Economic Complexity

LEA – Affaires Internationales

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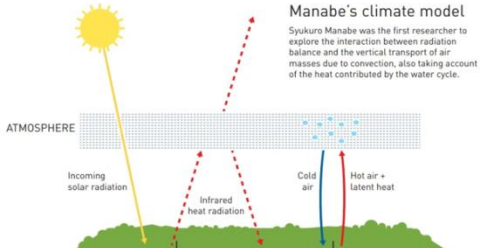
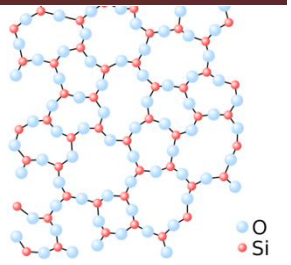
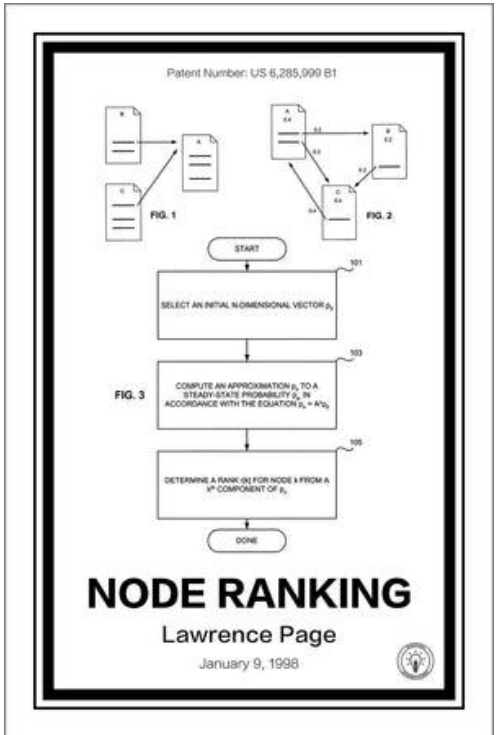
The Century of Complexity

2021's Physics Nobel Prize is about Complexity Science





AI applications extract information from complex network structures



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What is Economic Complexity?

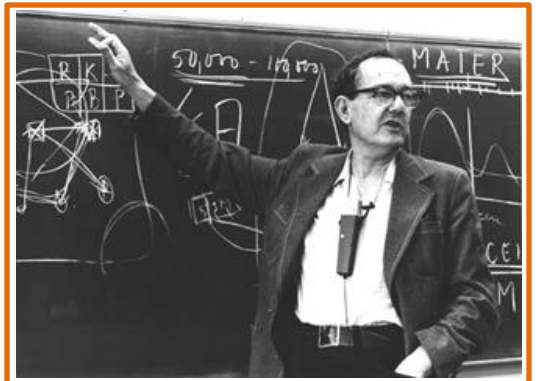
Economic complexity is the application of **complex systems** and **network thinking** to economics

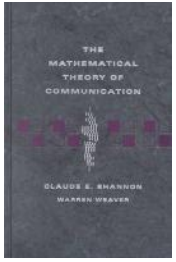
Paradigm shift from *isolated characteristics* to **systemic interactions**

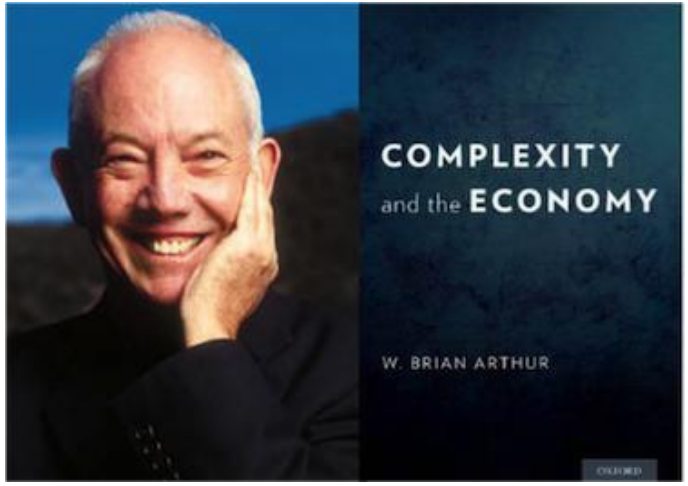
-> To understand emerging patterns of growth, regional evolution, technological change, inequality, sustainability…

