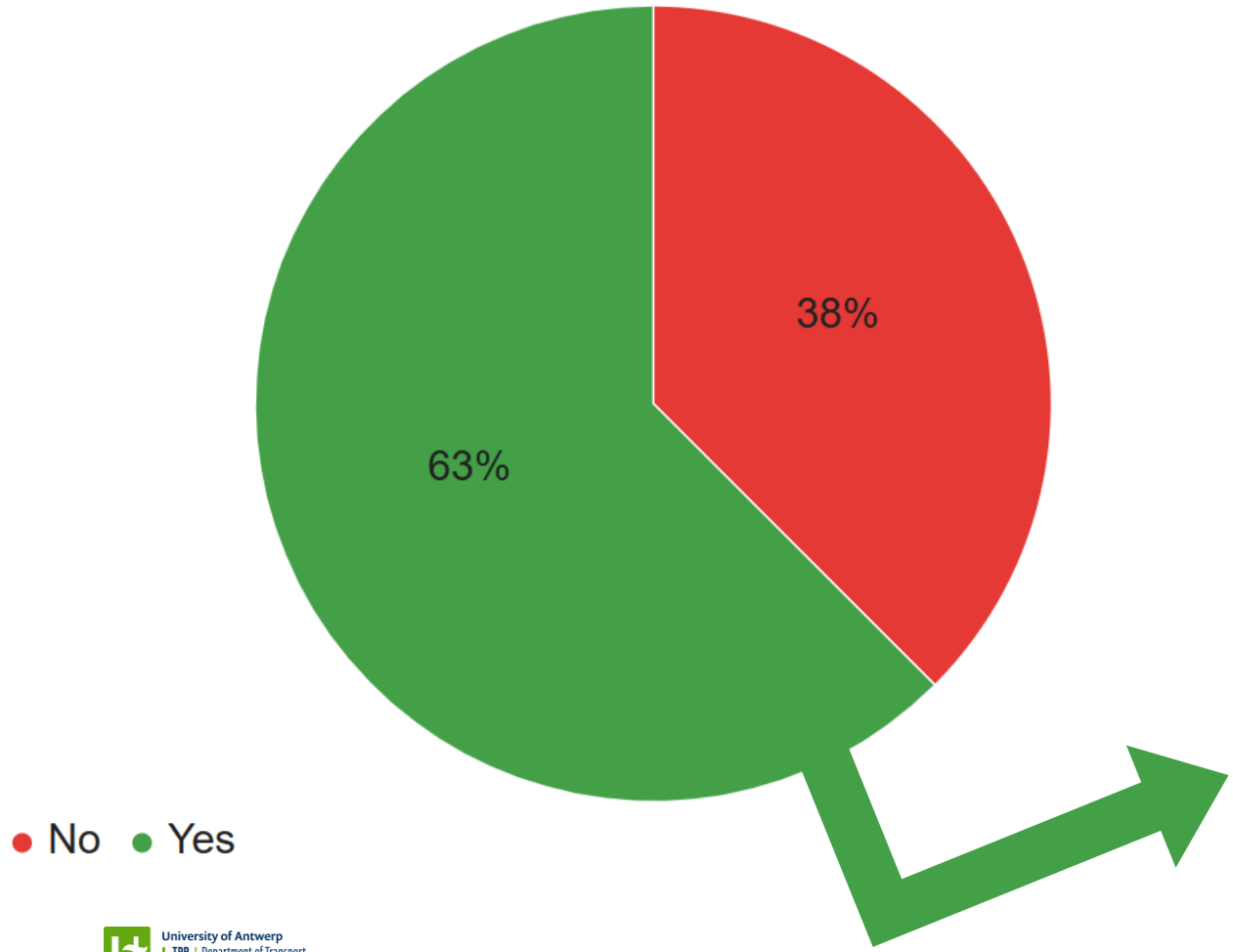


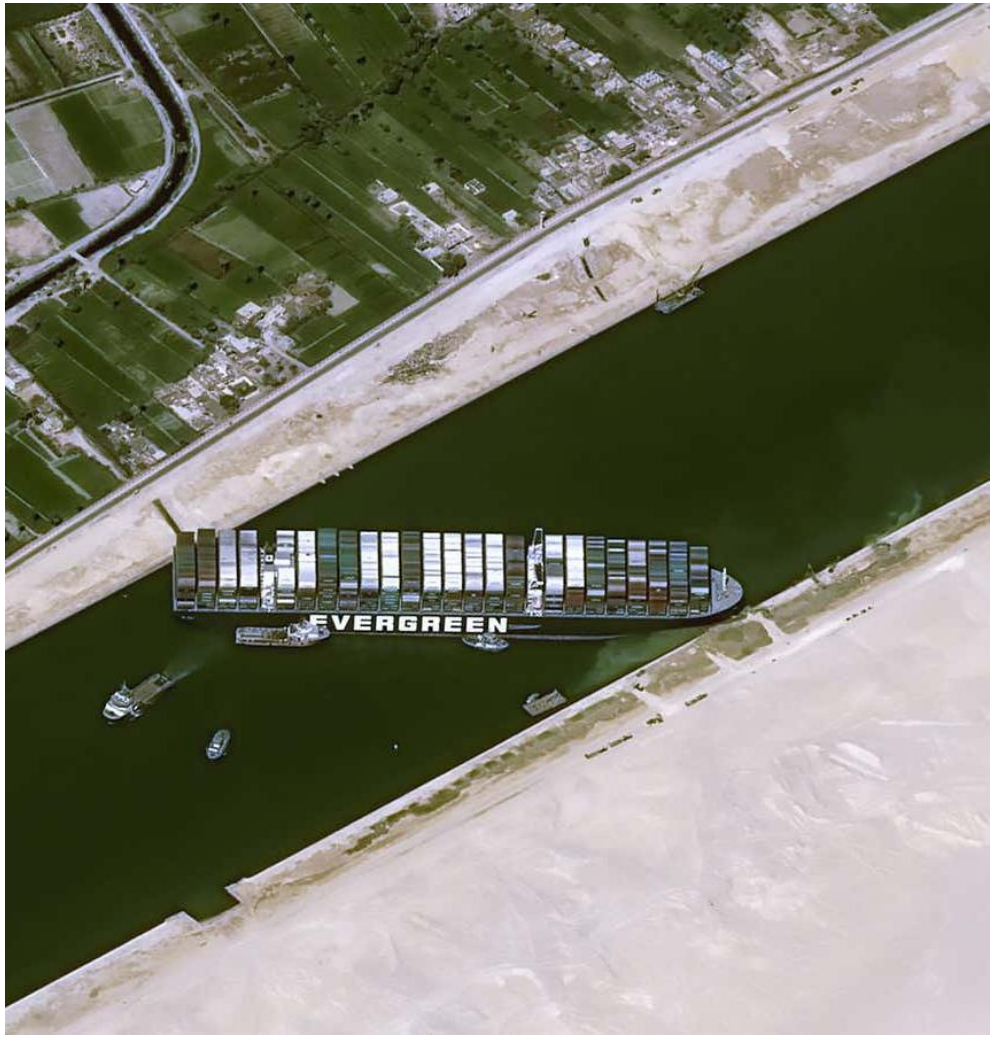




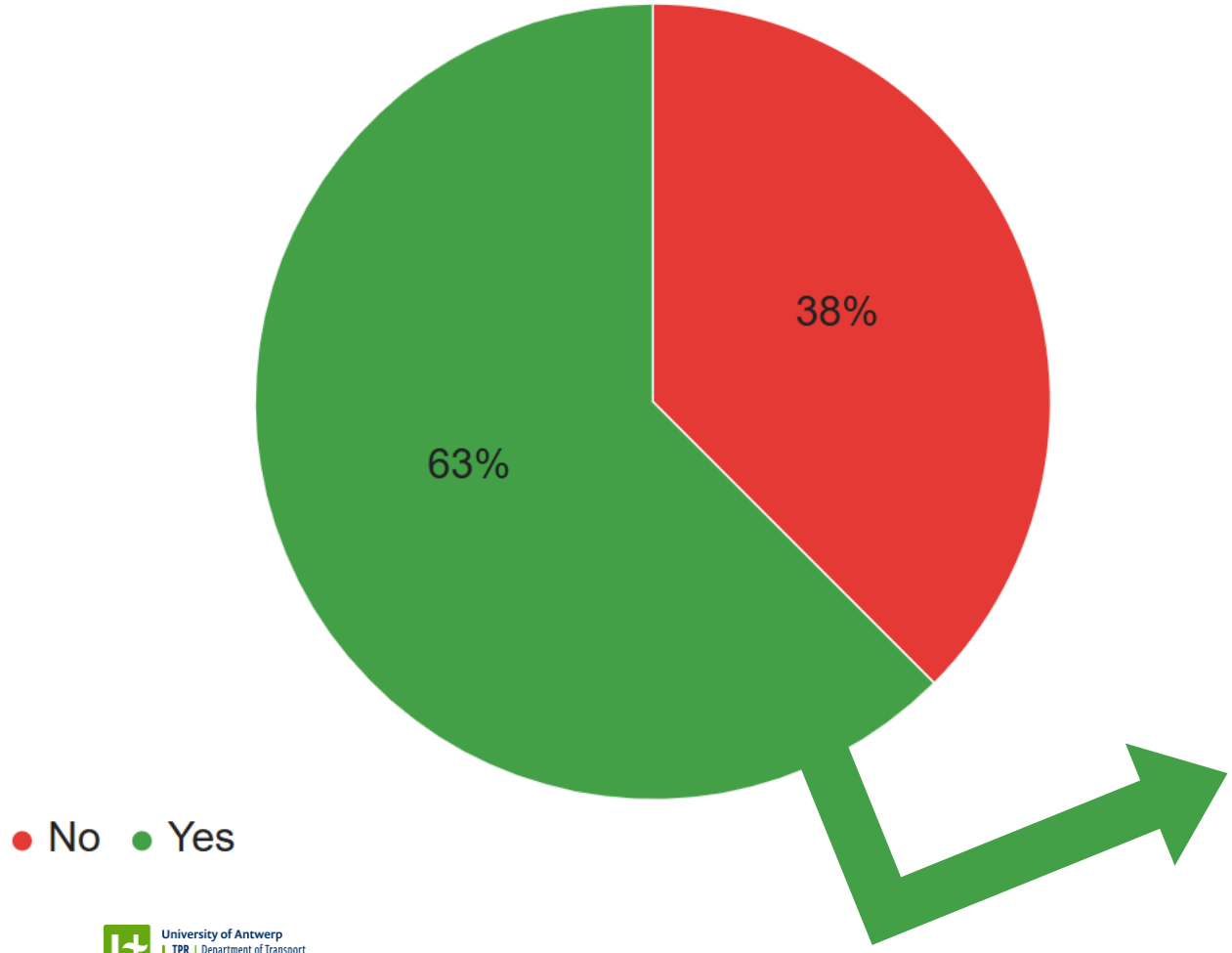


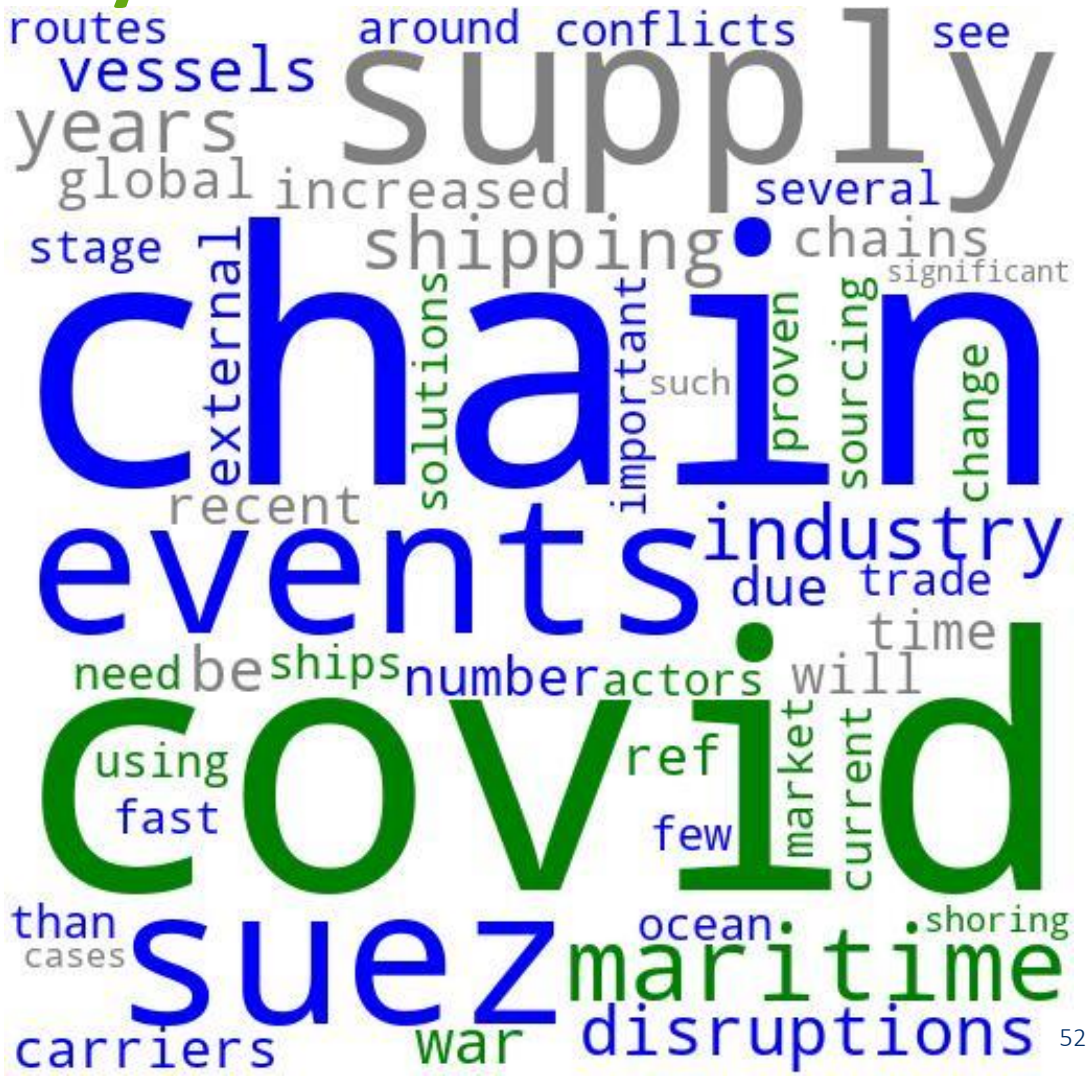
Do you think your views on resilience of maritime supply chains have changed in the recent years?





Do you think your views on resilience of maritime supply chains have changed in the recent years?





What do you see as the main barriers/issues to solve for increasing the resilience of maritime shipping?

Shortcomings in the areas of:

- **Redundancy**
- **Data, digitalisation, cybersecurity**
- **Trust**
- **Visibility, transparency**
- **Collaboration, responsiveness**
- **Oligopoly (carriers)**
- **Legislation**
- **Security, piracy**
- **Environmental pressures**
- **Hinterland transportation**

Action on what issue can be considered a “low-hanging fruit” and would improve resilience?

- Efficiency measures on ships (route optimisation, maintenance, energy saving technologies)
- Extension of ship lifetime
- Increase stock levels of fast mover products
- Level playing field worldwide
- Digitalisation & data exchange (real-time visibility), data processing with AI (or smarter)
- Extra capacity (e.g. 24 hour operations, warehouse capacity, etc.)
- Reduction of administrative burden
