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Clean, green ammonia
engines for maritime

Green Ammonia Innovation System: Challenges and Opportunities

Dr Laura Norris
Cardiff University

Ask questions online

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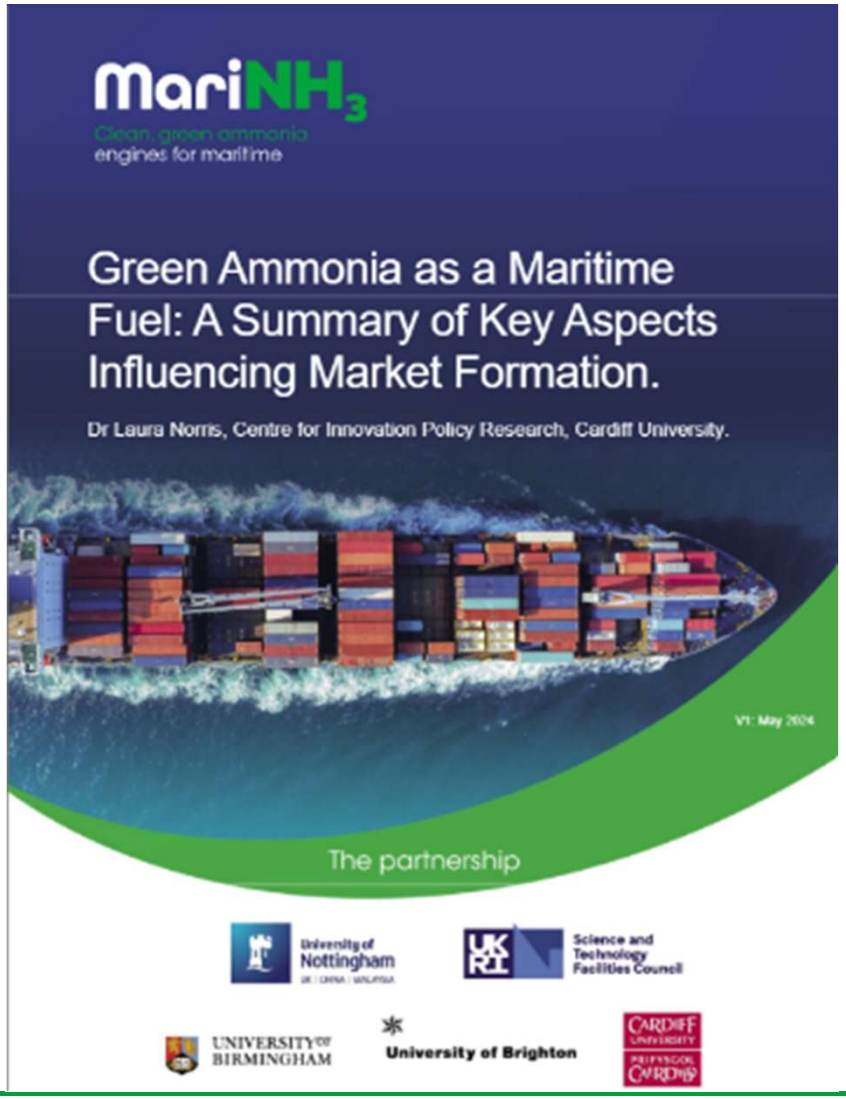

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Multi-level perspective: windows of opportunity

