Kajikawa Lab.

Member

Yuya Kajiakwa (Professor)

TMI (Technology Management for Innovation)

Yuewen Wang (D1)
Ke Wu (M1)

IFI (Institute for Future Initiatives)

Cristian Mejia (Associate Professor)
Yousif Elasmani (Post Doctoral Researcher)

Visiting Researchers at IFI

Beatrice D'Ippolito (Professor, Univ. York)
Pami Aalto (Professor, Tampere Univ.)
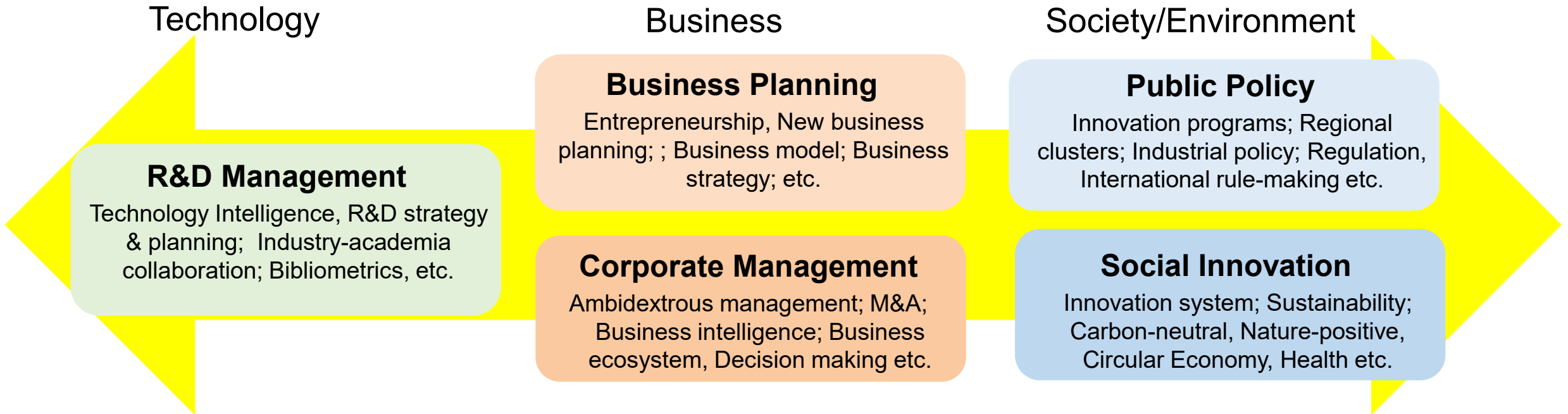Piotr Tomasz Makowski (Reader, Queen's University Belfast)
Anneli Ulla Saari (Associate Professor, Tampere Univ.)
Olga Kokshagina (Associate Professor, Univ. Sydney)
Eduardo Perez Molina (*formerly* European Patent Office)

Research Area

➤ **Theory and Methodological Development for Innovation Analysis and Design**

Technology   Business   Society/Environment

Business Planning

Entrepreneurship, New business planning; ; Business model; Business strategy; etc.

Public Policy

Innovation programs; Regional clusters; Industrial policy; Regulation, International rule-making etc.

R&D Management

Technology Intelligence, R&D strategy & planning; Industry-academia collaboration; Bibliometrics, etc.

Corporate Management

Ambidextrous management; M&A; Business intelligence; Business ecosystem, Decision making etc.

Social Innovation

Innovation system; Sustainability; Carbon-neutral, Nature-positive, Circular Economy, Health etc.

➤ **Action Research for Technology and Innovation Management in:**

- Energy (Solar, Wind, Hydrogens, Batteries, etc.)
- Nature (Biodiversity, Water, Soil, CNP cycles, etc.)
- AI (AI in organization, AI for design etc.)
- Food (Rice, Beef, Alternative meat, etc.)
- Health (Brain health and brain augmentation, etc.)
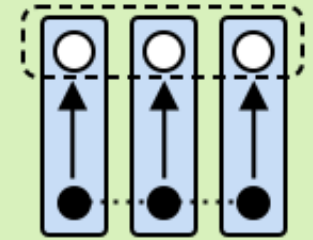- Innovation System (Science, technology, and innovation policy, Science diplomacy, Finance, Rule-making, etc.)

Our Approach

Innovation Science as a Transdisciplinary Science
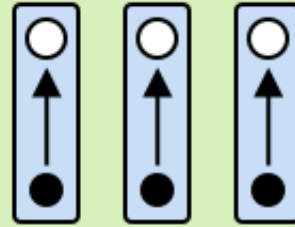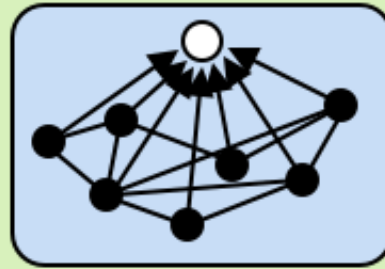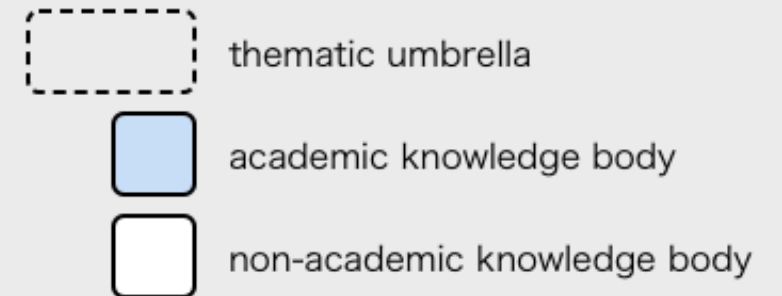
R&D Management