- Protection against piracy & military threats
- Subsidies for shipping & taxes for road freight

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Thank you!

Dr. Raimonds Aronietis

Senior Researcher, Transport Economist

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https://uantwerpen.be/tpr

Keynote speakers

Dr. Jan Blomme

Een duurzaam maritiem ecosysteem en innovatie: de volgende stap(pen)?

Dr. Raimonds Aronietis

Re-evaluation of Maritime Supply Chains: Creating a Sustainable Maritime Ecosystem

Dr. Valentin Carlan

Digitalisation in maritime ecosystem: accelerate or not?

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en Economie

Digitalisation in maritime ecosystem: accelerate or not?

Stephen Rakoma

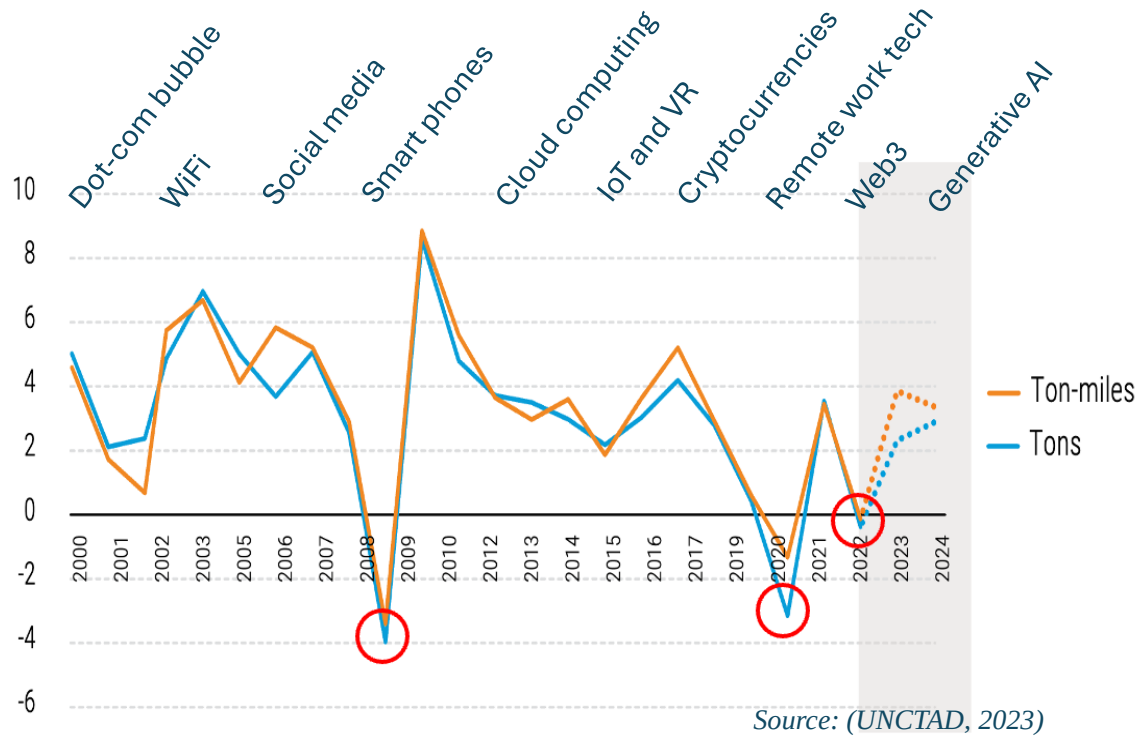
Dr. Valentin Carlan

Prof. Dr. Christa Sys

Digitalization's growing importance in the maritime sector

Maritime industry is susceptible to anomalies that directly affect global and regional economic activities

- ❖ 2008 Financial crisis
- ❖ COVID-19
- ❖ Suez Canal blockage,
- ❖ Russia's invasion of Ukraine
- ✓ Red sea crisis
- ✓ Piracy



Source: (UNCTAD, 2023)

❑Research question

❖When is the best moment for accelerated adoption of digital technologies?

