Designing for the Global Sustainable Information Society

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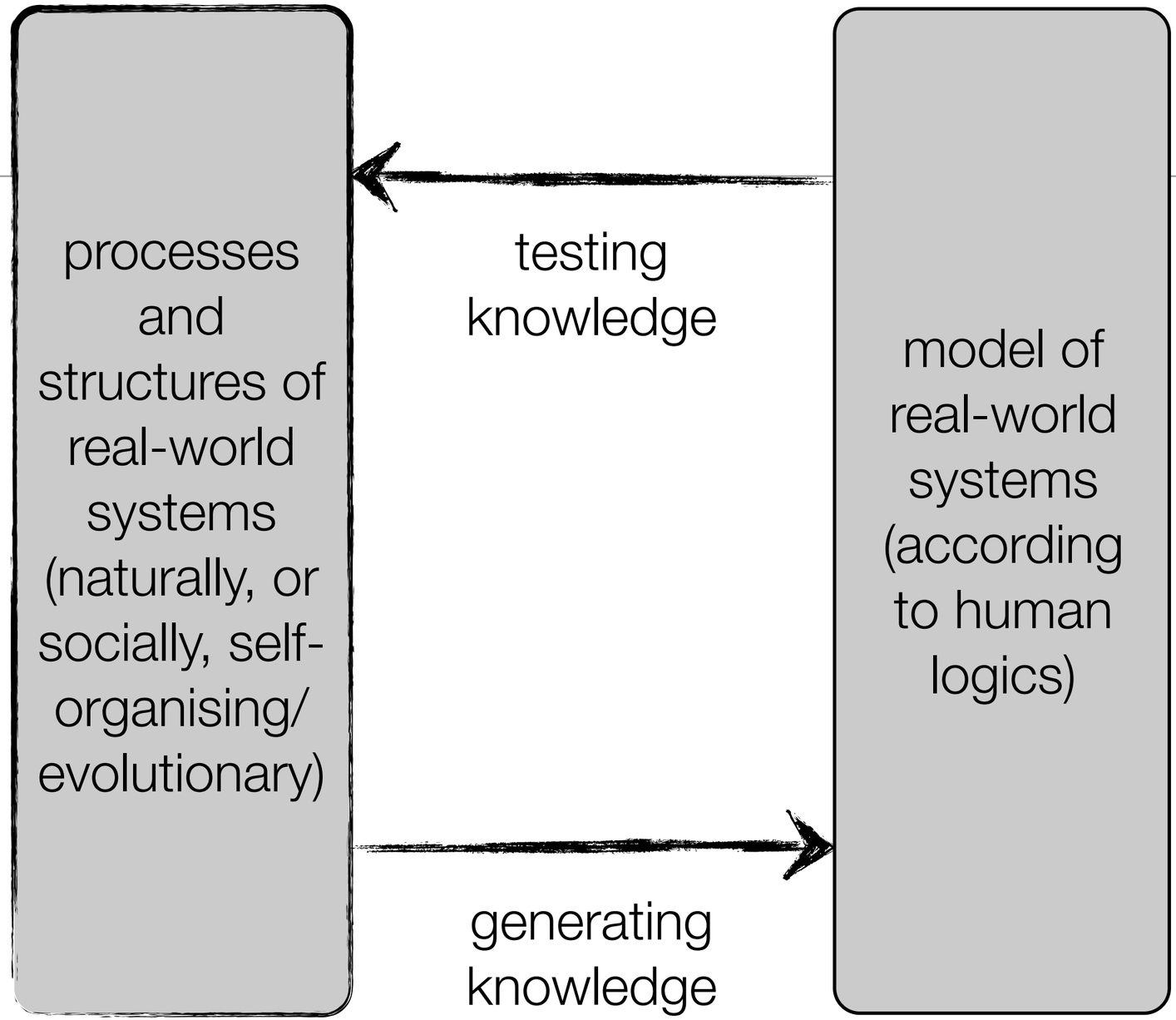
The Modeling Relation*



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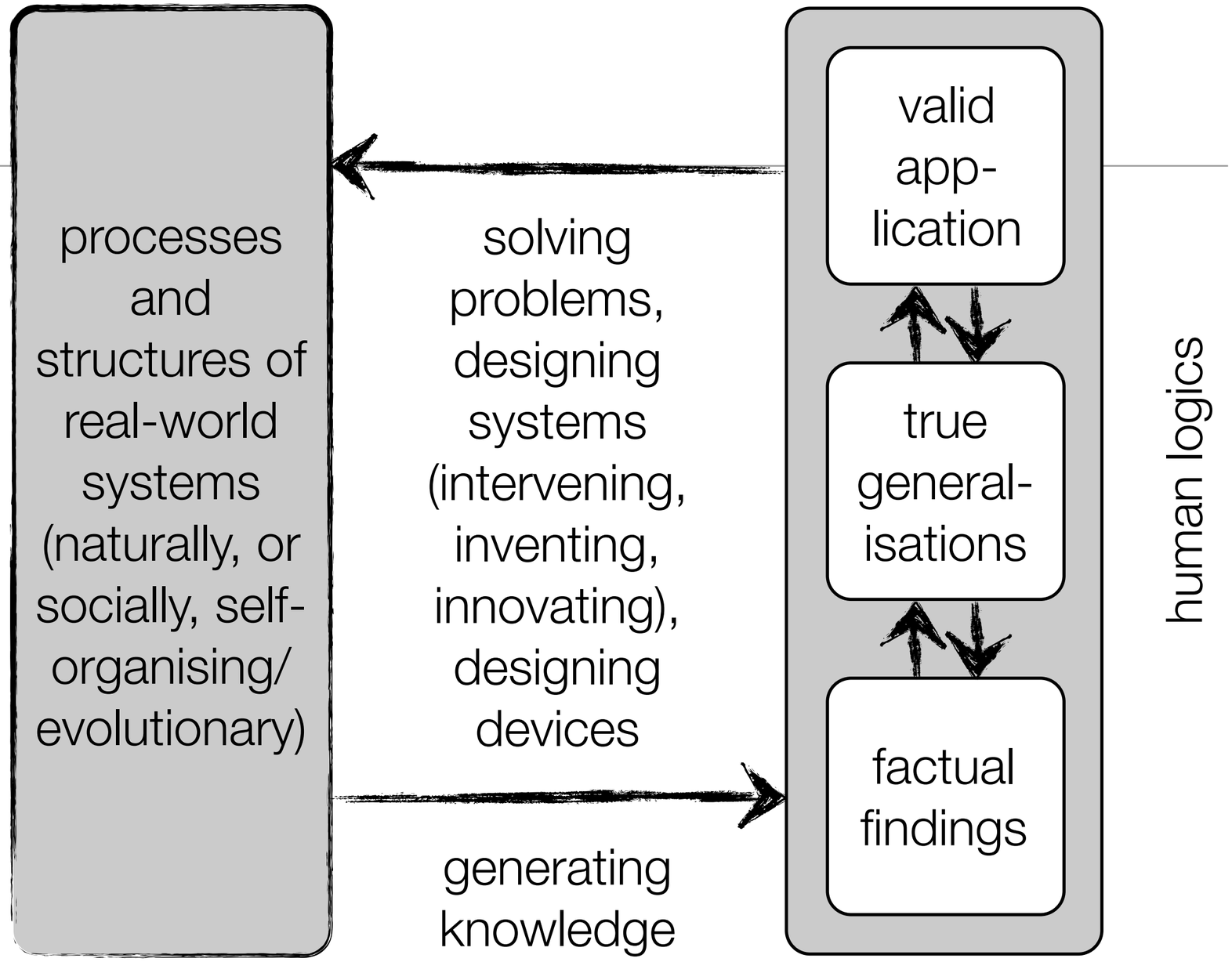
* Robert Rosen 1991

The Designing Relation



1.1 Socially embedded

- Whenever we design technology, we do interact with a **social system** and we do **design this social system itself**.
  The **device is embedded** in the social system. The device **turns the social system into a techno-social system**.

A social system consists of
– **actors** as elements and
– their social **relations**.
The **actors produce the social relations**, and the **social relations determine how the effects of social synergy** (which are the **commons**) **are provided**.

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1.1 Socially embedded

Social system

macrolevel

micro-level

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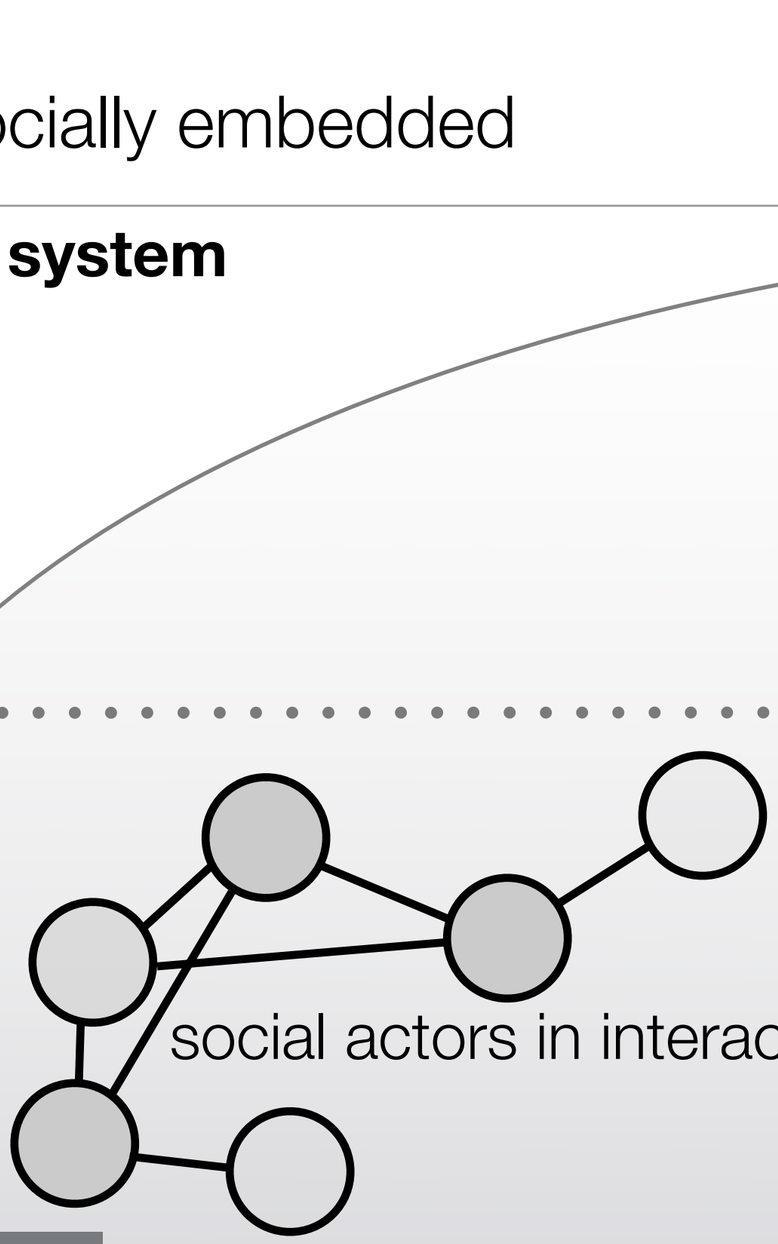
1.1 Socially embedded