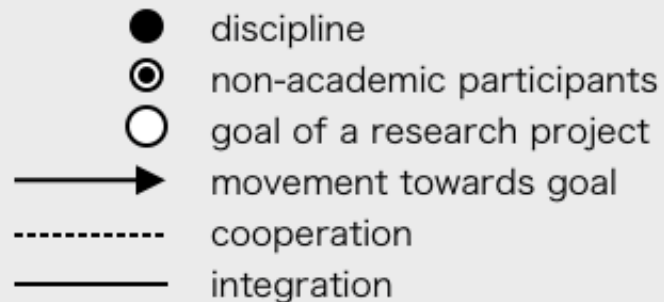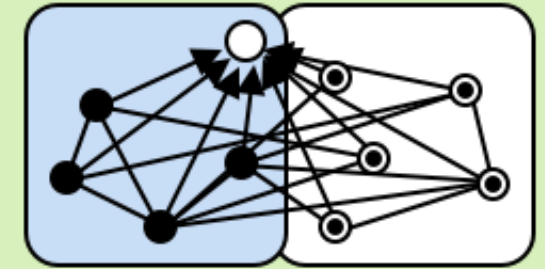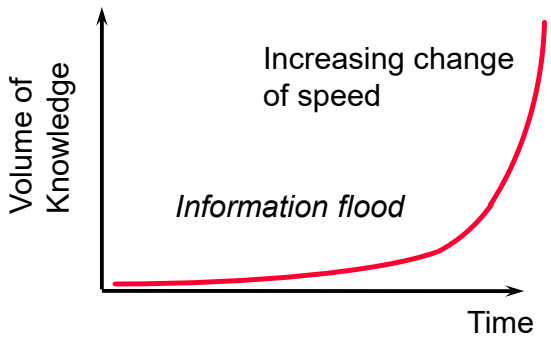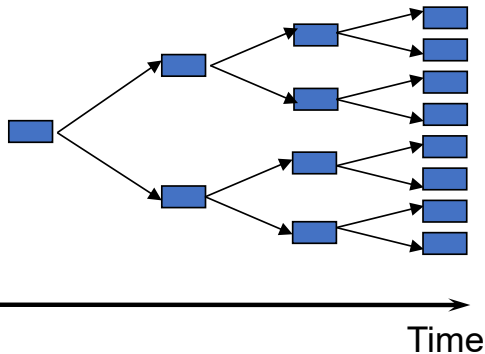## Opportunity

- Exponential growth of knowledge

- Segmentation & specialization

Enabler

- Bibliometrics(Network analysis, Topic model, Visualization, GAI)

+Tool
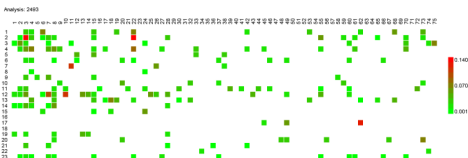
+Will

Prerequisite

Expertise and Capability

Social Issues
Policy Contexts

Design Capability

Domain Knowledge

Analytical Capability

Data and Algorithms

Y. Kajikawa, *Scientometrics* (2022)
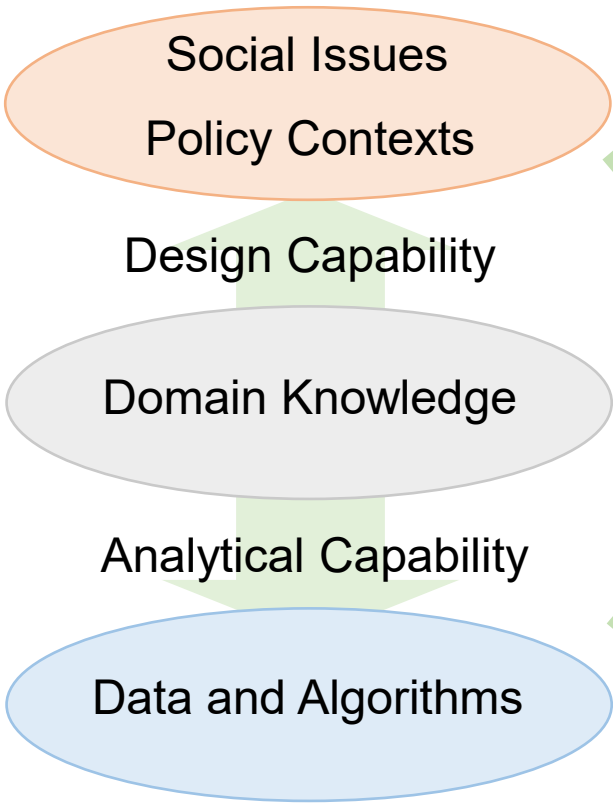
Output

Organizational and social logic and legitimacy

Effective strategy and implementation

Credible and salient solution

Business Planning & Corporate Management
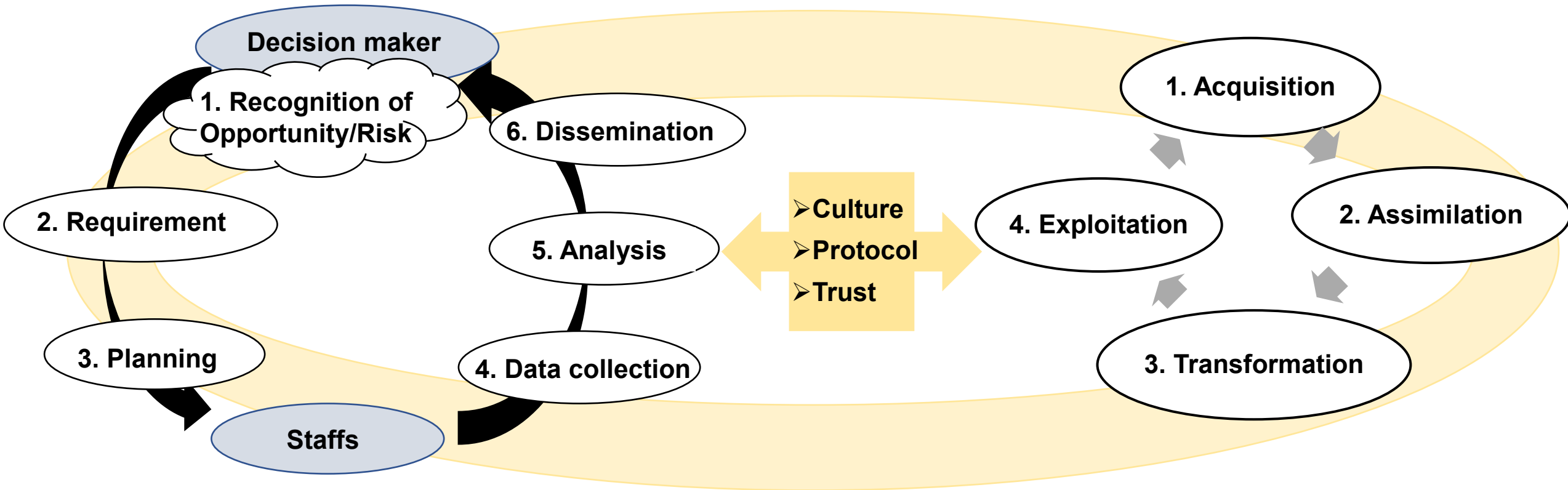
Analytics and intelligence in organization