Economic complexity produces useful **heuristics** and **metrics** to make better business and policy decisions

Founding parents







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ELSEVIER

Research Policy
Volume 51, Issue 3, April 2022, 104450

The new paradigm of economic complexity ☆

Pierre-Alexandre Balland [a, b], Tom Broekel [c], Dario Diodato [d, #], Elisa Giuliani [e], Ricardo Hausmann [f], Neave O'Clery [g], David Rigby [h]

Special Issue on Economic Complexity

Edited by Pierre-Alexandre Balland, Tom Broekel, Dario Diodato, Ricardo Hausmann, Neave O'Clery, David Rigby
Last update 17 January 2022

Transition to system thinking

Key **concepts** of interdependencies, non-linearity, feedback loops, self-organization, second-order effects, randomness, scaling, fat-tails, network effects, path-dependence…

- Industry 5.0, a transformative vision for Europe : governing **systemic transformations** towards a sustainable industry
- Global value chains : harnessing innovation to protect and transform the **backbone** of global trade
- Protect, prepare and transform Europe - Recovery and **resilience** post COVID-19

EconX & growth

Economic **development** from a complex systems perspective

As the economy becomes more complex, it **grows**

New technologies and globalization allow for a deeper **division of knowledge**

Trade and division of labor and this is a very **efficient** way to organize the economy

Yes, But!

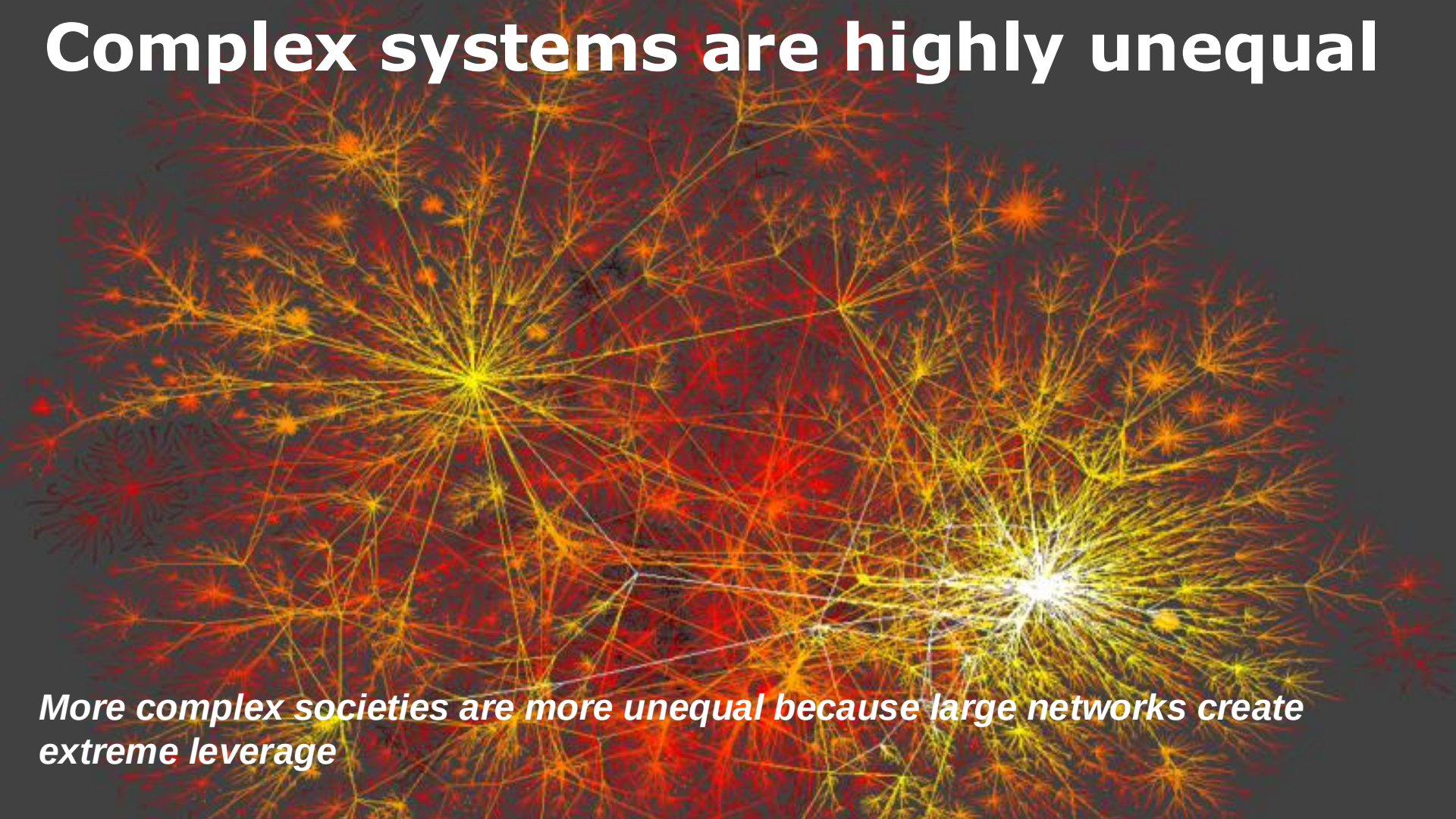
Increasing complexity creates an **overload** of information and noise

