Mirai webinar - Connecting Academia and Industry

How could researchers navigate collaboration between academia and industry in Sweden?

Photo by Magnus Johansson

Tom Sakao

4th of September, 2025

LINKÖPING UNIVERSITY

Department of Management and Engineering
Linköping University (LiU), Sweden

Agenda

- Who am I?
- Overview
- Example with reflection
- Q&As

Photo by Tomohiko Sakao

Brief bio of Tom Sakao

- 2007 – Present Linköping University (LiU), Sweden
  Started as environmental professor awarded by the Swedish Association of Graduate Engineers
- 2005 – 2007 Darmstadt University of Technology, Germany
  (Research Fellow of the Humboldt Foundation)
- 1998 – 2005, 2007 Mitsubishi Research Institute, Inc., Japan
- 1998 Ph.D., MSc, and BSc in Precision Machinery Engineering, The University of Tokyo, Japan
  Maintenance, Design, AI, Robotics, …

- Fellow of CIRP (The International Academy for Production Engineering) (one of three Swedish fellows)
  - Secretary for the scientific technical committee Design (STC Dn)
- Member of SPA (The Swedish Production Academy)

Contribution to society & academia

Joint Research Centre JRC

Science-for-policy contributions, 2018, 2025.

DELEGATIONEN FÖR CIRKULÄR EKONOMI

The Swedish government reference group.

ISO TECHNICAL COMMITTEES ISO/TC 323 Circular economy

The ISO CE standard issued in 2024.

ISO TC 323 plenary week in Kigali, 2022.

CIRP


Contents lists available at SciVerse ScienceDirect

CIRP Annals Manufacturing Technology

Journal homepage: www.elsevier.com/locate/cirp

Published in 2022

Designing Value-Driven solutions: The Past and Future of Industrial Product-Service Systems

Daniel Brissaud[a] (1), Tomohiko Sakao[b] (2), Andreas Riel[a] (2), John Ahmet Erkoyuncu[c] (2)


Contents lists available at SciVerse ScienceDirect

CIRP Annals Manufacturing Technology

Journal homepage: www.elsevier.com/locate/cirp

Published in 2024

Implementing Circular Economy Activities in Manufacturing for Environmental Sustainability

Tomohiko Sakao (2)[*,a], Nancy Bocken[b], Nabil Nasr[c], Yasushi Umeda (1)[d]

Linköping, Sweden

The groundbreaking innovations

The mobile communications sector here started with Ericsson, and ever since, the city has been a leader in GSM, 3G, 4G and now 5G.

Thanks to local companies such as NIRA Dynamics, Veoneer and Actia, we're well ahead in the field of vehicle safety.

The streaming media technology that enables companies such as Netflix, HBO and Spotify was born in Linköping.

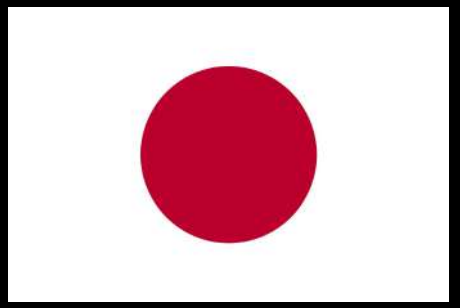
Medtech companies such as Sectra, AMRA and SyntheticMR are leaders in the field of digital imaging analysis.

https://www.linkoping.se/en/business-linkoping/local-industry/
https://www.linkoping.se/en/business-linkoping/news-and-stories/a-thousand-years-of-innovation-and-progress/

Difference influencing collaboration with industry

No funding for non-project-based research by the university **in the author's case**.

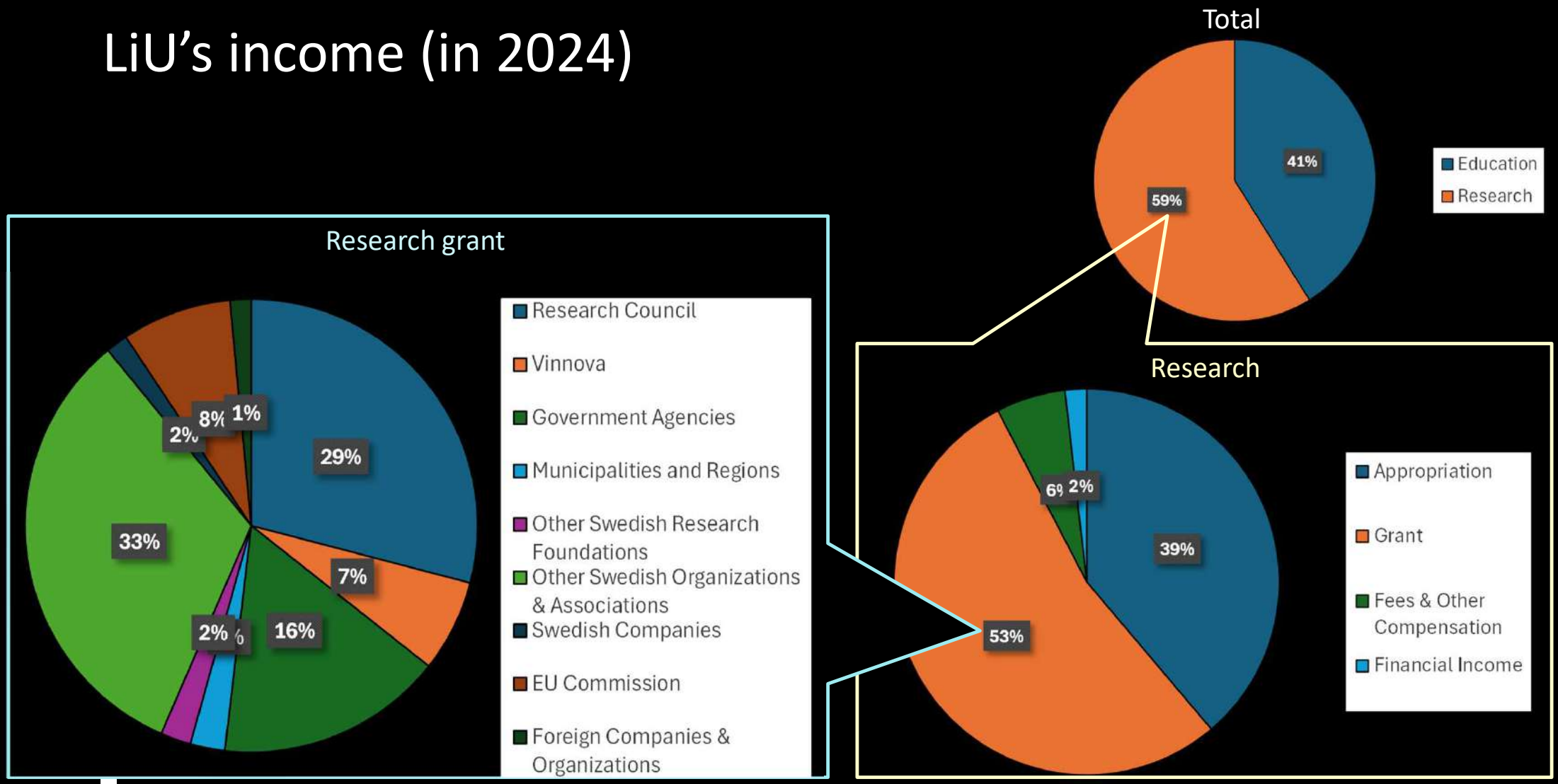
Note: some researchers receive appropriation from his/her university to cover part of his/her cost.