Intelligent Circle

Absorptive Capacity

Decision maker

1. Recognition of Opportunity/Risk

6. Dissemination

2. Requirement

5. Analysis

➢ Culture
➢ Protocol
➢ Trust

3. Planning

4. Data collection

Staffs

1. Acquisition

4. Exploitation

2. Assimilation

3. Transformation
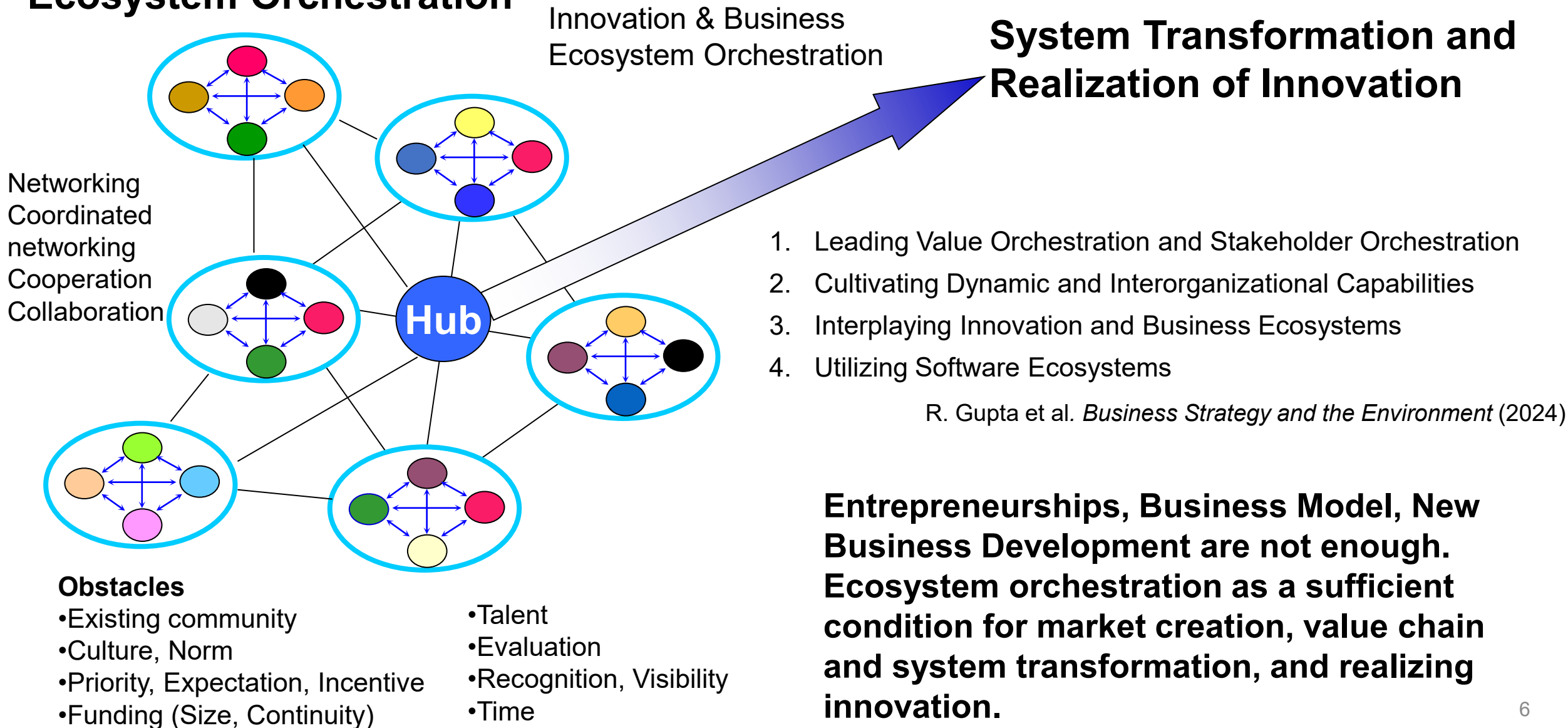
I. Tsuchimoto & Y. Kajikawa, *Aslib J. Info. Mgmt.* 7 (2022)

✓ Staffs who collect data and information from multiple perspectives and analyze them from multiple angles.
✓ Engineers who structure issues, design new solutions, and implement them.
✓ Decision maker who has the insight and logic to see the essence, considers diverse contexts, and makes appropriate judgments.
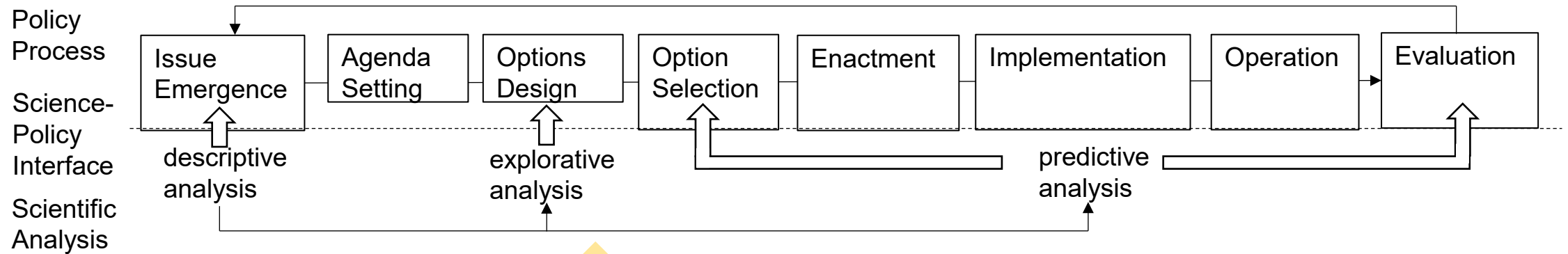
Business Planning & Corporate Management

Ecosystem Orchestration

Innovation & Business
Ecosystem Orchestration

System Transformation and Realization of Innovation

Networking
Coordinated
networking
Cooperation
Collaboration

1. Leading Value Orchestration and Stakeholder Orchestration
2. Cultivating Dynamic and Interorganizational Capabilities
