

Industrial Symbiosis – an end or a means?

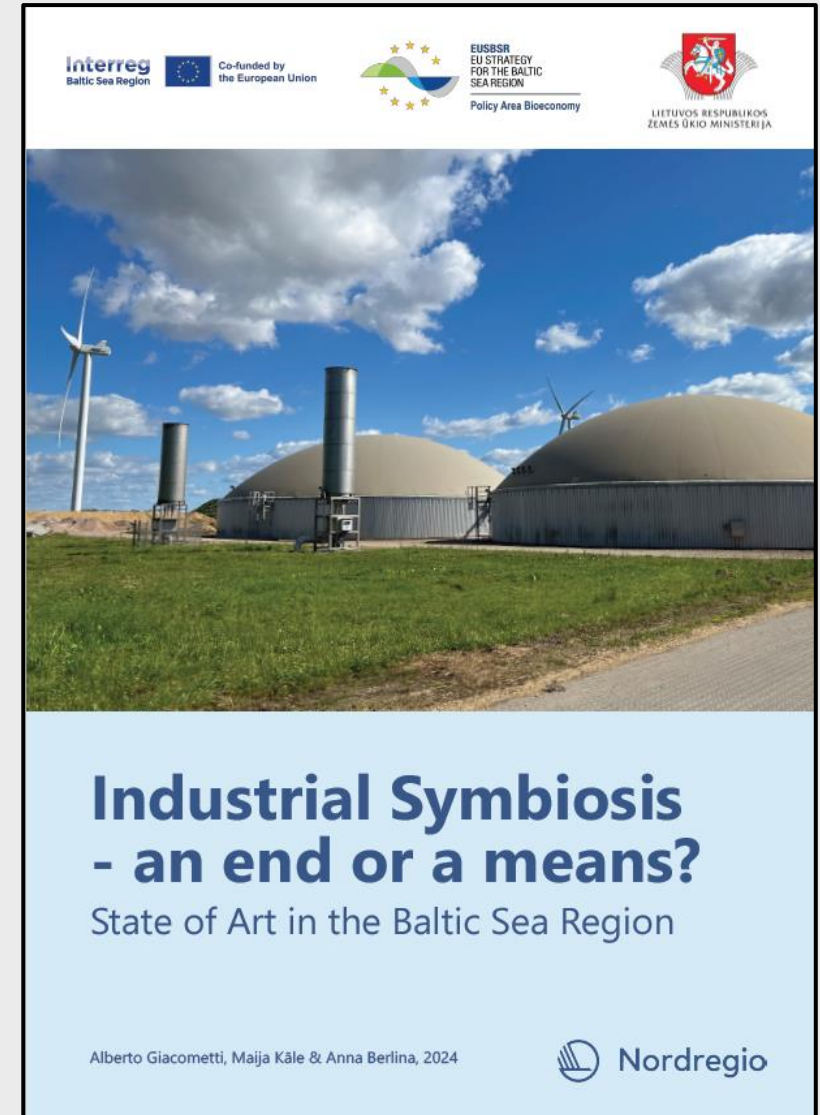
Alberto Giacometti
Maija Kāle
Anna Berlina

Nordregio

Outline presentation

- Discussion of concepts
- How IS develops – examples of BSR
- Policy implications

*Further reading →



Link publication: <https://eusbsr.eu/wp-content/uploads/industrial-symbiosis-bsr-nordregio.pdf>

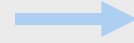
Or: <https://eusbsr.eu/policy-area-bioeconomy/activities/> - under Activities / Unlocking the Potential of Industrial Symbiosis: A Pathway to a Bioeconomy₂ in the Baltic Sea Region

Industrial Symbiosis (IS) is a collaborative or collective approach to resource management (Mirata 2018).

.... But what's the point? Is it an end or a means?

Making sense of concepts (Buzzwords?)