This **division** of knowledge also creates room for **hierarchy** and **inequality**

Complexity makes key resources very, very **concentrated** (hello network effects)

Increased **interdependencies** make us more vulnerable to pandemics such as Covid-19, financial, and ecological crises

Complex systems are highly unequal



More complex societies are more unequal because large networks create extreme leverage

Reframing economic development

Data Source: atlas.media.mit.edu

On smart specialization

Smart specialisation

Smart specialisation is a new innovation policy concept designed to promote the efficient and effective use of public investment in research. Its goal is to boost regional innovation in order to achieve economic growth and prosperity, by enabling regions to focus on their strengths. Smart specialisation understands that spreading investment too thinly across several frontier technology fields risks limiting the impact in any one area.

A smart specialisation strategy needs to be built on a sound analysis of regional assets and technology. It should also include an analysis of potential partners in other regions and avoid unnecessary duplication. Smart specialisation needs to be based on a strong partnership between businesses, public entities and knowledge institutions – such partnerships are recognised as essential for success.

To push forward the smart specialisation concept, the Commission announced the setting up of the S³Platform in a 2010 Communication entitled 'Regional Policy contributing to smart growth in Europe 2020'. This platform aims to assist regions and Member States in developing, implementing and reviewing regional smart specialisation strategies, and help regions identify high-value added activities which offer the best chances of strengthening their competitiveness.