Typically; Funding a researcher's full time by the university.

Note: the university's appropriation typically covers his/her cost.

LiU's income (in 2024)



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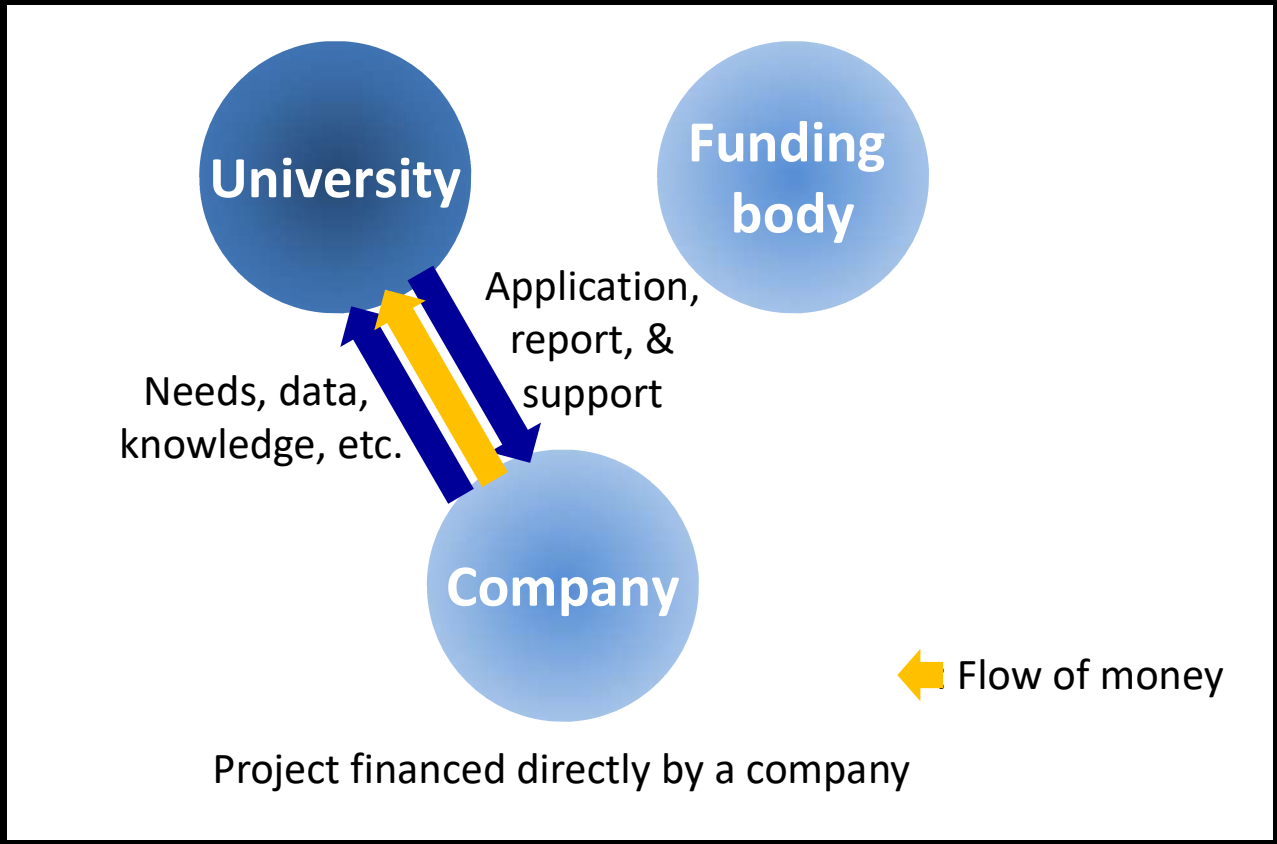
(Graphs made by the author based on Linköping University, 2025: Årsredovisning för Linköpings universitet avseende budgetåret 2024)

Research & Innovation project - Type 1

Note: the typology is made by the author and not official.