Conservation



Preserving, protection; no explicit link to socio-economic systems

Sustainable Development

Circular economy

Green Economy

Bioeconomy

De-Growth

Green Growth

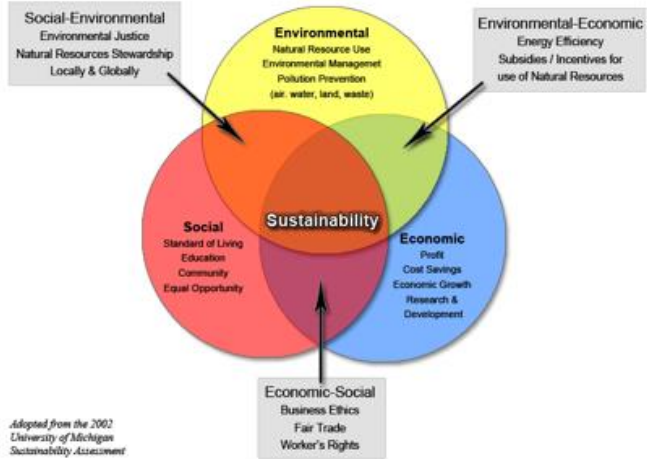
Green Transition



All relate to socio-ecological systems & Development (economy); emphasis on different aspects

Sustainable Development

The Three Spheres of Sustainability



[Vanderbilt University](https://www.vanderbilt.edu/sustainability/)

Green Economy



Doughnut Economics - Planetary boundaries (Kate Raworth, 2012)

Green Growth



<https://www.istockphoto.com/>

Green Transition



Geel et al. 2017 - <https://doi.org/10.1016/j.joule.2017.09.018/>

Circular economy

Linear Economy.

TAKE. MAKE. DISPOSE.



Circular Economy.

GIVING MATERIALS NEW LIFE.



Foster, 2023 -

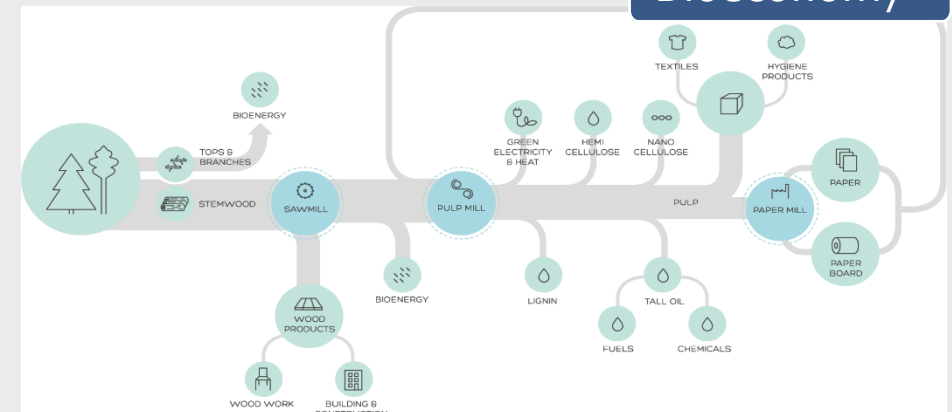
<https://www.pumpedbellingham.com/blogs/blog/embracing-the-circular-economy-a-path-to-sustainable-prosperity>

De-Growth



Jason Hickel- <https://www.localfutures.org/in-defense-of-degrowth/>

Bioeconomy



BiolInnovation - <https://www.biolinnovation.se/en/om-bioekonomi-begrepp-och-fakta/>

So... what do
concepts imply?

Two avenues

(to achieve sustainability)



Economic decline (de-growth)



<https://www.houstonforesight.org/forest-futures-economic-growth-or-degrowth/>



Decouple value creation from resource utilisation

CREATING VALUE



<https://engineeringunleashed.com/creating-value>

So... what do
concepts imply?

