R&D policies for better post-pandemic futures: new approaches and tools

Thursday 20 May 2021

Ministry of Economic Affairs and Employment of Finland

VTT

OECD

R&D policies for better post-pandemic futures: new approaches and tools

WORKING PARTY ON INNOVATION AND TECHNOLOGY POLICY

Introduction to the evidence session: Welcome and a few words on the case study on Finland

Arho Suominen

Principal Scientist, Quantitative Science and Technology Studies, Foresight-driven Business Strategies, VTT Technical Research Centre of Finland
@ArhoSuominen

20 May 2021

Ministry of Economic Affairs and Employment of Finland

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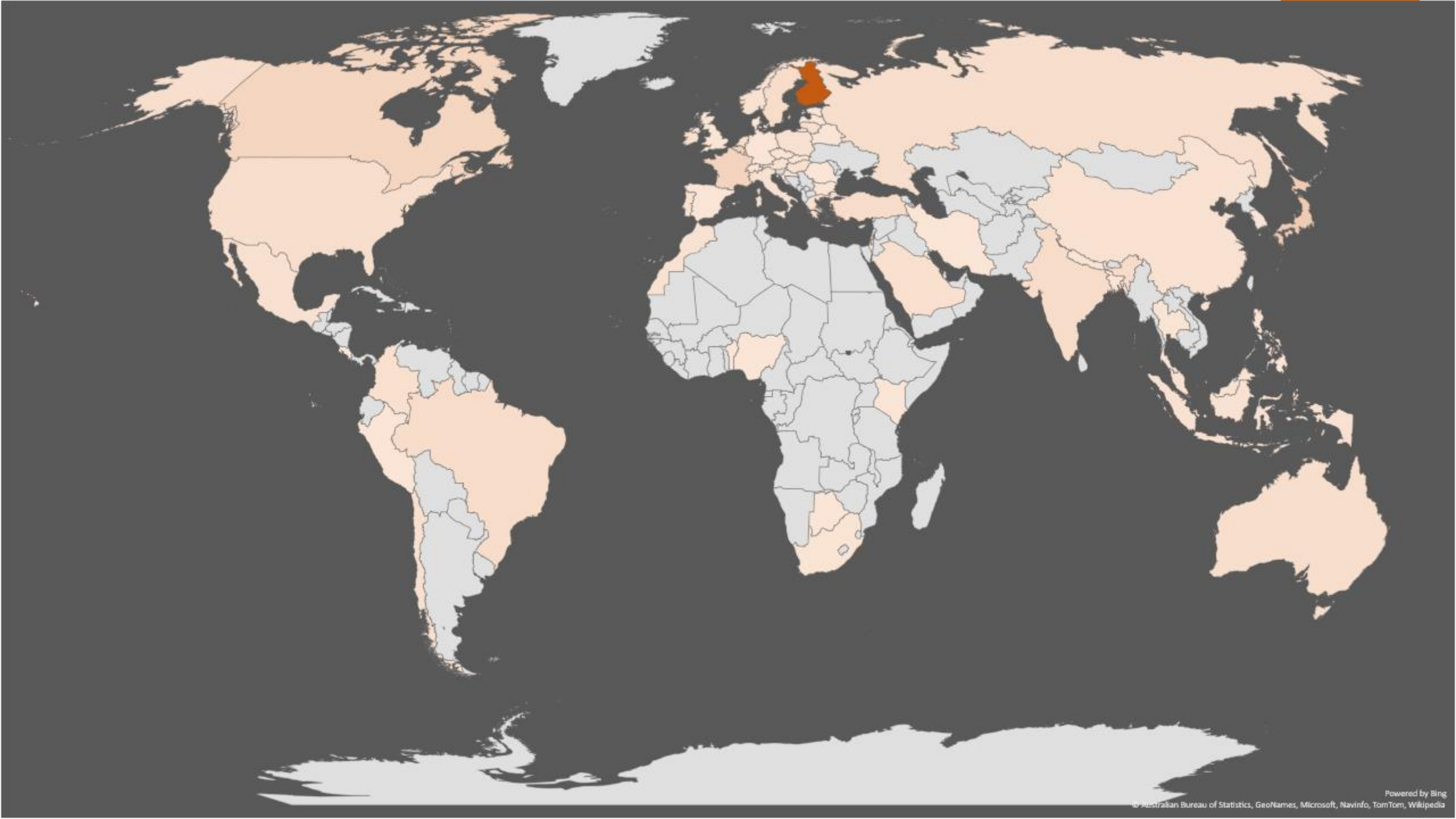
BETTER POLICIES FOR BETTER LIVES

Welcome to the global event!

#R&Dfutures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Fostering R&D intensity in Finland: policy experience and lessons learned

Country case study contribution to the OECD TIP project on R&D intensity

Matthias Deschryvere, Kai Husso and Arho Suominen

Please cite as:
Deschryvere, Husso and Suominen (2021) "Fostering R&D intensity in Finland: Policy experience and lessons learned", Country case study contribution to the OECD TIP project on R&D intensity, available at: https://community.oecd.org/community/cstp/tip/rdintensity

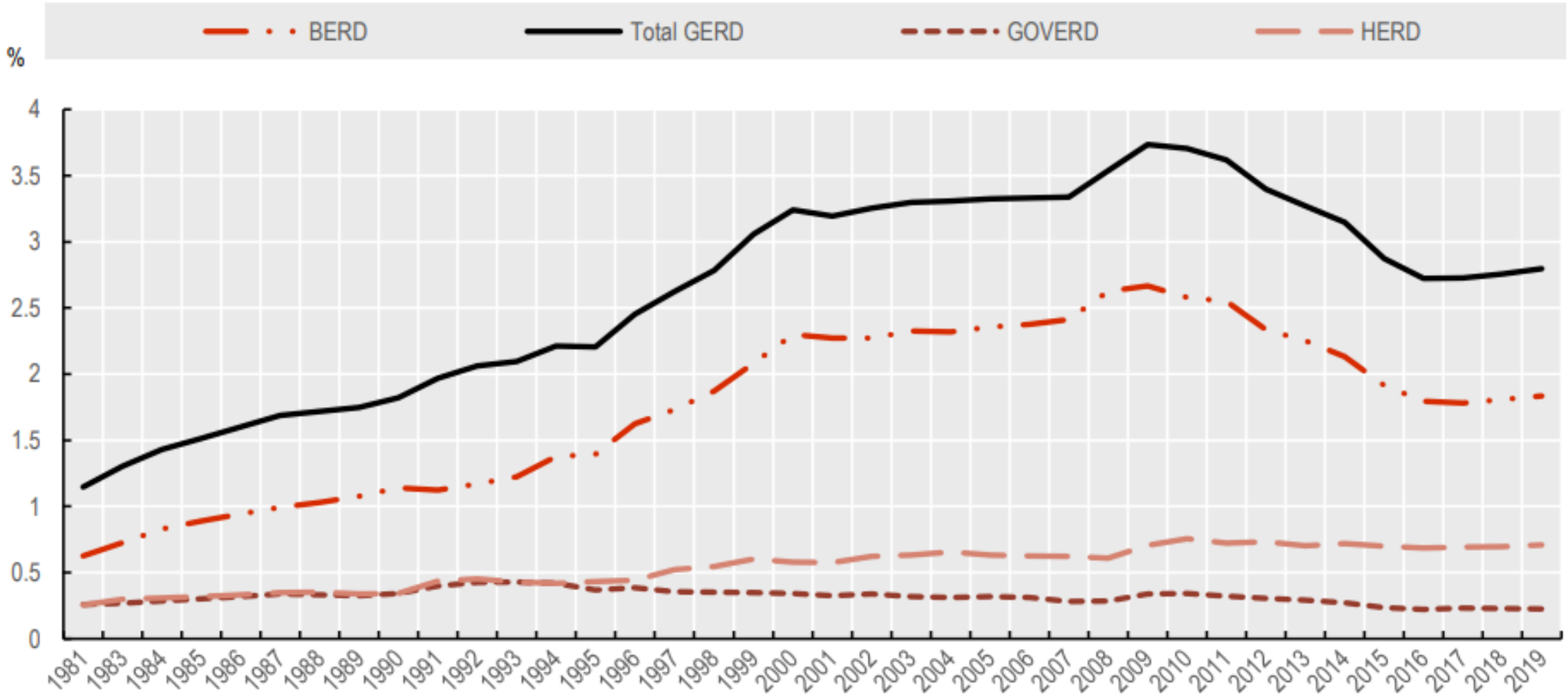
OECD

OECD's project on R&D intensity as a policy target – the Finnish experience

- We studied the Finnish national policy experience in fostering public and private investments in R&D and the development of Finnish policies for STI.
- We also participated in a peer exchange with other participating countries to reflect on the learnings of the process.

Finland has almost half a century of experience with national R&D target setting and its implementation

Finland's R&D intensity by performing sector



The ability of STI policy to shape changes in STI policy frame-works highly depends on the level of political commitment and the mandate of the institutions in charge of implementing reforms.

Country cases – shared issues and differences

- The case study countries have many differences, such as
  - Using R&D intensity as a policy target or not
  - Very different history in R&D intensity and its current level
  - Contextual factors, such as industry structure.
- Even with the differences the joint work was extremely productive
  - Much to learn on practical measurements and targets for R&D policy. These will extend from intensity (quantity) to quality.
  - Much is shared between the countries on inequalities extending to industries, companies, regions etc.