Barriers to digitalization in the maritime sector

	2018-19 (Carlan et al., 2020)	2024 (Rakoma et al., ...)
Economic	Market competition and uncertainty Lack of investing stakeholder involvement Cost, financial constraints	No competition for the carriers to invest Too high investments Cost and margins
Technological	Incompatibility of operating and strategic goals Lack of tools for new technology implementation in sustainable supply chains Security challenge	Hard to keep up with technology
Legal	Multiple jurisdictions involved: no consistent legal/regulatory framework Challenge of information disclosure policy between partners in the supply chain Lack of governmental policies Lack of rewards and encouragement programs	Unclear legislation
Culture	Trust (among partners and in new technology) Resistance to change Lack of customer awareness and tendency about new technologies Hesitation to convert to new systems Lack of management commitment and support	Limitations on data sharing due to trust Attitudes Short-term thinking and planning Lack of transparancy across the entire chain Lack of integration or close collaboration

Research questions

What are the current **digitalization initiatives** and how do they impact the maritime sector post-COVID-19?

What is the status **in adoption of digital technologies** and how that affects the adoption acceleration?

What is the **state of investment towards digitalization** in the maritime sector?

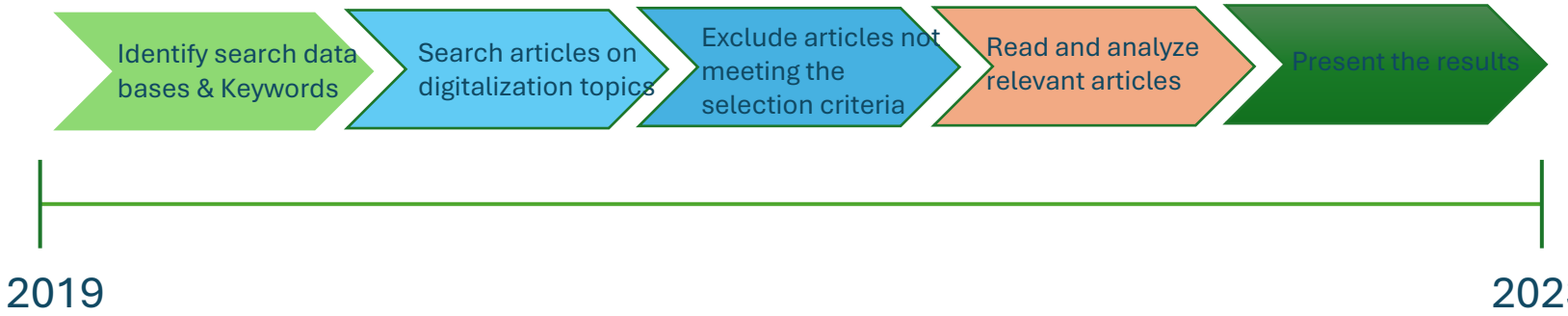
Do stakeholders trust modern technologies and **how can the Zero Trust approach enhance digital safety** in the maritime ecosystem?

Approach


should maritime industry
erate digitalization
About 21.900 results (0,24 sec)

Approach

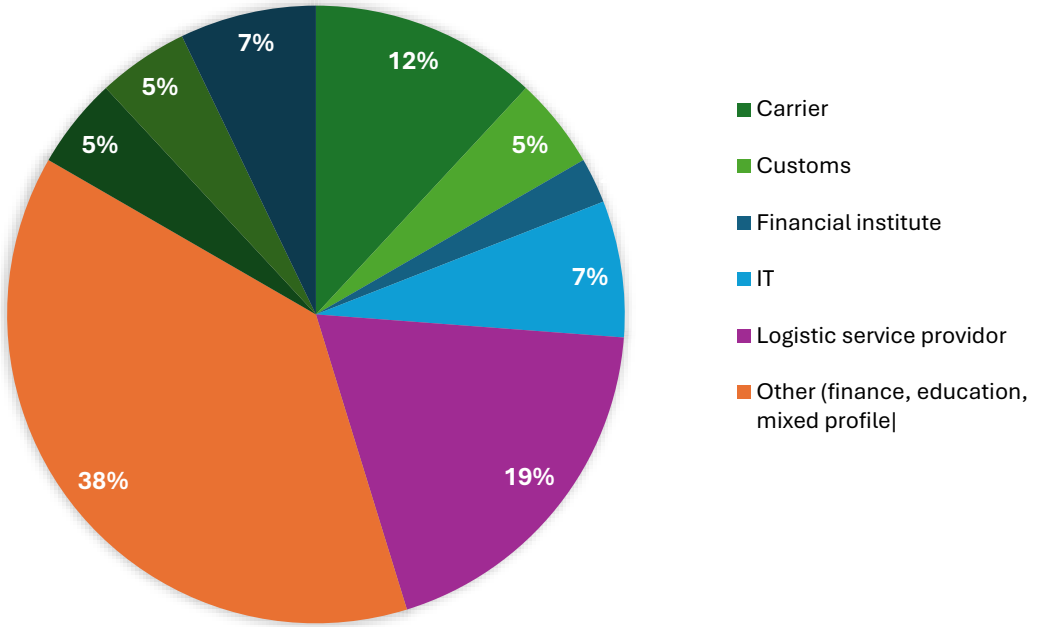
❑Literature review



❑Industry survey

❑ Number of respondents: 42

STAKEHOLDER PARTICIPATION



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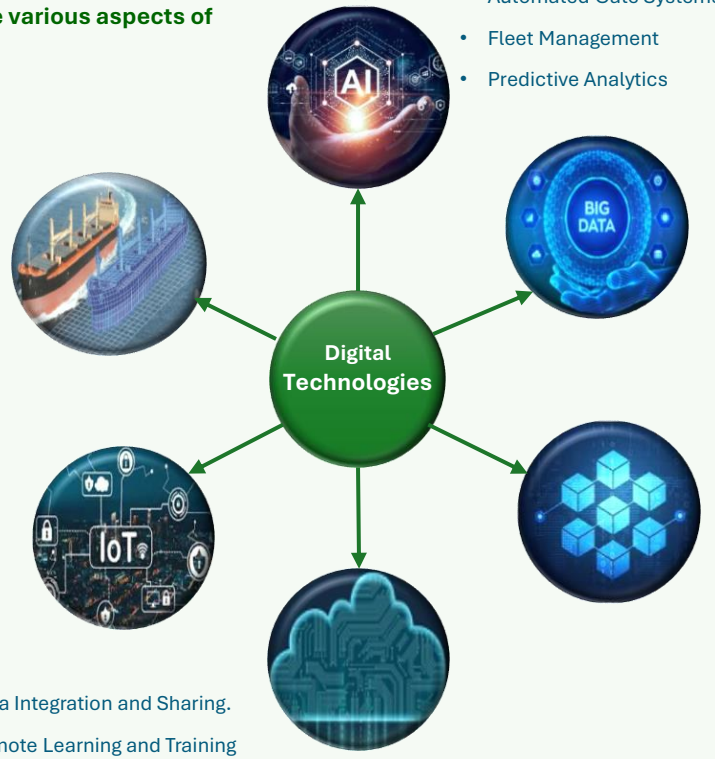
Digitalization initiatives

Key digital technologies and their opportunities

Digitalization in the maritime industry, involves integrating various digital technologies to enhance various aspects of the ecosystem.



Artificial intelligence

- Port Call Optimization
- Automated Gate Systems
- Fleet Management
- Predictive Analytics

Big Data

- Data-Driven Decision-Making
- Performance Monitoring
- Optimize operations & Efficiency.
- Enabling proactivity

Blockchain

- Data Security & Transparency
- Smart Contracts
- Immutable Data Sharing
- Integrity and Integrity

Cloud computing

- Data Integration and Sharing.
- Remote Learning and Training
- Real time data access & management
- Digital Logistics Platforms