2 new concepts

- Valorisation
 - capture the highest possible value per every unit of 'X resource'.
 - Help decoupling EG from recourse use
- Industrial Symbiosis (IS)
 - Exchange of resources, energy, heat between co-located companies (1+1=3)

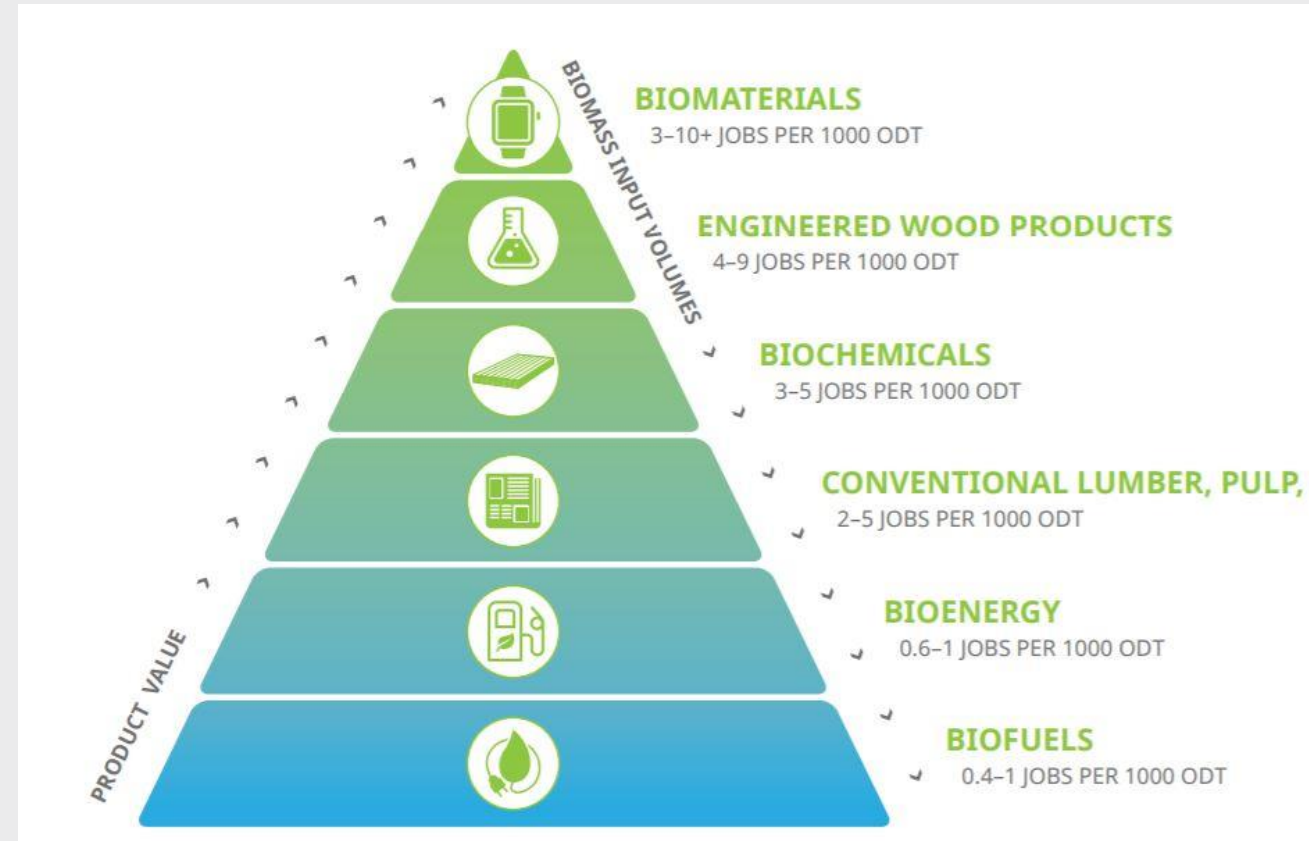


Figure 1: Bioeconomy valorisation pyramid. Source: Government of British Columbia 2024

2 new concepts (or 3)

- Valorisation
 - capture the highest possible value per every unit of 'X resource'.
 - Help decoupling EG from recourse use
- Industrial Symbiosis (IS)
 - Exchange of resources, energy, heat between co-located companies (1+1=3)
- Bio-IS
 - valorising biological resources (biomass) as means to replace fossil and mineral-based resources