3. Interplaying Innovation and Business Ecosystems
4. Utilizing Software Ecosystems

R. Gupta et al. *Business Strategy and the Environment* (2024)

Obstacles
- Existing community
- Culture, Norm
- Priority, Expectation, Incentive
- Funding (Size, Continuity)

- Talent
- Evaluation
- Recognition, Visibility
- Time

Entrepreneurships, Business Model, New Business Development are not enough. Ecosystem orchestration as a sufficient condition for market creation, value chain and system transformation, and realizing innovation.

6

Public Policy and Social Innovation

Policy Process

Evidence Process
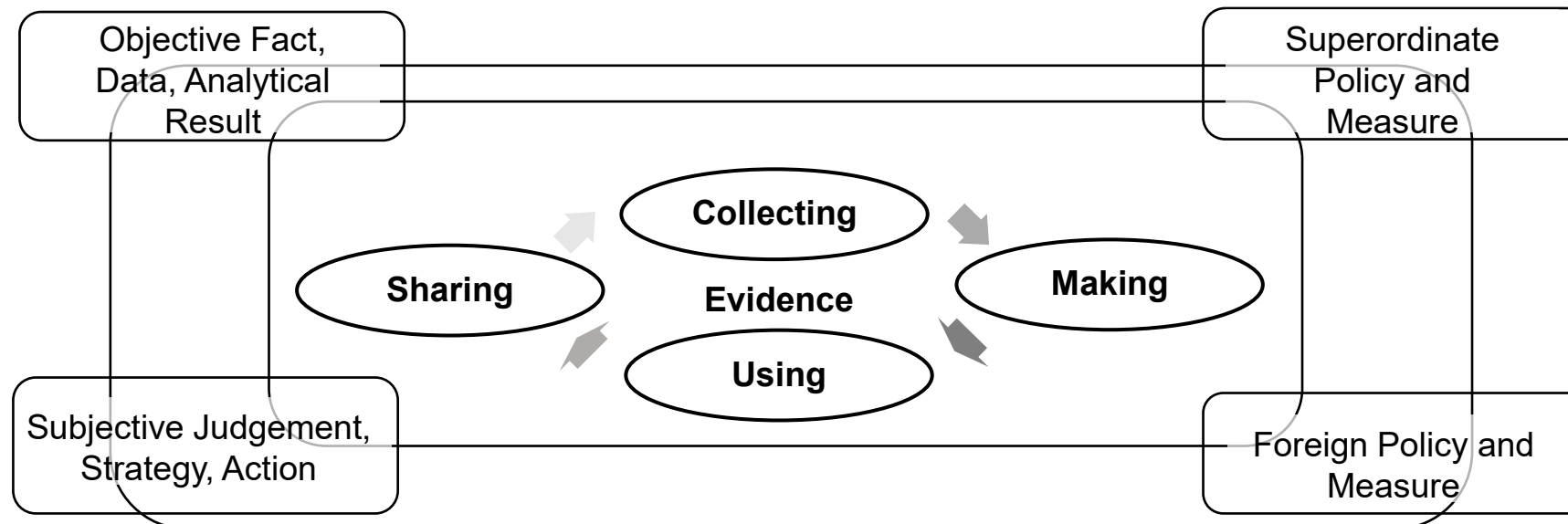
Energy

Identifying bottlenecks and solutions for transformation to sustainable energy system.

Ex.) Hydrogen Economy
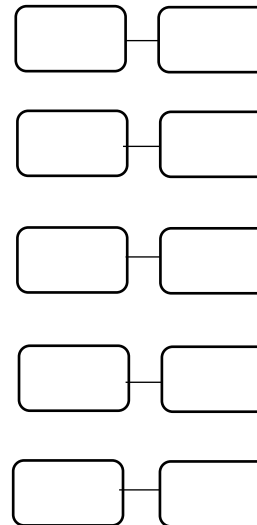
Hydrogen-related technologies and devices

Economy of scale →

Economy of scope ↓

- Hydrogen power generation
- Hydrogen-steel
- Green chemistry
- Energy Storage
- Aviation and Marine Fuel
- Fuel-cell electric vehicle
- Fuel-cells for houses and buildings
- Agri and synthetic foods