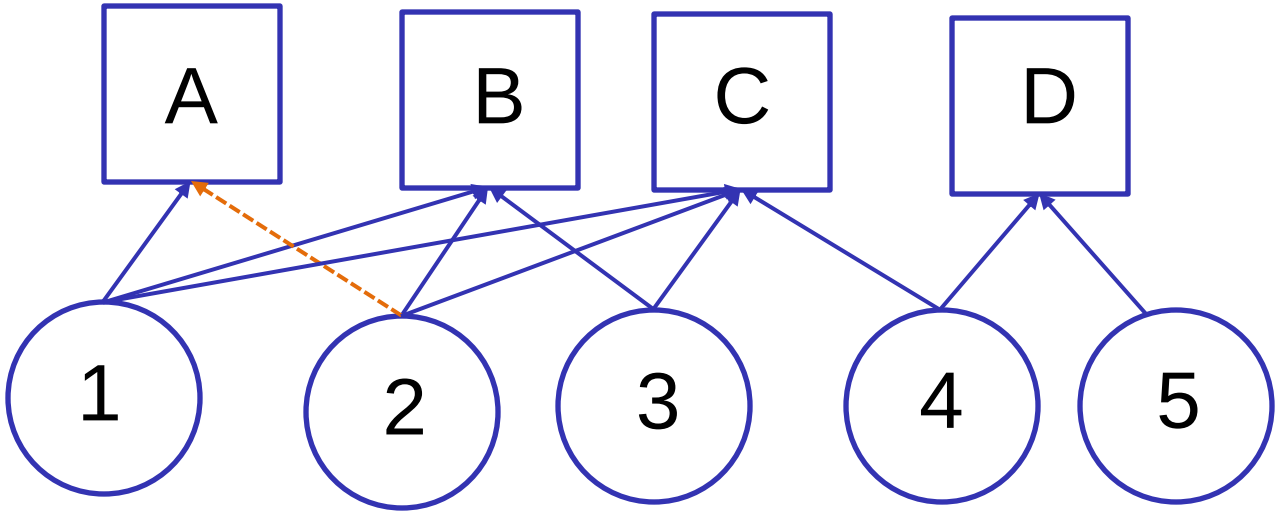
Applied AI for innovation policy

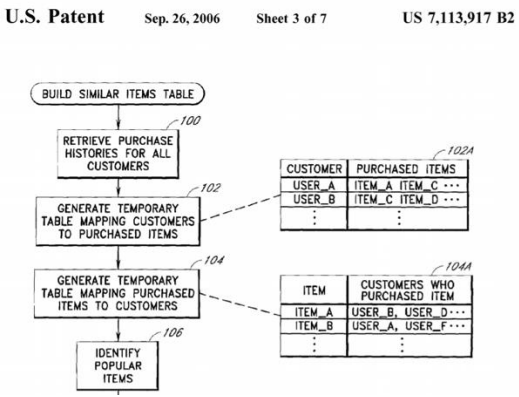
Recommender systems are the most successful application of AI in the business world. They are all about **filtering** massive