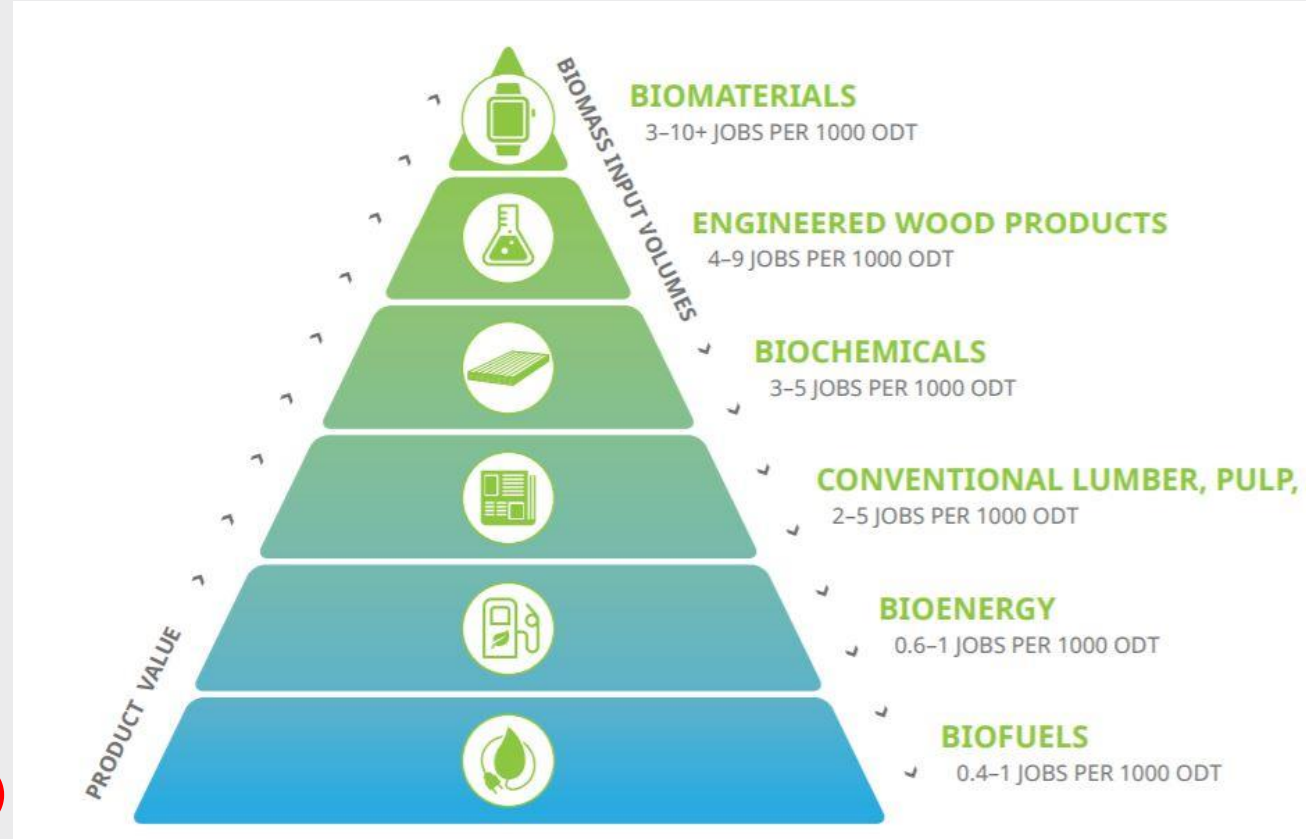


Figure 1: Bioeconomy valorisation pyramid. Source: Government of British Columbia 2024

Ends vs. Means

MEANS (+processes)

Valorisation, Industrial Symbiosis, De-Growth, Green Transitions...