Hydrogen Energy Systems

elemental technologies and devices

supply chain

- manufacture
- conversion
- transport
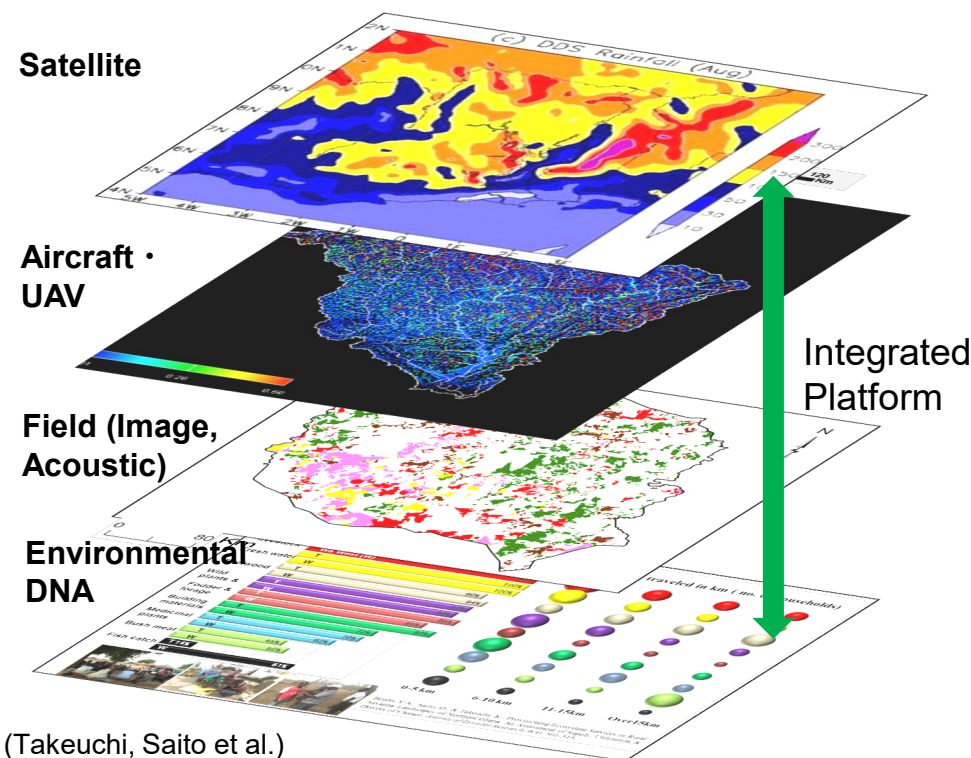- storage
- use

Hydrogen Economy & Society

- Cost
- Market
- Business development
- Environment (GHGs etc.)
- Economy (stable supply, macroeconomy)
- Security (energy self-sufficiency rate)
- etc.

Rules: GHG emission regulations, carbon pricing (carbon tax, credits, cross-boarder adjustment mechanism), certification, disclosure, procurement standards, investment standards, etc.
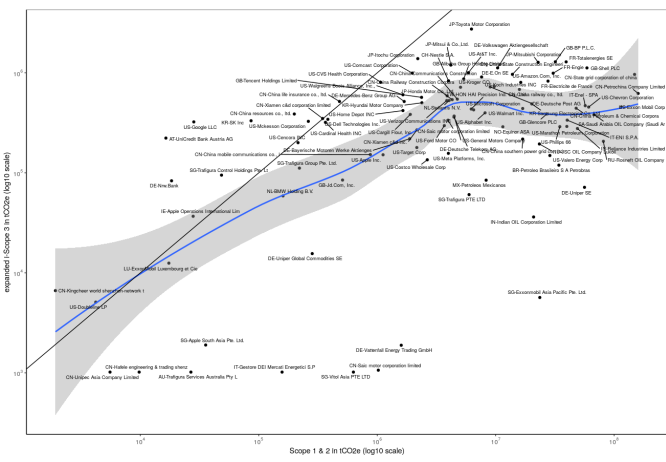
Nature

Capitalizing natural capital and promoting investments for protecting nature.

Monitoring, Reporting, & Verification

Satellite

Aircraft・UAV

Field (Image, Acoustic)

Environmental DNA

(Takeuchi, Saito et al.)

Integrated Platform

Biodiversity, Water, Soil, Nutrients etc.

Valuation & Finance

Which investment has the impact on nature?
Who should have the responsibility to protect nature in supply chain and financial chain?
What policy is needed to capitalize natural asset?

Solution Development for Nature Positive Economy

✓ Gene Editing
✓ Precision Agriculture with IoT
✓ Synthetic Biology
✓ Soil Management
✓ Water Management
✓ Regenerative Agri.
✓ Forest, Food, Mining system transformation