Social system

macrolevel

micro-level



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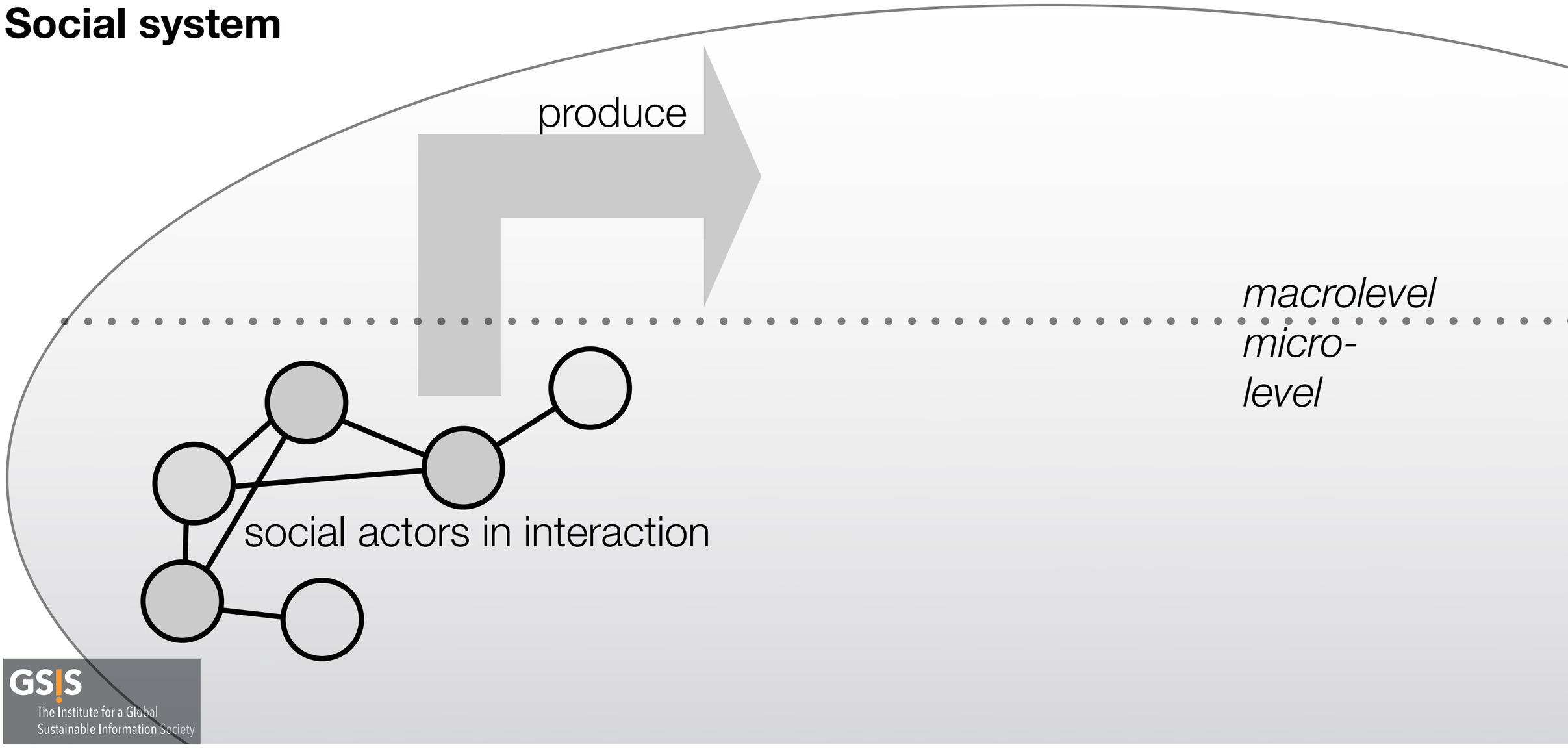
1.1 Socially embedded

Social system



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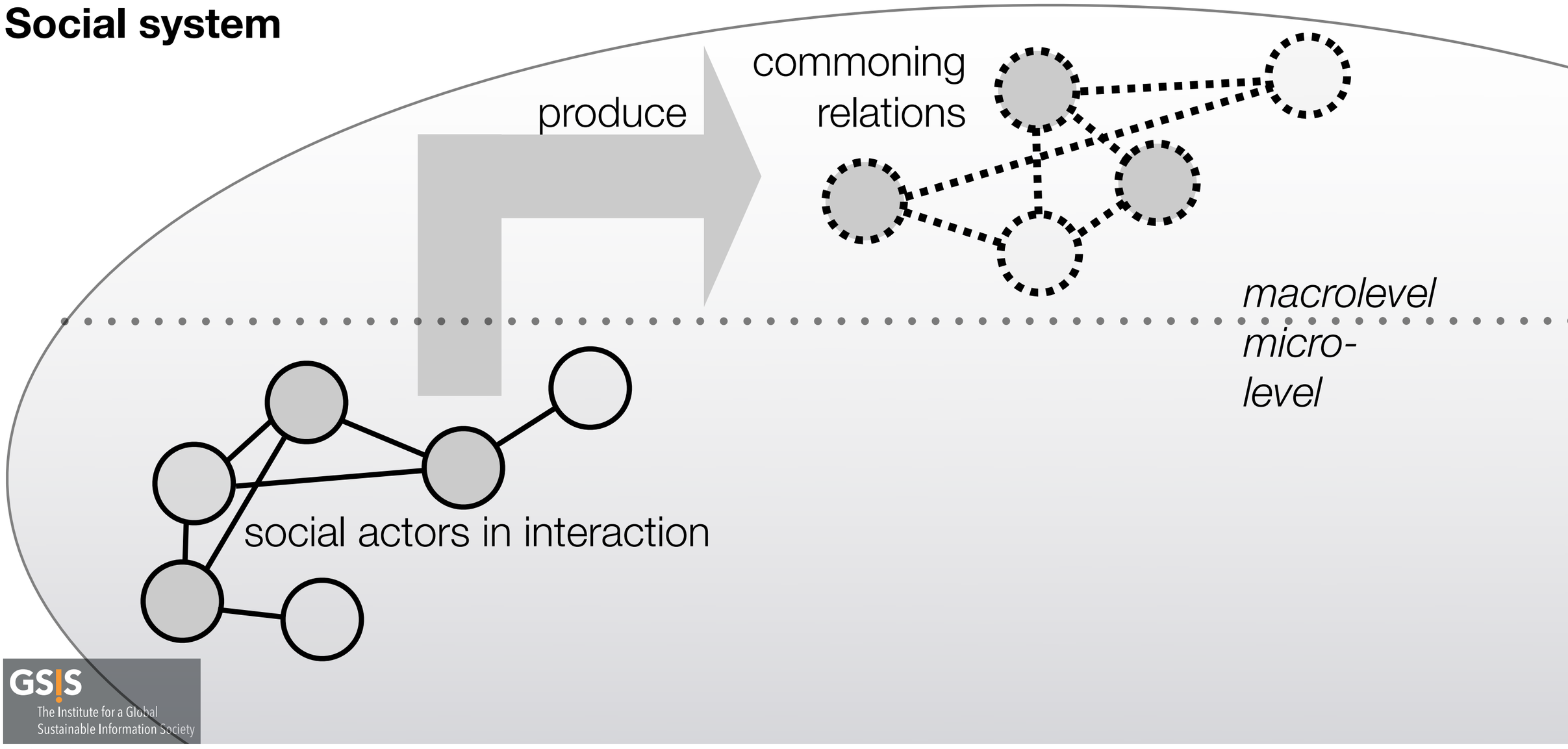
Social system