Caroline Paunov

Head of Secretariat for the OECD Working Party on Innovation and Technology Policy, OECD Directorate for Science, Technology and Innovation

#R&Dfutures

Welcome to the final launch event of the OECD-TIP **R&D intensity project (2019-20)**

Objectives of the event:

- **Launch the outputs** of the 2019-20 TIP project on R&D intensity, including 2 recent policy papers and a series of 11 case studies

- Bring together scholars, policy makers, industry representatives & other experts to discuss about the **future of R&D policy after COVID-19**, incl. changes in priorities and approaches, and how to effectively implement them

Summary of project outputs (1/2)

Stream of work	Project outputs
1 Country policy experiences in targeting R&D intensity	**11** case studies **1** synthesis report **1** policy paper **1** workshop
3 R&D performance and disparities	**1** policy paper **1** workshop
4 R&D intensity targets in the digital age	**1** policy paper **2** workshops

Summary of project outputs (2/2)

4 **The impacts of COVID-19 on STI systems**

2 policy papers
2 workshops and final launch event
6 TIP talks
Contribution to STI Outlook & OECD COVID-19 Watch

R&D policies for better post-pandemic futures: new approaches and tools

WORKING PARTY ON INNOVATION AND TECHNOLOGY POLICY

Day 1 (20 May)

12h45-15h30 CEST

Panel 1. The digitalisation of science and innovation in the time of COVID-19: opportunities and challenges for industrial inclusiveness

Panel 2. The changing nature of innovation policies: moving towards systems transformation approaches

Day 2 (21 May)

12h45-15h30 CEST

Opening and keynote address

Panel 3. Industry perspectives on R&D activities and policy support

High-level policy roundtable. Innovation and innovation policy post-COVID-19

Panel 1. The digitalisation of science and innovation in the time of COVID-19: opportunities and challenges for industrial inclusiveness

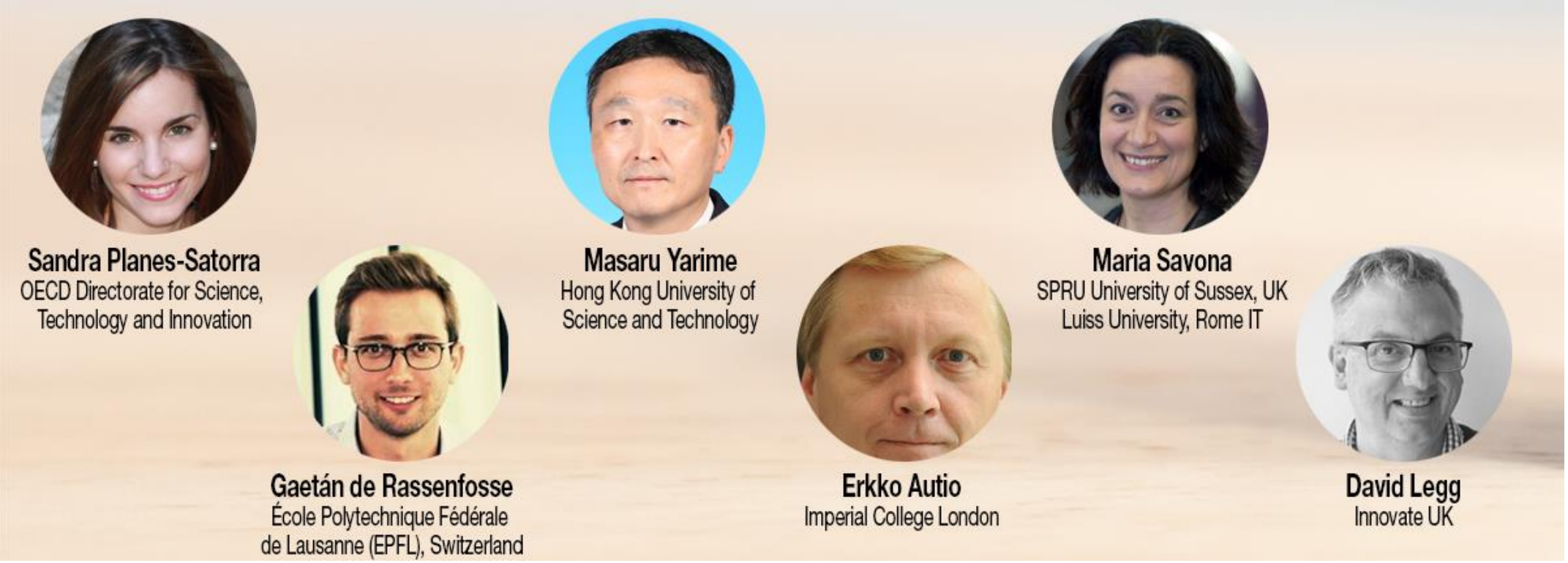
20 May 2021 | 13h10 - 14h05 CEST

- What are the positive and less desirable implications of accelerated digitalization for the **inclusiveness** of STI ecosystems?
- What **role should policy play** in ensuring these processes are industrially inclusive ?
- What is the **role of R&D** as digitalization changes the nature of innovation? How do traditional business R&D and digitalization processes interact?

Panel 2. The changing nature of innovation policies: moving towards systems transformation approaches

20 May 2021 | 14h20 - 15h15 CEST

- How can systems transformation approaches be **implemented in practice**?
- Which **capabilities** will we need at the policy end to implement such approaches?



Opening of day 2 and keynote address

21 May 2021 | 12h45 - 13h30 CEST

Dirk Pilat

Deputy Director

OECD Directorate for Science, Technology and Innovation

Antti Vasara

President of EARTO

CEO of VTT

Member of the Finnish Research and Innovation Council (TIN)

Panel 3. Industry perspectives on R&D activities and policy support

21 May 2021 | 13h30 - 14h20 CEST

- What are the **challenges industry faces regarding R&D** in general? Are there specific challenges emerging in the COVID-19 context? What type of policy support would industry require?
- How can industry best support moving towards more **sustainable, inclusive and resilient futures**?

Jaakko Hirvola
Technology Industries of Finland

Annu Nieminen
Upright

Timo Ahopelto
Lifeline Ventures

Gerhard Huemer
SMEunited

High level roundtable.

Innovation and innovation policy post-COVID-19

21 May 2021 | 14h35 - 15h25 CEST

- How has COVID-19 **changed practices, priorities, and objectives** in policies to promote R&D?
- Are there **new types of policy instruments** being implemented? What do we know about their impacts thus far?

Julien Guerrier
Director of the Common Policy Centre, DG Research and Innovation, European Commission

Michiel Sweers
Director of Innovation and Knowledge, Ministry of Economic Affairs and Climate Policy, The Netherlands

István Szabó
Vice President for Science and International Affairs, National Research, Development and Innovation Office of Hungary

Carlo Andrés Altamirano Allende
Head of Planning, Communication and International Cooperation, National Council on Science and Technology, Mexico

Enjoy the event!

Find the agenda:
vttresearch.com/rd-post-pandemic

Find all TIP project outputs:
oe.cd/tiprd

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BETTER POLICIES FOR BETTER LIVES

PANEL 1
The digitalisation of science and innovation in the time of COVID-19: opportunities and challenges for industrial inclusiveness

Margherita Russo,Caroline Paunov,
Paavo Ritala, Marianne Saam, Nathan Brown,
Wonjoon Kim

#R&Dfutures

R&D policies for better post-pandemic futures: new approaches and tools

WORKING PARTY ON INNOVATION AND TECHNOLOGY POLICY

The digitalization of science and innovation in the time of COVID-19: opportunities and challenges for industrial inclusiveness

Caroline Paunov

Head of Secretariat for the OECD Working Party on Innovation and Technology Policy

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BETTER POLICIES FOR BETTER LIVES

COVID-19 has accelerated the digitalisation of science and innovation processes

New forms of **knowledge exchange & collaboration:**

- Work from home
- Virtual conferences, training and research collaboration activities

Acceleration of automation and **business adoption of digital tools** to respond to new demands (e.g. health and education sectors during the pandemic)

Opportunities for enhanced efficiency but also challenges for inclusiveness

Social inclusiveness

Opportunities for greater inclusion in STI:

- **Remote work** enables wider engagement in STI (e.g. women, individuals in remote areas)
- **Online conferences** are more accessible and reach more diverse audiences

Risks of exacerbation of existing disparities:

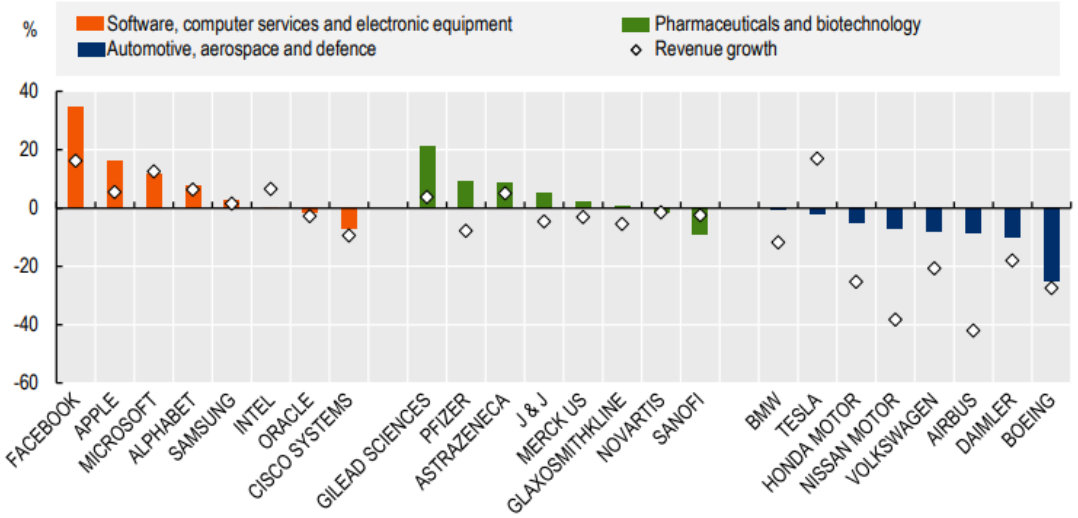
- Closure of education facilities reinforces **digital divide**
- Reinforcement of **"superstar"** phenomenon in research systems
- Difficult for **young researchers** to build networks in virtual worlds

Challenges for industrial inclusiveness

Trends :

- Unequal opportunities & **preparedness to leverage digital tools:** differences in absorptive capacities & financial resources for investments

Reported R&D expense and revenue growth, selected R&D companies, April to September 2020 (Percentage change with April to September 2019)



Source: OECD Science, Technology and Innovation Outlook 2021

Possible impacts:

- Risk of **widening gaps** in future innovation performance across and within sectors
- Higher **market concentration** ('winner-take-all dynamics')
- Changes in the **direction of innovation** and technological change

Questions

- What **role should policy play** in ensuring the process of digitalization of science and innovation is industrially inclusive (i.e. do not leave innovative SMEs and other actors behind)?
- What is the **role of R&D** as digitalization changes the nature of innovation? How do traditional business R&D and digitalization processes interact?

Panel 1 will address some of these questions

Nathan Brown
Confederation of British Industry (CBI), UK

Caroline Paunov
OECD Directorate for Science, Technology and Innovation

Wonjoon Kim
Korea Advanced Institute of Science and Technology (KAIST)

Paavo Ritala
LUT University, Finland

Margherita Russo
University of Modena and Reggio Emilia, Italy

Marianne Saam
Ruhr University Bochum, Germany

Find out more in our recent papers

References:

Paunov, C. and S. Planes-Satorra (2021), "**Science, technology and innovation in the time of COVID-19**", *OECD Science, Technology and Industry Policy Papers*, No. 99, OECD Publishing, Paris, https://doi.org/10.1787/234a00e5-en

Paunov, C. and S. Planes-Satorra (2021), "**What future for science, technology and innovation after COVID-19?**", *OECD Science, Technology and Industry Policy Papers*, No. 107, OECD Publishing, Paris, https://doi.org/10.1787/de9eb127-en.

