Inclusive Research and Innovation (IRI) in Science, Technology, Engineering and Mathematics (STEM)

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Chair GovReg/OECD Conference on
Agile Approaches for Governing Emerging Technologies
Paris, December 3th, 2024

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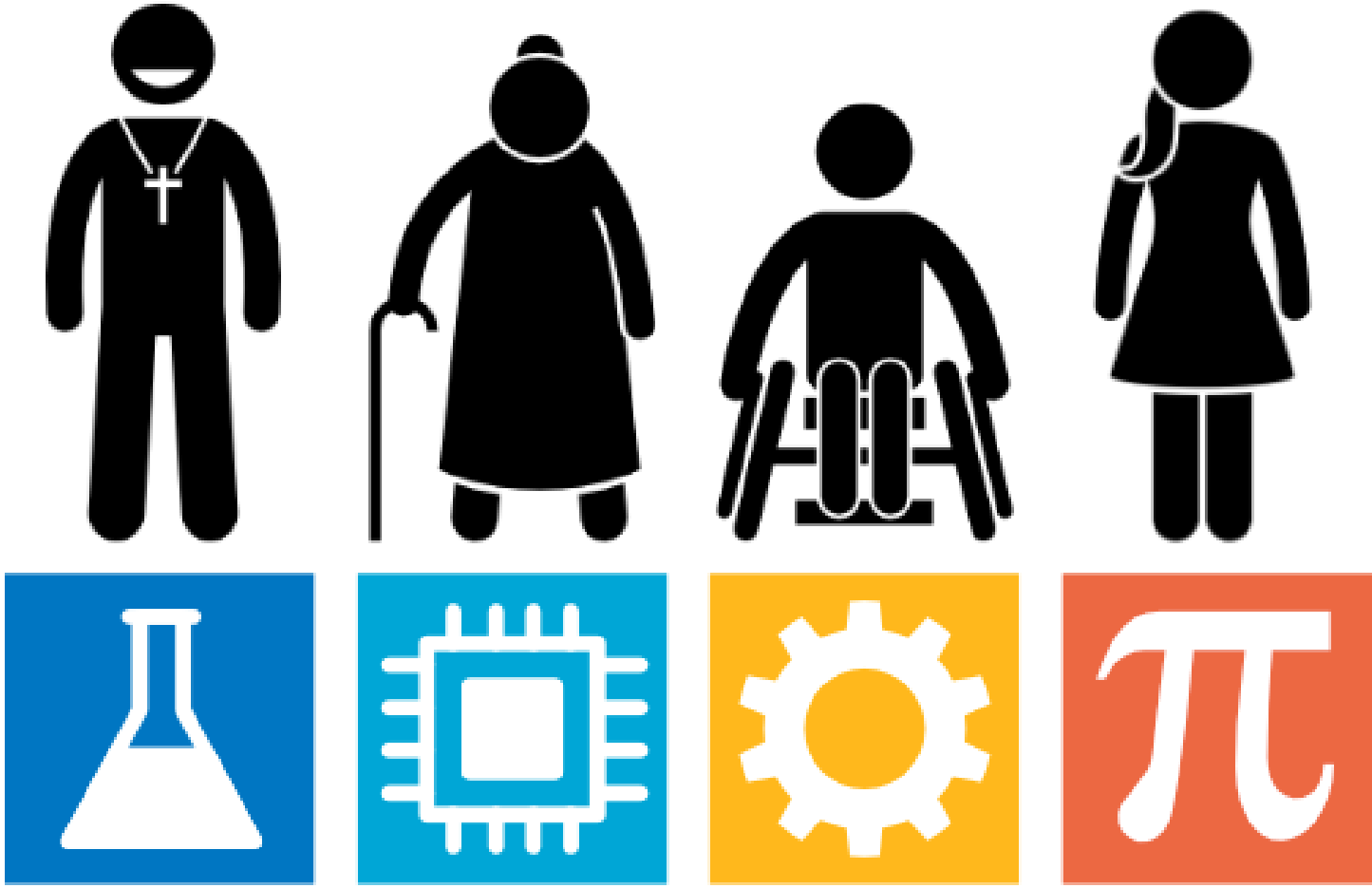
Beyond representative human beings in STEM

- Focus on ‘representative‘ human beings in STEM
- with consequences for all others (e.g. Perez, 2019)
  - Health: trials with 18-45 year old men
  - Cars: crash test dummies as ‘average‘ man
  - Algorithms mirroring biases