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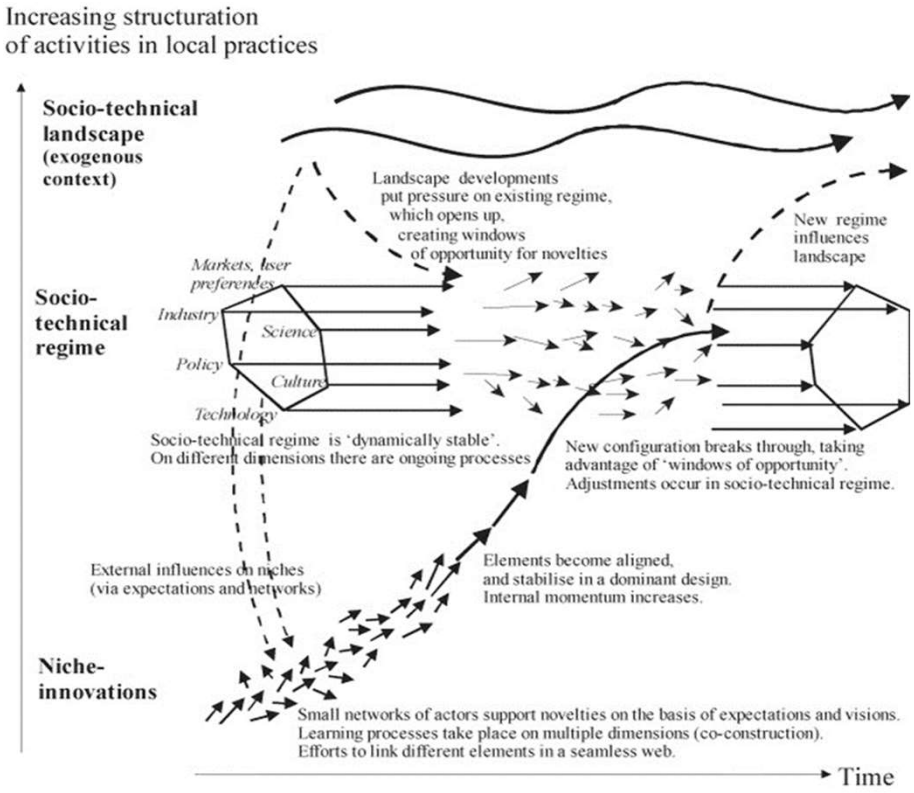
Geels and Schot, 2007; Smith et al. 2010



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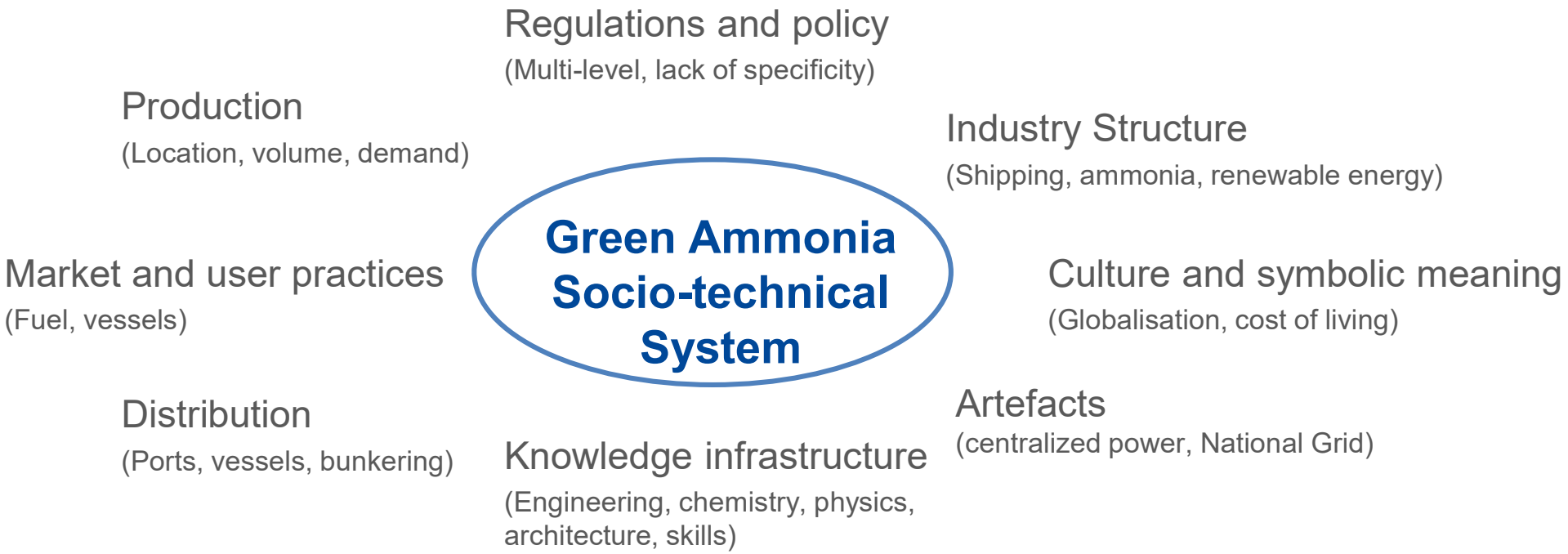

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Innovation System Approach: mapping system failures