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Paavo Ritala

Professor of Strategy and Innovation, LUT University, Finland

#R&Dfutures

OECD-VTT EVENT

THE DIGITALIZATION OF SCIENCE AND INNOVATION IN THE TIME OF COVID-19: OPPORTUNITIES AND CHALLENGES FOR INDUSTRIAL INCLUSIVENESS

ORGANIZATIONAL PERSPECTIVE

Paavo Ritala

Professor of Strategy & Innovation | LUT School of Business and Management

ritala@lut.fi

Twitter: @PaavoRitala

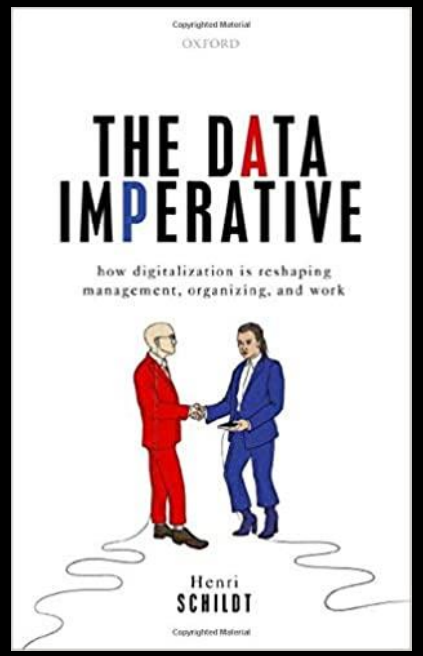
DIGITALIZATION AS NEW TECHNOLOGIES OF ORGANIZING

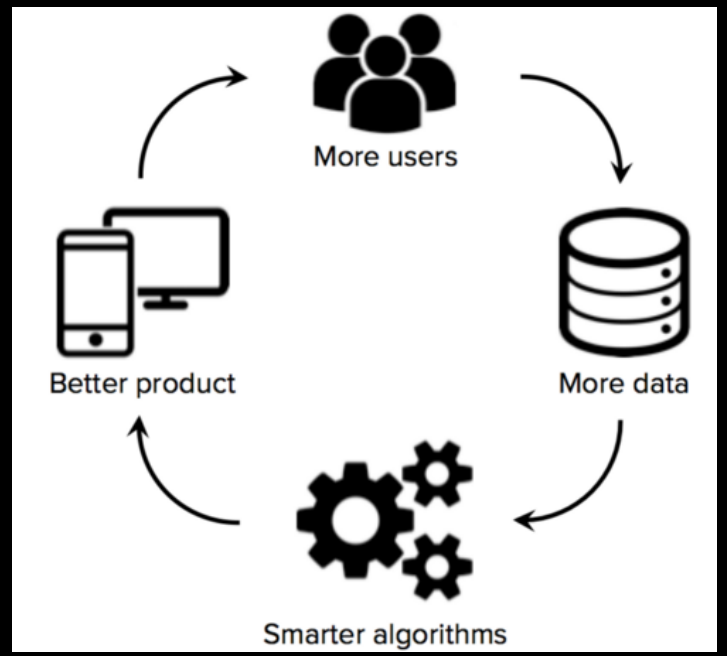
Digital omniscience:

- Ability to collect and analyze data on organizational processes, customers and partners

Digital omnipotence:

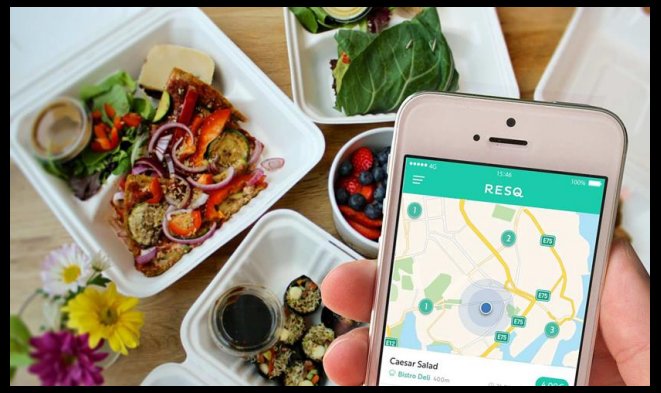
- Ability to control all business processes, as well as software, physical equipment, and humans, based on data





DIGITALIZATION AS NEW FORMS OF ORGANIZING

- **Internal organizing via effective use of data and analytics**
- **External organizing via platforms, interfaces, and APIs**
- **In practice:** new digital business models emerge, including digital channels and new means to create, capture and deliver customer value
- Access and ownership to data (e.g. customer data) and digital technologies (e.g. platforms and interfaces) creates major divergence between digital champions vs. digital laggards
- This development is long underway, but now facilitated by COVID-19



KEY TAKEAWAYS

COVID-19 as the ultimate crisis context:

- At the extreme, possibility to create and deliver customer value is *condititional* to the ability to do so via digital means
- A disruptive change in the business environment leads to reconfiguration of competitive advantages
- The change in business environment is **unevenly** distributed across industries and organizations
- Under crisis, strong get stronger, while those hit hardest by the crisis should aim to explore new opportunities*

Industrial inclusiveness is greatly challenged:

- Winner-take-all dynamics lead to centralization of data and resources to platform leaders
- Brand recognition and legitimacy of large companies is further highlighted in digital domain
- Non-digital firms, especially SMEs, are worse off, given the lack of resources to invest in digital architectures and business models
- Policy responses (e.g. in Finland) have helped businesses to build and invest in new digital business models and capabilities, but there is major divergence in the organizational readiness to do so

**Osiyevskyy, O., Shirokova, G., & Ritala, P. (2020). Exploration and exploitation in crisis environment: Implications for level and variability of firm performance. Journal of Business Research, 114, 227-239.*

Marianne Saam

Professor of Innovation Ecomonics and Policy at the Center for Entrepreneurship, Innovation and Transformation, Ruhr University Bochum, Germany

#R&Dfutures

Digitalization of German “Mittelstand” is broad-based but in small steps

- KfW surveys of German Mittelstand firms:
  SMEs and firms with < 50 Mio. € turnover.

- Half or more of large Mittelstand firms (> 50 employees) had finished digitalization projects during the 3-year periods 2014-2016 to 2017-2019.

- The share for firms with less than 50 employees was around one third.

- Average annual project expenditure:
  - 8.000 Euro for < 5 employees
  - around140.000 Euro for > 50 employees.

Source: KfW-Digitalisierungsbericht Mittelstand 2020
https://www.kfw.de/KfW-Konzern/KfW-Research/Digitalisierung.html

Innovation in reaction to the crisis is atypical

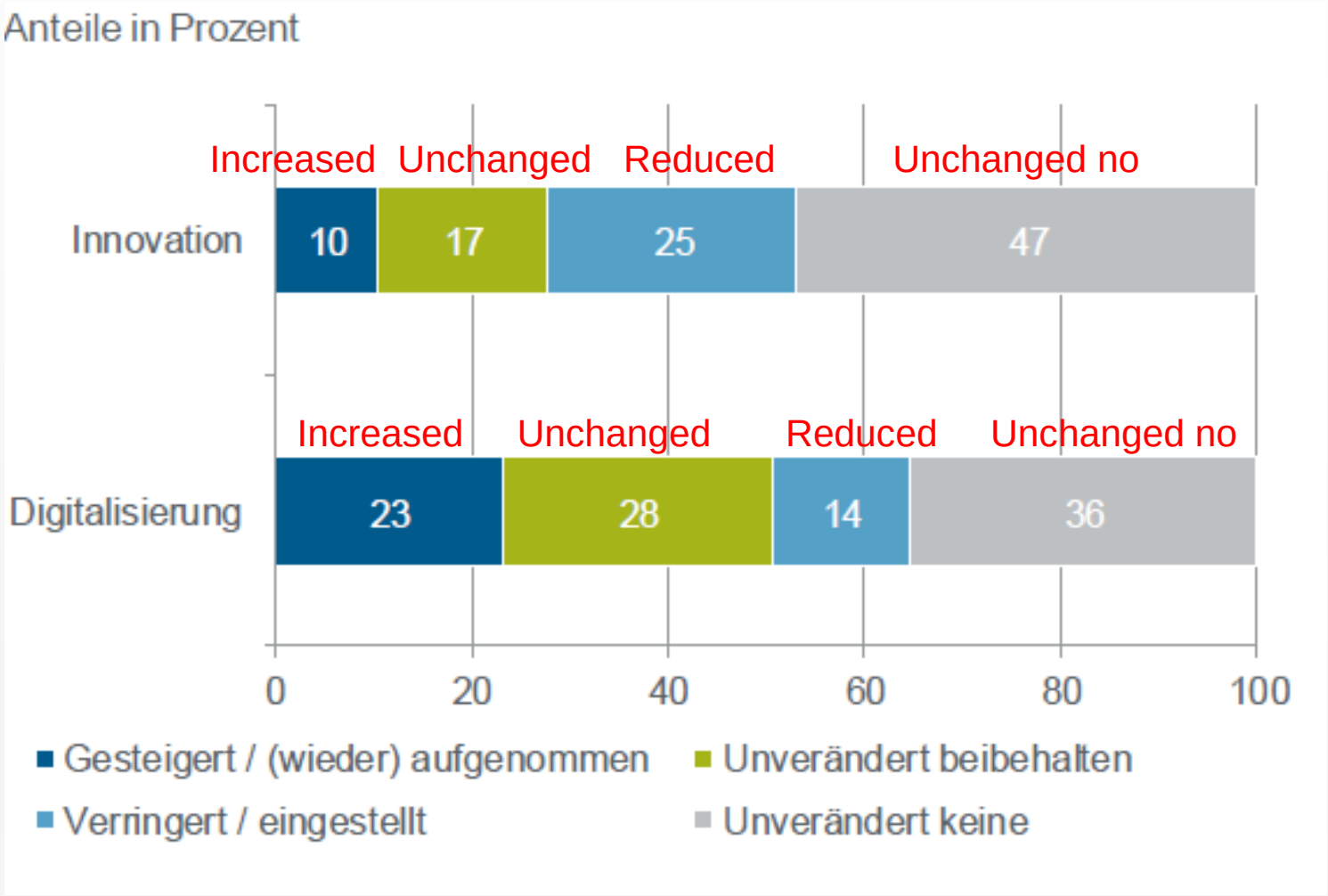
- In German „Mittelstand“ firms, innovations in reaction to the COVID crisis are atypical compared to non-crisis innovation.

- More frequently than in other times, innovators have:
  - Small firm size
  - Declining turnover
  - No own R&D

- Innovation in the crises seems more about preventing worse than about long-term productivity increase.