Project financed directly by a company

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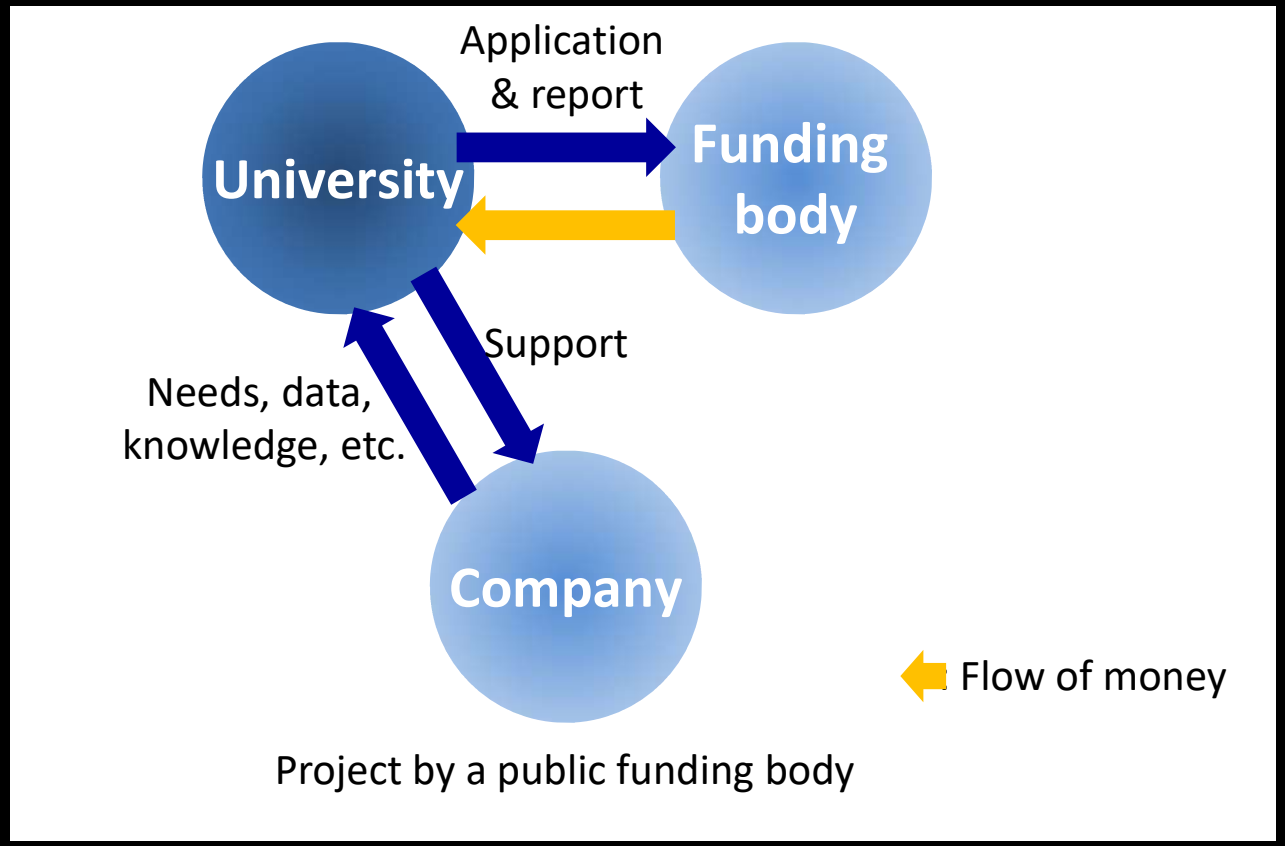
Research & Innovation project - Type 2a

Note: the typology is made by the author and not official.



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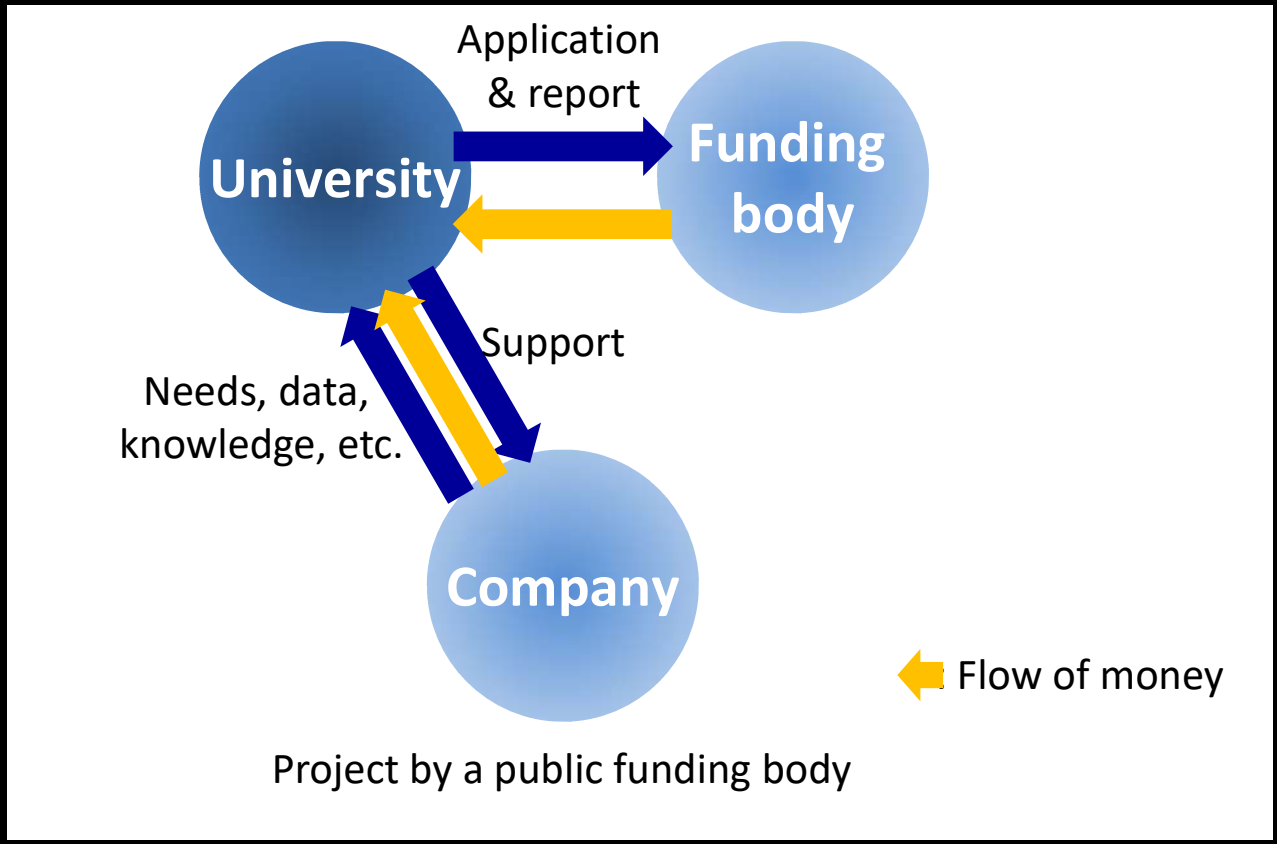
Research & Innovation project - Type 2b

Note: the typology is made by the author and not official.