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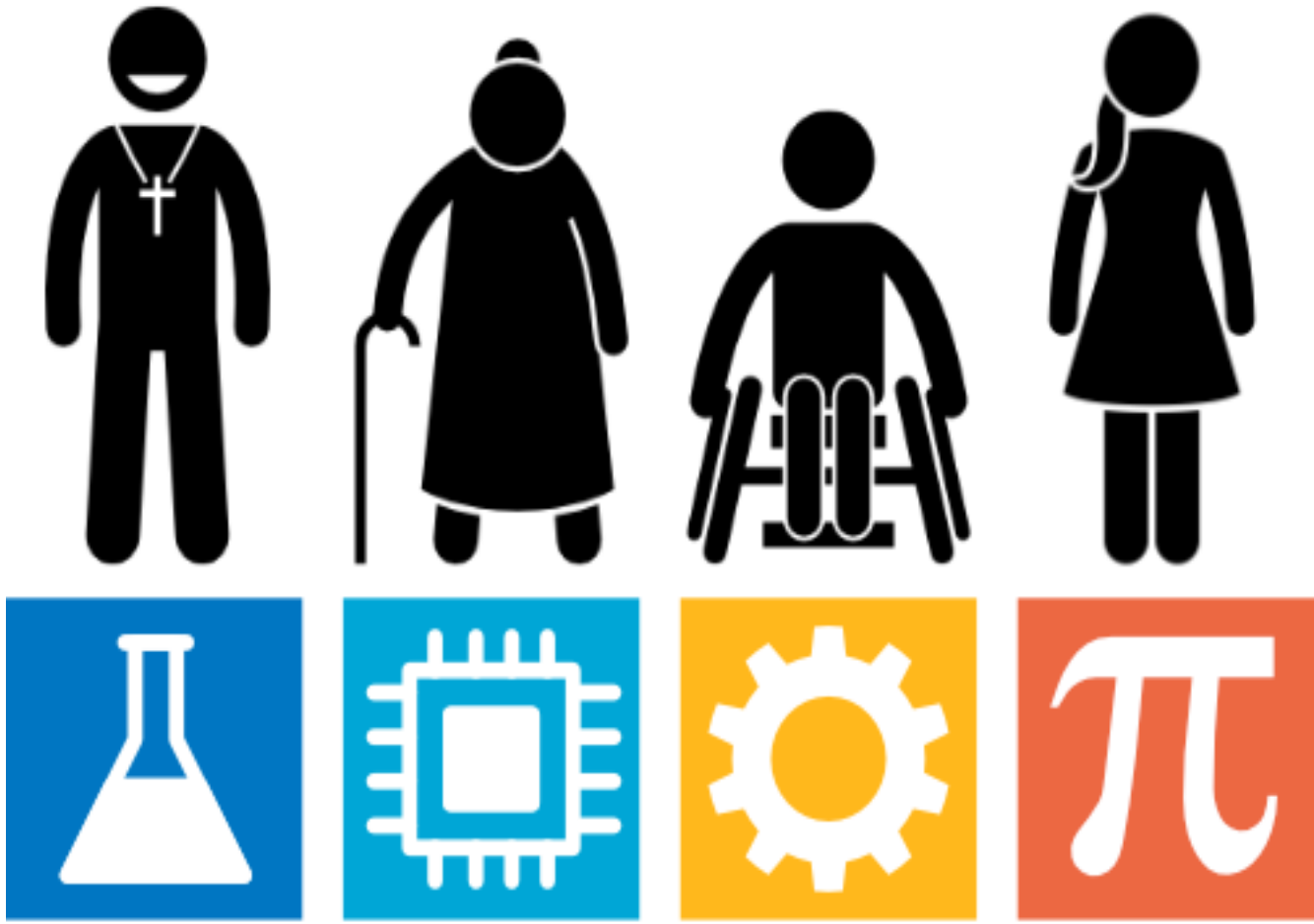
Towards IRI in STEM

Gendered Research and Innovation **(GRI)**: sex and gender as drivers of scientific discovery (EU Commission, 2020)

Uptake in Horizon 2020 and Horizon Europe disappointing (Cheveigne et al., 2017)

IRI in STEM: innovative agents carry out their projects by exploring and exploiting the potential of diversity of human beings in all its facets to drive scientific discovery and innovation.