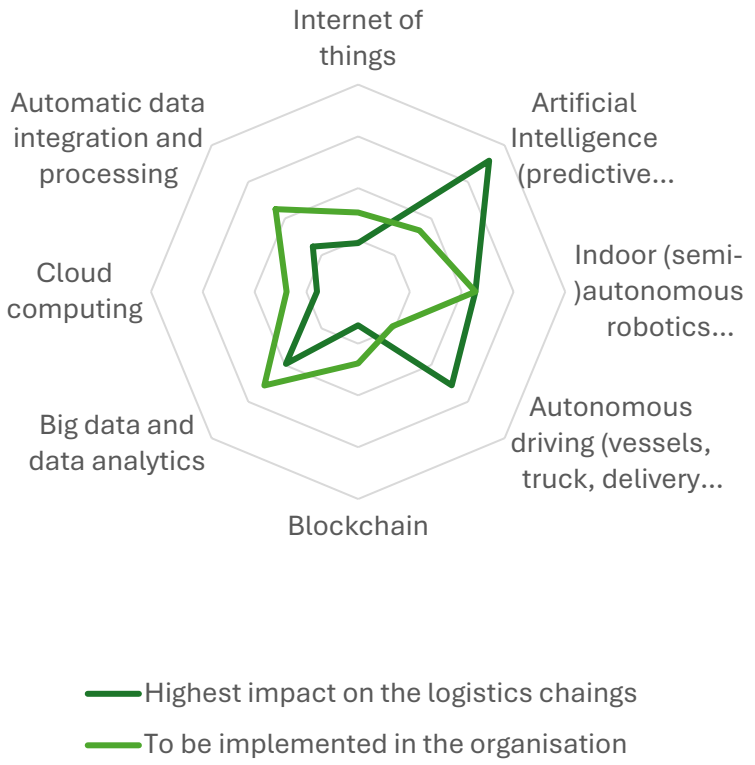
Internet of Things

- Real-Time Data Collection
- Temperature Monitoring
- Resource Planning
- Remote Control Systems

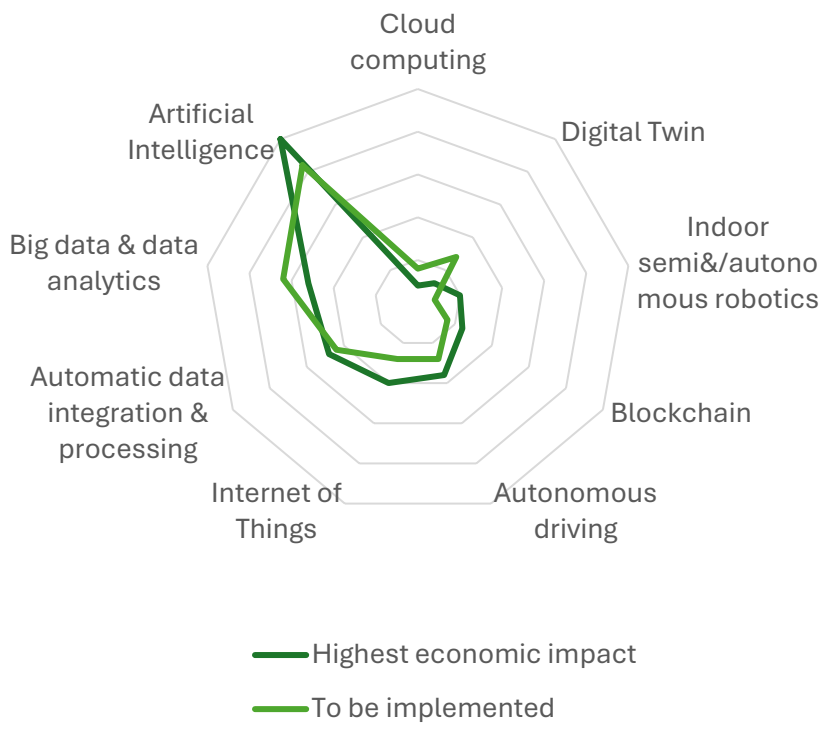
Digital Twin

- Real time visibility
- Real time simulation
- Product design
- Real-time data exchange

What do companies do about technologies?



2020



2024

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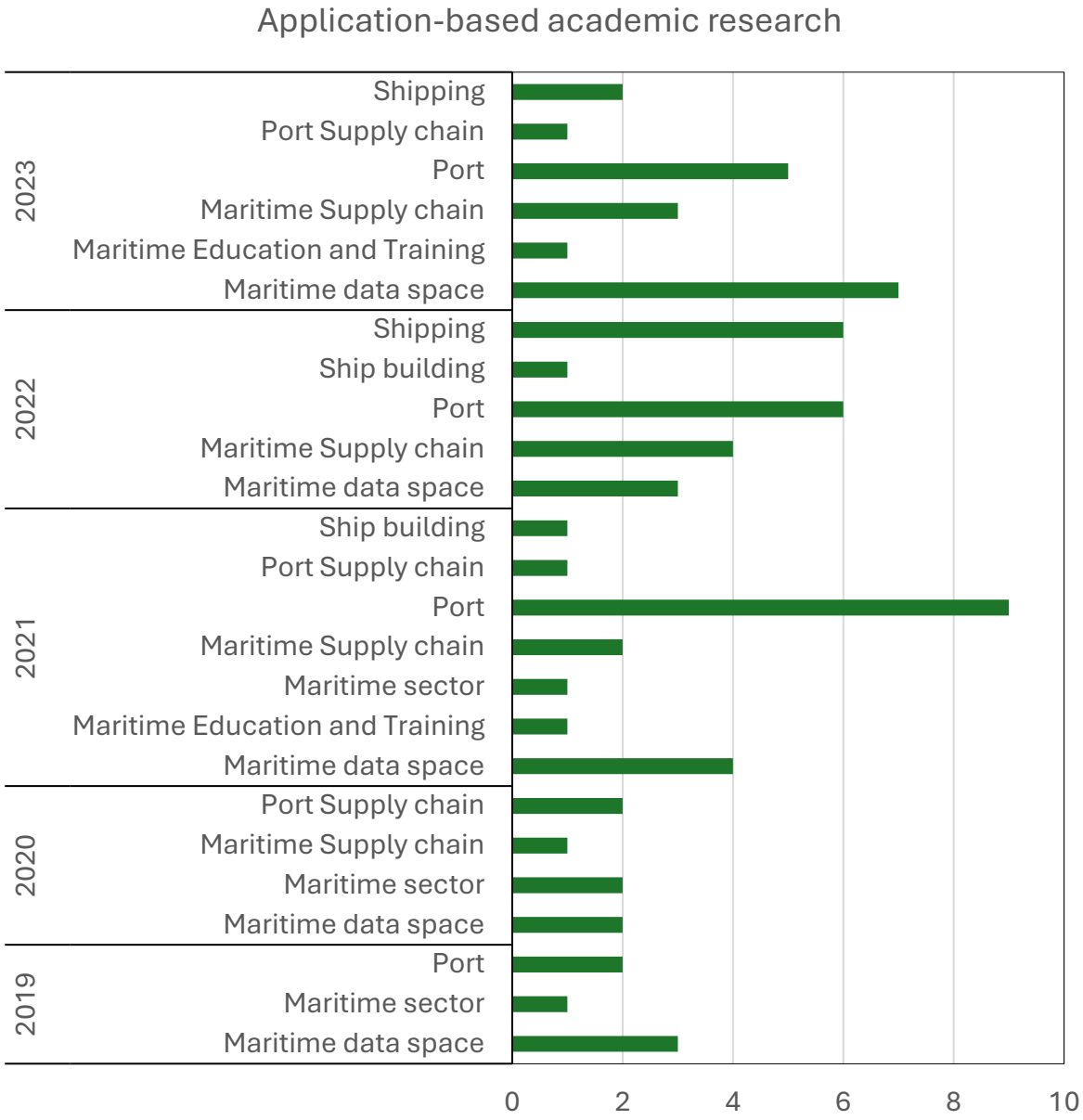
Adoption status of technologies

Who invested in digitalization?

❑Literature review

- ❑ A significant shift in digitalization pre and post-COVID-19
- ❑ Fragmented information flows, high logistics costs and cybersecurity threats remain a barrier
- ❑ Investment strategies and priorities are leaning towards ports, maritime education and training, and offshore services.



Challenges and Barriers to Maritime Digitalization

The maritime industry faces several challenges in digitalization

External

- Economic factors & market volatility
- Geopolitical challenges

Technological

- Legacy systems
- Cybersecurity threats
- Interoperability
- issues Data quality