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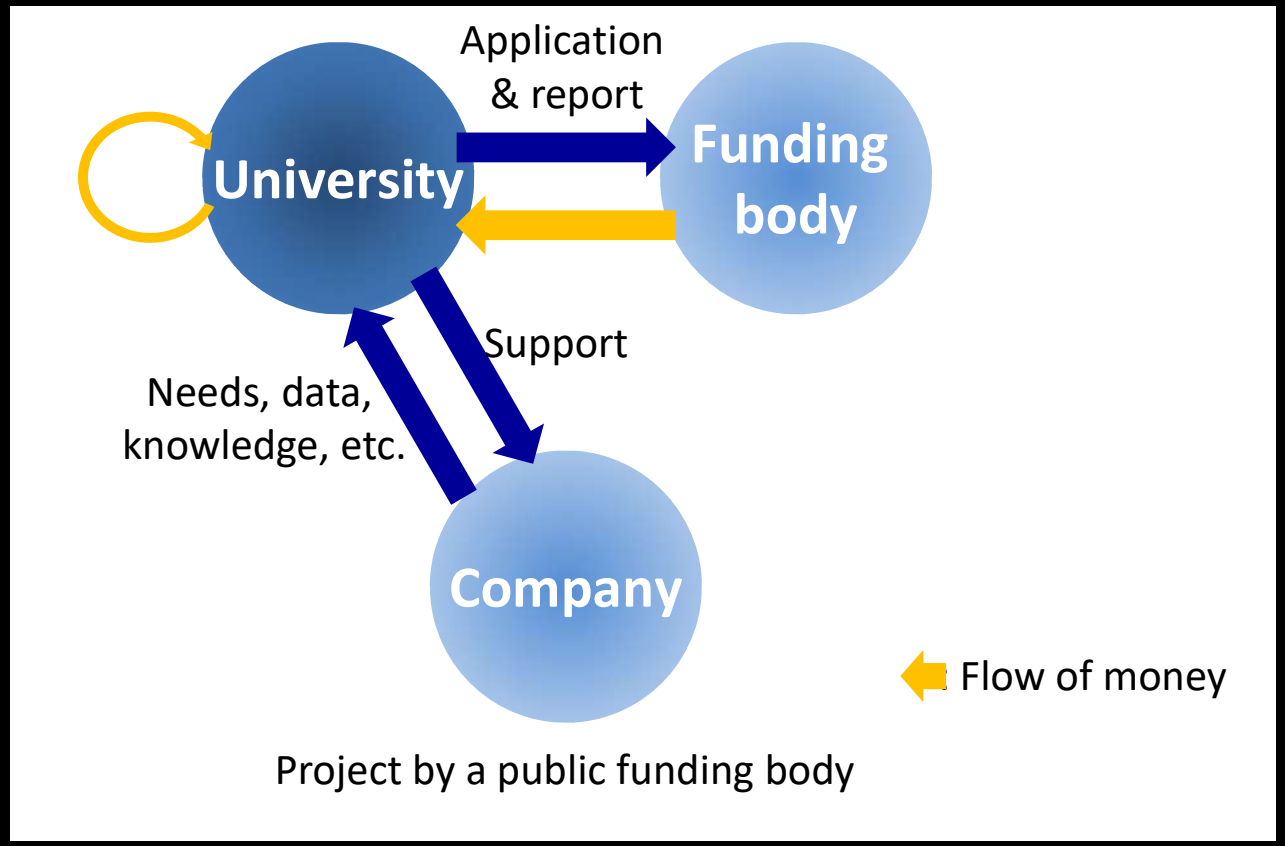
Research & Innovation project - Type 2c

Note: the typology is made by the author and not official.



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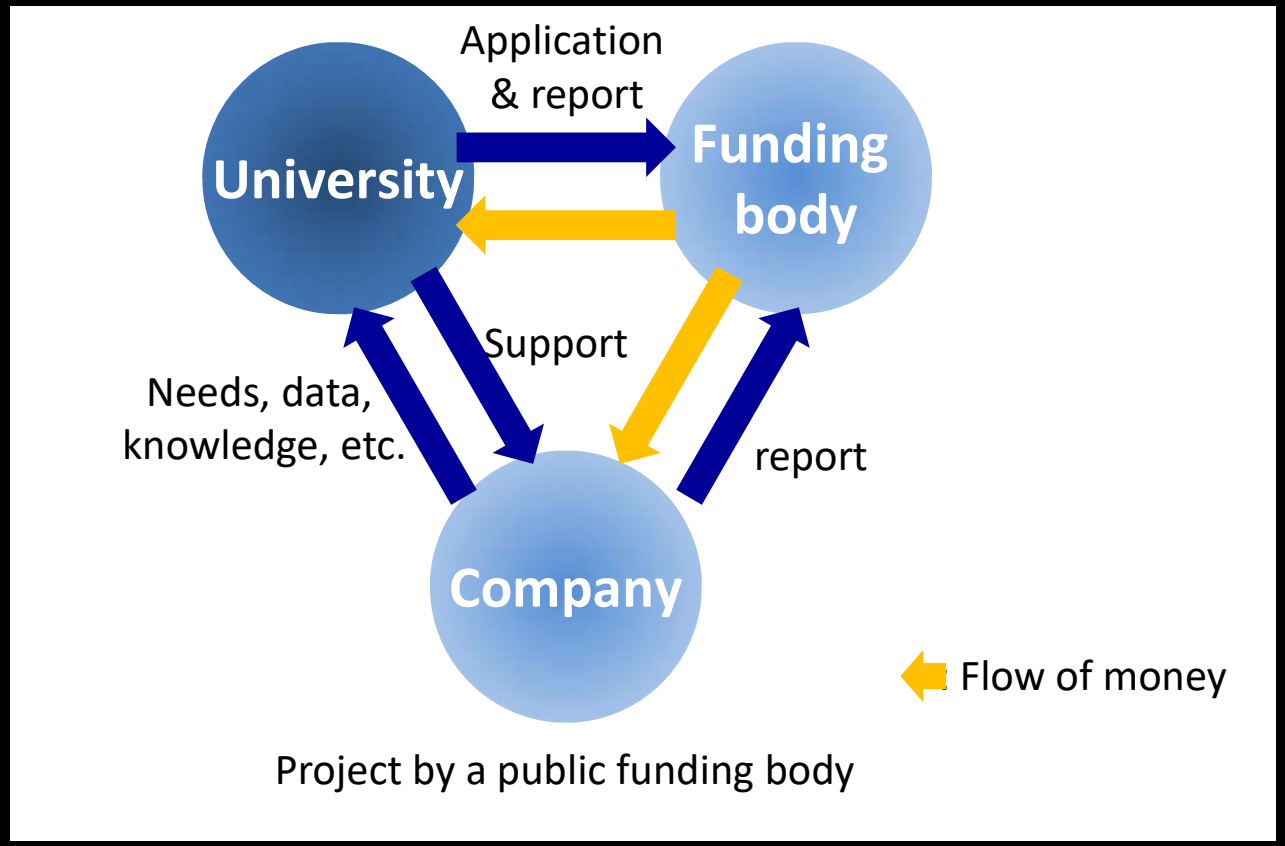
Research & Innovation project - Type 2d