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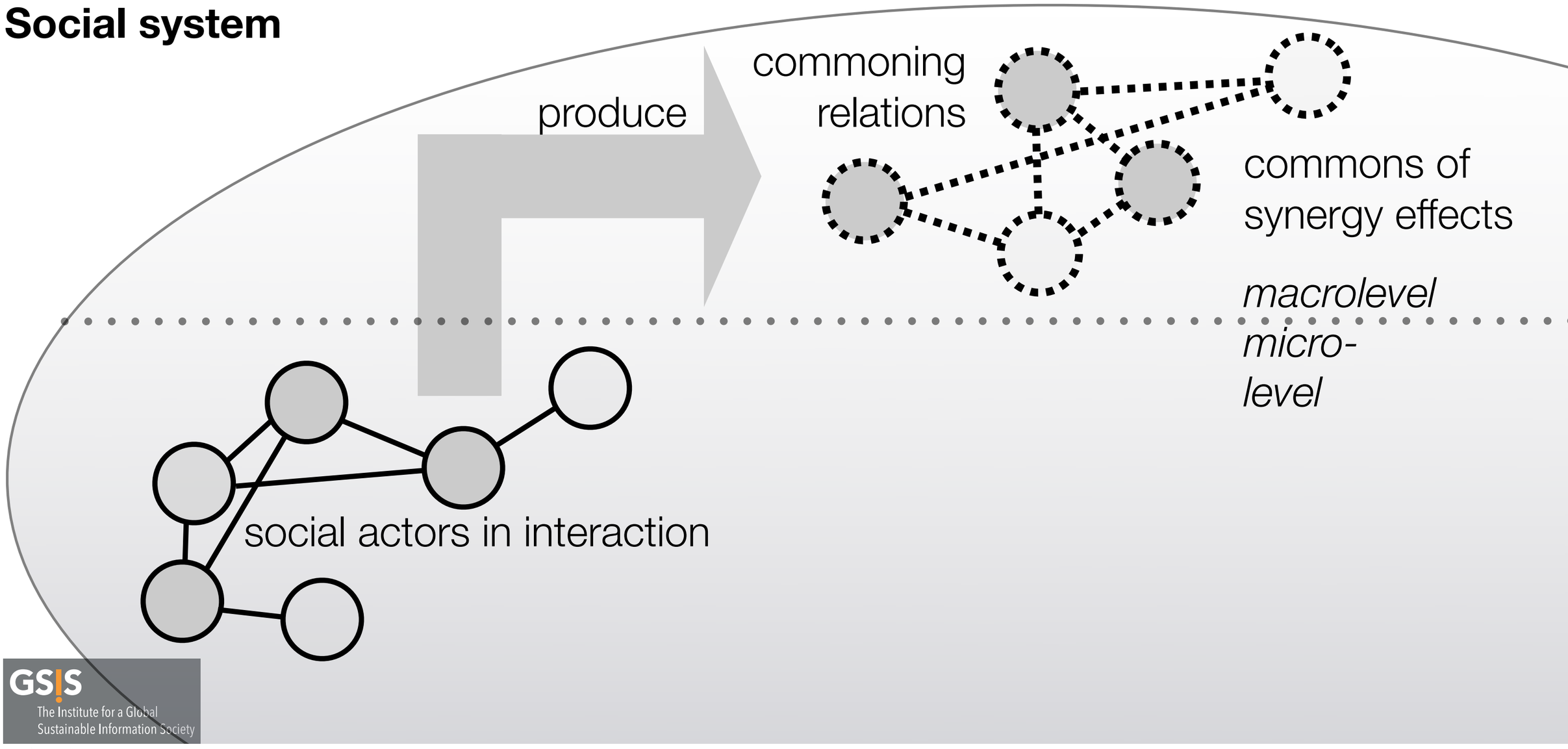

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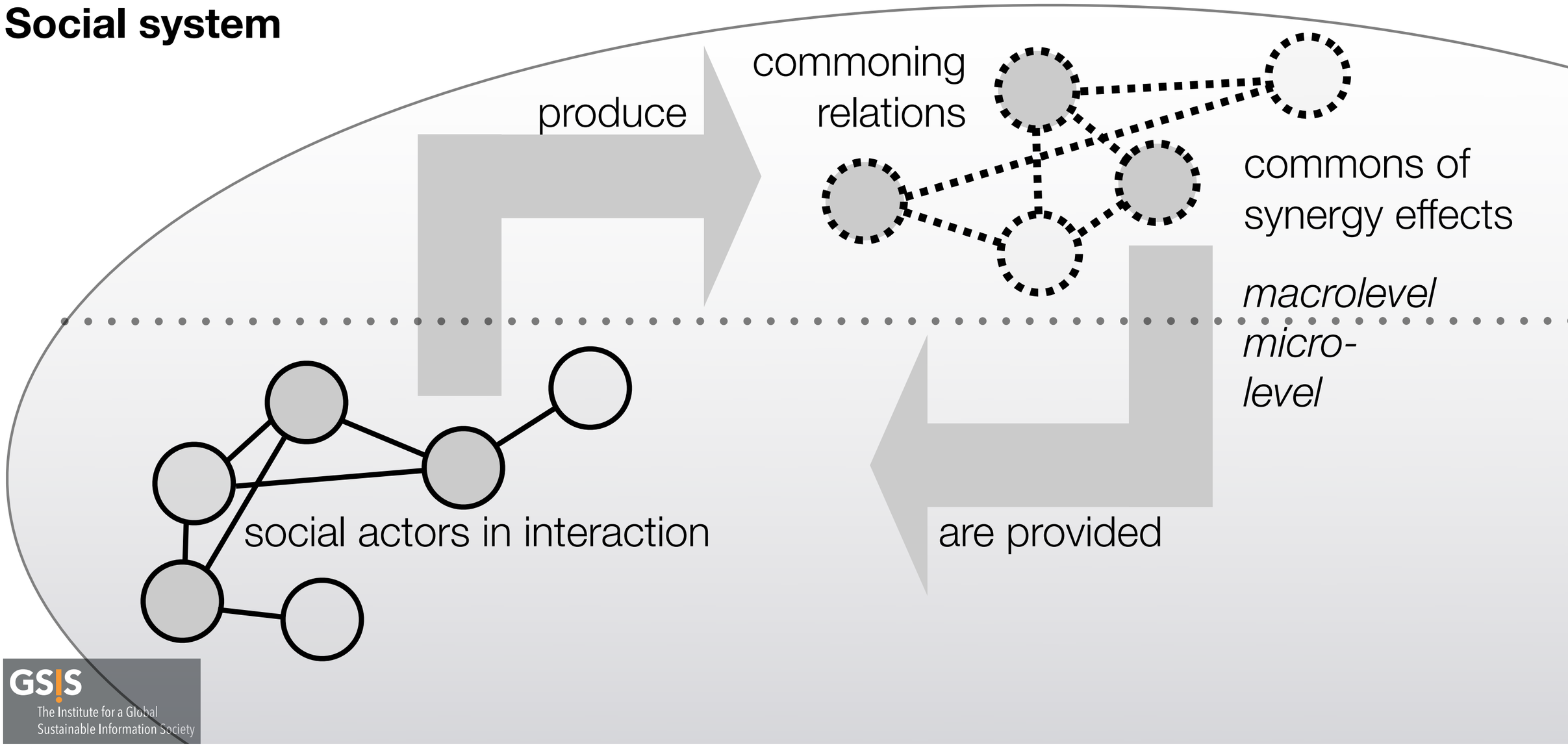

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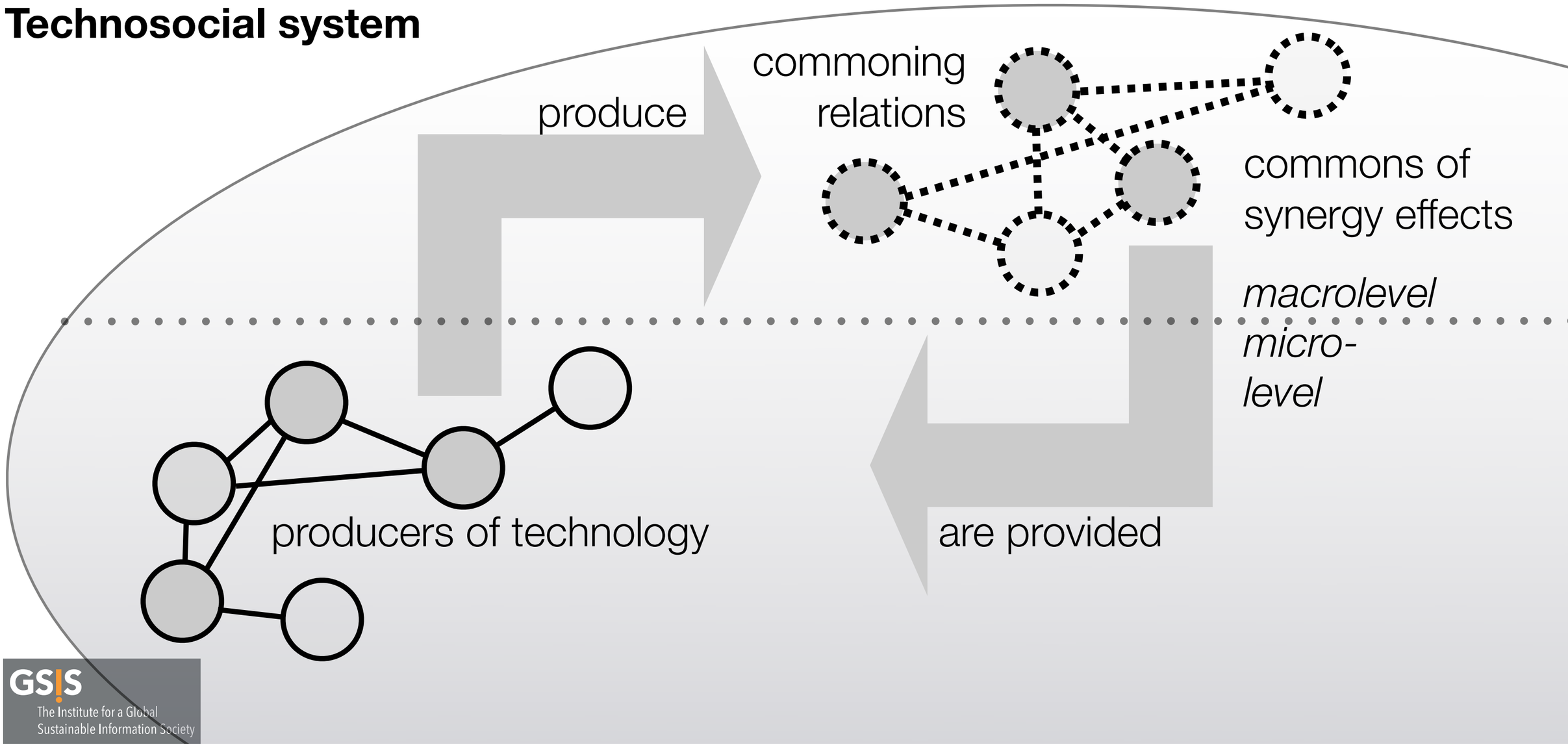
1.1 Socially embedded