ENDS (Goals)

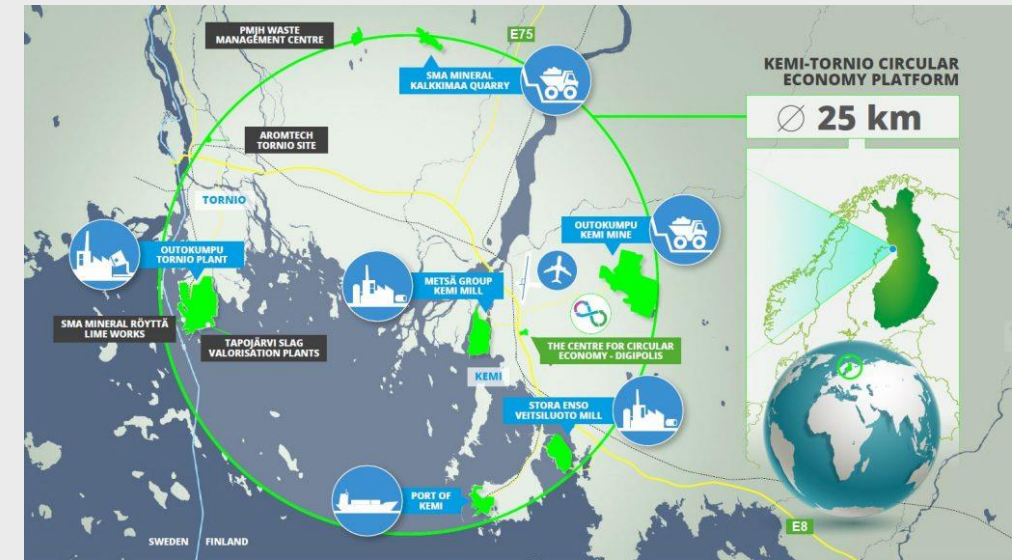
Sustainability,
Green
Economy,
resilience...

From theory to practice

- Why IS? Why not just valorisation? -

How does IS originates?

- Initial exchanges are frequently **spontaneous – structures follow** (e.g. Kalundborg, Norrköping, Helsingborg, Stenungsund, and Örnsköldsvik) → *Bottom-up*
- In other cases IS networks emerge via **intentional facilitation** (e.g. Rotterdam harbour, Sotenäs)
- **Local and regional** networks drive the IS
- **Formalisation:** coordinating entity e.g., business park, cluster organisation, or the local or regional authority (then association) → help spot opportunities, fend challenges, facilitate coordination
- **Complexity:** increases over time – start with material/energy exchange, move to joint infrastructures, organisations, joint purchases, etc.



Source: Poikela 2014

Policy support

Nordics:

- **Denmark:** Green Symbiosis programme by the Danish Business Authority
- **Finland:** SITRA (Finnish Innovation Fund) National Roadmap for Circular Economy
- **Sweden:** no explicit IS national strategy, more decentralised initiatives

Baltics:

- **Estonia:** Circular Economy White Paper and the Bioeconomy Roadmap – initiatives for regional IS networks; pilot programmes
- **Latvia:** Sinergia platform, LIFE projects (IS in isolated cases e.g., biogas production & establishment of Vidzeme bioregion)
- **Lithuania:** Roadmap for Lithuania's industrial transition to a Circular Economy; Lithuanian Bioeconomy HUB; 'green procurement'; no clear IS pilots

Degree of maturity of IS in the BSR

Old/ well developed, e.g:

- Kalundborg Symbiosis in Denmark, 1959
- Svartsengi Resource Park in Iceland, 1976
- Händelö IS in Sweden, 1990
- Kemi-Tornio facilitated municipal-owned Digipolis technology park

Mid/development

- Sotenäs, Sweden, 2011, Centre of Symbiosis – municipally led platform
- Smilowo Eco-Industrial Park, Poland – one company as key locomotive (Farmutil HS Inc)

Emerging

- Balticovo (valorisation /closed loop system ≠ IS)
- Biomund
- Initiatives listed in Sinergia platform (More during the panel)

Embryonic state

- Estonian Industrial Symbiosis Agropark (EISAP)



Contextual factors & stages of development

Nordics

- Critical mass of industry & high maturity (but varies significantly across regions)
- Decentralised – municipalities with mandate and resources to act
- High R&D expenditure
- Consensus & collaborative culture (creative - collaborative business models)