Note: the typology is made by the author and not official.



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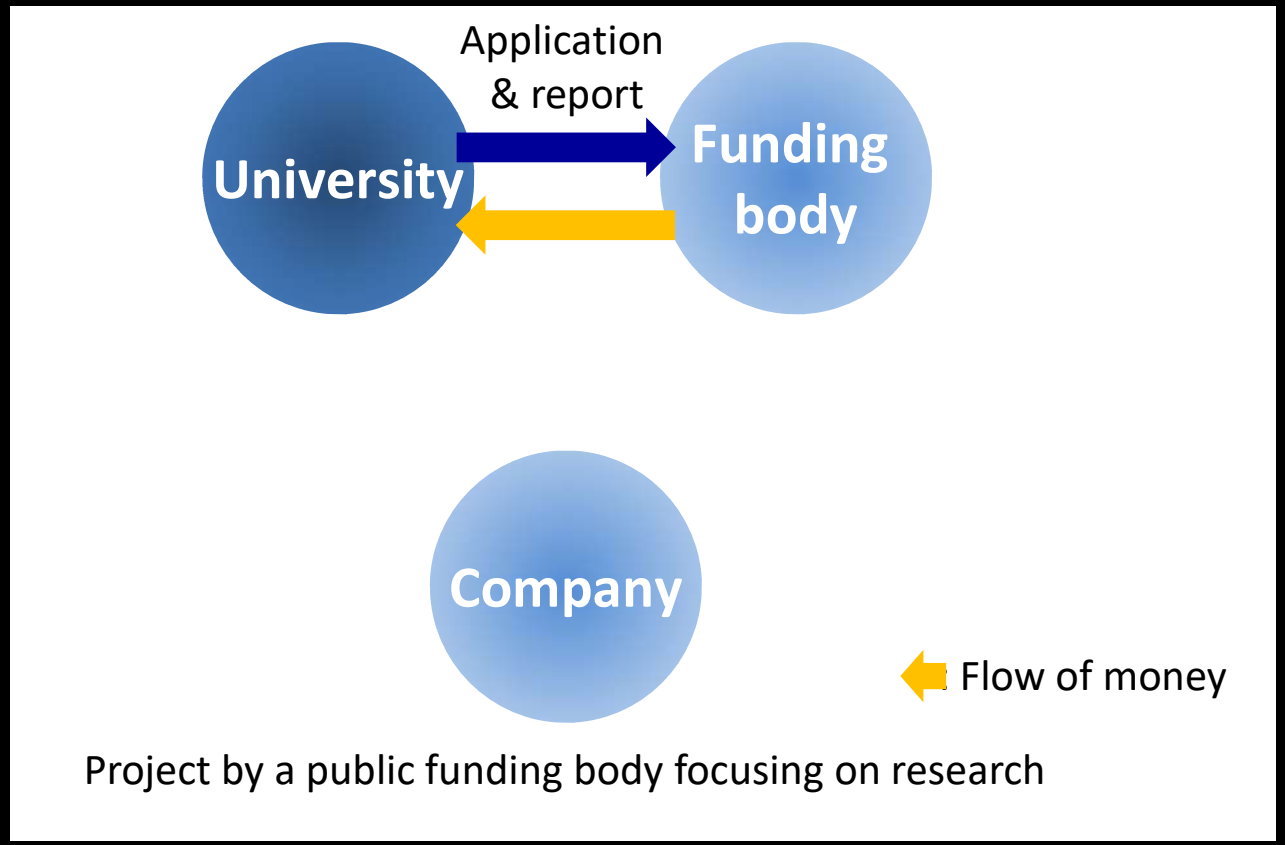
Research & Innovation project - Type 3

Note: the typology is made by the author and not official.



Project by a public funding body focusing on research

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R&I projects of Types 1, 2, and 3 (examples)

- Design projects in Mistra REES – Resource-Efficient and Effective Solutions based on circular economy thinking (2015-23) Mistra (89 MSEK) (DIA. 2014/16)

- Scandere – Scaling up a circular economy business model by new design, leaner remanufacturing, and automated material recycling technologies (2022-25), EU-cofounded ERA MIN (1.3 M€) (101003575 — ERA-MIN3)

- Circ€uit – Circular European Economy Innovative Training Network (2016-20), EU Horizon 2020 (4 M€) (No. 721909)

- Implementing a PSS design method (2012-15) Siemens Industrial Turbomachinery AB (2.8 MSEK)

- Developing an ecodesign process to address circular resource flows and environmental issues (2024-2025), Hitachi, Ltd.