Technosocial system



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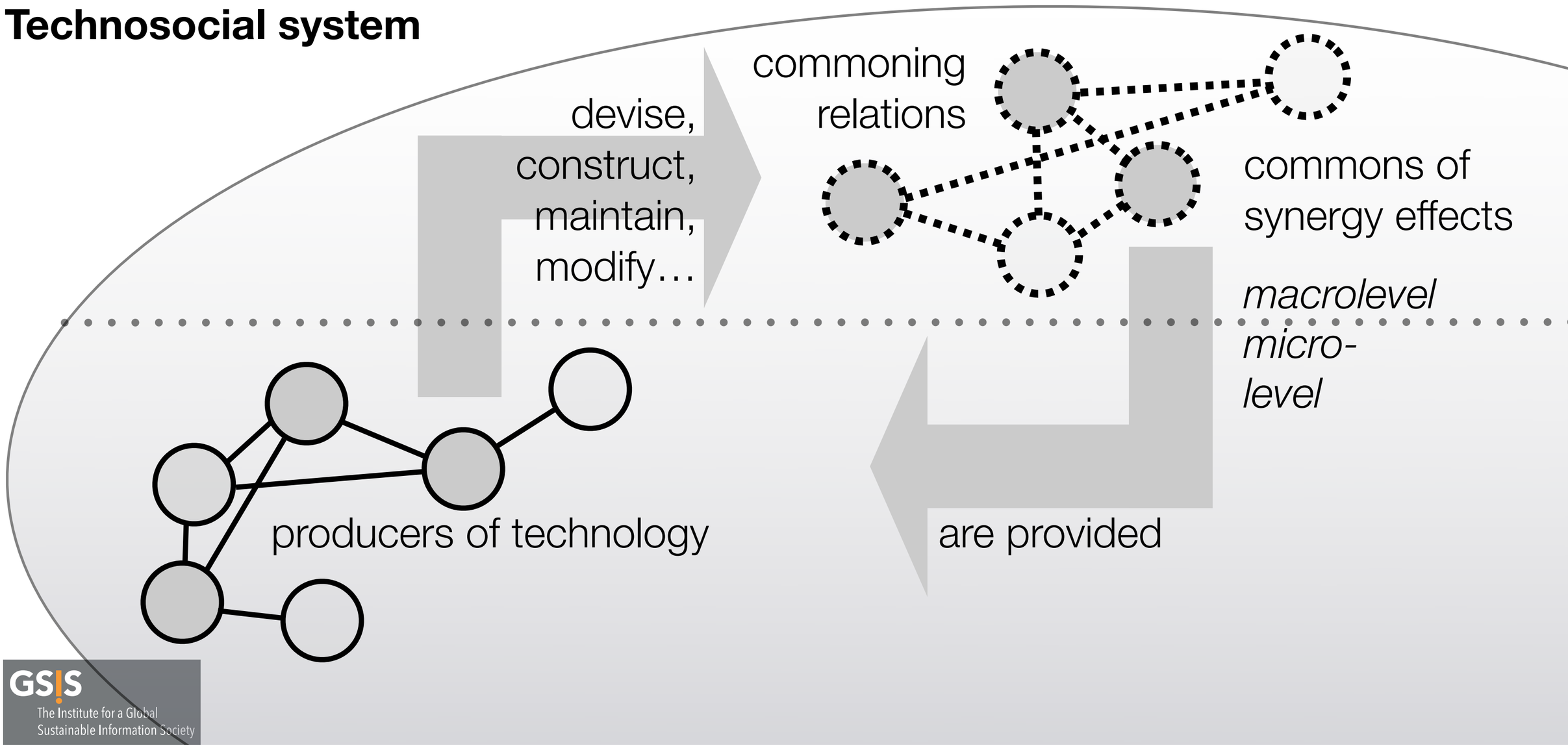
Technosocial system



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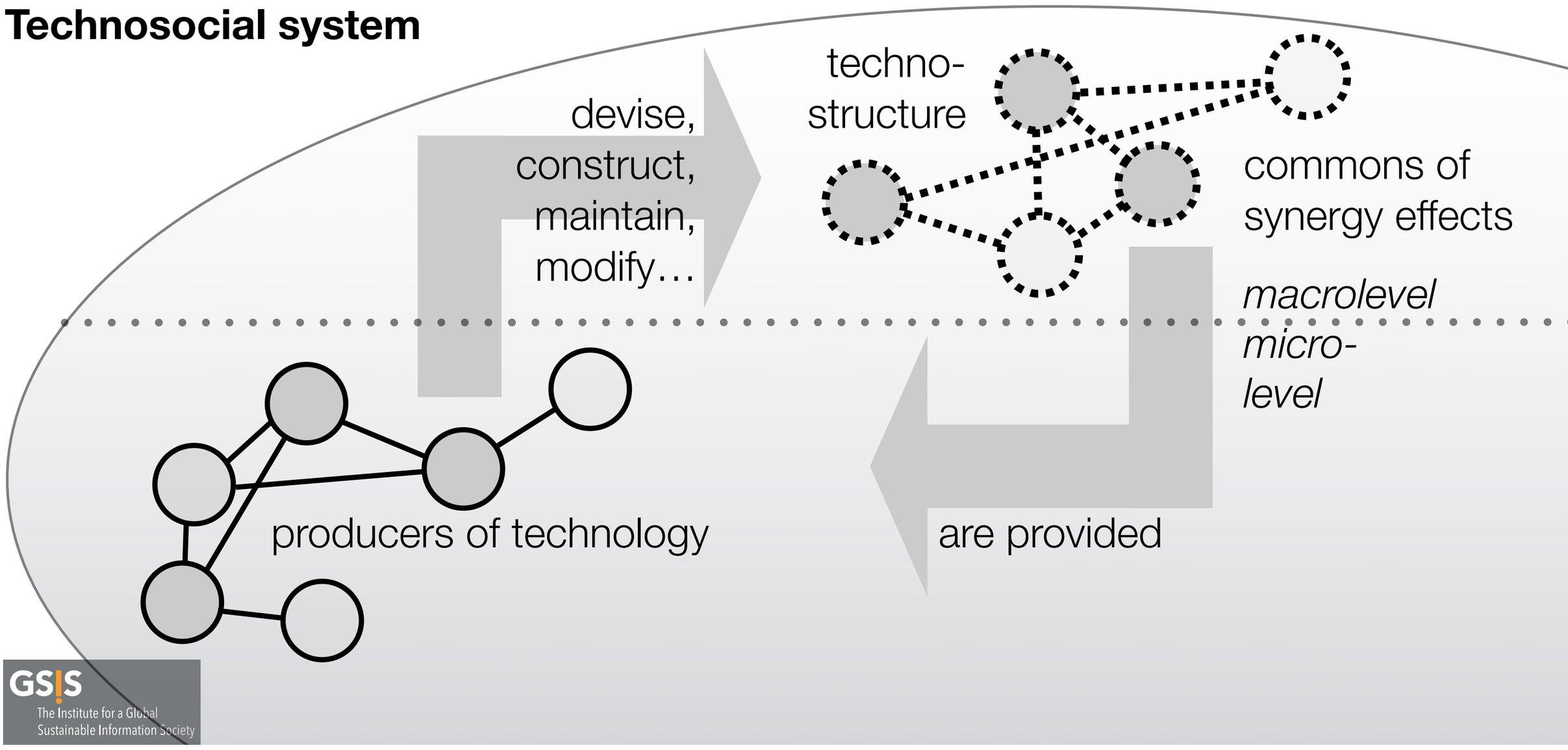