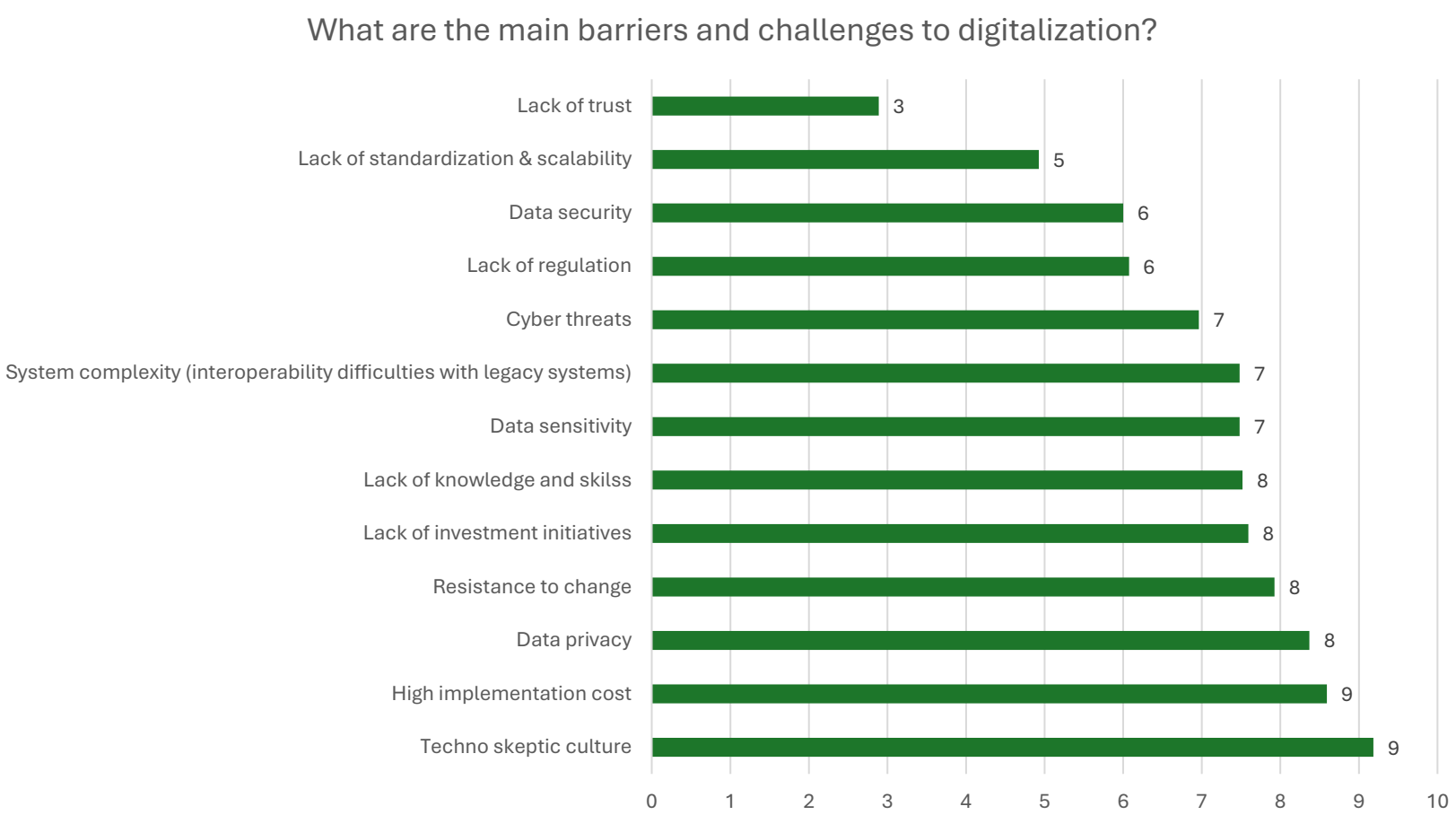
Regulatory

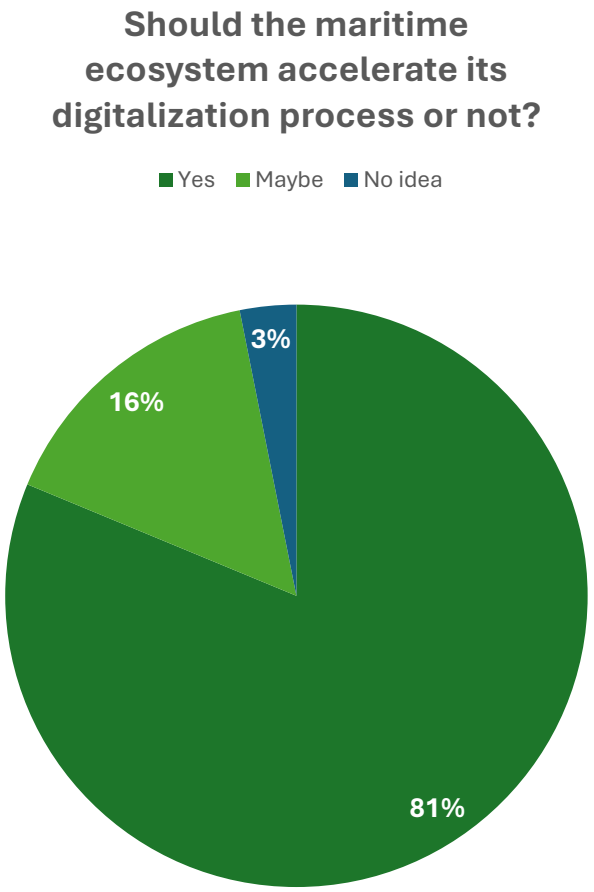
- Compliance complexities legal uncertainties.

Organizational

- Resistance to change
- Management & skills gaps.

Survey Approach & Results





- Strong consensus on the need to accelerate digitalisation.
- Moderate resilience levels indicate awareness but also significant challenges.

Why or why no?

- **Why accelerate?**
  - Increased Vulnerability Awareness
  - Frequent and Complex Crises
  - Advancements in Technology

- **Why not?**
  - Power Imbalance Concerns - significant power held by ocean carriers can lead to self-oriented solutions.

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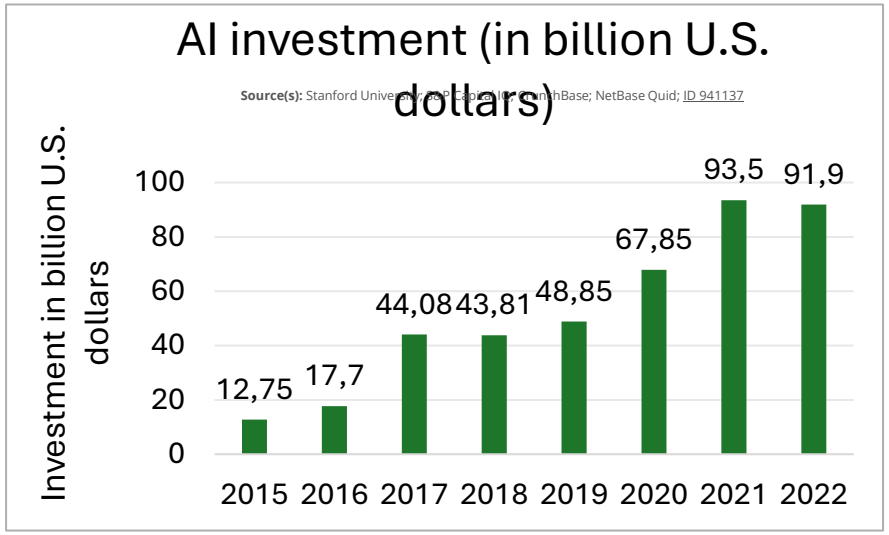
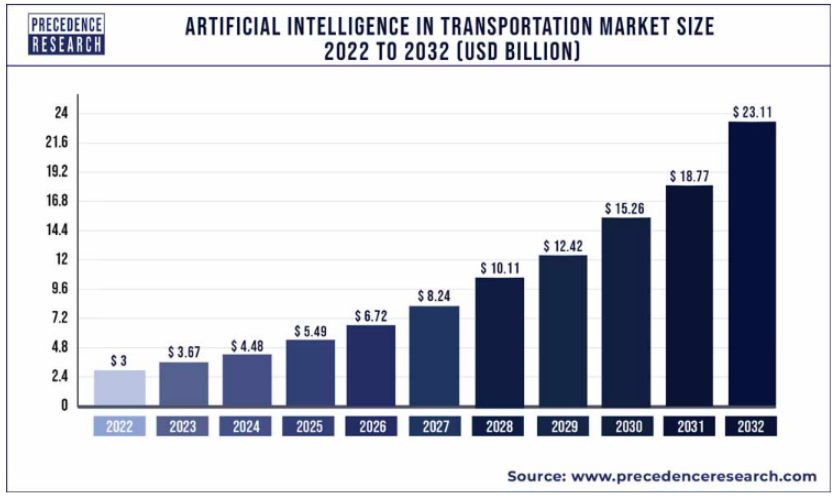
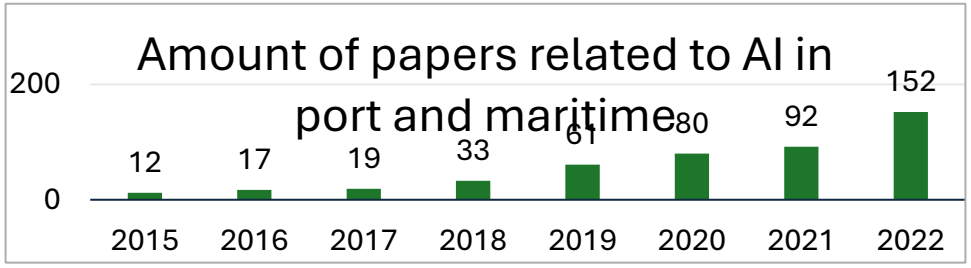
Investment in digitalization