amount of data (content-based filtering & collaborative filtering)

Economic complexity tools are based on **similar machine learning algorithms**

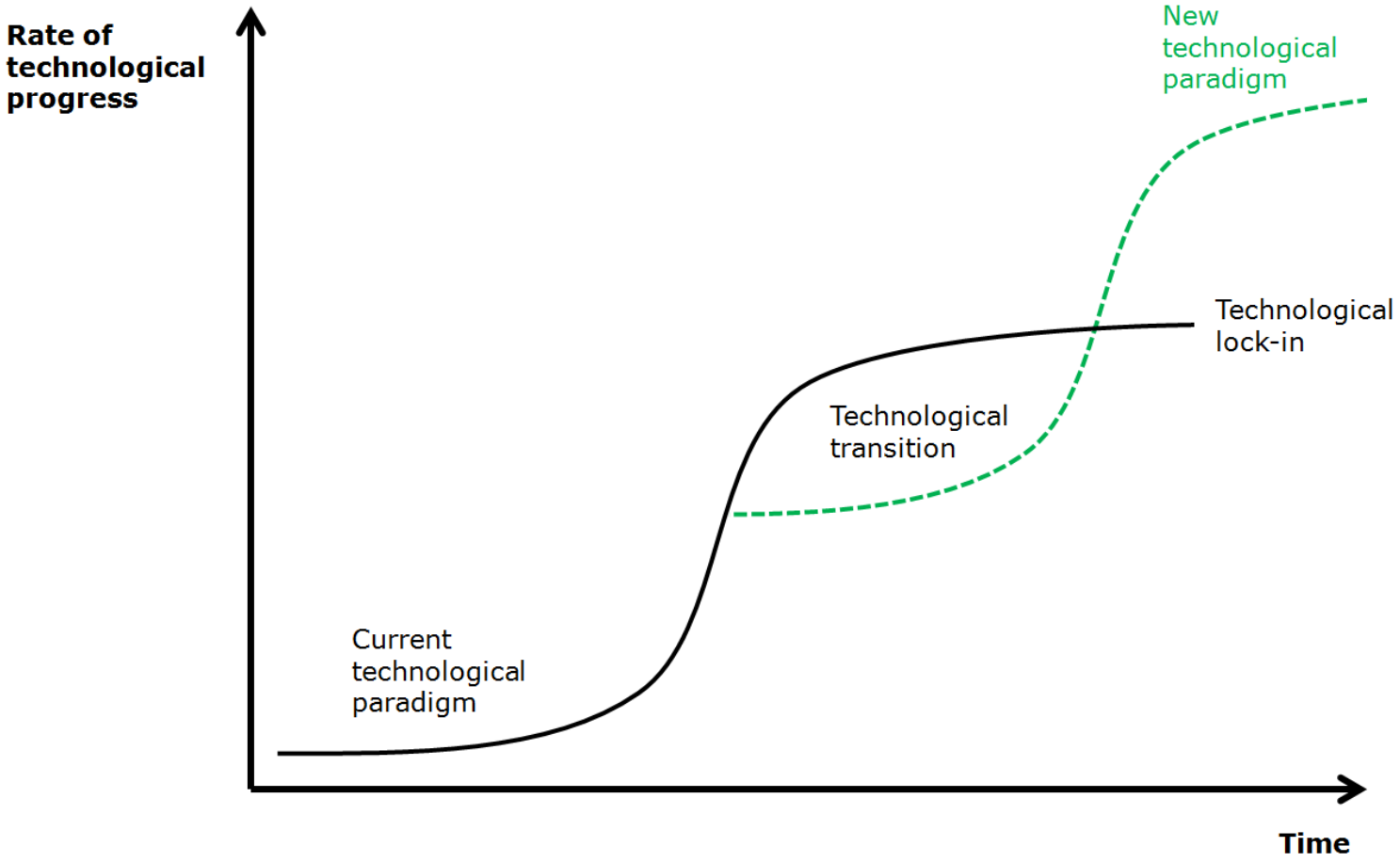
→ Can support innovation policy & smart R&I investments