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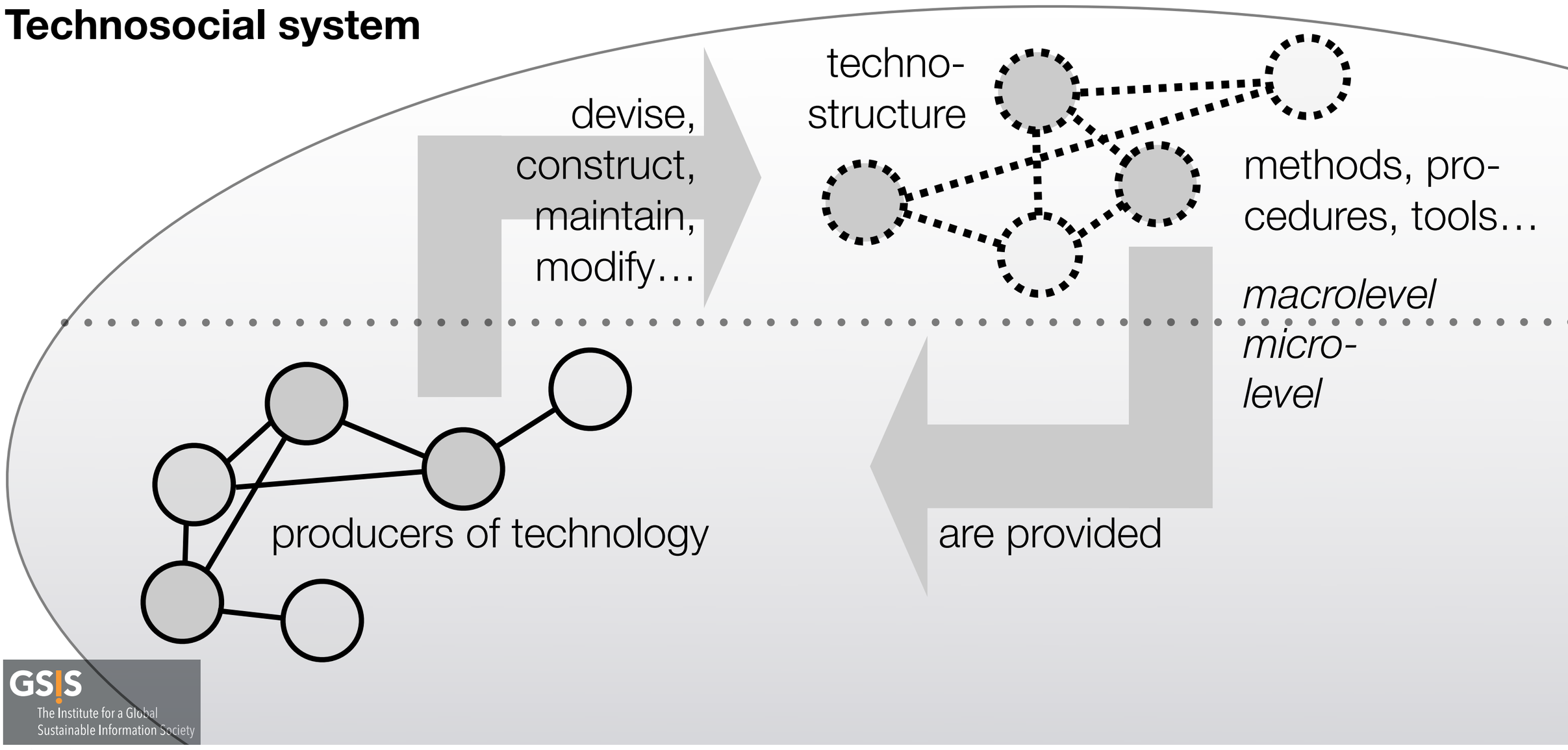
Technosocial system



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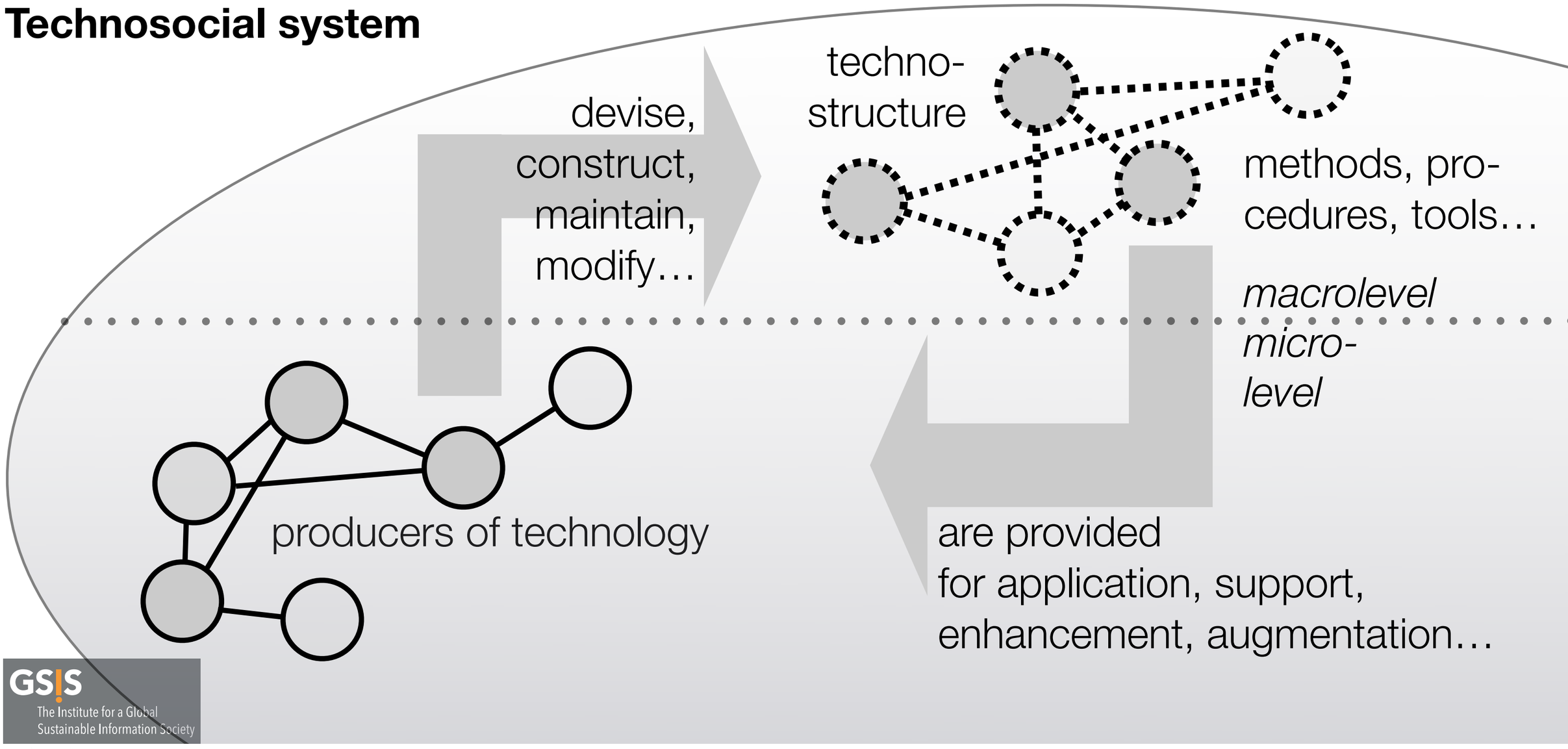

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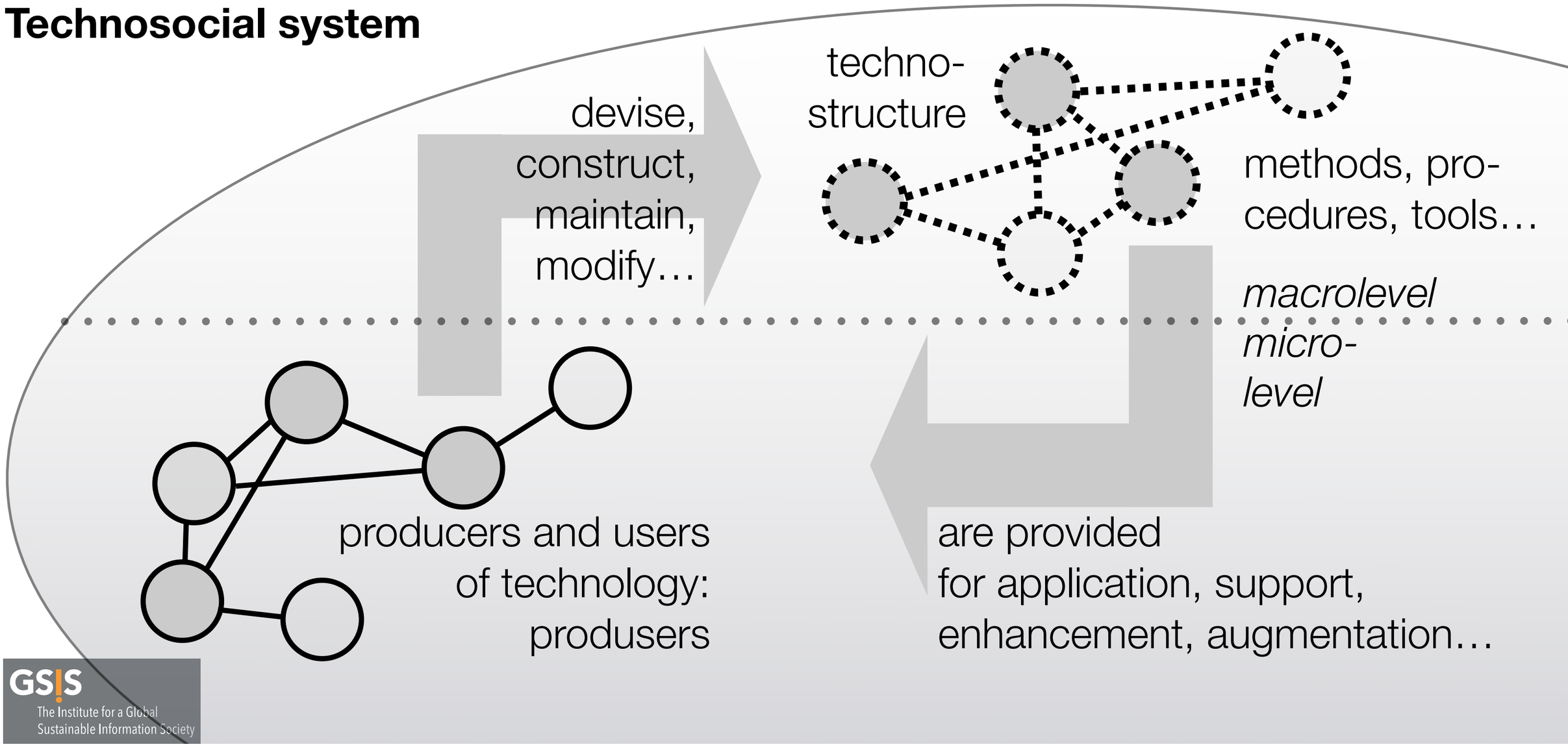
Technosocial system



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1.1 Socially embedded

The **techno-social system** consists of
– **actors** who are the producers and users, that is, the **"produsers"***, **of technology** that is incorporated into the social relations and turns those relations into a technostructure;
– and the **technostructure**, that is, the **social relations** that determine the provision of the synergy effects yielded by **the common technological device**.