An AI point of view

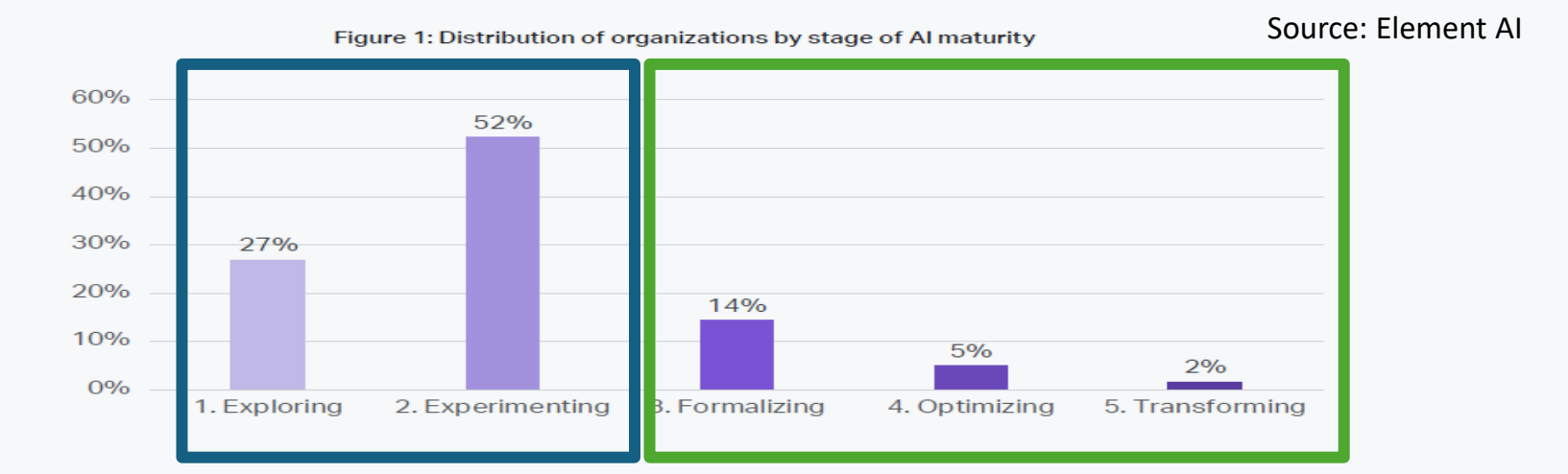
AI investments







Gap

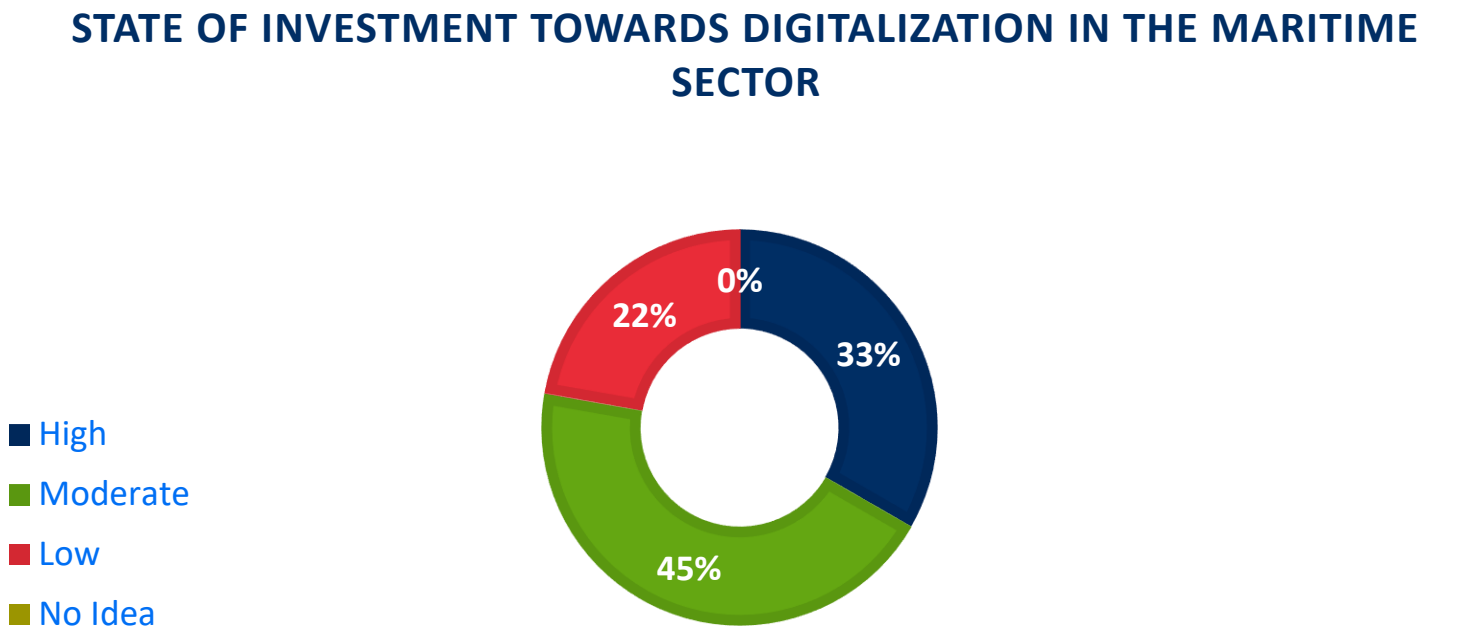


Source: Element AI

- Only 31 % of 2000 IT decision makers said they now have AI in production (IDC, 2021)
- Only one third of the above 31% claim that the entire organization benefits from AI (IDC, 2021)

Survey Approach & Results

- ❑Strong consensus on the need to accelerate digitalisation.
- ❑Moderate resilience levels indicate awareness but also significant challenges.



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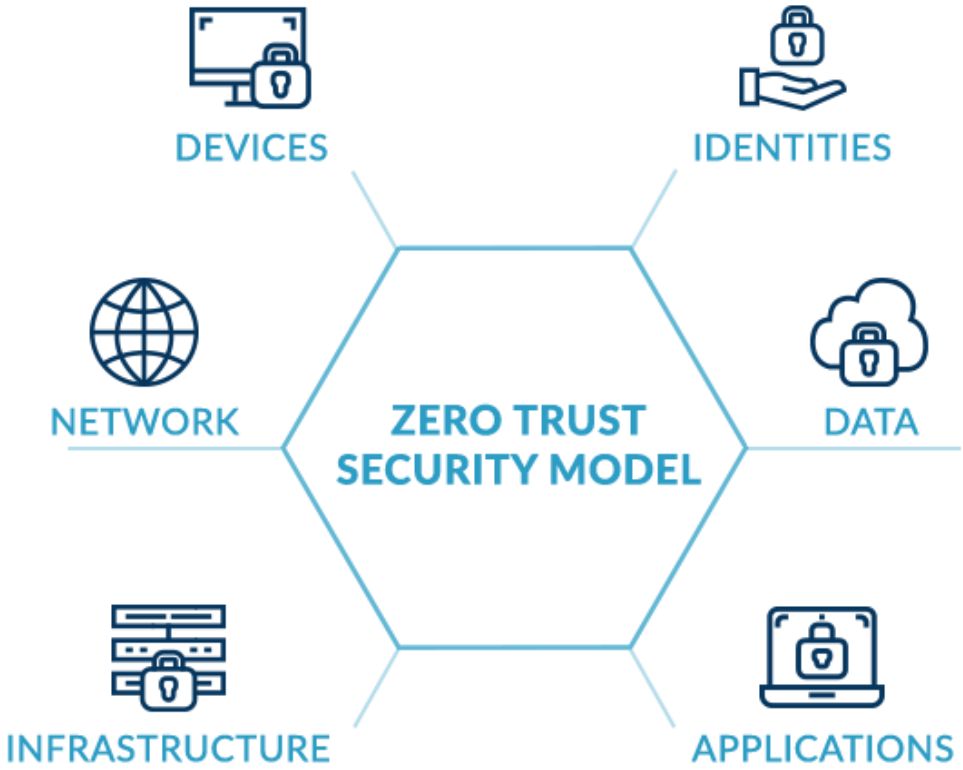
Trust issues and tools to overcome them

Cybersecurity and Zero Trust Architecture

Existing cybersecurity measures in the maritime industry are traditional perimeter-based models.

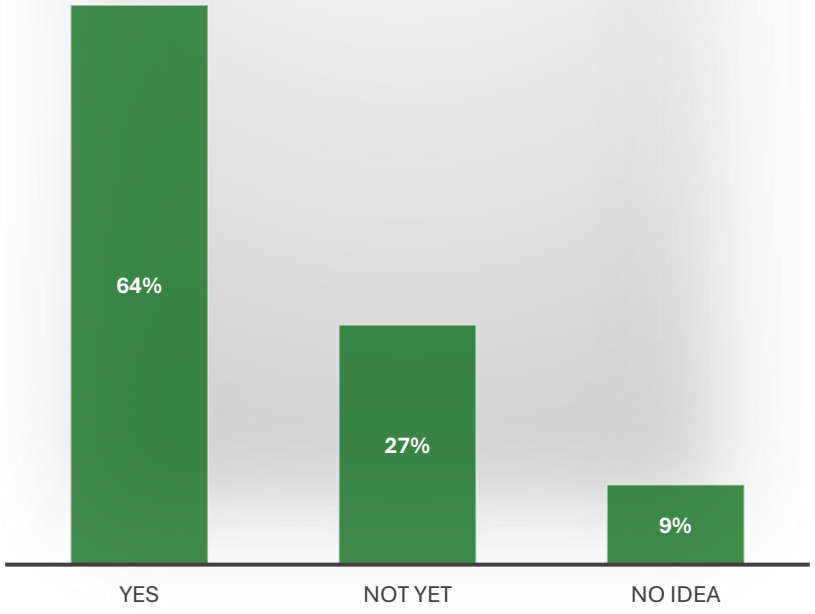
Cybersecurity and Zero Trust Architecture

- Zero Trust Architecture (ZTA) is crucial for ensuring digital safety.
- ZTA involves rigorous verification of all access requests.
- It enhances data security and fosters trust among stakeholders.

