



Quantifying Methods for an Innovation Systems Analysis of the UK Wave Energy Sector

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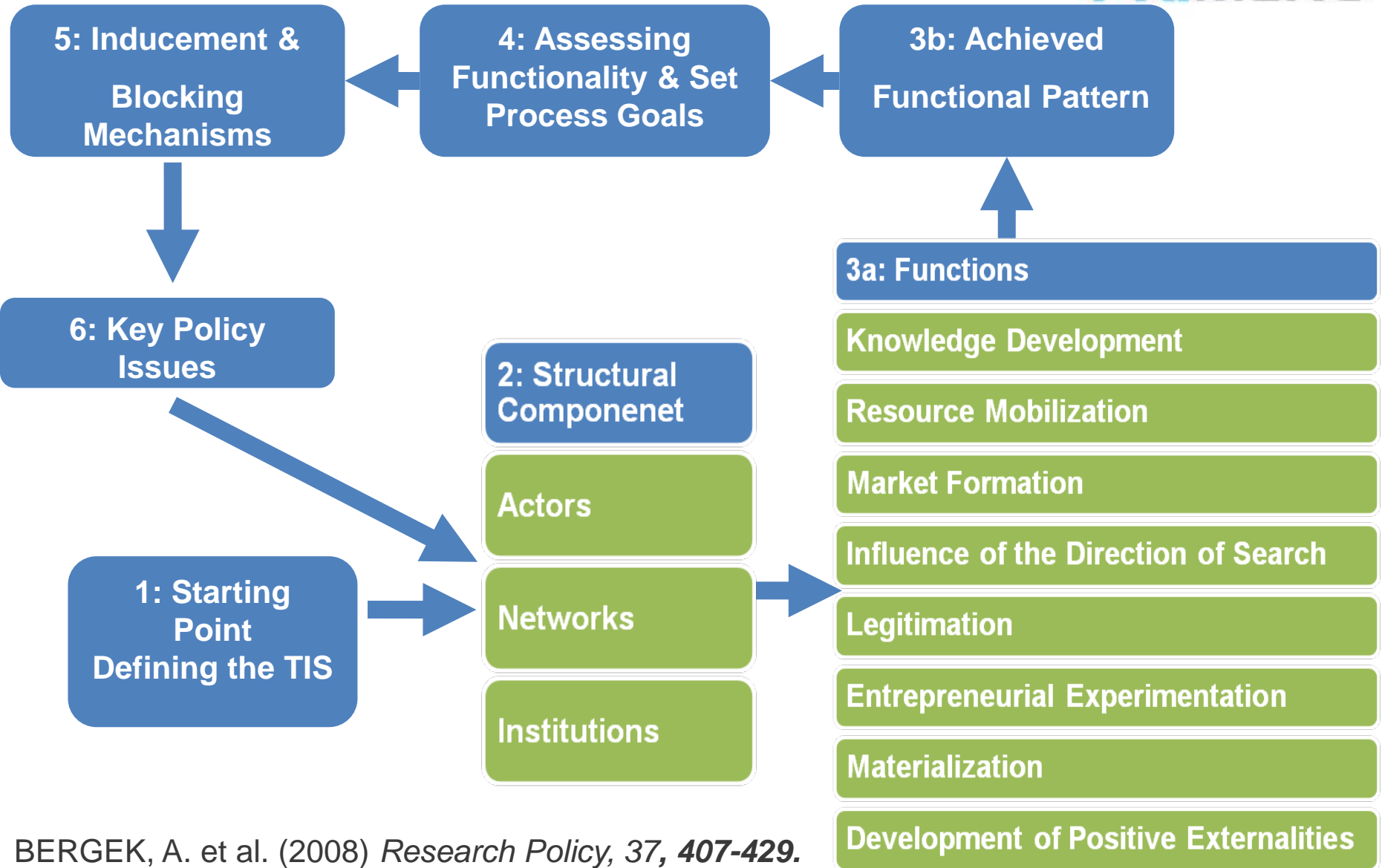
University of Exeter, (Cornwall Campus)



Research Questions:

- How can we come to a clearer understanding of early stage technological innovation systems through a robust measure of key emergent system functionalities?
- How insightful are the various methodologies for system functionality analysis and how replicable are they?
- Can it be shown that there is any form of consistent relationship between these systems' functionalities and regionally effective policy instruments?