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* Axel Bruns 2009

1.2 Mechanistically balanced

- Whenever we design technology, we design **mechanisms for the fulfilment of social function**s. Technologies **mediate** the fulfilment of social functions.

  Mechanisation is the process of **designing technologies** (methods, procedures, tools…). Mechanisation **functionalises cause-effect relationships** – existing in social or natural systems – **into means-end relationships** such that **the cause is a means and the effect is the end**.

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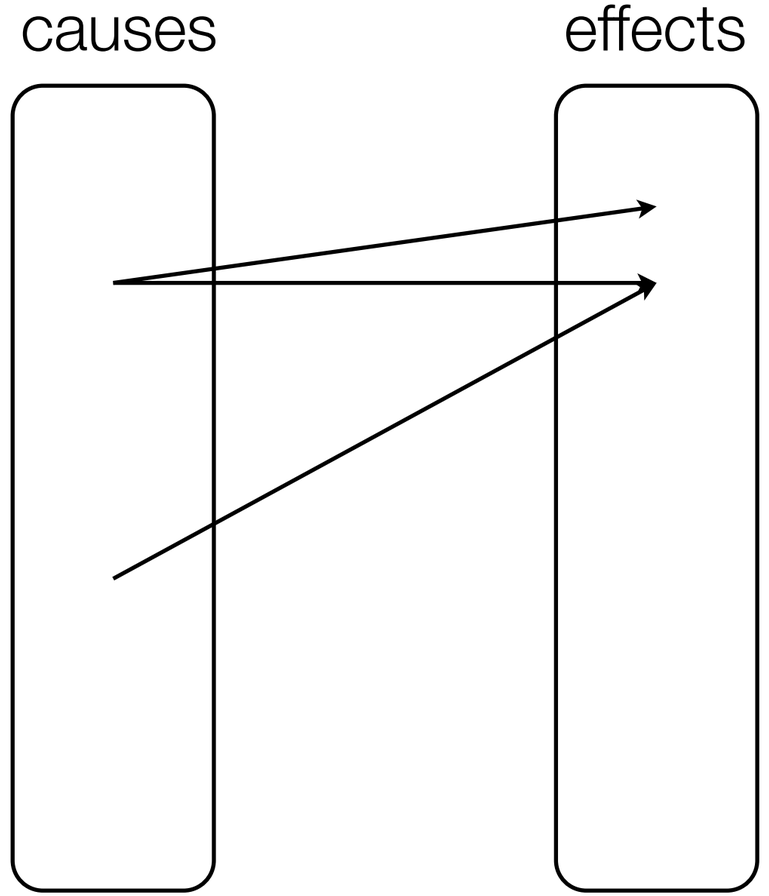
1.2 Mechanistically balanced

Real world efficient causation according to less-than-strict determinism*



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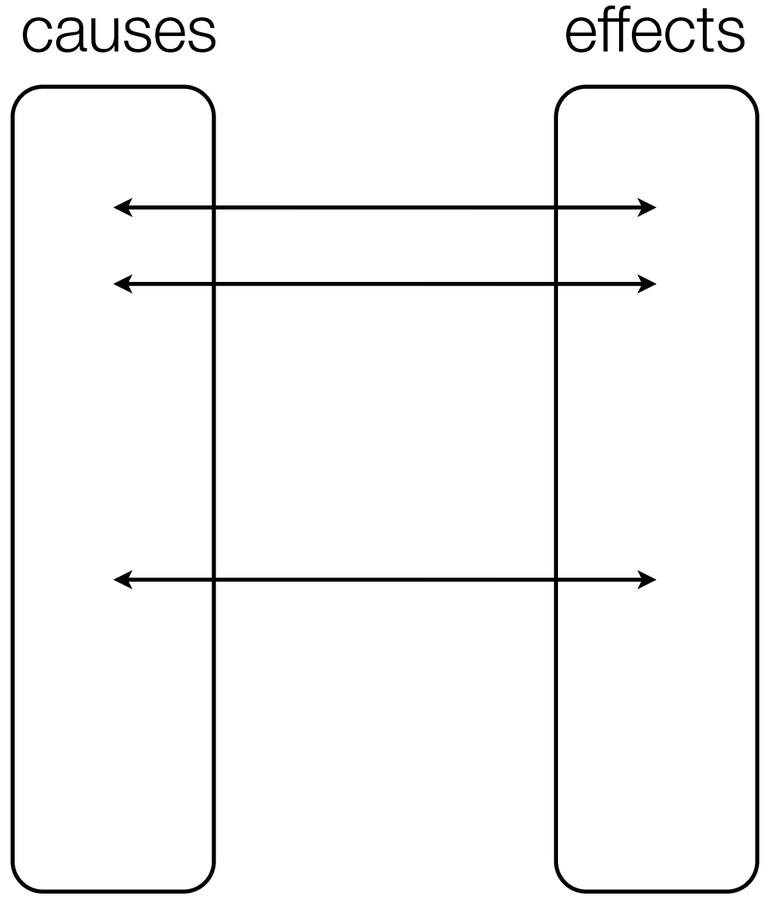
* Francis Heylighen

1.2 Mechanistically balanced

Bijective relations* according to strict determinism for mechanical devices



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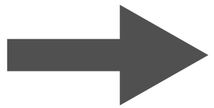
* Francis Heylighen 1990

1.2 Mechanistically balanced

Four Aristotelian causes

cause 

1.2 Mechanistically balanced

Four Aristotelian causes

cause → caused

1.2 Mechanistically balanced

Four Aristotelian causes

cause → caused

– **necessary** (bijective): strictly determined, mechanical

1.2 Mechanistically balanced

Four Aristotelian causes

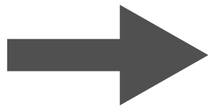
cause → caused

– **necessary** (bijective): strictly determined, mechanical

– **contingent** (not bijective): conditioned (by a necessary but not sufficient condition)

1.2 Mechanistically balanced

Four Aristotelian causes

efficient cause 

diachrony

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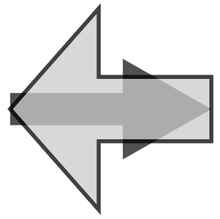
1.2 Mechanistically balanced

Four Aristotelian causes

efficient cause,
end-directed



final cause

diachrony

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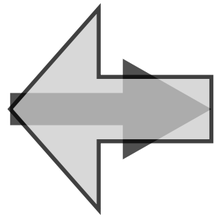
1.2 Mechanistically balanced

Four Aristotelian causes

efficient cause,
end-directed



final cause

diachrony

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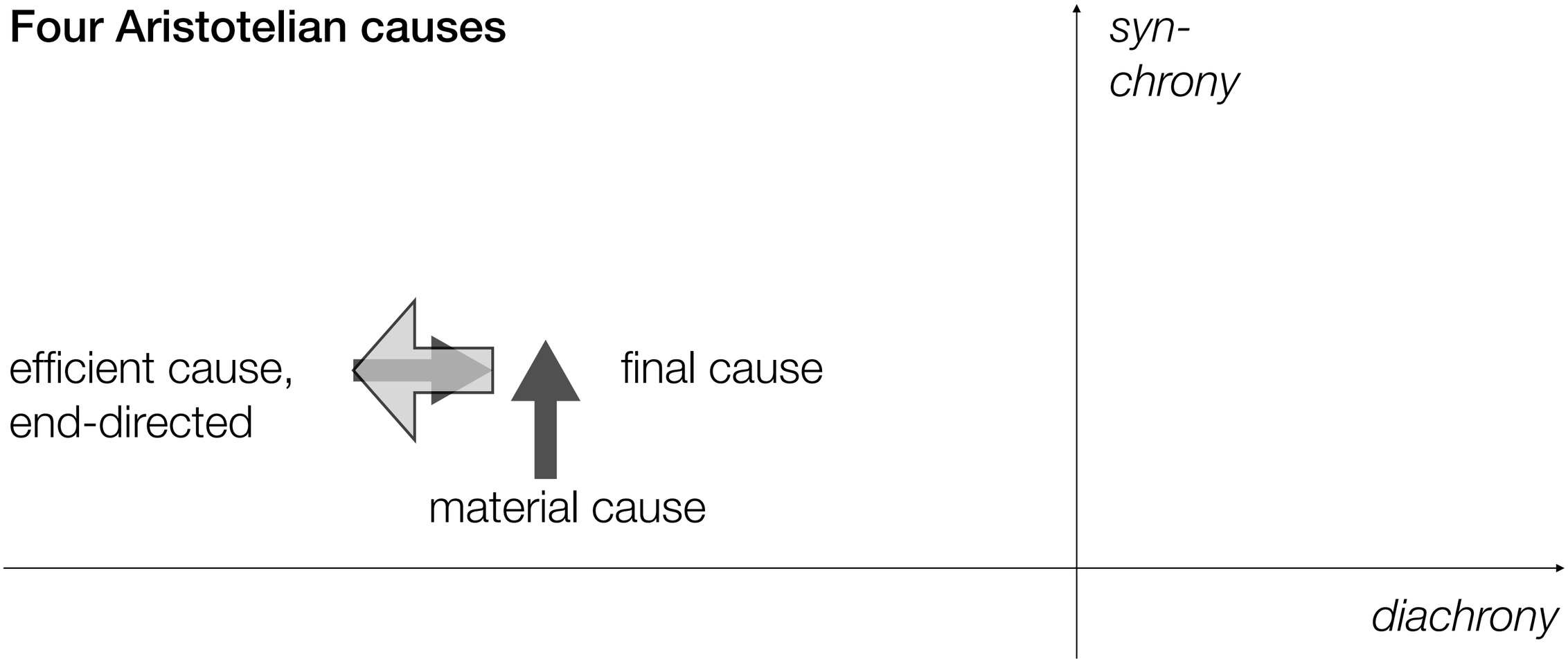
1.2 Mechanistically balanced