Source: Zimmermann (2020), KfW Research, https://www.kfw.de/KfW-Konzern/Newsroom/Aktuelles/News-Details_596544.html

Half a year into the crisis, more digitalization than innovation



Source: Zimmermann (2021), KfW Research, https://www.kfw.de/KfW-Konzern/Newsroom/Aktuelles/News-Details_596544.html

Nathan Brown

Senior Policy Adviser, Confederation of British Industry, UK

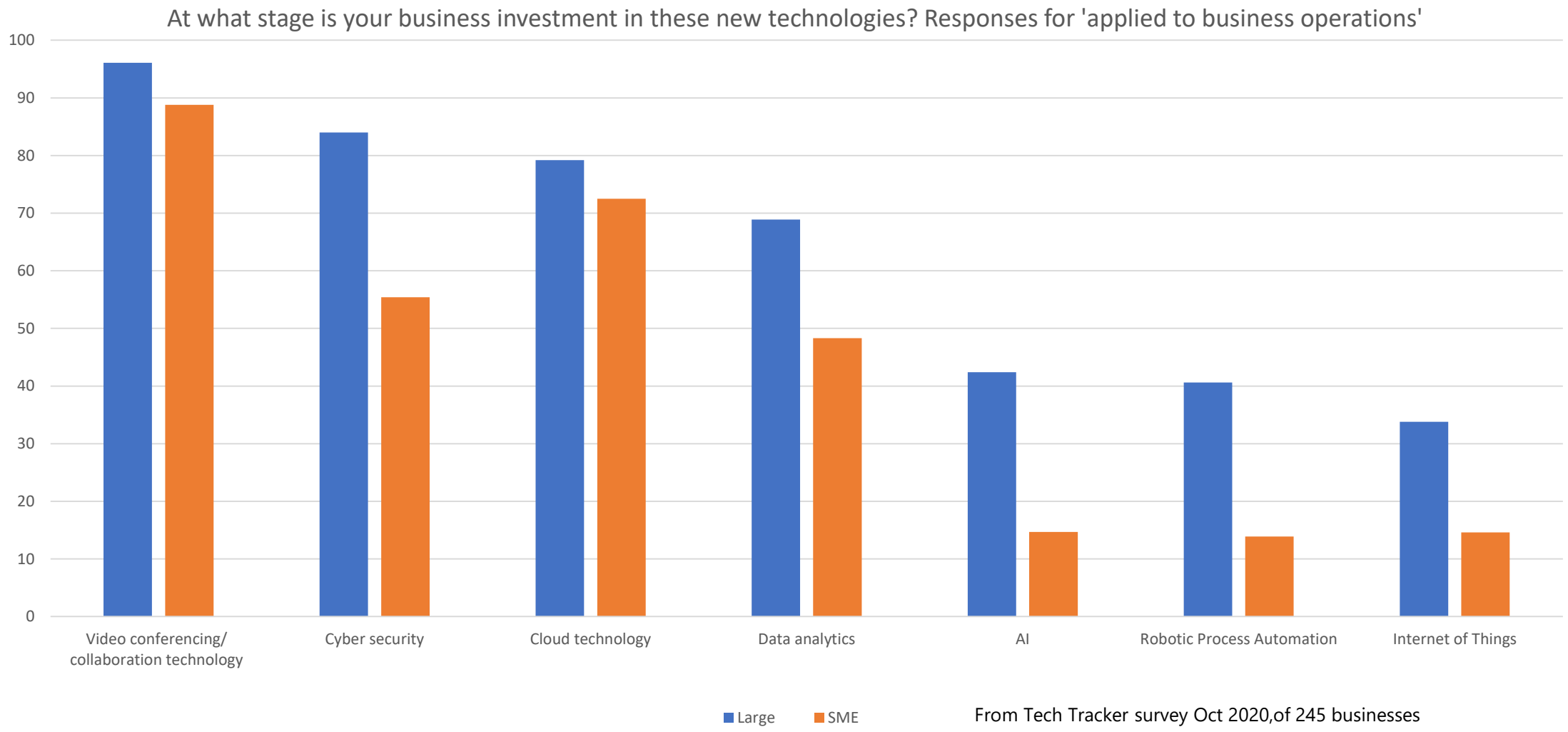
#R&Dfutures

CBI TECH TRACKER DATA:

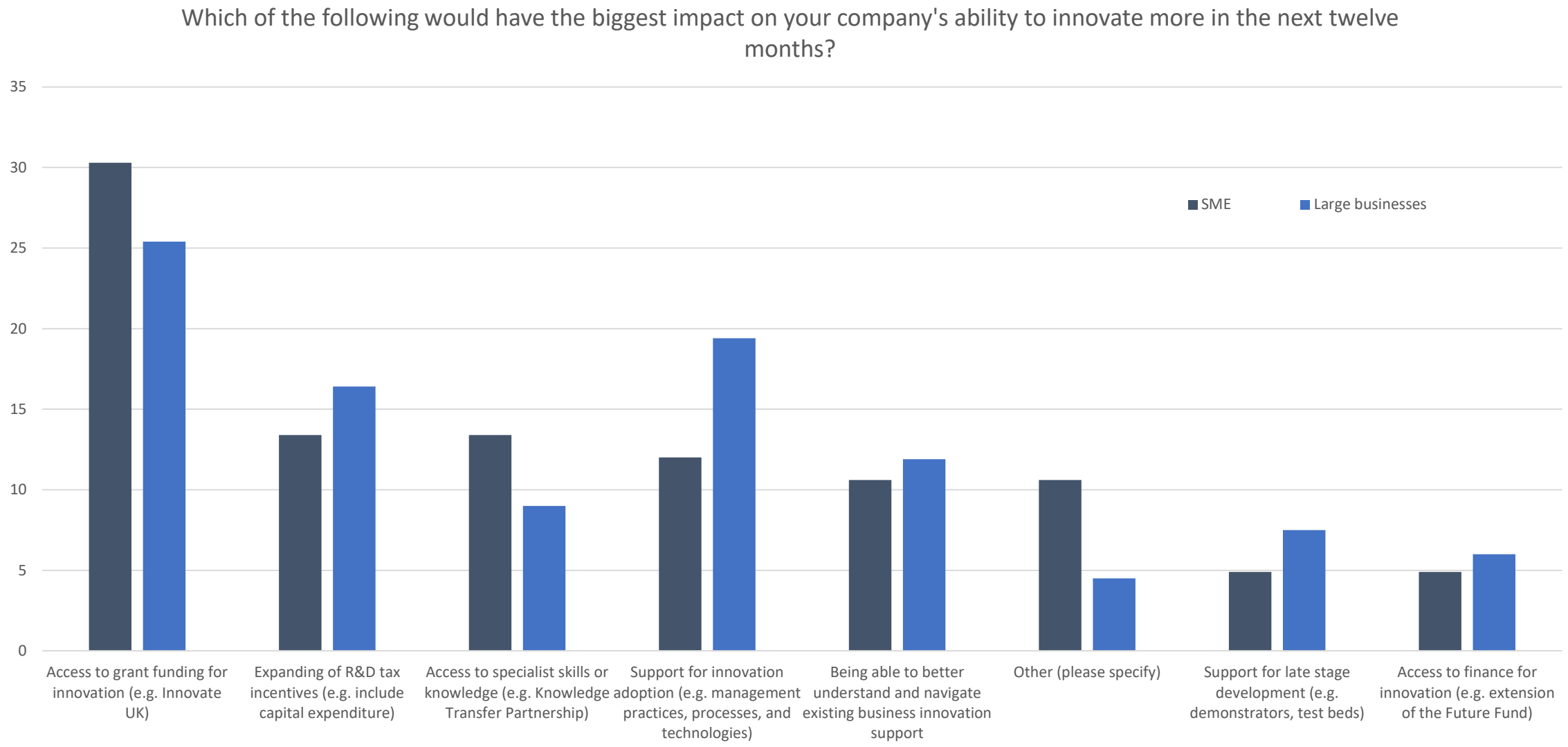
OECD PANEL - THE DIGITALIZATION OF SCIENCE AND INNOVATION IN THE TIME OF COVID-19

OPPORTUNITIES AND CHALLENGES FOR INDUSTRIAL INCLUSIVENESS

20.05.21



From Tech Tracker survey Oct 2020,of 245 businesses



From Tech Tracker survey Oct 2020,of 245 businesses

Wonjoon KIM

Head of the Graduate School of Innovation and Entrepreneurship, and Professor at the School of Business and Technology Management, Korea Advanced Institute of Science and Technology

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DIGITALIZATION AND STI POLICY

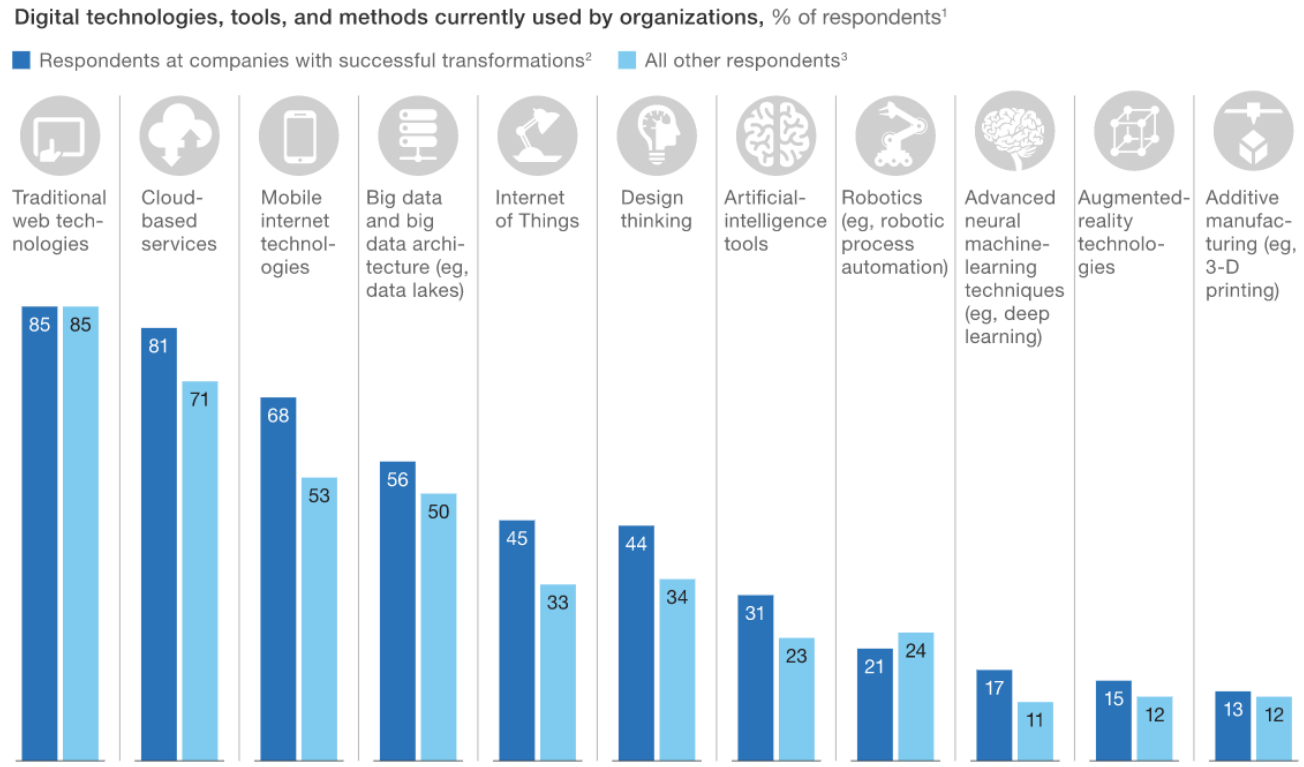
OECD WORKING PARTY ON INNOVATION AND TECHNOLOGY POLICY (TIP)
AND THE VTT TECHNICAL RESEARCH CENTRE OF FINLAND