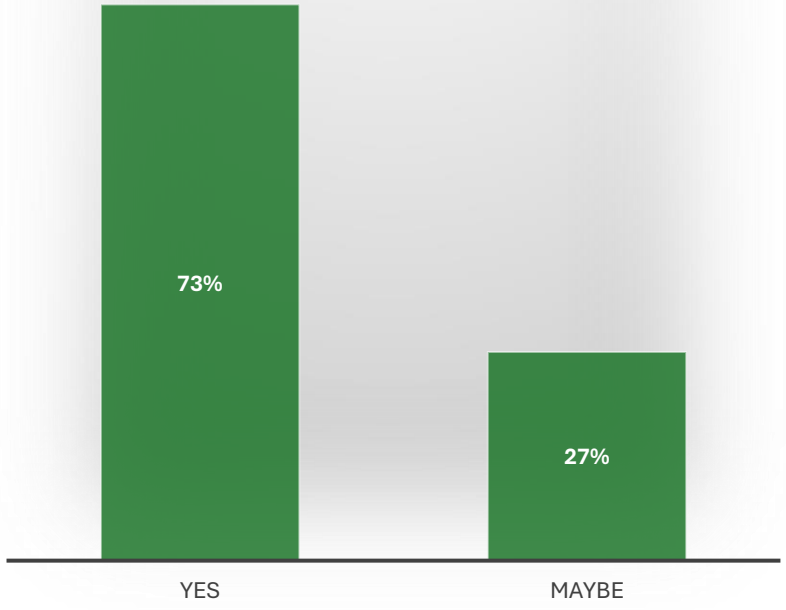


Survey Approach & Results

Has your organization implemented Zero trust principles?



Should organizations adopt zero-trust principles to enhance cybersecurity?



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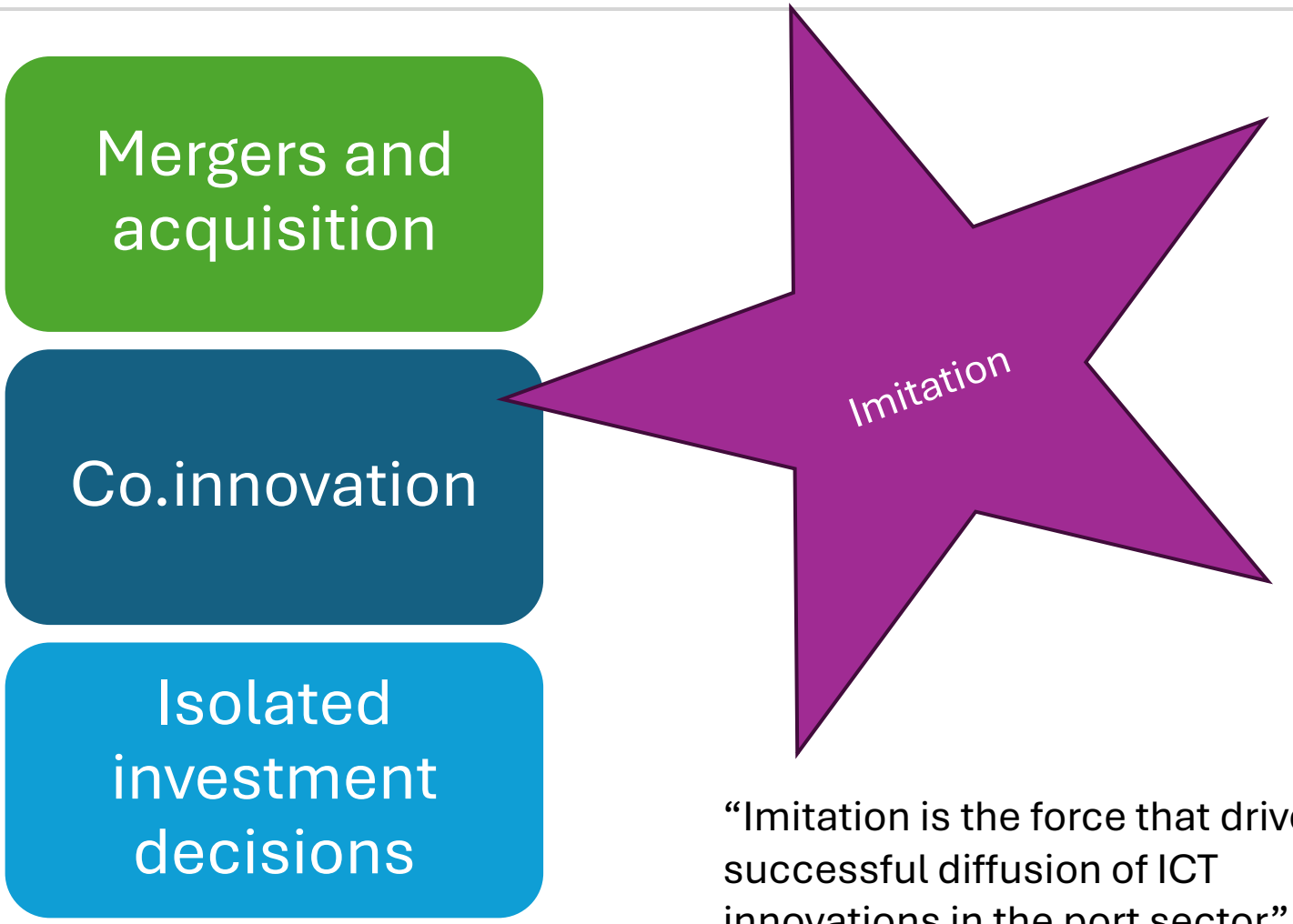
General take aways

Maritime Digitalization

Aspects of Digitalization	Pre-COVID-19	Post-COVID-19
Adoption Rate	Moderate to Low	Accelerated
Technologies Adopted	Mainly focused on automation and basic digital tools like GPS, AIS, and ECDIS. Limited integration of IoT, AI, and blockchain.	Widespread adoption of advanced technologies including Digital Twin, IoT, AI, ML, Blockchain, cloud computing, Drones, cameras, and simulations
Applications	Limited utilization, mostly for monitoring and basic control functions.	Expanded applications in predictive analytics, energy efficiency, operation and resource optimization, knowledge and information sharing, safety and security, training and communication.
Impact on Efficiency and Safety	Enhancing fuel efficiency, process optimization, improved decision-making	Increased focus on safety measures, further optimization, real-time decision-making enhancement, predictive maintenance, and early diagnostics.
Maritime Education and Training	Initial integration of digital resources for education	Enhanced integration, more comprehensive digital tools for education and training such as the use of simulators and AR/VR
Innovation	Incremental innovation in digital adoption	Rapid innovation and exploration of new digital solutions
Collaboration and Partnerships	Limited collaboration between academia and industry	Increased collaboration to foster digital innovation
Regulatory Landscape	Slow adaptation of regulations to accommodate digital innovations.	Regulatory bodies actively working to establish guidelines and standards for the safe and effective implementation of digital technologies in maritime operations.
Cybersecurity	Recognized as a concern but not a top priority.	Given heightened importance due to increased digitalization and connectivity, leading to increased investment in cybersecurity measures.

Investment strategies towards digitalization



"Imitation is the force that drives the successful diffusion of ICT innovations in the port sector"

Roumboutsos et al. (2022)

Discrepancies (attention points)

Discrepancies

Literature results	Survey results
Cautious optimism towards new technologies, with concerns about data security and reliability.	Higher levels of distrust among stakeholders than expected from the literature.
Promotes the Zero Trust approach as a robust solution for enhancing digital safety.	Some stakeholders are aware of Zero Trust, many are either unfamiliar or sceptical about its implementation.
Optimistically projects rapid adoption of digital technologies in the maritime sector.	Indicate slower-than-expected adoption rates, largely due to barriers identified.

Different perception of speed

Summary & contributions

- The maritime ecosystem stands to benefit significantly from the adoption of digital technologies
- The adoption of digital technologies must accelerate
- There is a need for stakeholders to collaborate for seamless integration and interoperability
- ‘One size fits all’ intervention for such a complex network will not work for every stakeholder.
- The adoption of ZTA in the maritime sector will enhance security and boost digitalization process.
- A combination of methods like interviews and focus groups will provide better insights than those applied in the current study
- Isolated investment strategies may not yield the expected returns. Co.innovation is recommended

Thank you

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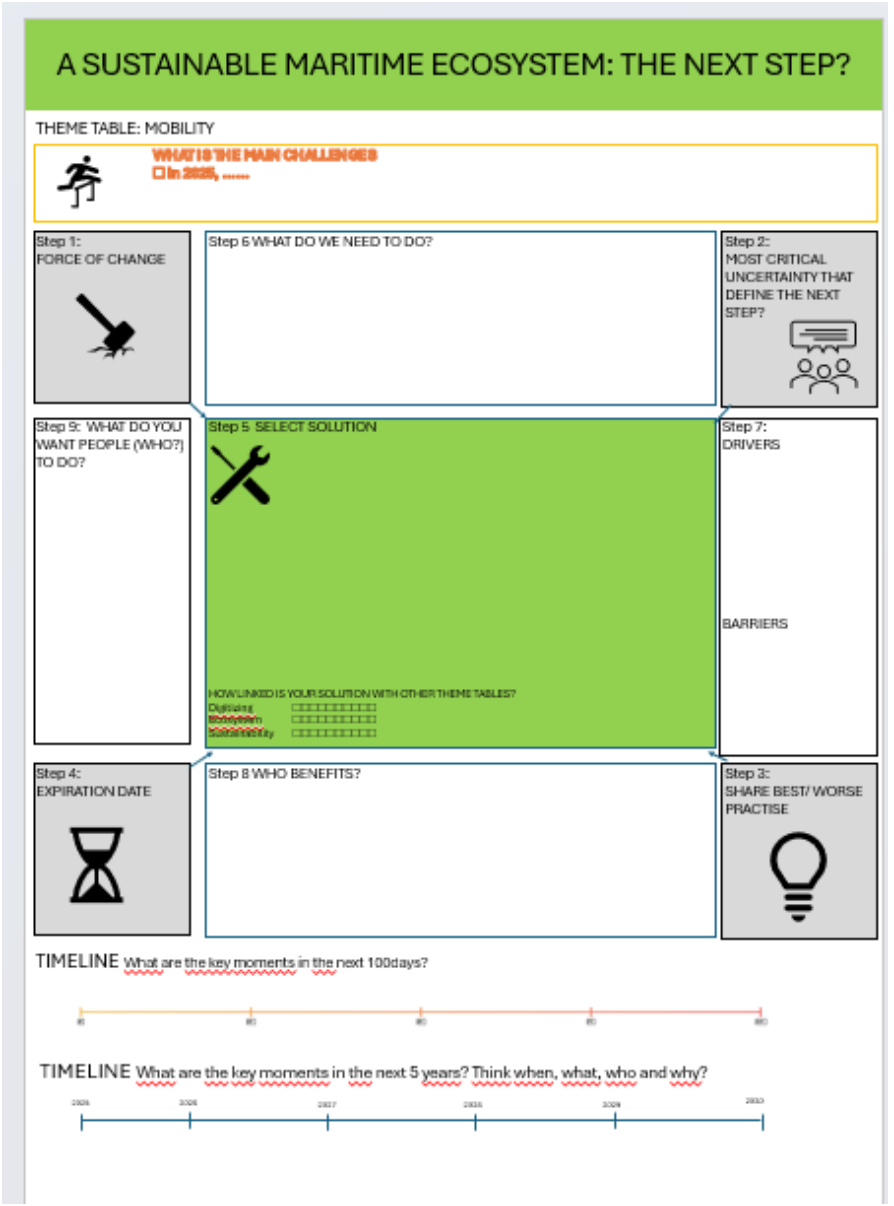
Technology is an integral part of our daily lives. We should not devilize technology but let's embrace it as an essential part of life.