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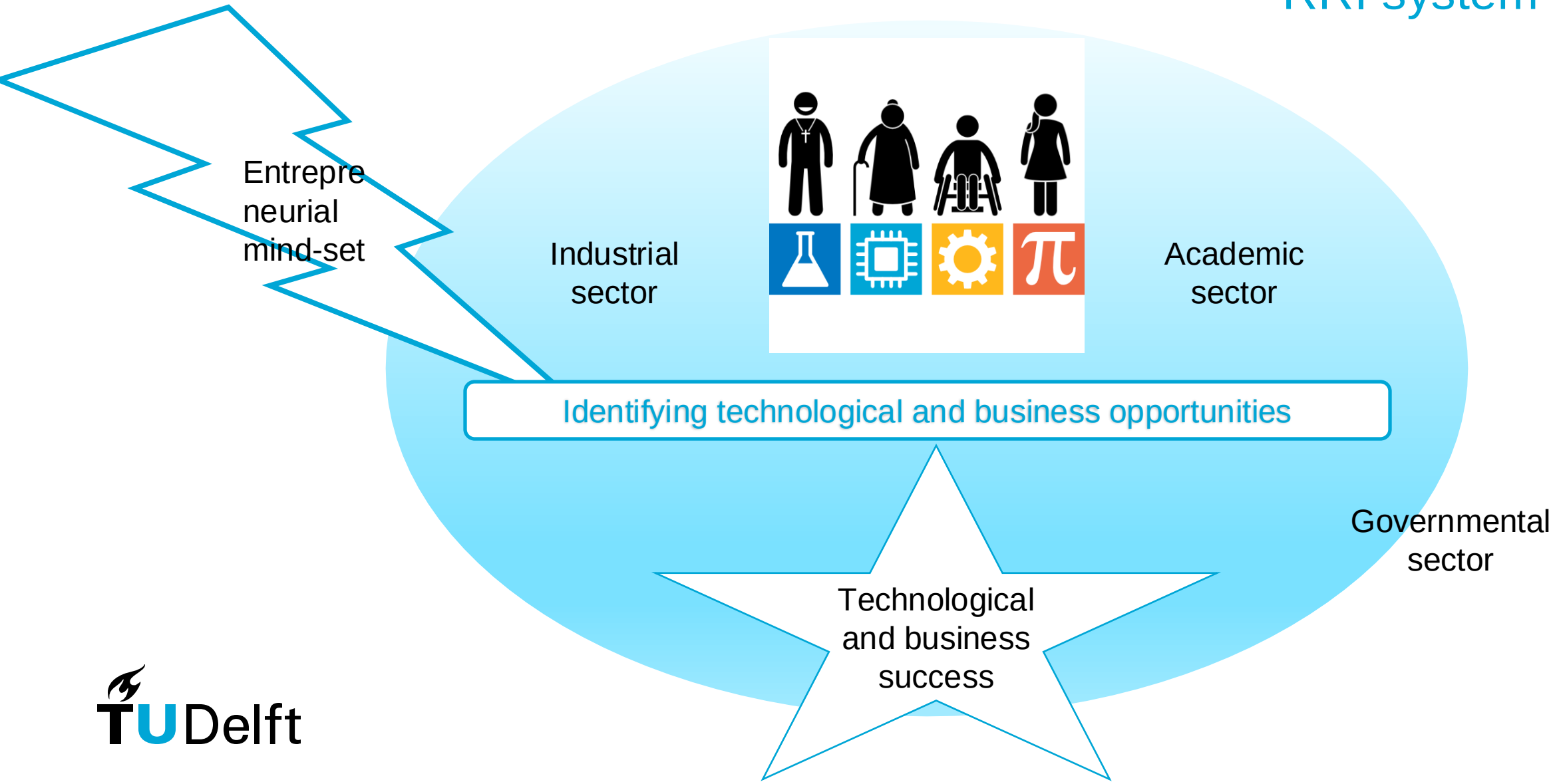
Conceptualization of IRI in STEM: considering economics and ethics