MAY. 20. 2021

PROF. WONJOON KIM
KAIST
GRADUATE SCHOOL OF INNOVATION AND TECHNOLOGY MANAGEMENT

COVID19 AND DIGITALIZATION

- COVID19 and acceleration of 'Digitalization'
- Digitalization (IDC, Brookings, Forbes)
  - Digitize information, digitalize processes and roles that make up the operations of a business
  - Digitally transform the business and its strategy (digital transformation)



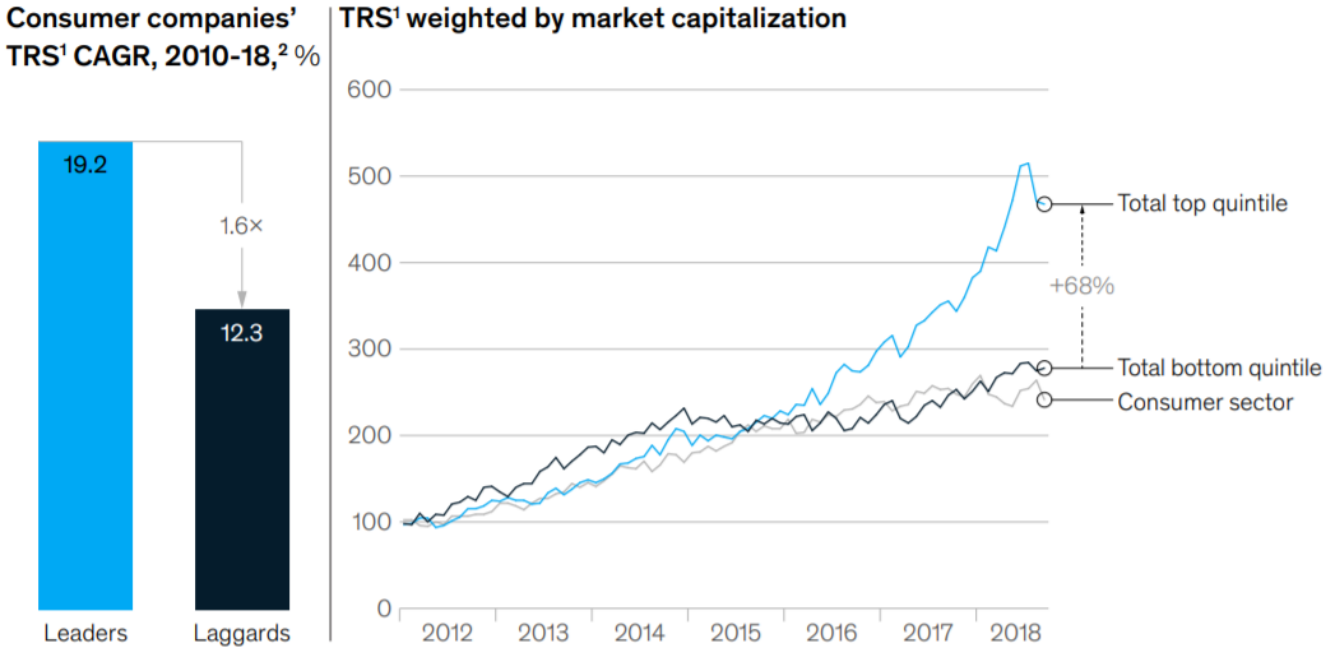
[1]Respondents who answered "other" or "don't know" are not shown.
[2]Respondents who say their organizations' transformations were very or completely successful at both improving performance and equipping the organizations to sustain improvements over time, n = 263.
[3]n = 1,258.

McKinsey&Company

DIGITALIZATION DIVIDE

- COVID19 and deepening 'Digital Divide'
- Digitalization (IDC, Brookings, Forbes)

Digital and analytics leaders outperform their competitors in total returns to shareholders.



[1]Total returns to shareholders.
[2]S&P 500 index, consumer sector.
Source: Capital IQ, McKinsey analysis

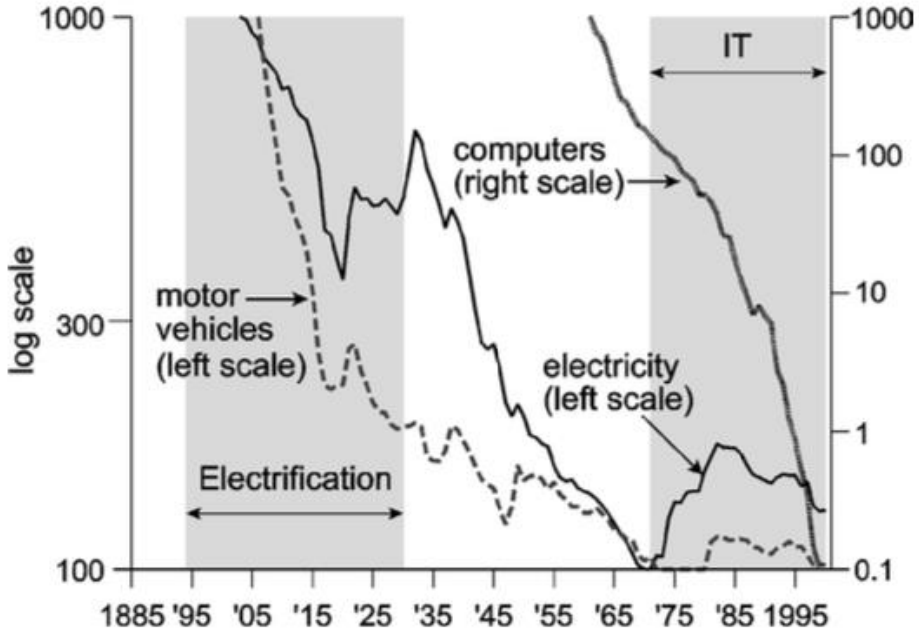
DIGITALIZATION AND GENERAL PURPOSE TECHNOLOGY (GPT)

- **General Purpose Technology (GPT) - Digital Technologies**
  - GPT is a technology that radically save labor time and cost as well as life pattern such as Internal combustion engine, **electricity**, computer, nano-technology

Bresnahan, Timothy F., and Manuel Trajtenberg. "General purpose technologies 'Engines of growth'?." *Journal of econometrics* 65.1 (1995)
Gambardella, Alfonso, and Anita M. McGahan. "Business-model innovation: General purpose technologies and their implications for industry structure." Long range planning 43.2-3 (2010)
Jovanovic, Boyan, and Peter L. Rousseau. "General purpose technologies." Handbook of economic growth. Vol. 1. Elsevier, 2005

DIGITALIZATION AND GENERAL PURPOSE TECHNOLOGY (GPT)

- **General Purpose Technology (GPT) - Digital Technologies**
  - GPT is a technology that radically save labor time and cost as well as life pattern such as Internal combustion engine, **electricity**, computer, nano-technology
  - **Characteristics**
    - **Pervasiveness: applied to various industries**
    - **Improvement Potential: cost reduction can be extensive under continuous innovation**
    - **Innovational Complementarities: become easy to introduce new business innovation, new product innovation, new process innovation**



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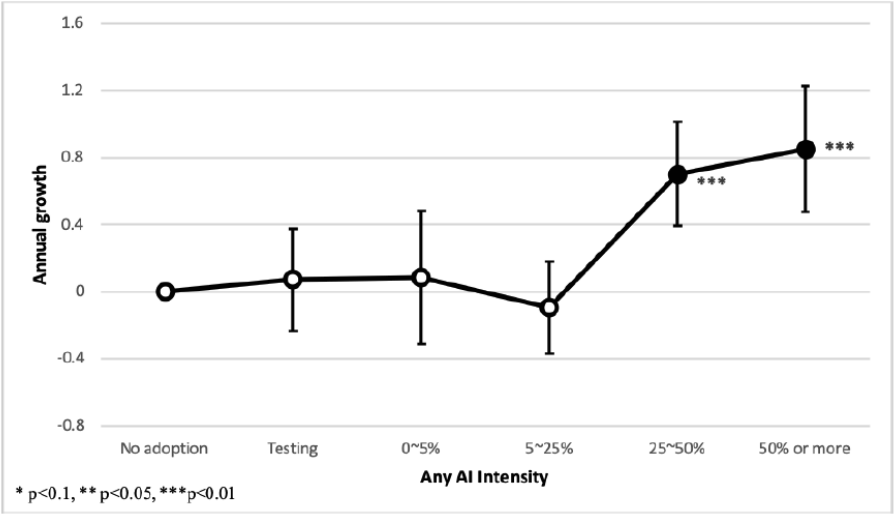
DIGITALIZATION AND *J*-CURVE

- **AI and firm performance** (Annual Revenue Growth) – ***J*-curve** (Wonjoon Kim et al. 2020)
  - 249 U.S. firms adopted AI out of 9,396 unique listed firms in 444 unique industries (SIC)
  - ***J*-Curve, Importance of Complementary Technologies (Cloud and Data Technologies)**

Figure 1A. Any AI



AI general / NLP / Computer Vision / Machine Learning

- **Challenges of Digitalization**
  - **Lack of IT infra and digital expertise**
  - **Difficulties in organizational changes**
  - **Lack of digitalization strategy**
  - **Limited Budget (due to COVID19)**

Yongsuk Lee, Taekyun Kim, Sukwoong Choi, and Wonjoon Kim. "Artificial Intelligence and Firm Performance." Stanford and *KAIST working paper* (2020)

DIGITALIZATION AND STI POLICY

- **What role should policy play in ensuring the process of digitalization?**

❖ **Digital Infra Policy (focusing on Human Infra)**

- Digitalization is GPT-based transformation affecting all the industries and businesses
- Therefore, leaving behind can be critical for firms and industries
- Industrial inclusiveness perspective, **to reduce the cost of transformation, digitalization infrastructure** and **human capital development** can be (most) effective to support businesses with less access to digitalization resources (infra and digitalization experts)
  - ex, Korea industry is in the phase of AI transformation across industries beyond the digital transformation, and the most challenging issue is the human capital, i.e. lack of AI experts

❖ **Deep Transformation Policy**

- Digitalization requires businesses to overcome *J*-curve challenges
- Policy for supporting the long/medium term-changes of business strategy, organization, human resources

DIGITALIZATION AND STI POLICY

- **What is the role of R&D as digitalization changes the nature of innovation? How do traditional business R&D and digitalization processes interact?**
  - **Two dimensions of digitalization**
    - Cost reduction (automation and augmentation)
    - New opportunity creation (new business creation)
  - **Digitalization also affect R&D process with…**
    - Strengthened 'analytical' power (automation and augmentation)
    - Creating new (business and technology) applications (new business creation)
  - **R&D merged with digitalization can be the key sources of new business creation and digital transformation**

nature

SPOTLIGHT · 30 MAY 2018

How artificial intelligence is changing drug discovery

Machine learning and other technologies are expected to make the hunt for new pharmaceuticals quicker, cheaper and more effective.