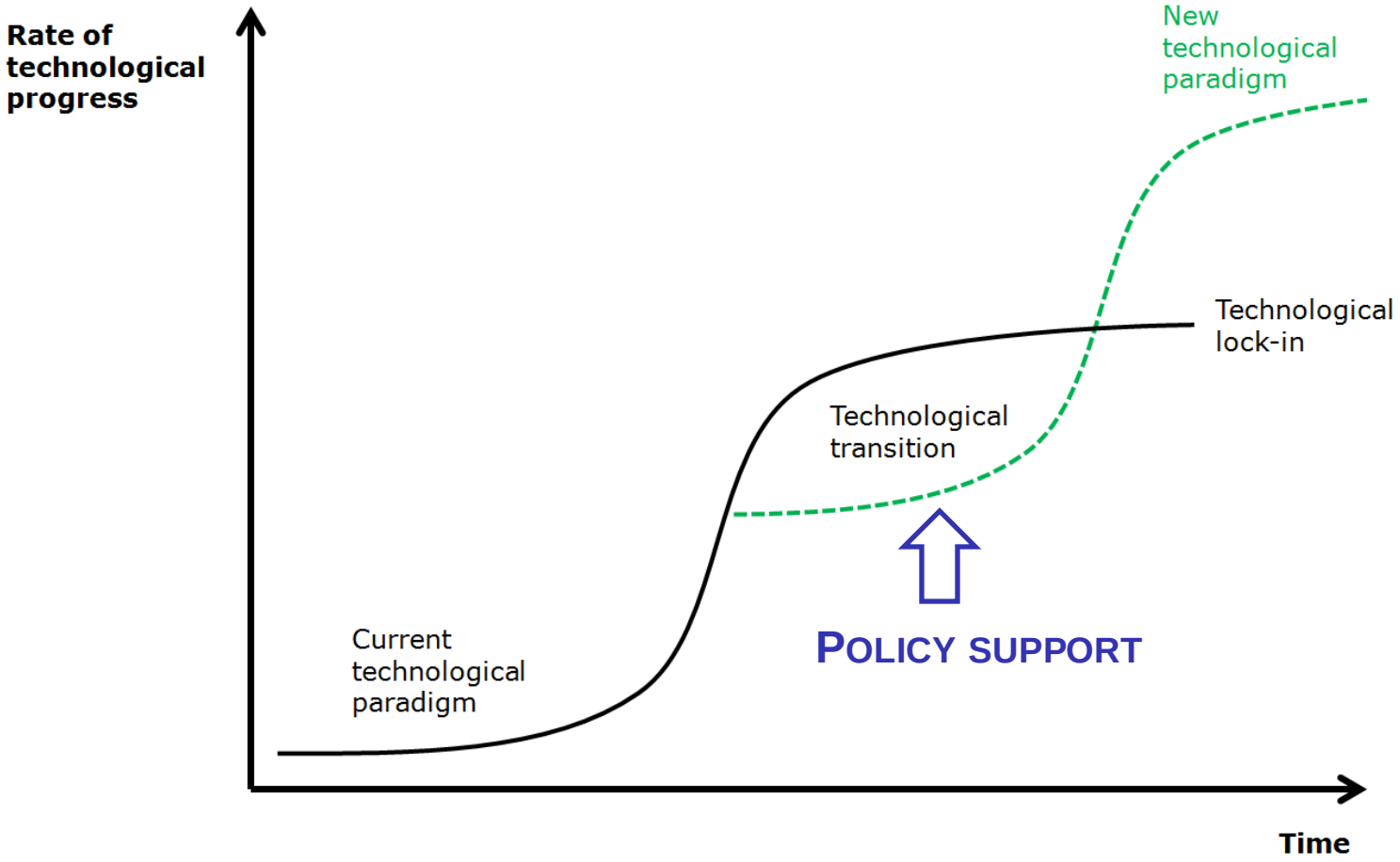
Matching products and customers





Modern **AI** techniques extract information from network structures


Rate of technological progress
New technological paradigm
Technological lock-in
Technological transition
Current technological paradigm
Time