Baltics

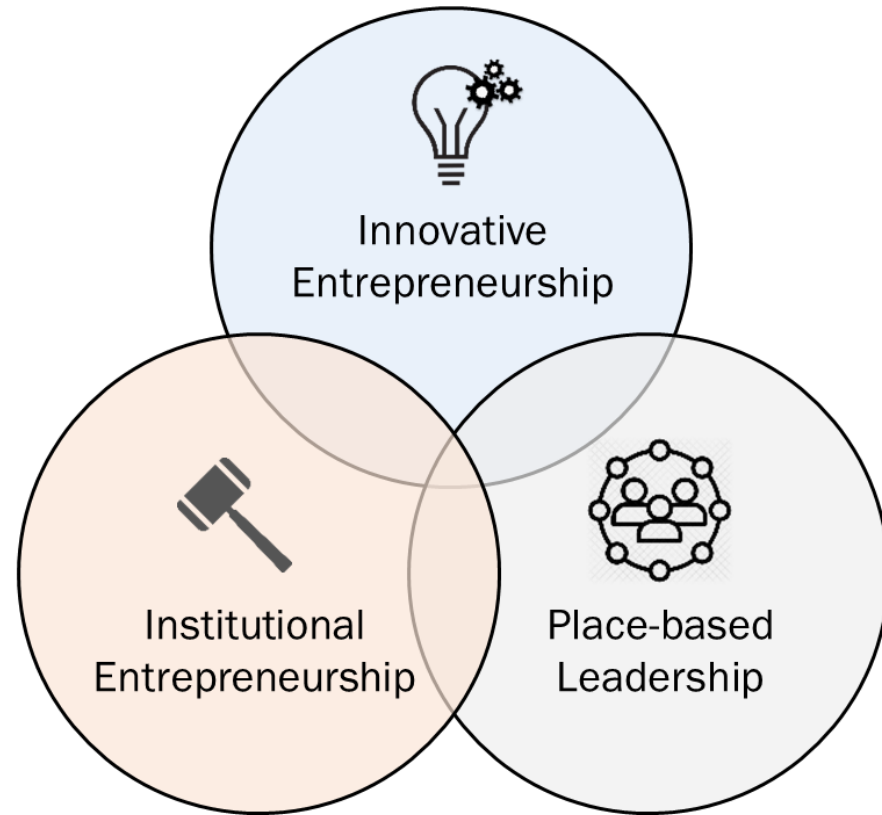
- Limited industrialisation (exceptions + regional variations), but increasingly dynamic – valorisation initiatives (largest potential around biomass side-streams)
- Centralised – municipalities with narrow mandate and limited resources
- Limited R&D expenditure / reliance on EU/project funding
- Export focus – looking outside more than within
- Limited cooperation/ communication (Valorisation without symbiosis)

Who drives change?

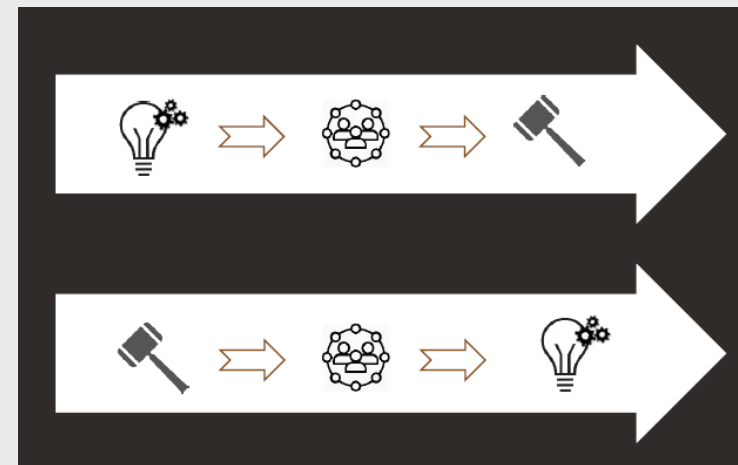
(policy implications)