Thank you

Panel 2
The changing nature of innovation policies: moving towards systems transformation approaches

David Legg,
Sandra Planes-Satorra,
Erkko Autio, Maria Savona,
Gaetán de Rassenfosse and
Masaru Yarime

#R&Dfutures

David Legg

Regional Manager for London and South East England, Innovate UK, and Vice-Chair of the OECD TIP Working Party

#R&Dfutures

David Legg: Innovate UK

The changing nature of innovation policies: moving towards systems transformation approaches

https://youtu.be/rDls1R0wOtY

Innovate UK

ktn

Innovate UK EDGE

CATAPULT

COVID-19 one year on: from crisis comes innovation

To-date, our COVID-response has delivered £400 million of new investment to over 3,000 R&D-intensive businesses in every corner of the UK. Our specialists at Innovate UK EDGE have provided expert advice on finance, growth, and globalisation to a further 2,700 companies. These numbers grow day by day.

The UK's burgeoning appetite for innovation was also seen across our core-programmes; Smart Grants, Women in Innovation, Industrial Strategy Challenge Fund, Young Innovators etc. also saw double, sometimes triple-figure growth in applications.

UKRI Innovate UK

Industrial Strategy Challenge Fund

INDUSTRIAL STRATEGY

- Established as UKRI was forming as a new approach to UK R&D funding.
- **Industry-led**, with challenges selected to meet industry needs and a strong track record of securing match-funding.
- It takes a **challenge-led** approach, focusing on interdisciplinary societal and industrial challenges.
- Through this approach, we aim to **deliver the research and innovation that business needs to transform existing industries and create new ones**.

Ageing Society

Leading-edge healthcare (inc. medicines manufacturing)

Data to early diagnosis and precision medicine

Healthy ageing

Accelerating detection of disease

AI and Data Economy

National Satellite Test Facility

Audience of the future

Quantum technologies

Next generation services

Made smarter

Future of mobility

Self-driving vehicles

Manufacturing and materials of the future

Faraday battery challenge

Robots for a safer world

Driving the electric revolution

Future flight

Clean growth

Energy revolution

Transforming construction

Transforming food production

Industrial decarbonisation

Smart sustainable plastic packaging

Transforming Foundation Industries

Sandra Planes-Satorra

Policy Analyst, OECD Directorate for Science, Technology and Innovation

#R&Dfutures

R&D policies for better post-pandemic futures: new approaches and tools

WORKING PARTY ON INNOVATION AND TECHNOLOGY POLICY

The changing nature of innovation policies: moving towards systems transformation approaches

Sandra Planes-Satorra

Policy Analyst, OECD

20 May 2021

Ministry of Economic Affairs and Employment of Finland

VTT

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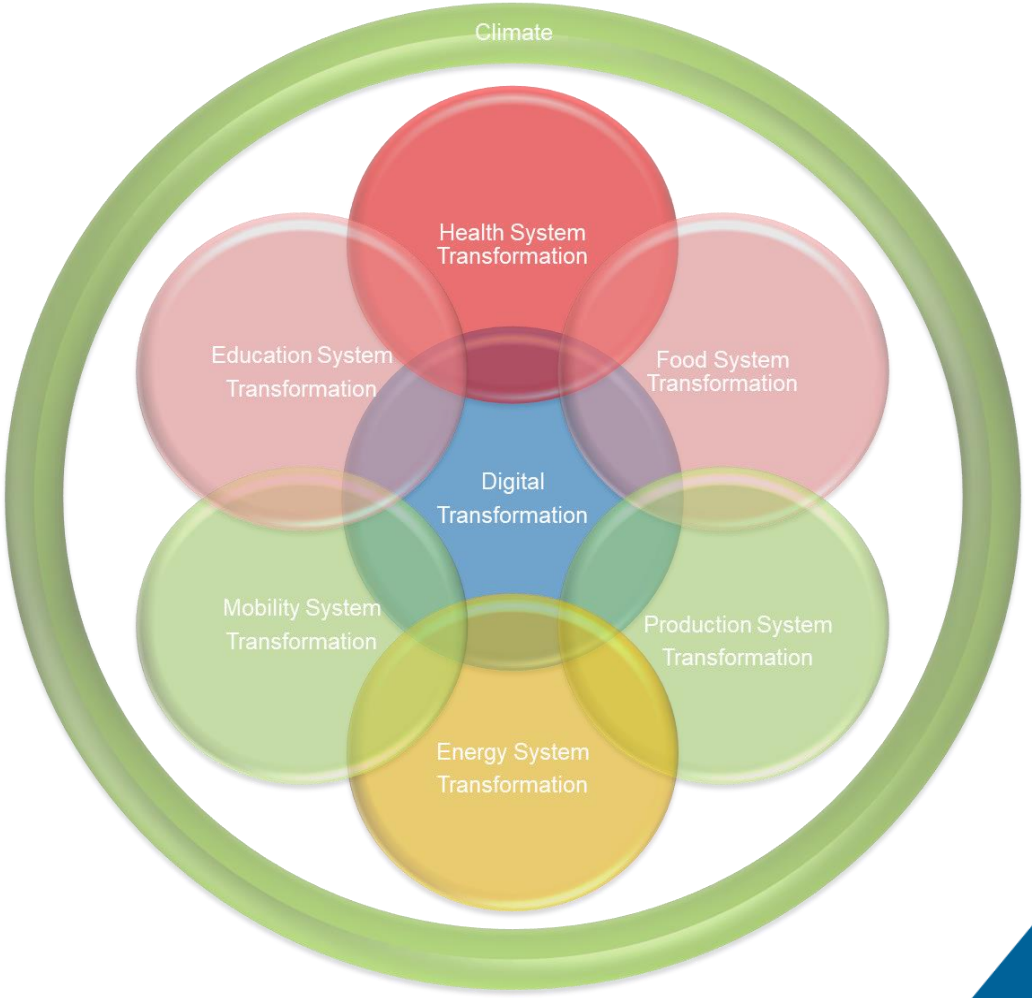
BETTER POLICIES FOR BETTER LIVES

Systems transformation policy approaches

Definition:
Setting policies considering that they are addressing issues that are part of a **complex system of systems** (economic, social, political, health, environmental…)

Implications for STI policy making:

- Avoid policy silos and ensure **alignment within and across policy fields**
- Set incentives to **"steer" the economy** towards different trajectories (going beyond the traditional role of addressing "failures")
- **International co-operation** is key to addressing global challenges



Source: Presentation of Goran Marklund (VINNOVA, Sweden) at the TIP Talk of 12 November 2020

Increasing directionality of STI policy in order to "build back better"

Economic growth & competitiveness

Resilience

Environmental sustainability

Inclusiveness

Complementarities & trade-offs

New data and better data analytics tools are key to implement systems approaches

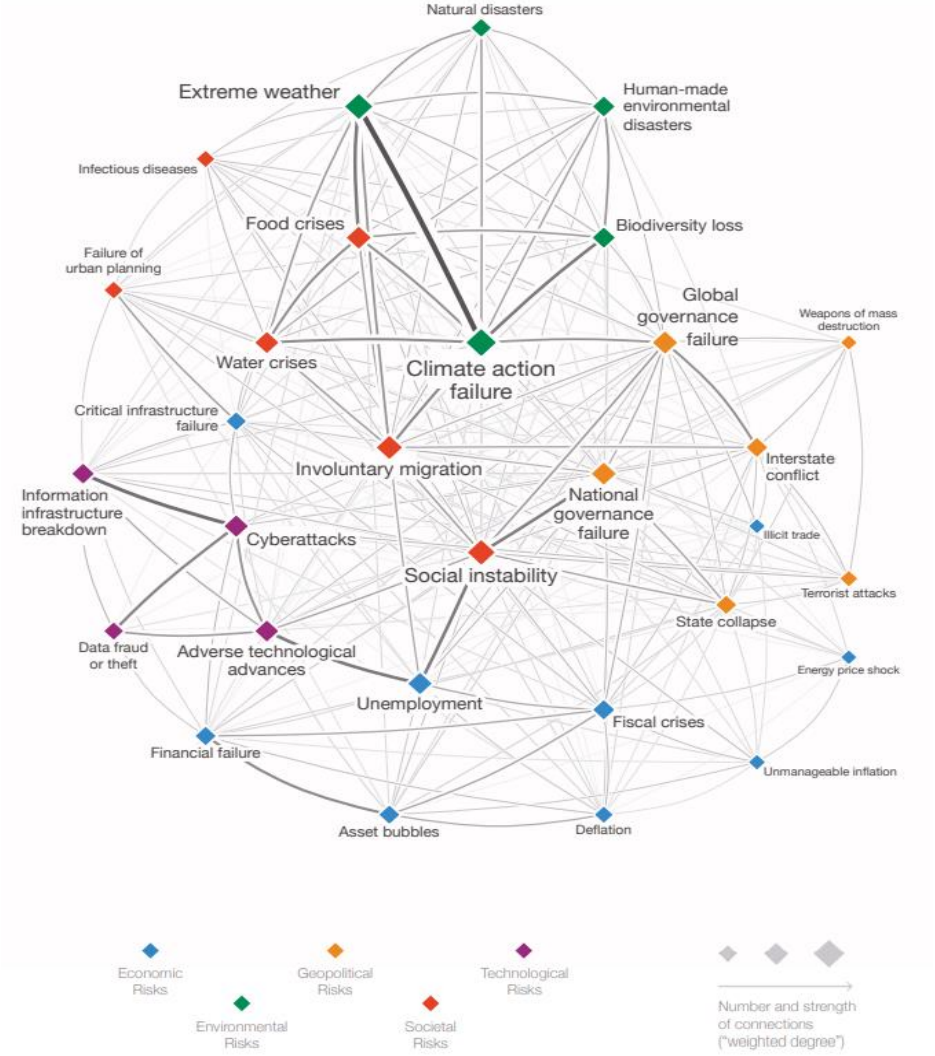
Clusters map of NSF-funded research addressing the COVID-19 pandemic