A Brief Look at Technological Innovation Systems:



An Example: Knowledge Development Functionality (using SNA application)



• Identify Actors:

Device Developers:



Universities:



Test Facilities:



Aquamarine Power

University of Exeter

Wave Hub

AWS Ocean Energy Ltd

University of Plymouth

EMEC

Checkmate SeaEnergy

University of Edinburgh

NaREC

Ocean Power Technology

University of Manchester

~~Oregon~~

Queens University Belfast

Pelamis Wave Power Ltd

University of Strathclyde

Trident Energy Ltd

Lancaster University

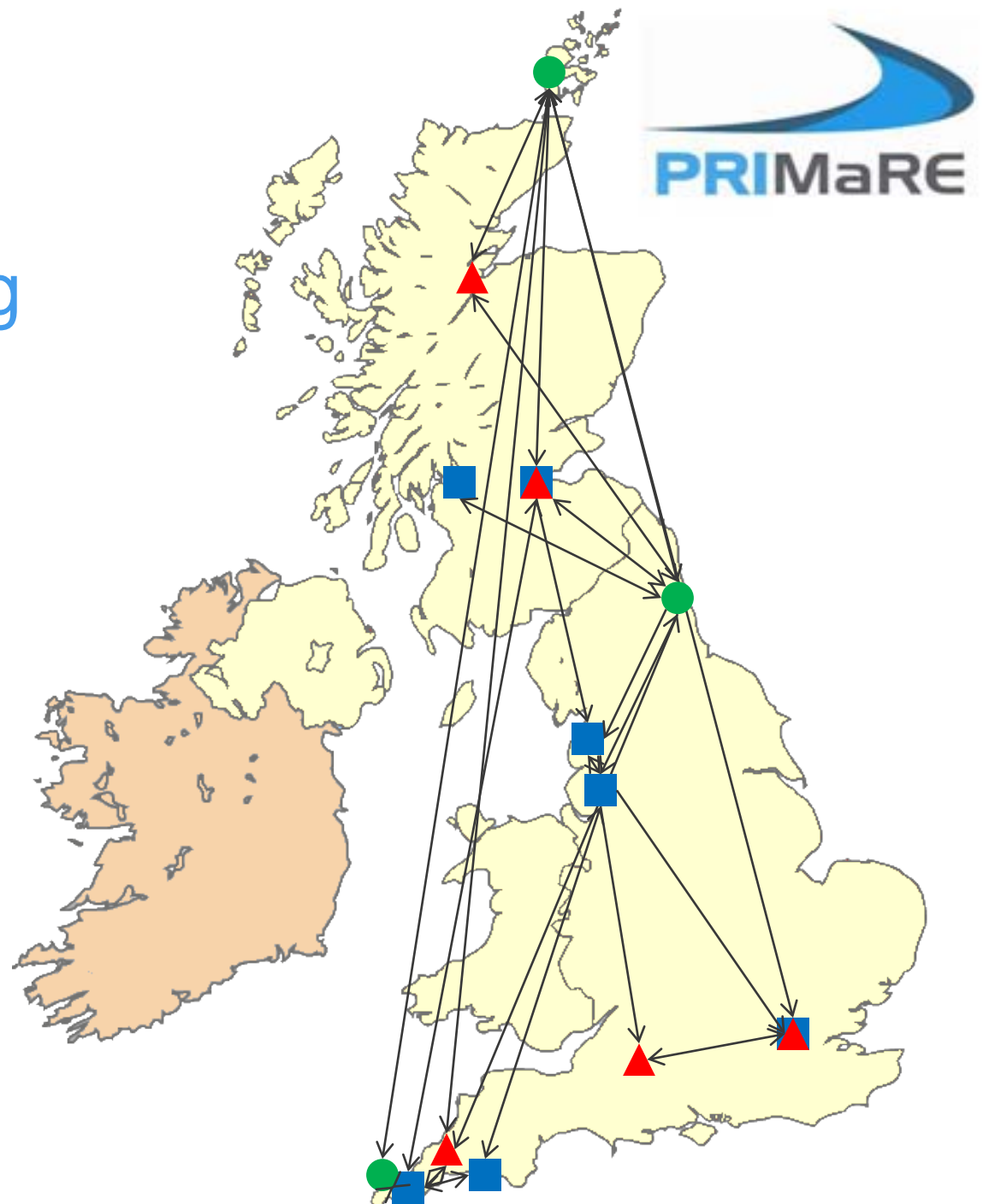
Imperial College London

Quantify levels of collaboration, communication & knowledge sharing through:

- Desk Research

- tank test time
- co-patents
- publications
- supply chain analysis
- KTPs

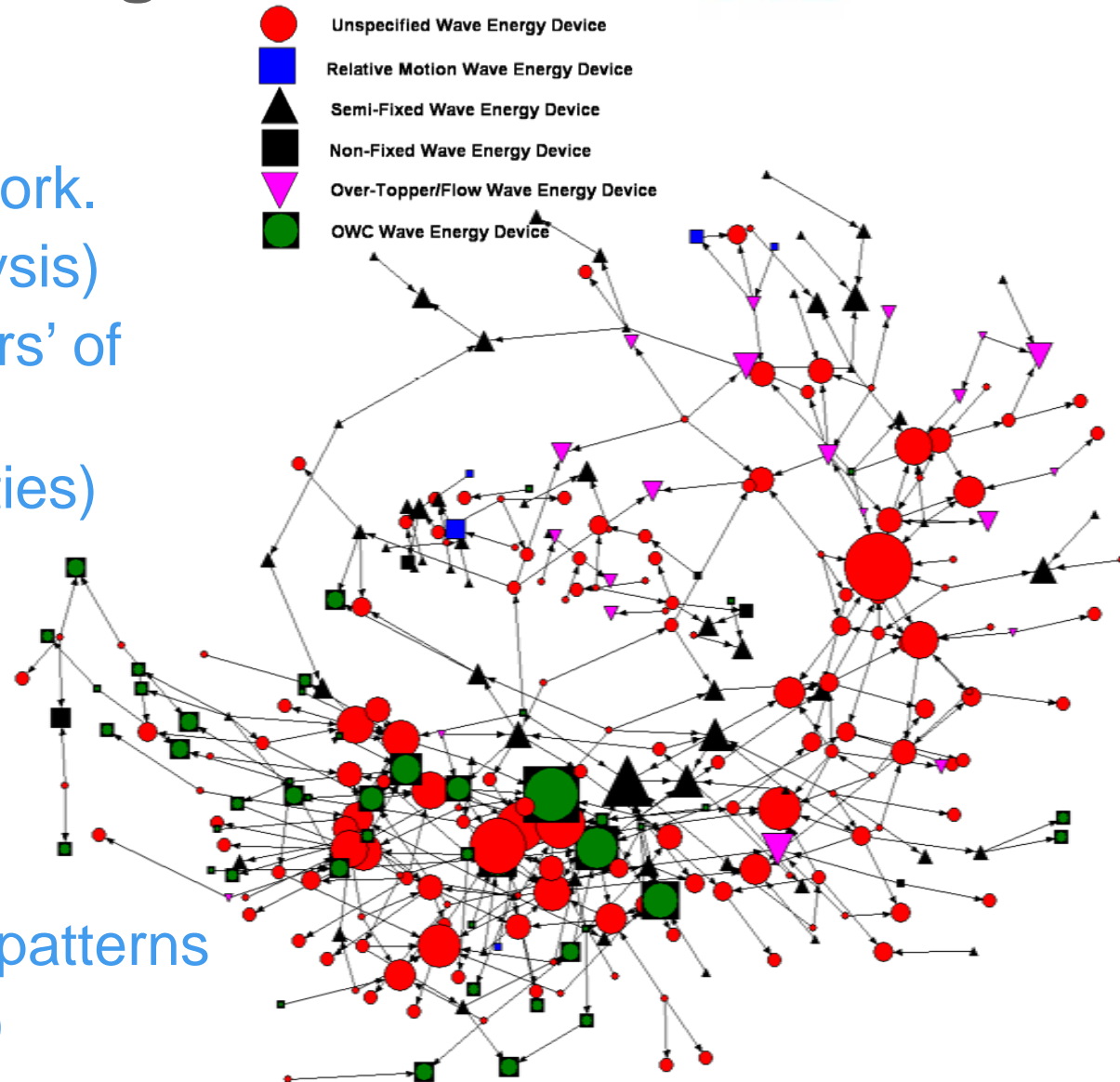
- Interviews



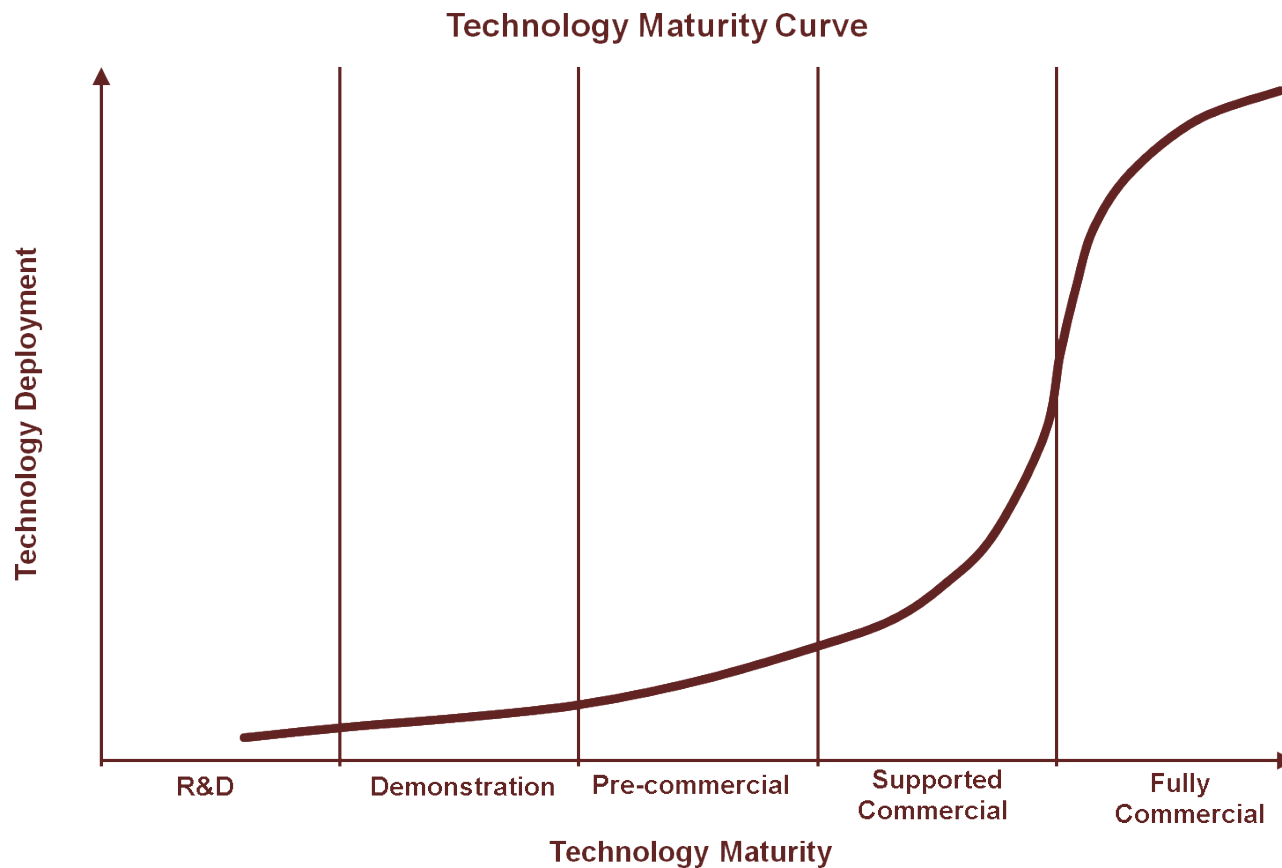
Assess contribution of stakeholders to different knowledge bases:



- Measure levels of academia/industry collaboration in network. (structural hole analysis)
- Identify 'Prime Movers' of knowledge within network, (out ties)
- Identify 'knowledge clusters' (Such as environmental/market etc...)
- Identify overlaps in knowledge diffusion patterns (correlation analysis)



Other Functions: Materialization



Technology Deployment



Step Descriptions:

Step Location:

R&D

Demonstration

Basic principles observed and reported	Concept for Wave Energy Converter
Technology concept &/or application formulated	Concept for Wave Energy Converter
Analytical & experimental critical function &/or proof of con.	Utilise Research Providers (Unis etc.)
Component &/or partial system validation in a laboratory	Develop Design Utilising Eng. Expertise
Component &/or partial system validation in environment	Tank Testing
Sub/system model validation in environment	Scale Test Facilities e.g. NaREC
System prototype demonstration in environment	Full Scale Test Facilities - EMEC
Actual system completed & service qualified	Full Scale Test Facilities - EMEC
Actual system proven through mission operation	Full Scale Test Facilities - EMEC
Singular 'commercially' deployed on grid connected installation	Pre-Commercial Dep. - EMEC/Wave Hub
Small arrays (<10MW or 20 dev) deployed, grid connected installation	Pre-Commercial Dep. - Wave Hub/Pentland Firth





Other Functionalities:

- Influence on the Direction of Search
- Resource Mobilization
- Market Formation
- Legitimation
- Entrepreneurial Experimentation
- Development of Positive Externalities



Thank you for your attention:

- Questions?

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