- Catena-D - Circular and resource-efficient value chain systemically enabled with AI and digital thread, VINNOVA (6 MSEK) (No. 2023-02477)

- Vice leader for WASP cluster Manufacturing & Process Control (2022 and onward), WASP (Wallenberg AI, Autonomous Systems and Software Program)

- RE:think - Rethink and improve product design and service cost for circular economy business models (2022-25), Energy Agency (4 MSEK) (No. P2022-00342)

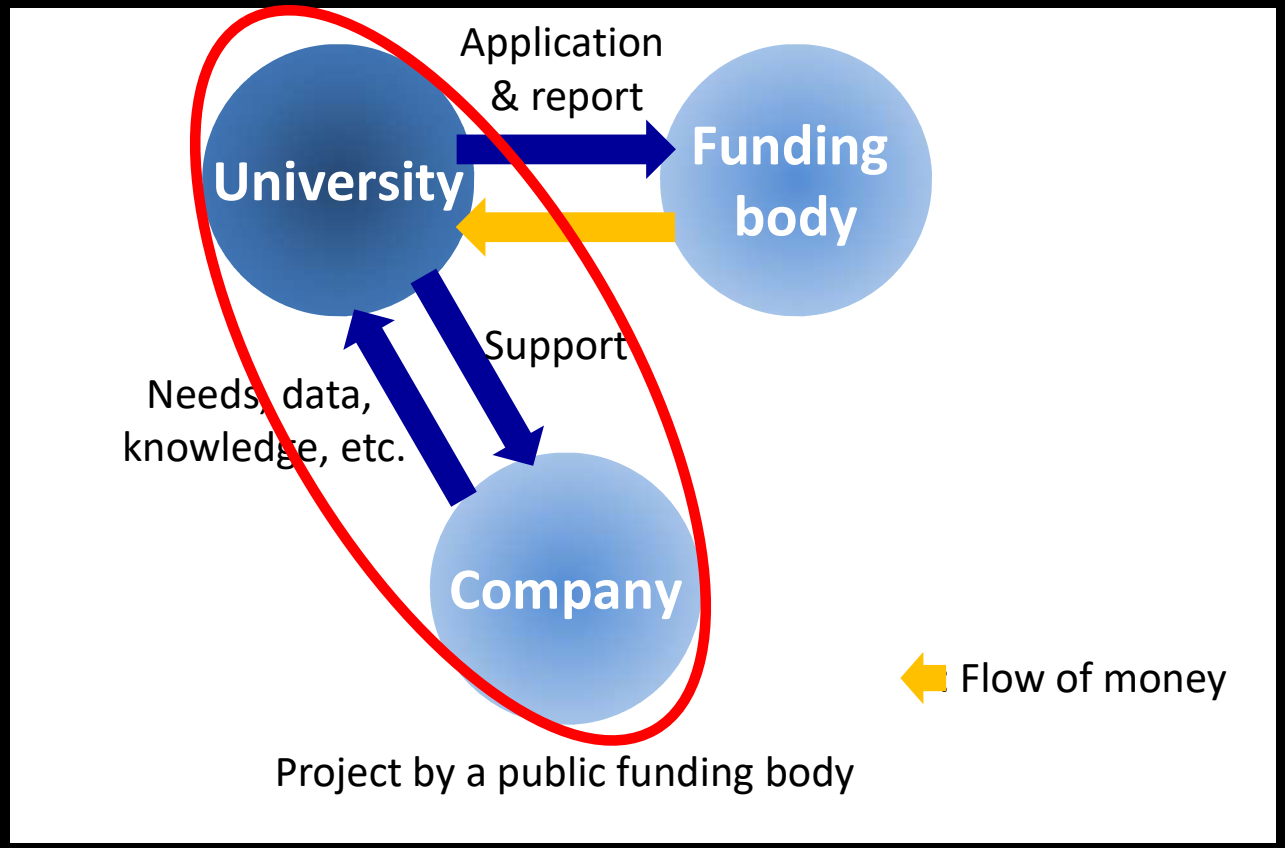
- Analysis of Lifecycle Costs and Values to Improve Lifecycle Management (2014-2017) Toyota Material Handling (5 MSEK)

- :

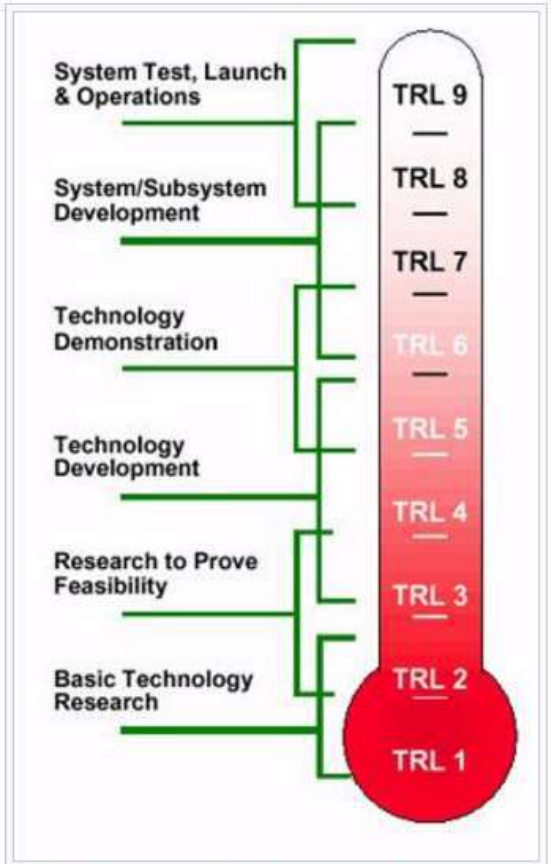
Industry partners (examples)

Research & Innovation project - Type 2a

Note: the typology is made by the author and not official.