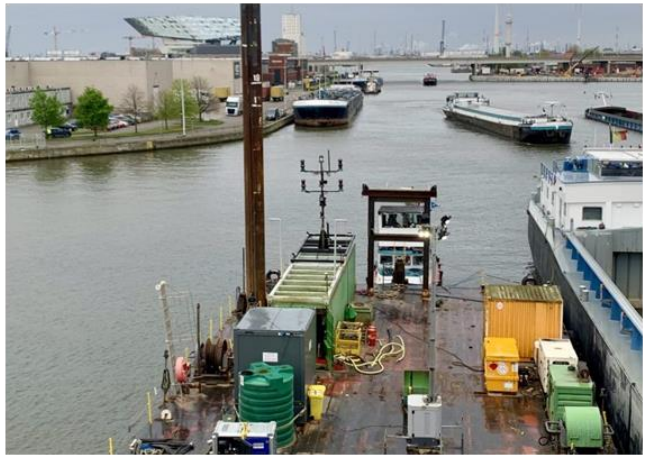
Theme table

- **Doel**
  - Toekomstgericht (tijdspad 2025-2030)
  - Oplossingsgericht



Thema tafel

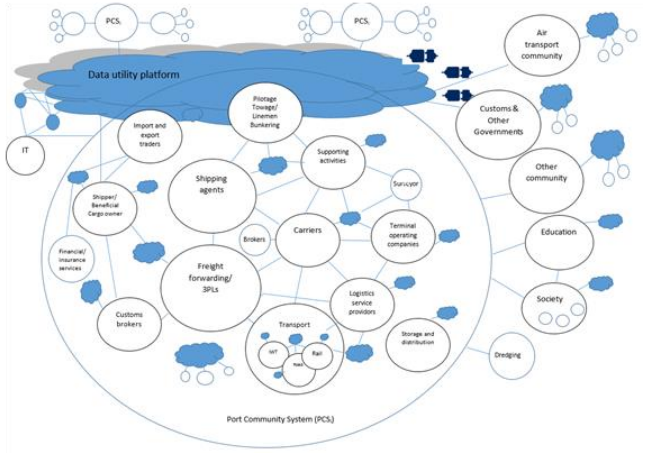
Mobiliteit



Duurzaamheid

Digitalisering

Ecosysteem



Stamgasten

TAFEL 1
Mobiliteit

Prof. Dr. Thierry Vanelslander

TAFEL 2
Ecosystem

Dr. Raimonds Aronietis

TAFEL 3
Digitalisering

Dr. Valentin Carlan

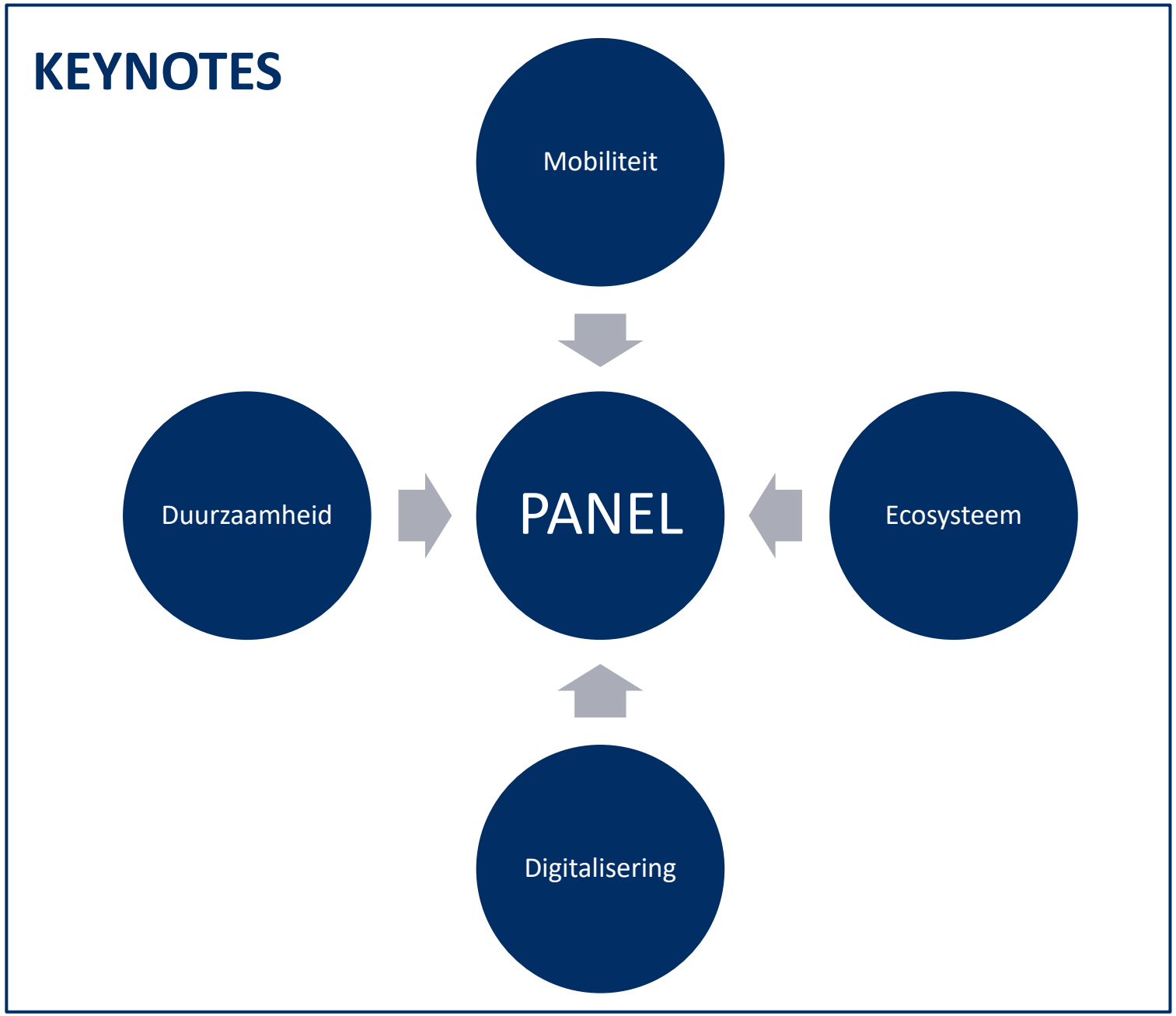
TAFEL 4
Duurzaamheid

Prof. Dr. Christa Sys

Keynotes

Pitches

Panel



Moderator/Panel

Prof. Christa Sys
houder leerstoel BNPPF

Wouter Bassier
General Manager Import
at MSC Belgium

Yves De Lariviere
Managing Director at
Antwerp Euroterminal

An Moons
Director Legal, Regulatory & Customs
DP World

Nico Wauters
CEO / cofounder T-Mining

Steve Declercq
Director of Business Development
at Port Oostende

Dr. Jan Blomme
Gewestelijk Havencommissaris

Closing

Koen Ceyssens, Director - Corporate Coverage Belgium

Networking

Prof. Christa Sys

Holder BNP Paribas Fortis Chair Transport, Logistics and Ports/Course coordinator C-MAT/Promotor Chair Dennie Lockefeer

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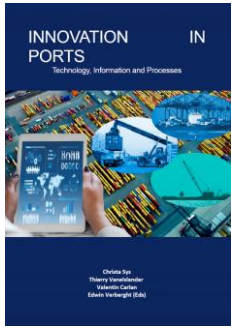

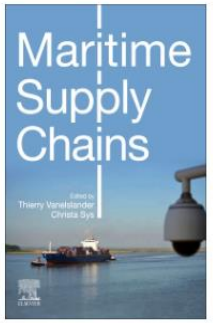

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