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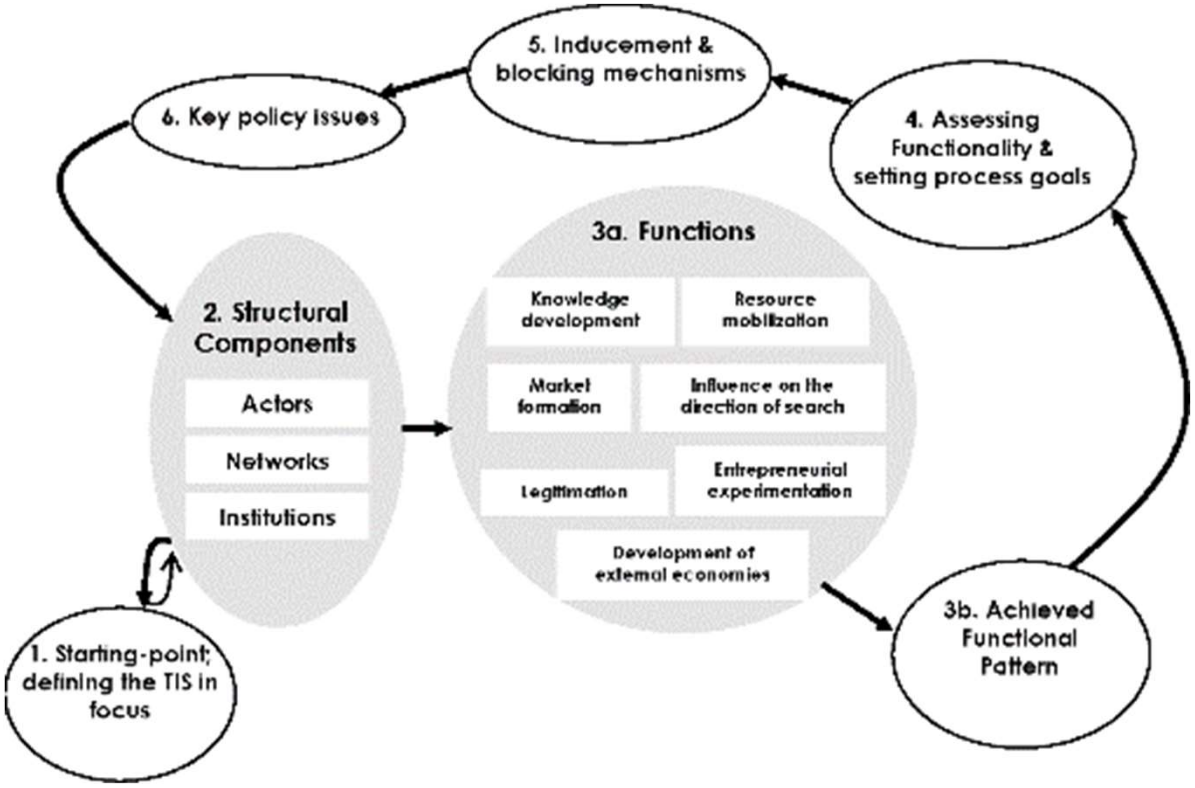
Hekkert et al., 2007; Bergek et al., 2015



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Green Ammonia Innovation System

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- **6. Key policy issues: controlling risk, occupational safety, impact on the environment, storage, ship building legislation.**
- **5. Inducement and blocking mechanisms: other maritime fuels, economic, renewable energy availability, governmental support, production, experimentation and scaling, green ammonia on vessels, and supply chain infrastructure**
- 4. Assessing functionality and setting process goals
- 3.a Functions:
  - Knowledge development, resource mobilization, entrepreneurial experimentation, influence direction of the search, legitimation, development of external economies, market formation
- 3.b Achieved Functional Pattern
- 2. Structural components: Actors, Networks, Institutions
- 1. Defining the TIS in focus

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Towards green shipping corridors

(creating a ‘window of opportunity’)
(achieving a functional IS pattern)
(the role of place in sustainability transitions)