Four Aristotelian causes



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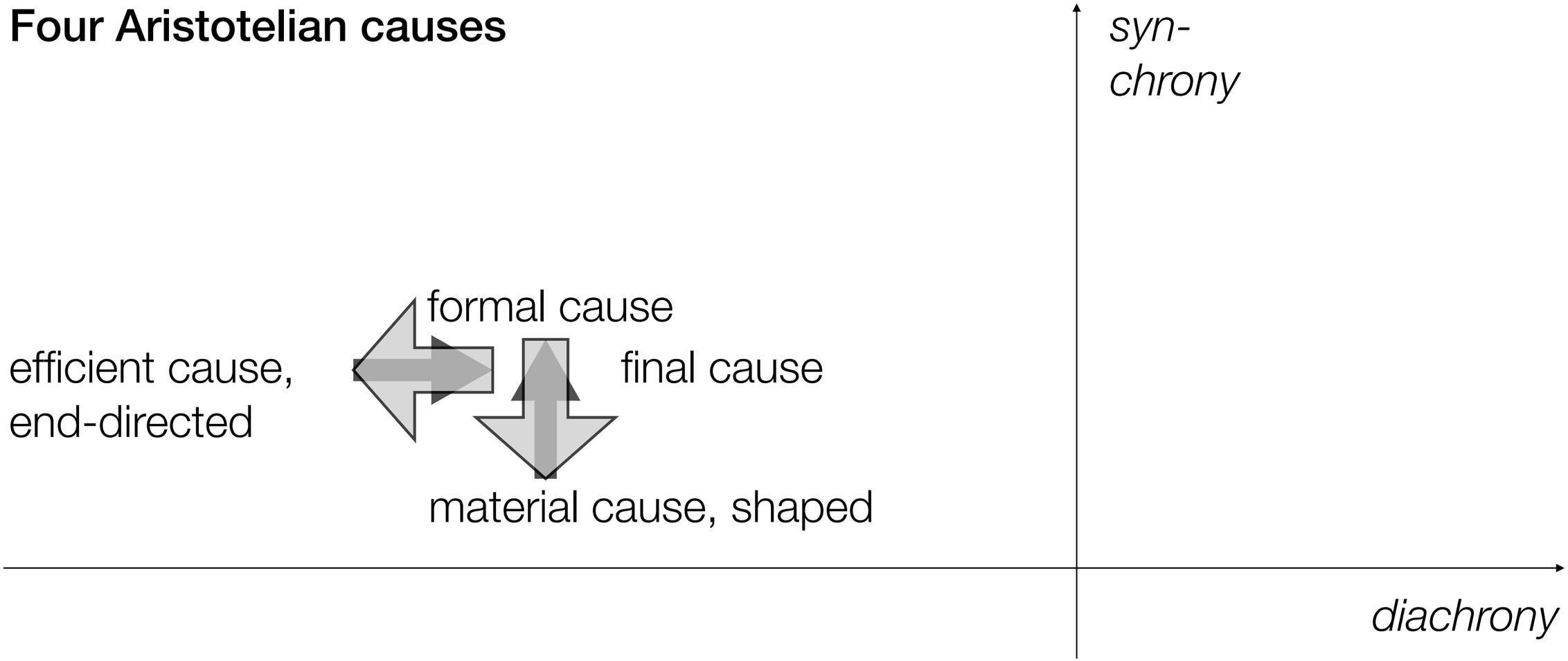
1.2 Mechanistically balanced

Four Aristotelian causes



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1.2 Mechanistically balanced

- The functionalisation of cause-effect relationships
  – directs the **efficient cause** towards the **required end (final cause)** and
  – gives the **material cause** the **required form (formal cause)**.

- **Ideal-typically**, technologies would work best with **bijective relations**.
  For that reason, mechanisation attempts to **curb the self-organisation dynamics** of social or natural systems and **restrict the space of possibilities** to make them predictable.

- However, mechanisation should be **appropriate**: the constraints should be **as little as possible, as much as necessary**.

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1.2 Mechanistically balanced

Strict determinism

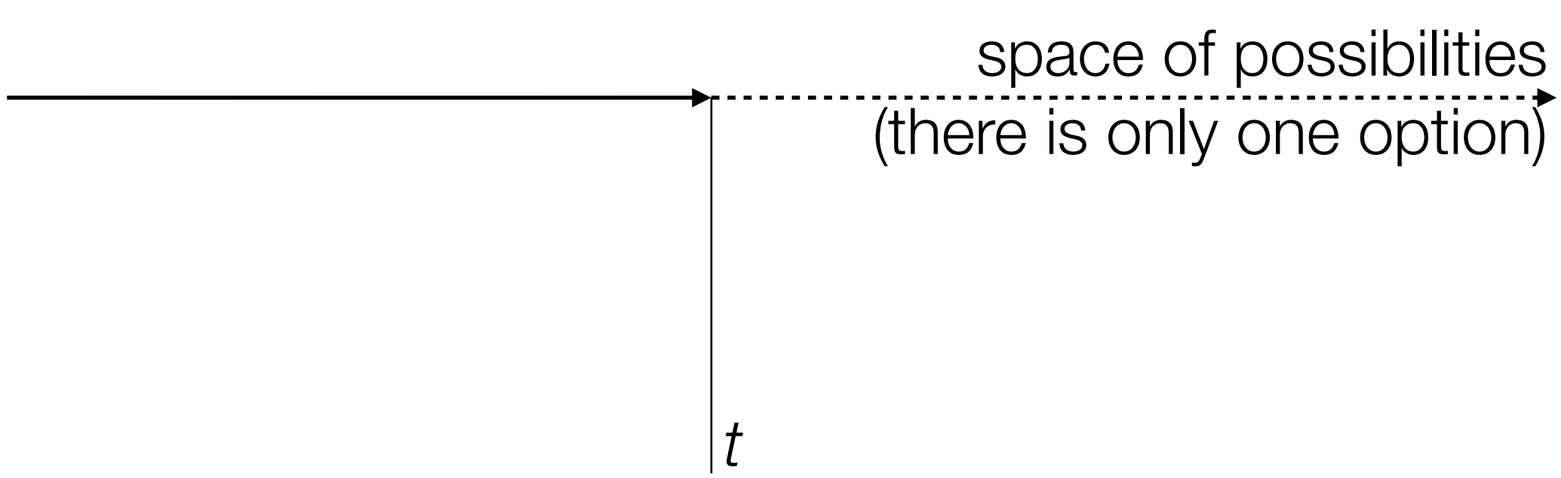
1.2 Mechanistically balanced

Strict determinism

1.2 Mechanistically balanced

Strict determinism

space of impossibilities



space of impossibilities

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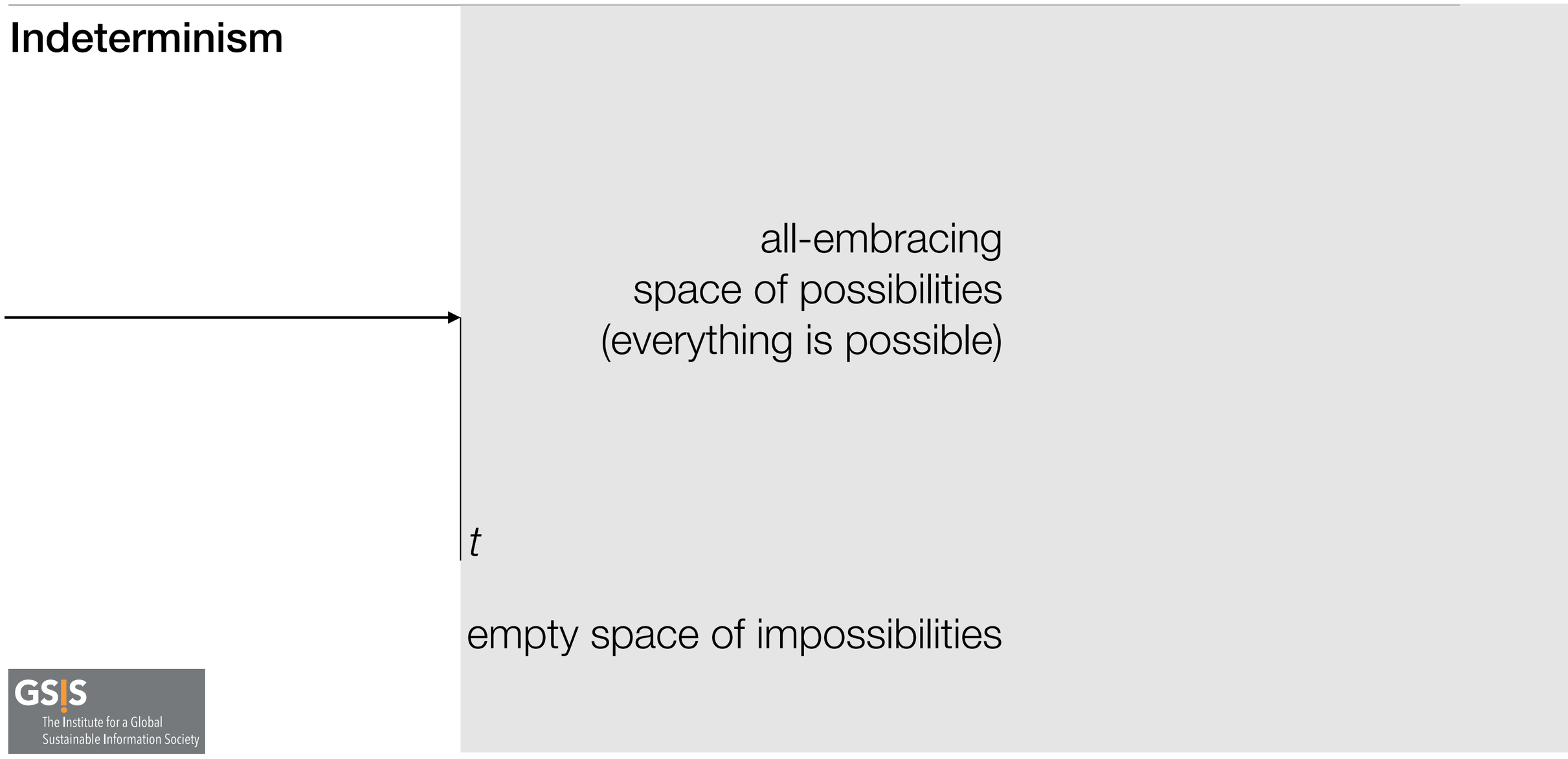
1.2 Mechanistically balanced