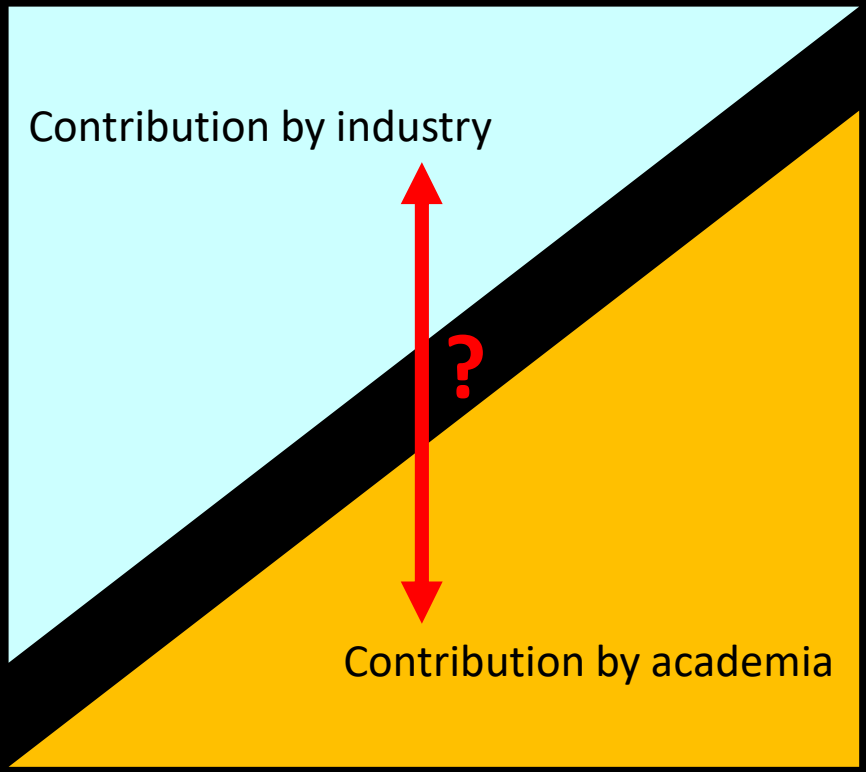


Technology readiness level (TRL)



NASA Technology Readiness Levels

https://en.wikipedia.org/wiki/Technology_readiness_level

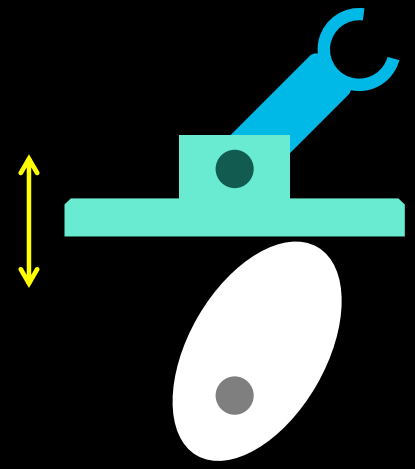


There is nothing so practical as a good theory.

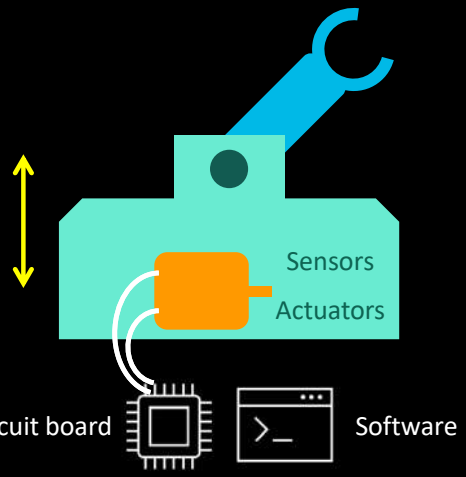
(Kurt Lewin, a psychologist)

Mechatronics

Emerged in industry from two disciplines, **mechanics** and **electronics,** in late 1960s - Transdisciplinary 1 and 2



Mechanics



Mechanics
+
Electronics

Example: Sewing machines

Mechanics

By Birmingham Museums Trust, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=39737099

Mechanics
+
Electronics

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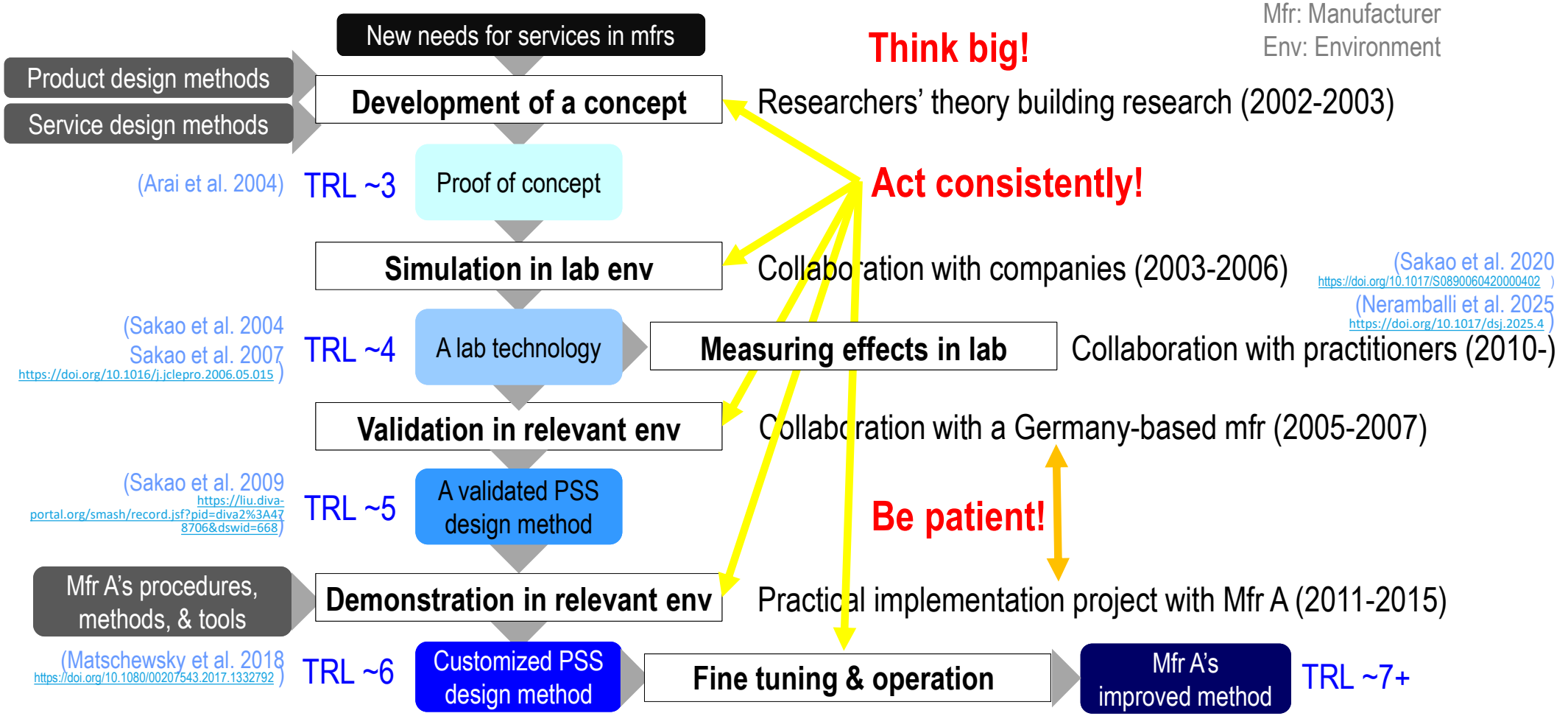
From theory building to industrial implementation: a PSS design method case