Source: Columbia University (2020)

- **Large-scale experimentation with granular and timely data** during COVID-19 (e.g. mobility data, social media data, pulse surveys)
- **Semantic analysis and AI techniques** to analyse large-scale real-time data → can help map entire systems and detect where vulnerabilities exist
- New **visualisation tools** to render large amounts of data useful to policy

Strategic foresight may be increasingly embedded in policy making processes

Global risks interconnections, 2020



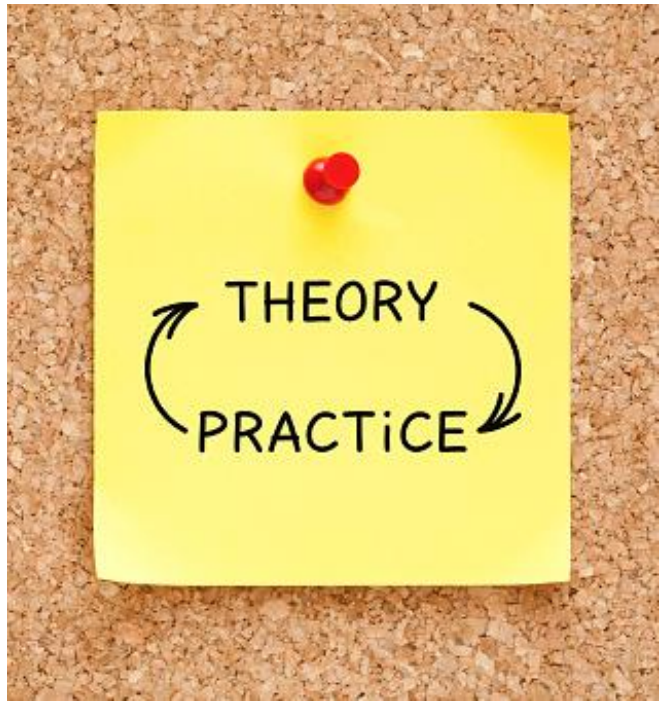
- From forecasting emerging technologies and research fields to **preparing to strategically respond to future shocks**
- Prioritizing **assessment and monitoring of systems' vulnerabilities** at regional, national and international levels & their interlinkages

Source: World Economic Forum (2020), based on the World Economic Forum Global Risks Perception Survey 2019-20

Key challenge ahead: how to put systems transformation approaches into practice?

Some key aspects to consider:

- Designing **new governance models** that engage diverse actors (incl. citizens and industry) in systems transformation – critical to build trust and create a shared vision for the future
- Addressing **complementarities and trade-offs** across policy objectives
- Assessing implications of **selecting priority fields** in a context of budgetary constraints
- Building **new metrics and data management systems** to serve policy needs that are transparent and technically sound, and guarantee data privacy and security
- Improve **public sector capacities** to operationalize new data and tools for policy purposes (training for government officials)



Panel 2 will address some of these questions

Sandra Planes-Satorra
OECD Directorate for Science, Technology and Innovation

Masaru Yarime
Hong Kong University of Science and Technology

Maria Savona
SPRU University of Sussex, UK
Luiss University, Rome IT

Gaetán de Rassenfosse
École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Erkko Autio
Imperial College London

David Legg
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Ministry of Economic Affairs and Employment of Finland

VTT

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BETTER POLICIES FOR BETTER LIVES

Find out more in our recent papers

References:

Paunov, C. and S. Planes-Satorra (2021), "**Science, technology and innovation in the time of COVID-19**", *OECD Science, Technology and Industry Policy Papers*, No. 99, OECD Publishing, Paris, https://doi.org/10.1787/234a00e5-en

Paunov, C. and S. Planes-Satorra (2021), "**What future for science, technology and innovation after COVID-19?**", *OECD Science, Technology and Industry Policy Papers*, No. 107, OECD Publishing, Paris, https://doi.org/10.1787/de9eb127-en.

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#R&Dfutures

Wicked Acceleration: Challenges and New Approaches

OECD Working Part on Innovation and Technology Policy

R&D Policies for Better Post-Pandemic Futures: New Approaches and Tools

Erkko Autio, Professor

Thursday, May 20, 2021

Imperial College Business School
Royal College of Art
Postgraduate Art and Design
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wicked acceleration labs

Digitalisation Enables New Innovation Heuristics

Design Thinking
Lean Startup
Agile Development
Design Sprints
Growth Hacking

Challenges:

- Focus on a focal customer in isolation
- Iterate solutions to customer's immediate needs
- Solution-centric
- Adoption landscape given, static

Wicked Acceleration: Challenges

Complex adoption landscape
Multiple hierarchically independent stakeholders
Solution complexity
Medium-term time span
Systemic inertia
High uncertainty regarding solution, adoption

Policy implications

- From top-down to bottom-up
- System dynamics thinking to identify causal chains
- Backcasting and speculative design
- Dynamic control to manage collective imagination
- Simultaneous orchestration of solution and adoption landscapes

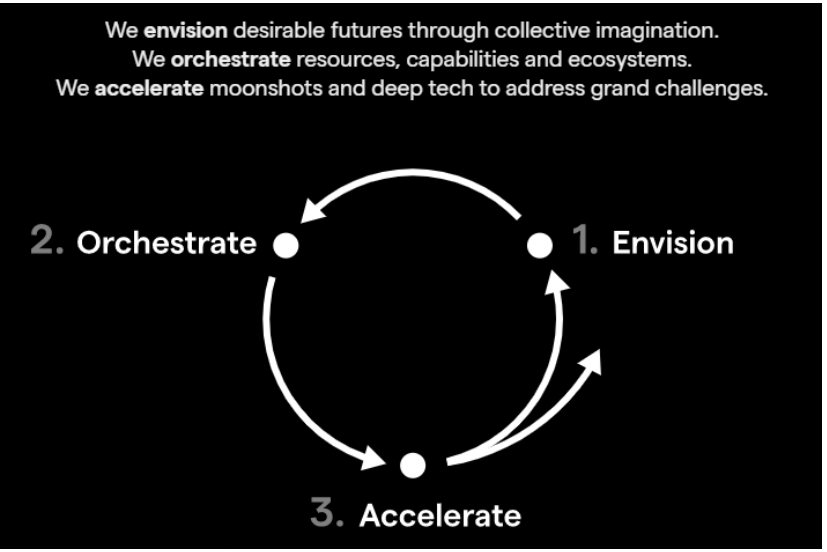
WICKED PROBLEMS DEMAND WICKED SOLUTIONS

Accelerating desirable futures

Humanity is facing complex problems
Be part of the solution with Wicked Labs

Our mission

We develop techniques to accelerate the resolution of **wicked problems**.



Our toolkits (tools, methods and systems) aim to orchestrate complex multi-stakeholder ecosystems to help established firms, governments, universities and new ventures to better address today's urgent systemic challenges in areas like climate and economic renewal.

Imperial College Business School, in partnership with the Royal College of Art and leading global industry players, has established Wicked Labs.

www.wickedacceleration.org

(on entrepreneurial resilience see also www.entresilience.com)

Imperial College Business School

Royal College of Art
Postgraduate Art and Design

wicked acceleration labs

Maria Savona

Professor of Economics of Innovation at SPRU, Sciency Policy Research Unit, University of Sussex Department of Economics, Luiss University, Rome

#R&Dfutures

SPRU - SCIENCE POLICY RESEARCH UNIT

Three challenges: STI-SDGs mis-alignments; The future of digital jobs; Data governance

OECD Panel
The changing nature of innovation policies: moving towards systems transformation approaches

Maria Savona

SPRU, University of Sussex

DEF, Luiss University

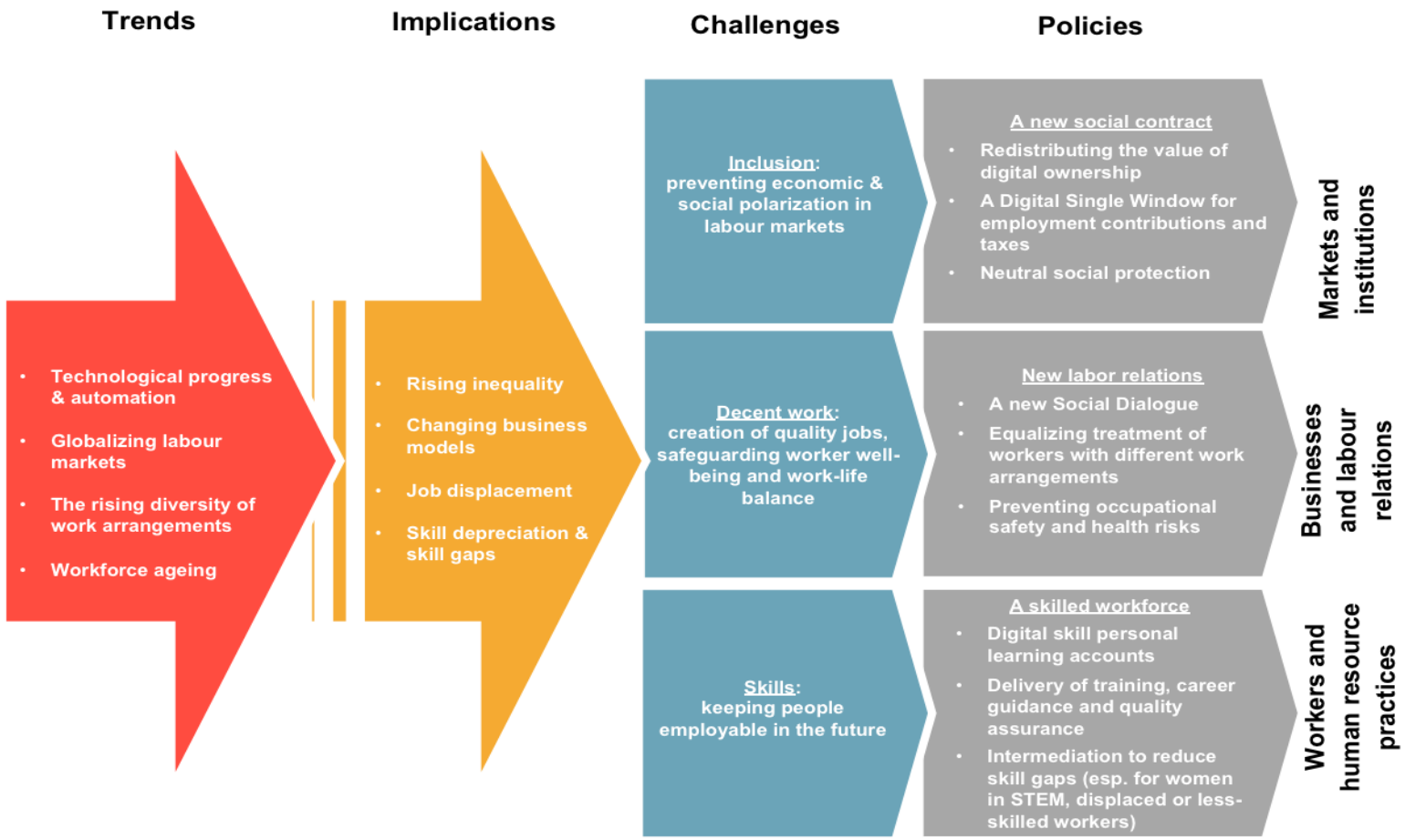
UNIVERSITY OF SUSSEX | BUSINESS SCHOOL

1st – Tackling mis-alignments between STI and (post-Covid) SDGs

strings
Steering Research and Innovation for Global Goals

- **Mapping Mis-Alignments** between global distributions of STI [priorities, funds and research efforts] and SDGs, particularly in Low Income Countries
- **Building evidence** to support steering of STI priorities to (Post Covid- sensitive) SDGs (health & global disease, infrastructure, decent jobs, inequality)
- **Re-Aligning STI and (post-Covid) SDGs** means ensuring inclusion in decisions processes around global and context-specific research priorities