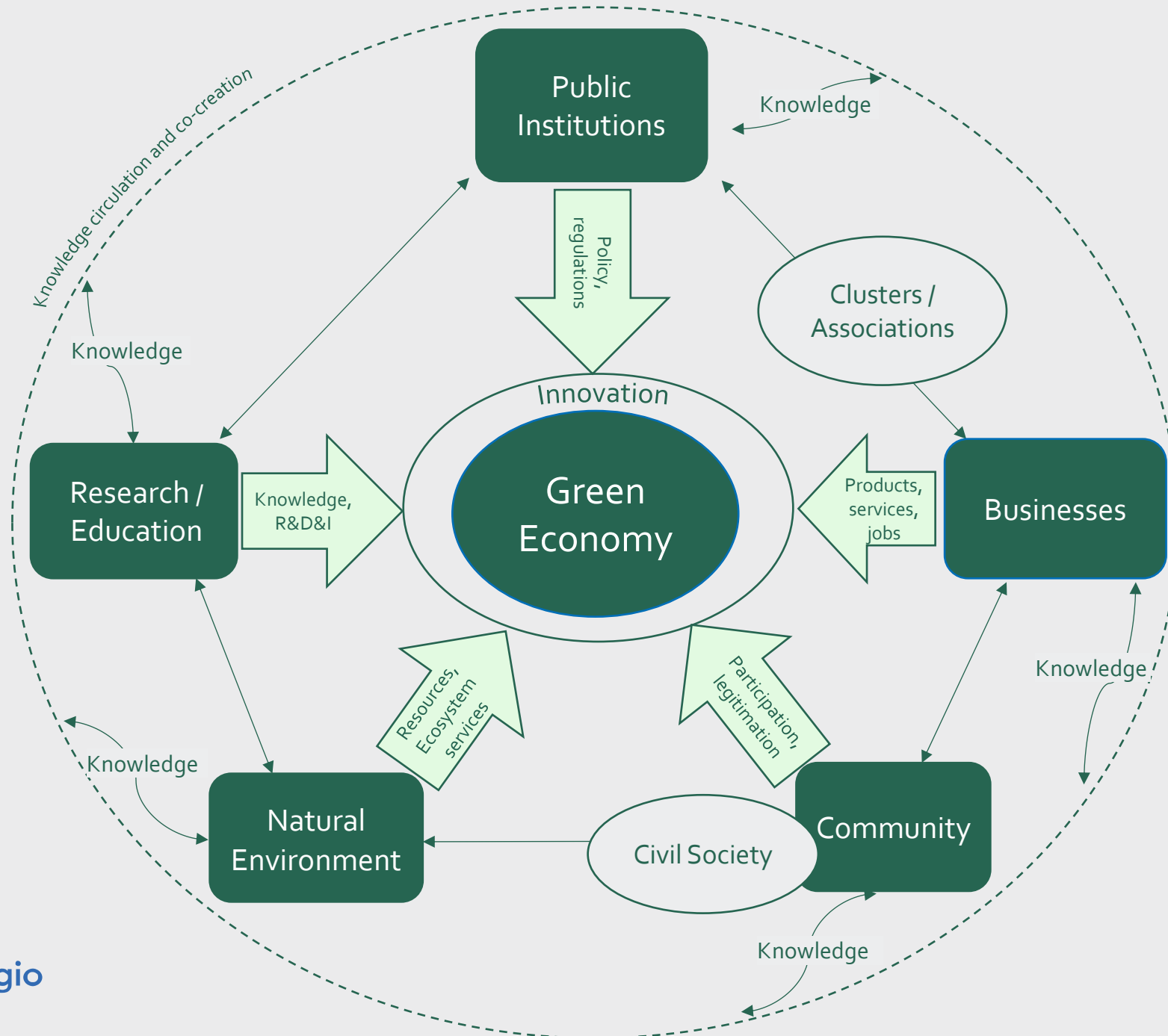
Key message: Change can come from different 'Change Agents' driving process with or without coordination, but...

Trinity of Change Agency



- Symbiotic relations bring added value
- There is no silver bullet
- Development is non-linear





Thank you!

Further info:

Report:

<https://eusbsr.eu/wp-content/uploads/industrial-symbiosis-bsr-nordregio.pdf>

Recording seminar in Vilnius:

<https://www.youtube.com/watch?v=rOVouSyNEqc>