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Global and local complexity

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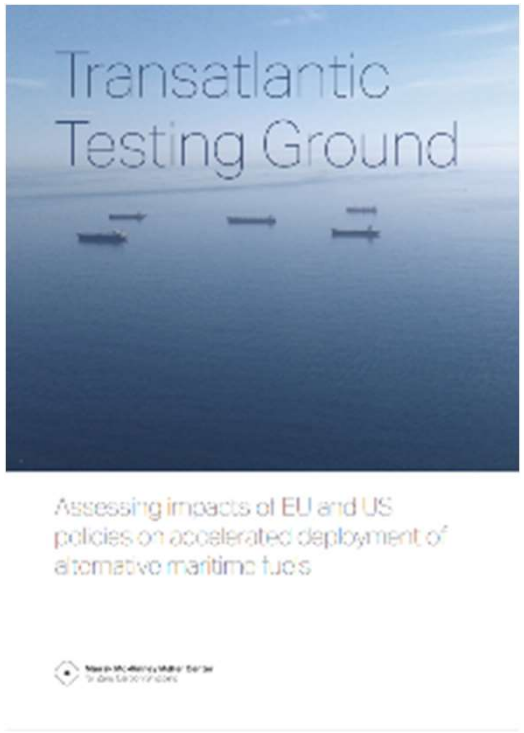

"The results from our analysis of container voyage costs show that the combination of EU and US policies could close the gap between LSFO and alternative fuel cost in 2030. When we factor in the additional benefits of FuelEU pooling to e-fuel costs, the gap is further reduced. For e-ammonia, the combined impacts of US and EU policy can bring total container voyage costs to 20% below conventional fossil fuels. In the case of other e-fuels, the benefits from the combination of the policies can reduce projected e-fuel costs by 45% or more in 2030, creating a potentially viable business case for sailing on alternative fuels."

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The socio-technical role of ports…

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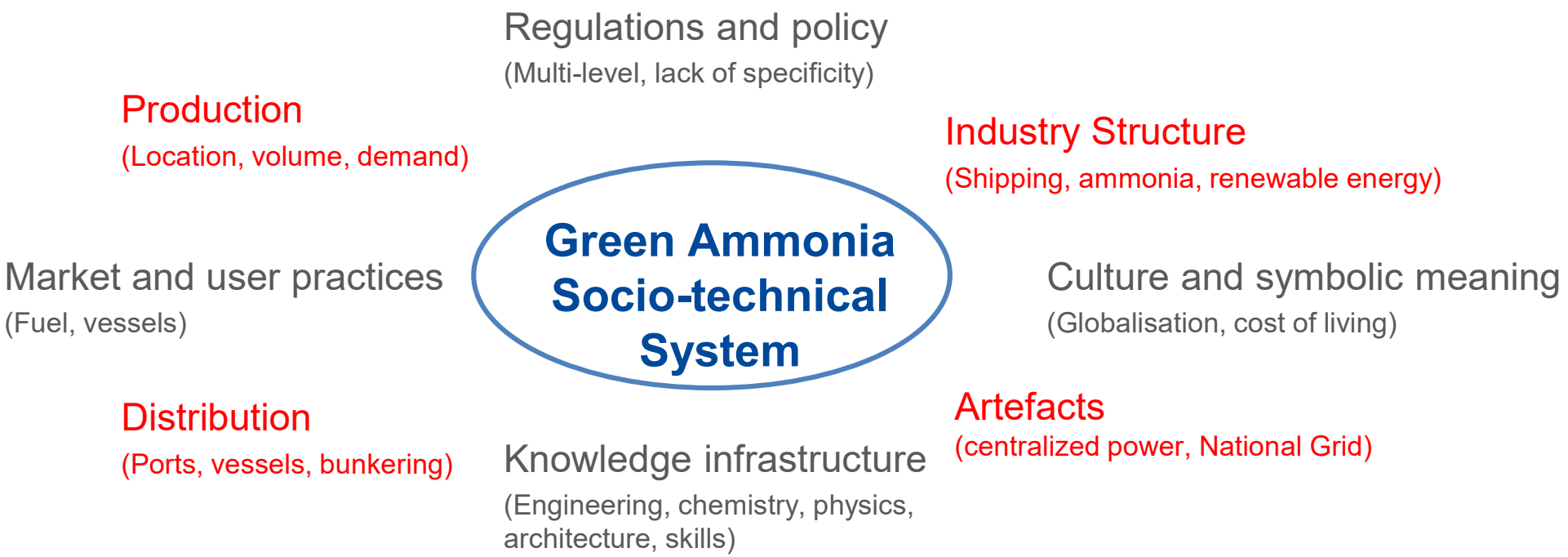

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The IS challenge/opportunity for Ports

Actor in shipping decarbonization

- resource mobilization, influence direction of the search, legitimation, market formation

Actor in own decarbonization

- Entrepreneurial experimentation

Institution within community and port industry

- Development of external economies, legitimation

Network intermediary across sectors

- Knowledge development, legitimation, market formation

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