2nd – Mitigating the effects of digital (accelerated) transformation on jobs (HLG, 2019)



3rd – Governance of data for public value

- Aligning **technical, legal and economic** infrastructure for the governance of data:
  - Understanding and measuring data value in national statistics and cross-borders data flows
  - Understanding data value chains and data-intensive business models

- Creating **incentives to data sharing for public purposes** while preserving privacy and access control (e.g. public health, research)
  - Building on and beyond GDPR
  - Tackling the ‘anti-commons’
  - Reducing uncertainty around the creation of markets of “personal data intermediaries” within the **EU Data Governance Act**

Gaetán de Rassenfosse

Assistant Professor, École Polytechnique Fédérale de Lausanne, Switzerland

#R&Dfutures

EPFL

R&D policies for better post-pandemic futures: New approaches and tools

Gaétan de Rassenfosse

@gderasse

May 20, 2021 via Zoom

The million-dollar questions

1. How can systems transformation approaches be implemented in practice?
2. Which capabilities will we need at the policy end to implement such approaches?

Hi Gaétan, can you please discuss these questions at our OECD event?

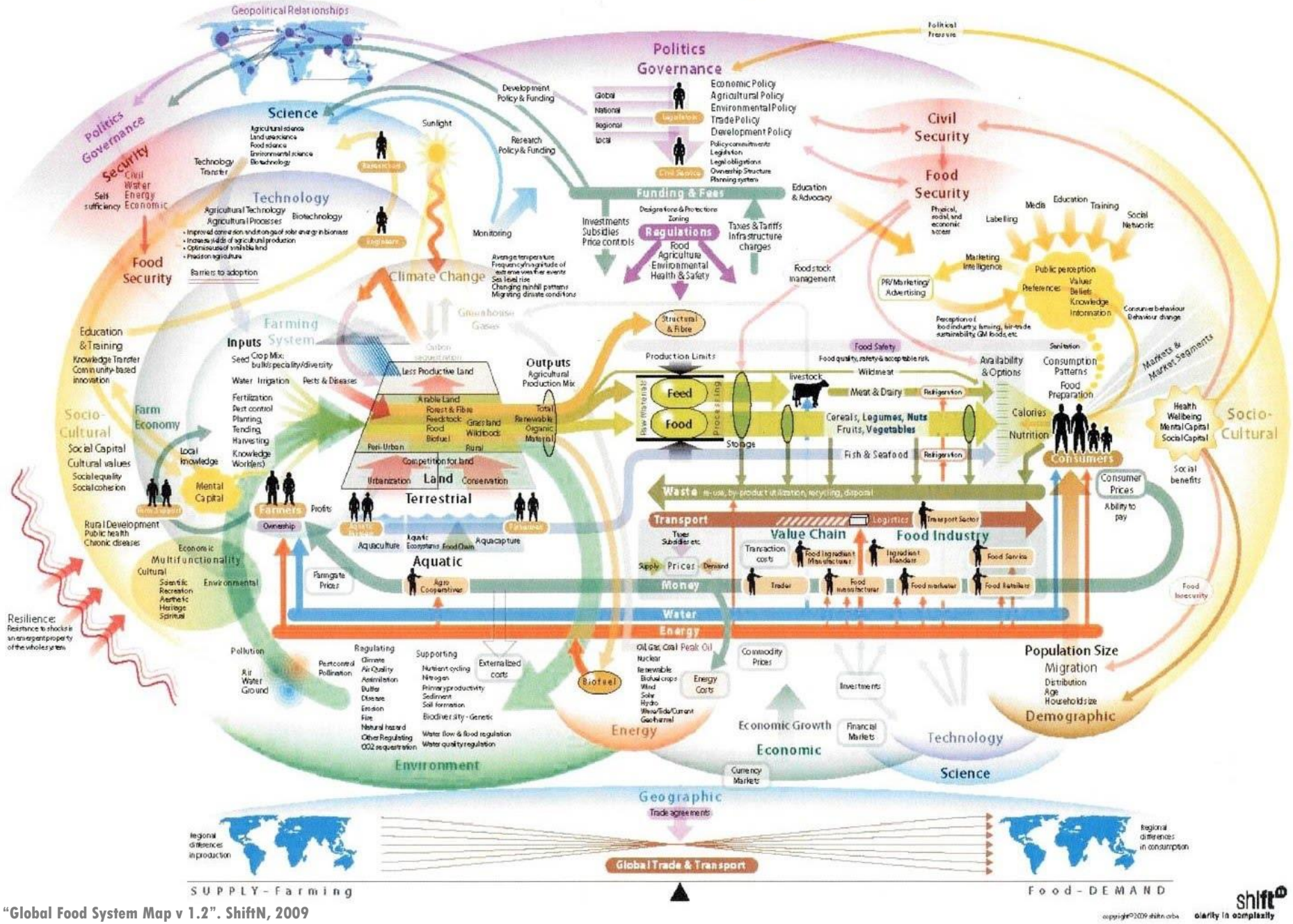
Wow. That's a degree of complexity higher than finding the optimal policy mix, which many countries struggle with.

Let's take these questions very seriously and provide a straight answer. Let's not be afraid of wishful thinking…

Five ingredients

1. **An Office of Strategic Planning…**
   - Due to its very nature, a systems approach transcend STI ministries. It needs to be overseen by a high-power office that has reach in all ministries.
2. **… staffed with a multidisciplinary team…**
   - Depending on the objective, may include medical doctors, scientists and engineers, jurists, economists, etc.
3. **… working on a clear "mission"…**
   - As wide as possible but as narrow as necessary.
4. **…equipped with an effective delegation mechanism…**
   - Can be either centralized ("*dirigisme*") or decentralized ("collective intelligence").
5. **… and a map**.

The Global Food System



The map…

- Is critical to understanding the system and its dependencies.
- Is tailored to a single mission.
- Should be done at various resolution levels.
- Allows to identify holes and weaknesses in the system.

Source: "Global Food System Map v 1.2". ShiftN, 2009

What can individual STI ministries do?

- Systems transformation needs support and continuous engagement at the highest level. Rather unlikely to happen any time soon.
- Does it mean that individual STI ministries should stand still? No!

- They can independently work on high-resolution maps of their own territory.
  - Ministries know their environment very well, so the broad map will be easy to draw.
  - But mission-specific, higher-resolution map might be more challenging. So is understanding the links (interdependencies, feedback loops).
  - Policy evaluation studies/expert inputs/surveys/critical thinking are key to draw the maps.
  - Maps may shed a new light on the policy mix and will help identifying the various ways in which the STI system plugs into other systems (health, environment, etc.) → First step to start a dialogue with other ministries.

Masaru Yarime

Associate Professor, Hong Kong University of Science and Technology, and Visiting Associate Professor at the Graduate Scholl of Public Policy, University of Tokyo

#R&Dfutures

香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

PPOL DIVISION OF PUBLIC POLICY 公共政策學部

Governing Data Circulation for Innovation: Opportunities and Challenges in STI Policy for Systems Transformation

Masaru YARIME

Associate Professor, Division of Public Policy, The Hong Kong University of Science and Technology

Visiting Associate Professor, Graduate School of Public Policy, The University of Tokyo

Panel 2 - The changing nature of innovation policies: moving towards systems transformation approaches

R&D Policies for Better Pandemic Futures: New Approaches and Tools

20 May 2021

The Use of Data for Tackling the COVID-19 Pandemic in East Asia

- Use of personal data for public health
  - Mobility and locational data from mobile phones, transportation, social media, credit cards, surveillance cameras
  - Dashboards showing detailed information about cases
- Effective contact tracing and quarantine monitoring
- Role of platforms for assembling and analyzing data
  - Health codes making personal evaluation of risks
- Potential of personalized advices and services
  - Integration of environmental and health data
- Concerns about data security and privacy
  - Use of personal data for other unexpected purposes

Li and Yarime (2021)

Data-Driven Innovation for Social Good

- Resilience
  - Early warning and emergence relief systems for typhoons and floods
  - Monitoring of infrastructure with IoT and drones
- Inclusiveness
  - Assistance to elderly people visiting clinics through integration of health and transportation data
- Sustainability
  - Distributed energy systems with peer-to-peer exchange of renewable energy
  - Personalized advices for energy saving behavior
  - Traceability of environmental and social issues throughout global supply chains
- Challenges in data governance
  - Data availability, accessibility, interoperability, applicability, and ownership

Ahl, Yarime, Tanaka, Sagawa (2019); Ahl, Yarime, Goto, Chopra, Nallapaneni, Tanaka, Sagawa (2020); Asokan, Yarime, Onuki (2020); Spandagos, Yarime, Baark, Ng (2020); Spandagos, Baark, Ng, Yarime (2021)

Challenges in the Governance of Data Circulation in the Innovation System

- Schemes of data sharing and exchange
  - Data marketplaces, data trusts, data commons, data collaboratives
- Access to data possessed by private sectors for public purposes
- Potential use of synthetic data
  - Digital twins for simulation of cyber-physical systems
- Normative issues involved in micro-targeted nudging
  - Paternalism and manipulation for social good
- Cross-border data transfer
  - Coordination of standards and practices
- Capabilities for learning and adaptation
  - Regulatory sandboxes for data use in societal experimentation
  - Policy-makers collaborating with entrepreneurs for possible regulatory adjustments
- Stakeholder participation and engagement
  - Identification and legitimization of values in local contexts
- Trust in institutions for data governance

Yarime (2020); Papyshev and Yarime (2021); Barrett, DeWit, Yarime (2021)

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