Food

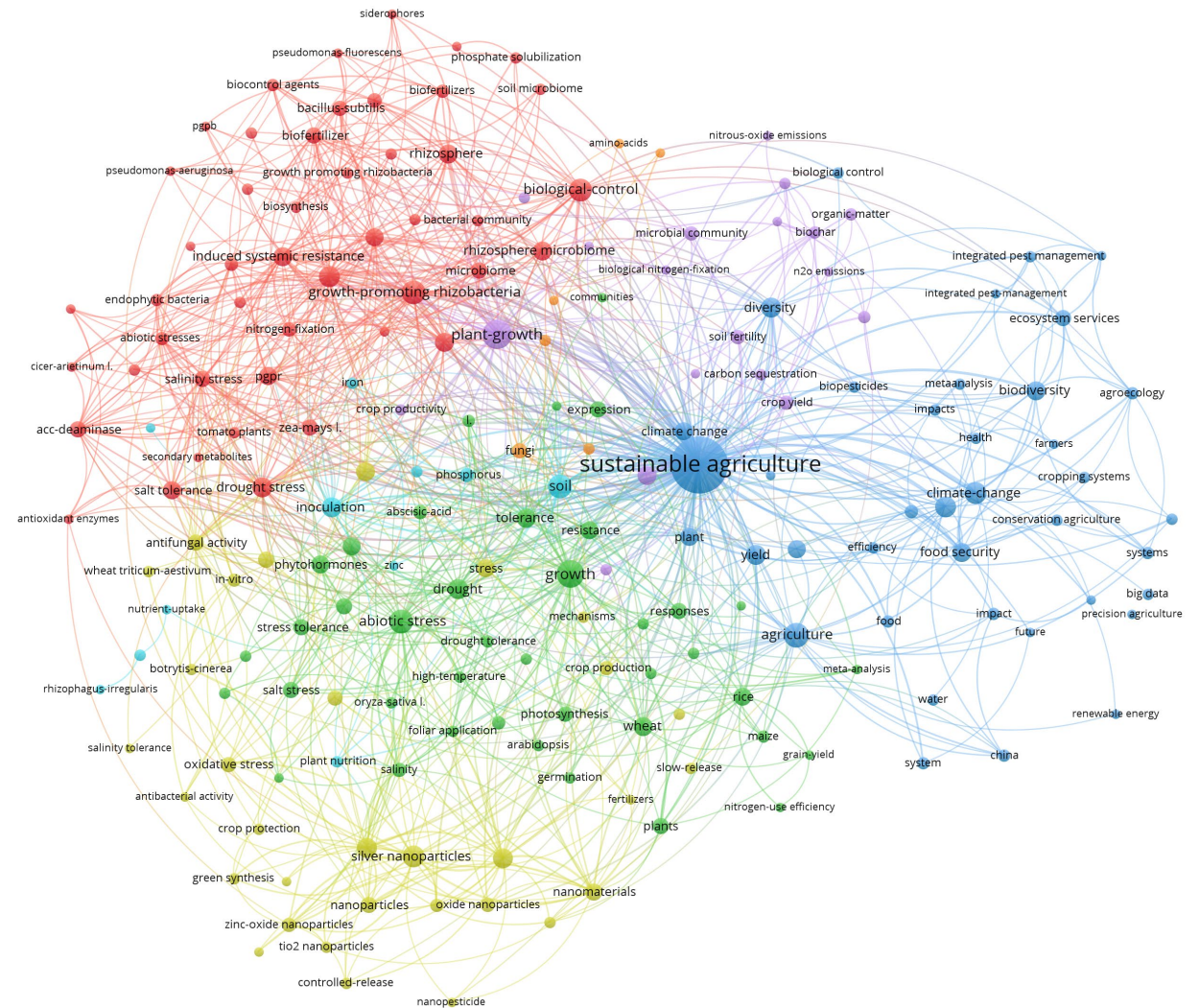## What should be future food system?

Upstream
- ✓ Seeding/Cropping
- ✓ Cultivation/Feeding/Harvesting
- ✓ Agricultural machinery
- ✓ Water/Soil management

Midstream
- ✓ Collecting
- ✓ Manufacturing
- ✓ Logistics
- ✓ Circular use of agricultural residues

Downstream
- ✓ Diet
- ✓ Culture
- ✓ Food waste
- ✓ Animal welfare
- ✓ Ethical consumption

Beef, Dairy, Rice, Coffee, Palm oil, Cacao, etc.

Health

Core challenge of CAD
= Cancer detection/diagnosis
→ Mental Health and Brain Health

Accumulated Evidence between
Body Health, Mental Health, and Brain Health

Emerging Research in
- Brain & gut microbiome connections.
- Blood-Brain Barrier

Policy proposal for new institutions in
Brain Health Check and Brain Augmentation
are essential for our quality of life (QoL) and also for
opening business and innovation opportunities

It is also crucial for well-being and creativity of us and
corporate productivity and sustainability.

Trend of CAD (Computer-Aided Diagnosis) Research

Takahashi & Kajikawa, *Intl. J. Med. Info.* (2017)
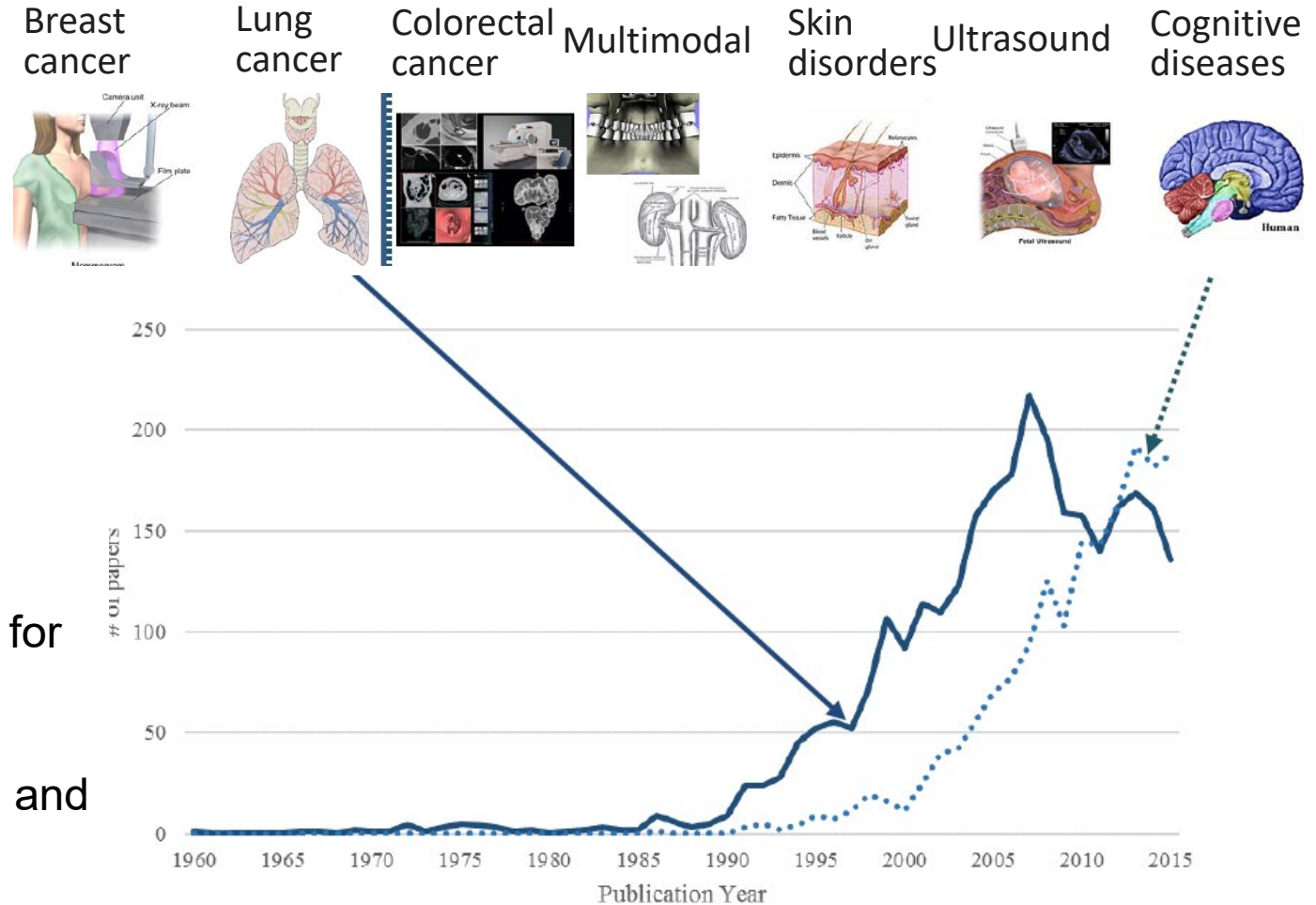
AI