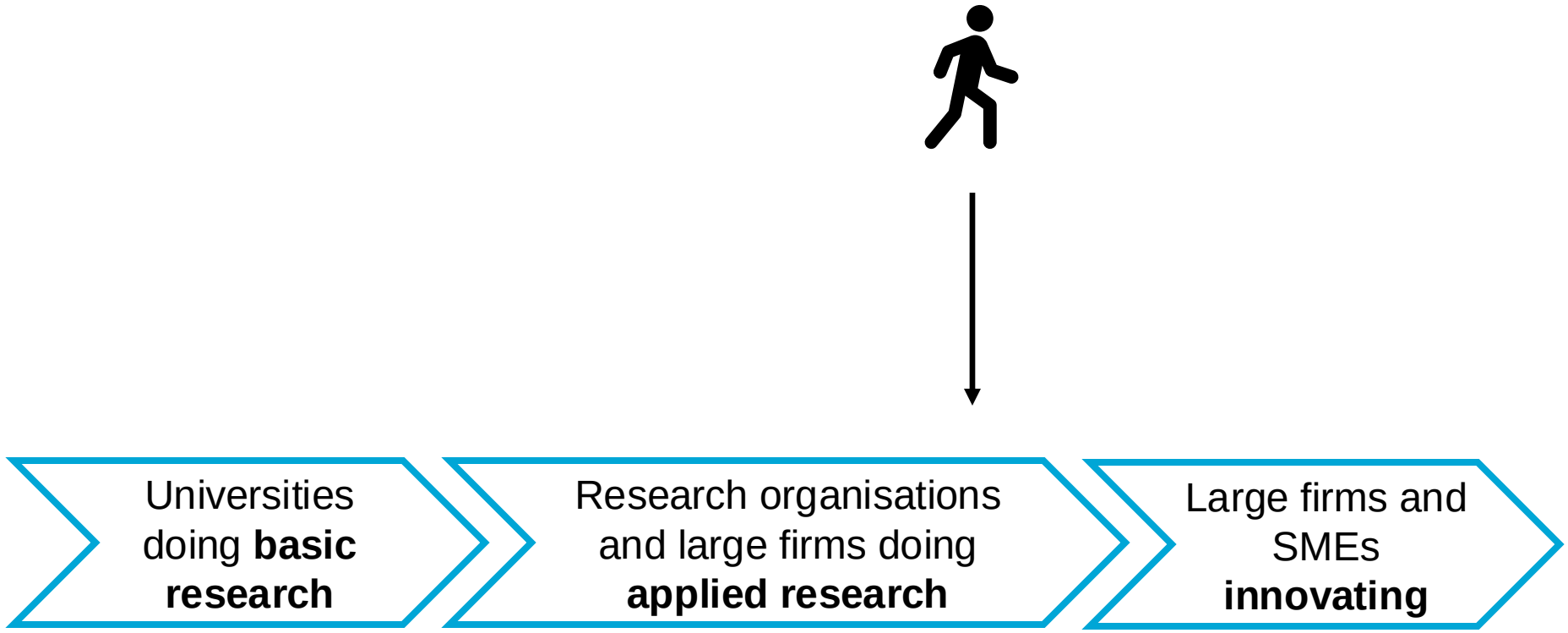
RRI system



Empirics of IRI in STEM

based on 18 engineering project in EU project ATTRACT2

under the spell of the linear model of innovation



The **linear innovation model** inspired by Balconi et al., 2010

Bottlenecks IRI in STEM

throughout research and innovation

- keep considering the diversity of human beings
- keep collaborating with relevant innovative agents and stakeholders

Data

- collection of data of diverse human beings
- knowledge on tools how to analyse this data

based on Podcast Series IRI in STEM

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Relevant Literature

Balconi, M., Brusoni, S., & Orsenigo, L. (2010). In defence of the linear model: An essay. *Research Policy*, *39*(1), 1-13.

Cheveigné, S. d., Knoll, B., Bustelo, M., Engebretsen, E., & Sandström, U. (2017). *Interim Evaluation: Gender equality as a crosscutting issue in Horizon 2020*. Retrieved from https://hal.science/hal-02948895/

European_Commission. (2020). *Gendered Innovations 2: How Inclusive Analysis Contributes to Research and Innovation*. Retrieved from dx.doi.org/10.2777/316197

Nielsen, M. W., Bloch, C. W., & Schiebinger, L. (2018). Making gender diversity work for scientific discovery and innovation. *Nat Hum Behav, 2*(10), 726-734. doi:10.1038/s41562-018-0433-1

Owen, R., Macnaghten, P., & Stilgoe, J. (2012). Responsible research and innovation: From science in society to science for society, with society. *Science and Public Policy*, *39*(6), 751-760.

Perez, C. C. (2019). *Invisible women: Data bias in a world designed for men*: Abrams.

Tannenbaum, C., Ellis, R. P., Eyssel, F., Zou, J., & Schiebinger, L. (2019). Sex and gender analysis improves science and engineering. *Nature, 575*(7781), 137-146.

Werker, C. (2021). Assessing Responsible Research and Innovation (RRI) systems in the digital age. In E. Yaghmaei & I. Van de Poel (Eds.), *Assessment of Responsible Innovation : Methods and Practices.* . Abingdon (UK): Taylor & Francis.

Werker, C., Feenstra, M., & Pruschak, G. (2024). Inclusive Research and Innovation in Engineering–Theory Building from Five Case Studies. Academy of Management Proceedings.

Podcast Series on IRI in STEM: https://creators.spotify.com/pod/show/iri-in-stem

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Thank you very much!

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