PSS: Product/Service System
Mfr: Manufacturer
Env: Environment

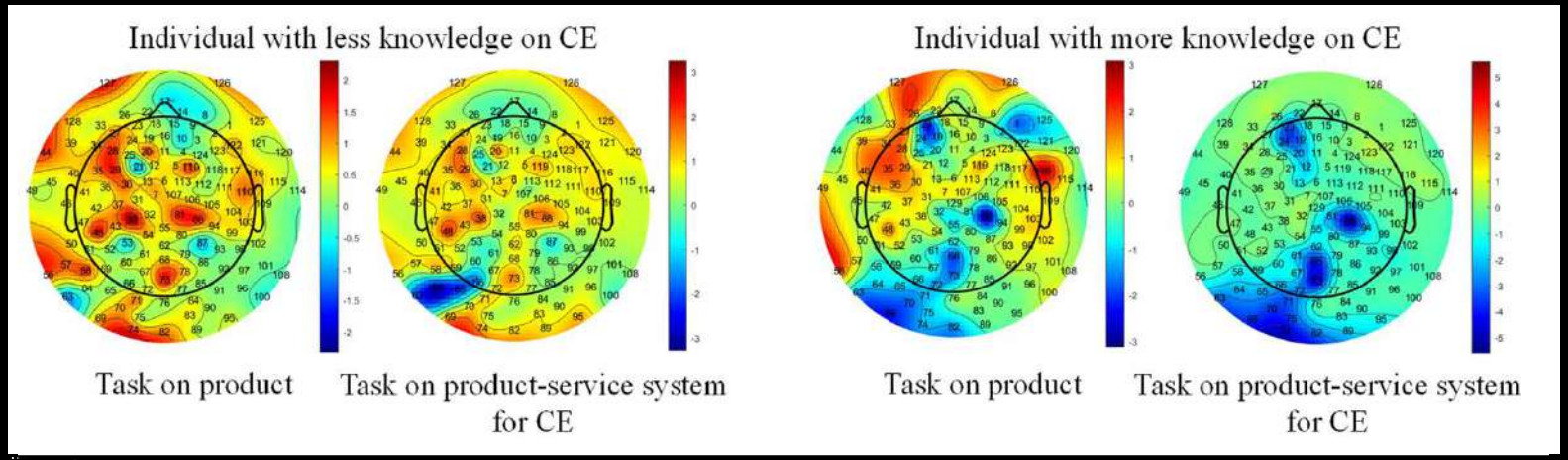


Neural-imaging of designing

- E.g., electroencephalography (EEG), functional near-infrared spectroscopy (fNIRS), and magnetic resonance imaging (MRI).

EEG lab. in the Department of Behavioral Sciences and Learning at LiU
(Photo by Magnus Johansson of LiU)

- Example of images by EEG



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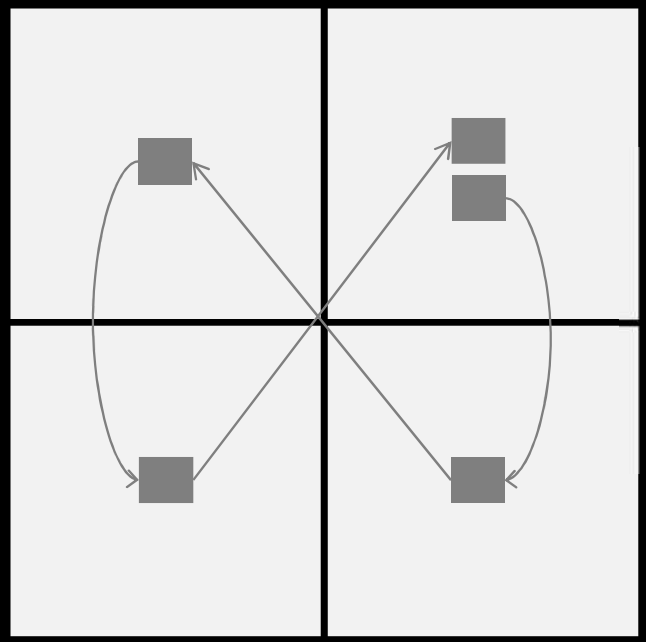
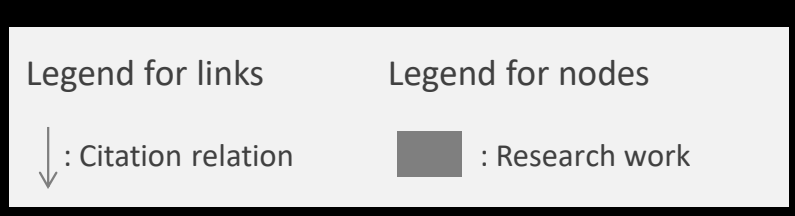
(Neramballi, Signoret, Sakao, Gero. 2024. Validation of a procedure for examining the neurocognitive characteristics of design for sustainability activities)
https://liu.diva-portal.org/smash/get/diva2:1912081/FULLTEXT01.pdf

R&I pathway in a figure eight



"Honeybee dancing with inquiry"



Sakao, 2019. Research series review for transdisciplinarity assessment – Validation with sustainable consumption and production research. https://doi.org/10.3390/su11195250

Want to know more?

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