➢ AI for Automation of AI

- ✓ How to enlarge the scope of AI application in innovation processes from R&D, demonstration, deployment, commercialization, and decision making processes there?
- ✓ How to differentiate strategies?
- ✓ How to incorporate governance scheme?
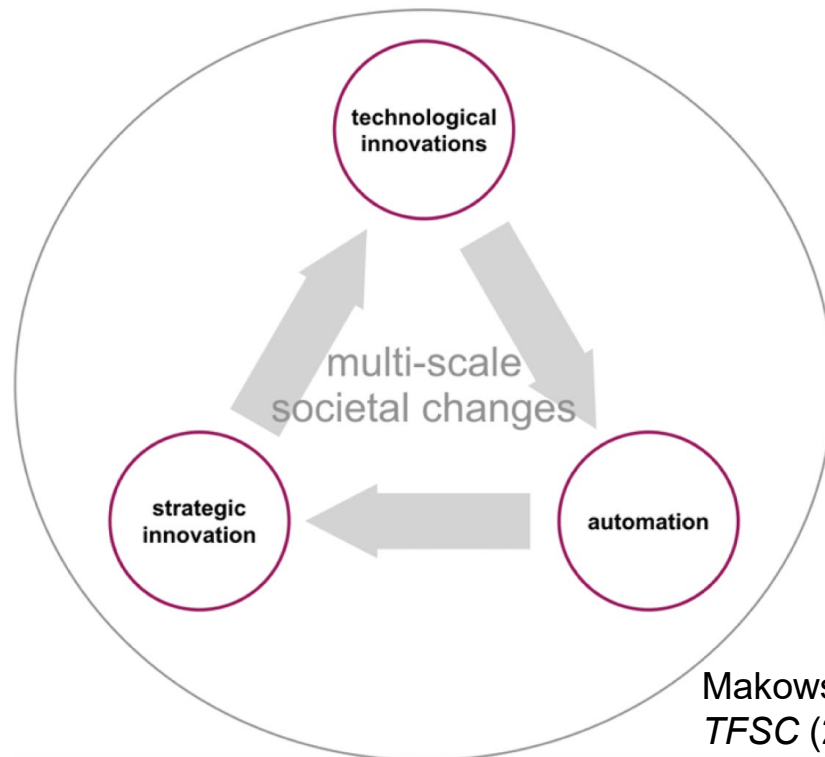
Makowski & Kajikawa, *TFSC* (2021).