Rate of technological progress
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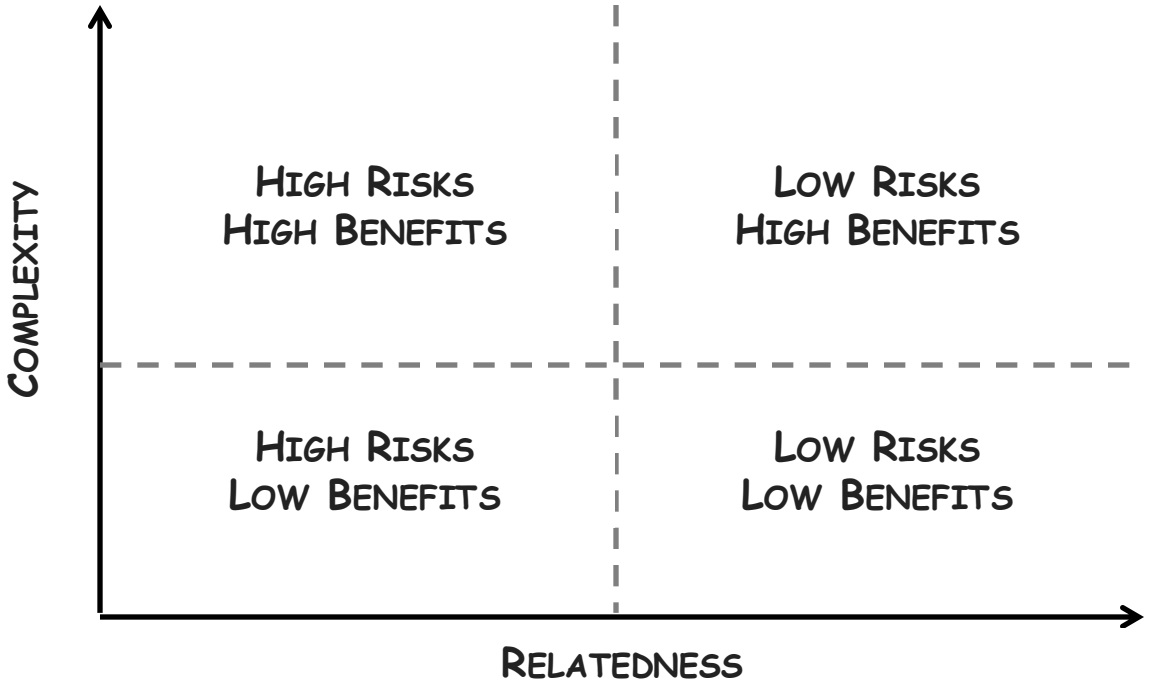
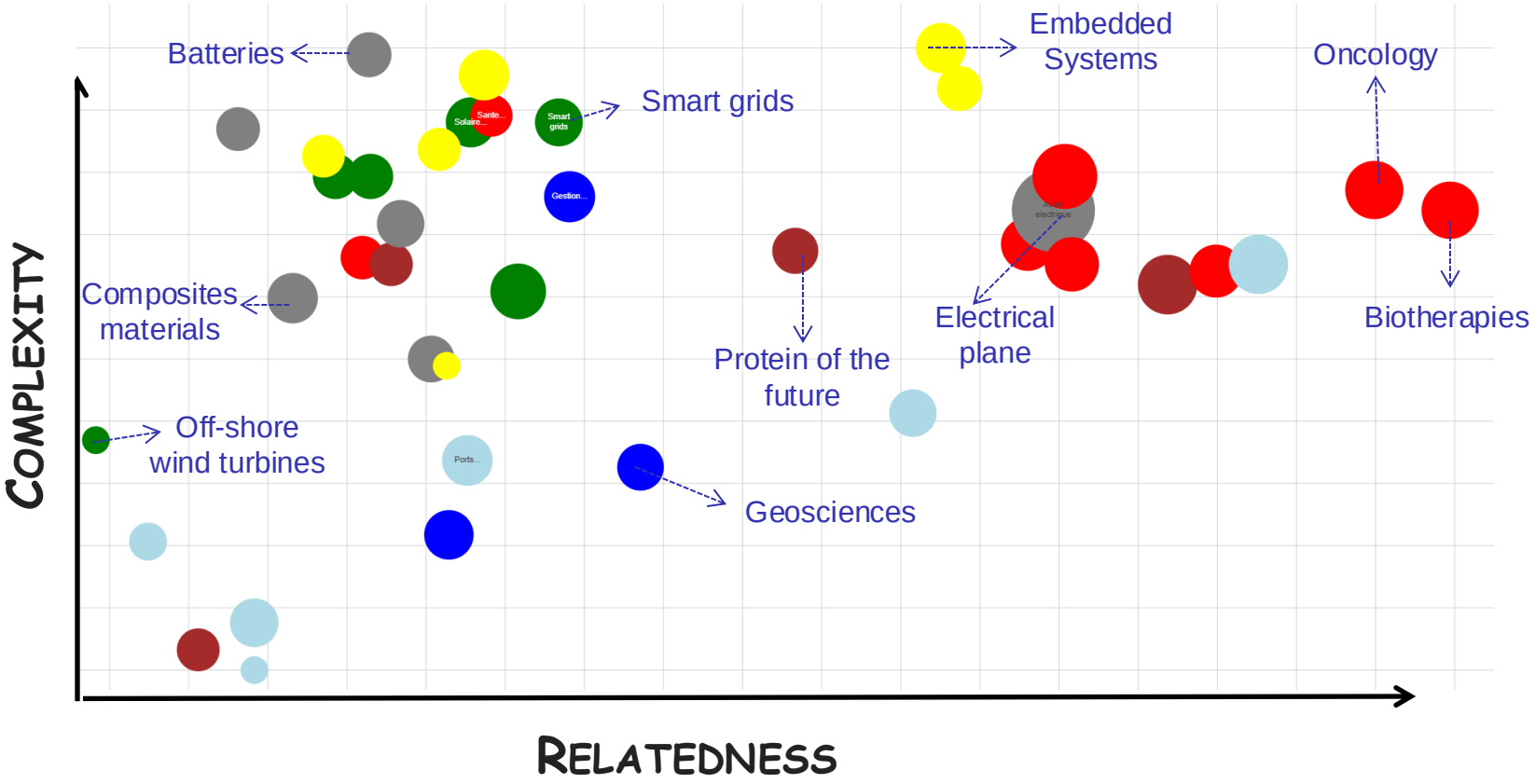
POLICY SUPPORT
Current technological paradigm
Time

Smart Occ Investment Framework



Smart Occ Investment Framework



Q&A