➢ AI for Design

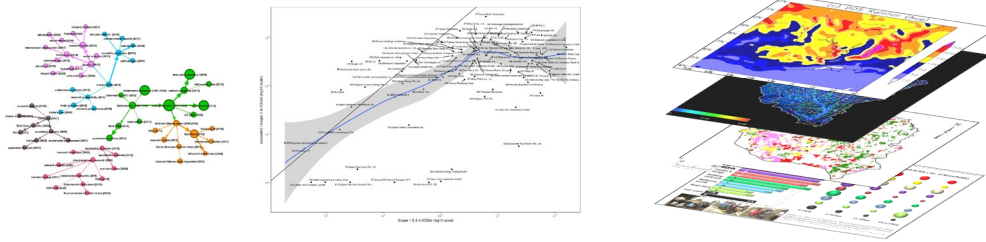AI use for design management, design choice, and design results at multiscale level
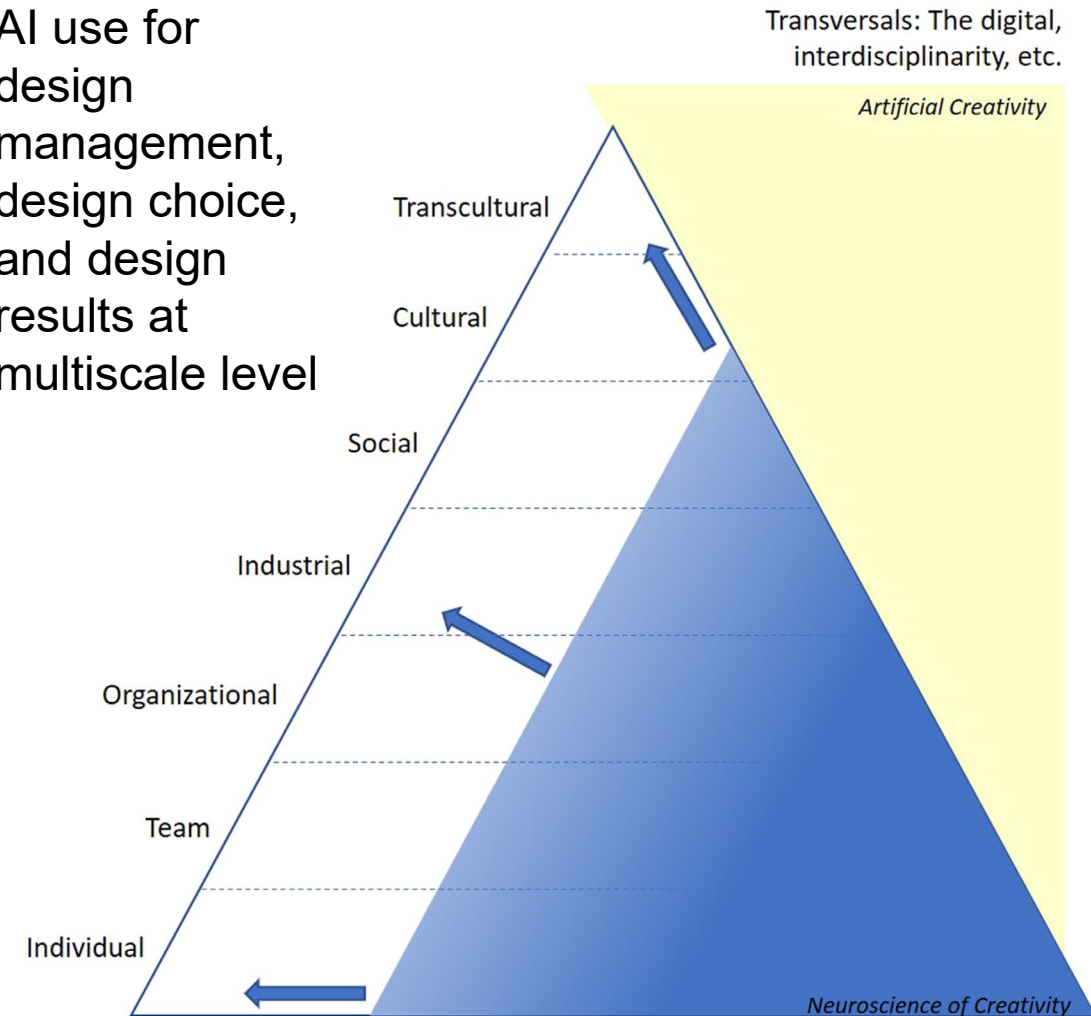
Mejia, D'Ippolito, & Kajikawa, *Creat. Innov. Manag.* (2021).

Innovation System

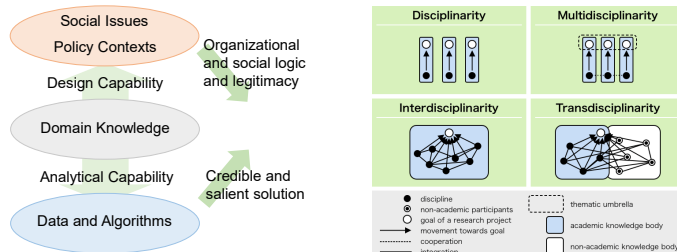## Toward Science-based Innovation Processes

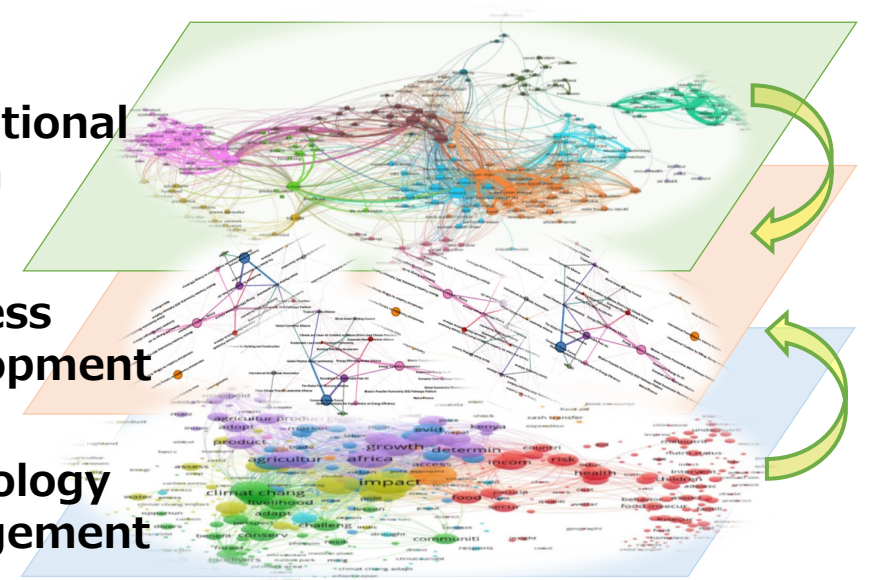➤ **Factual Data and Predictable Evidence**

➤ **Credible Theory and Methods**

Technology | Business | Society/Environment

R&D Management
Technology Intelligence, R&D strategy & planning; Industry-academia collaboration; Bibliometrics, etc.

Business Planning
Entrepreneurship, New business planning; ; Business model; Business strategy; etc.

Public Policy
Innovation programs; Regional clusters; Industrial policy; Regulation, International rule-making etc.

Corporate Management
Ambidextrous management; M&A; Business intelligence; Business ecosystem, Decision making etc.

Social Innovation
Innovation system; Sustainability; Carbon-neutral, Nature-positive, Circular Economy, Health etc.

➤ **Professional with Salient Expertise**

Social Issues
Policy Contexts
Design Capability
Domain Knowledge
Analytical Capability
Data and Algorithms

Organizational and social logic and legitimacy

Credible and salient solution

Disciplinarity | Multidisciplinarity
Interdisciplinarity | Transdisciplinarity

● discipline
◉ non-academic participants
○ goal of a research project
→ movement towards goal
⋯ cooperation
— integration

thematic umbrella
academic knowledge body
non-academic knowledge body

Institutional Design

Business Development

Technology Management

➤ **Trusted Network and Community**

Hub