Indeterminism



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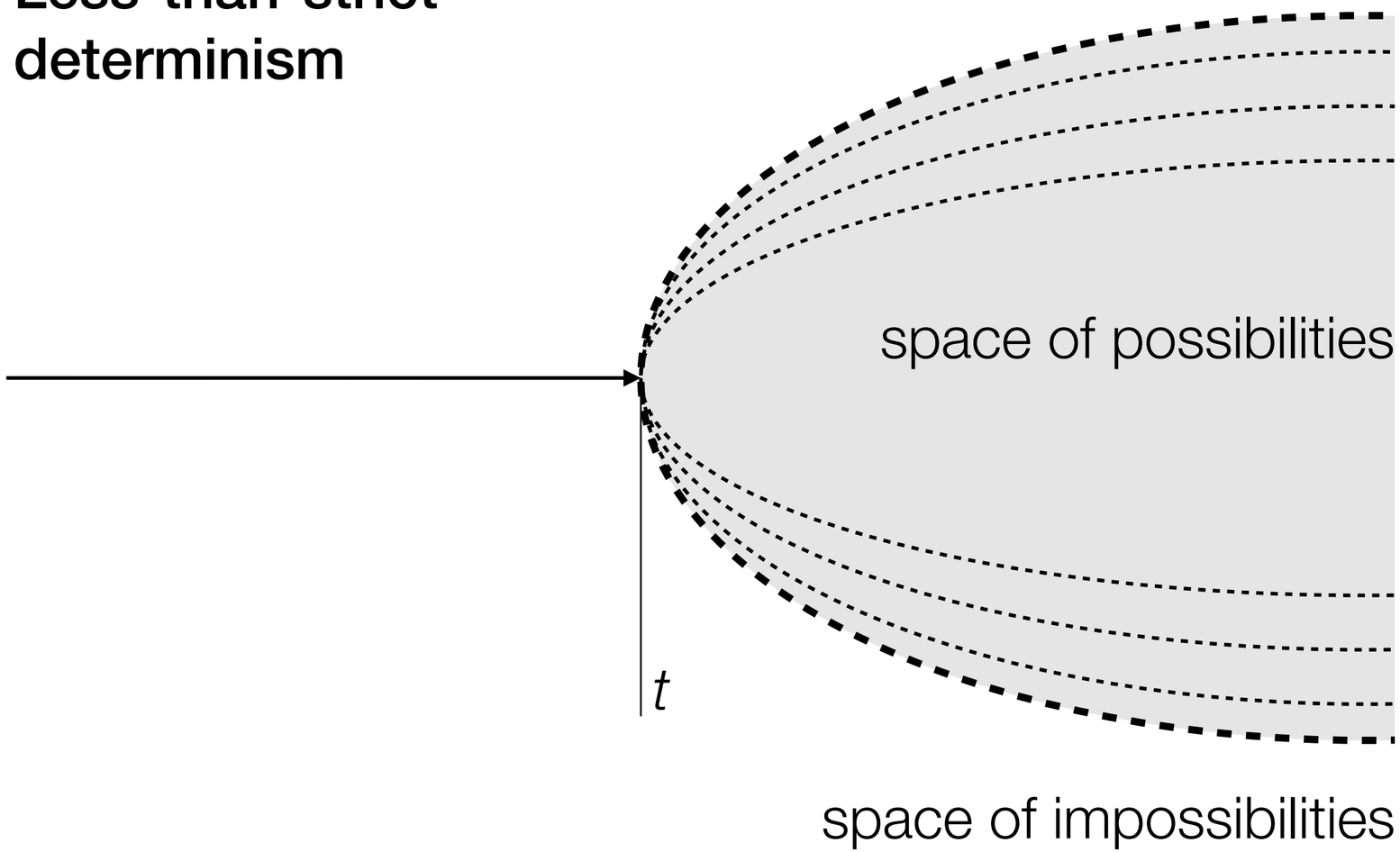
1.2 Mechanistically balanced

Less-than-strict determinism



1.3 Ethically aligned

- Whenever we design technology, we take over **responsibility***, willingly or not, in two different respects:

  – First, we take over responsibility for the **functionality** of the device**:

Does the mechanism effectively lead to the end for which technology shall be designed, that is, is it **functional**?
This is a **matter of fact**. Anyway, we can look upon it in a **de-contextualised manner from a mere technical point of view**, which is not enough though.

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* RRI – Responsible Research & Innovation; ** TA – Technology Assessment

1.3 Ethically aligned

– Second, we take over responsibility also for the **meaningfulness** of the device:

Does the end for which technology shall be designed **make sense**, that is, does it **promote a social value**, does it **conform with a social norm**?

This is a **matter of ethics**. We can see the **whole picture only when in the context of the social**.

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1.3 Ethically aligned

- Responsibly reflecting **both the functionality and the meaningfulness** of the device, makes the design process a **visioneering** process.
  Visioneering =*def.* engineering a vision* (the vision being a desired future state of the social system, to be engineered by support of technologies designed for that purpose)

- The default value of **meaningful technology** can be put as follows:
  it shall, ultimately, serve a **vision of**
  – **the good society**,
  – **individuals living the good life**,
  – **cultivating the common good**.

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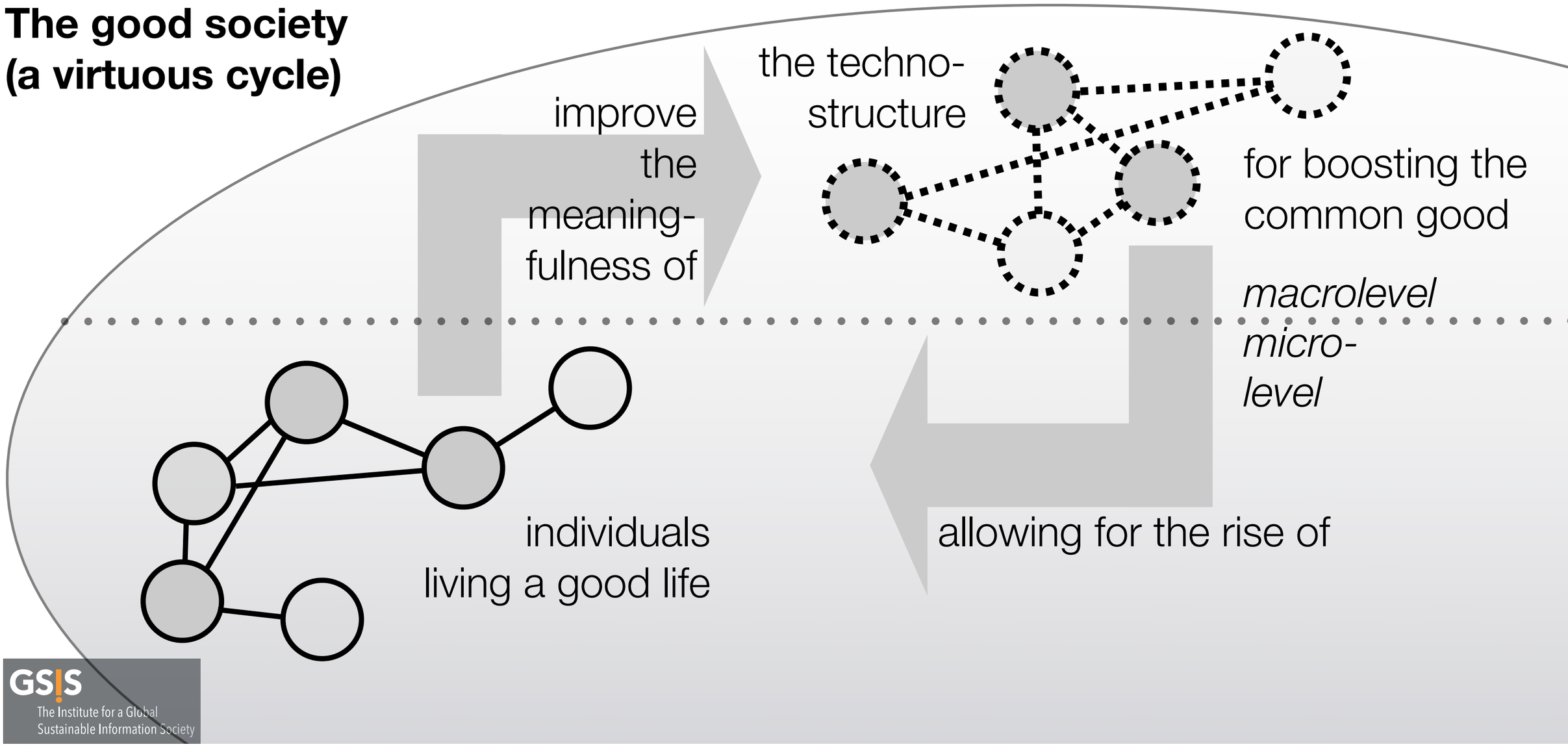
* Joon Kim/Taikan Oki 2011; Patrick McCray 2013

The good society (a virtuous cycle)



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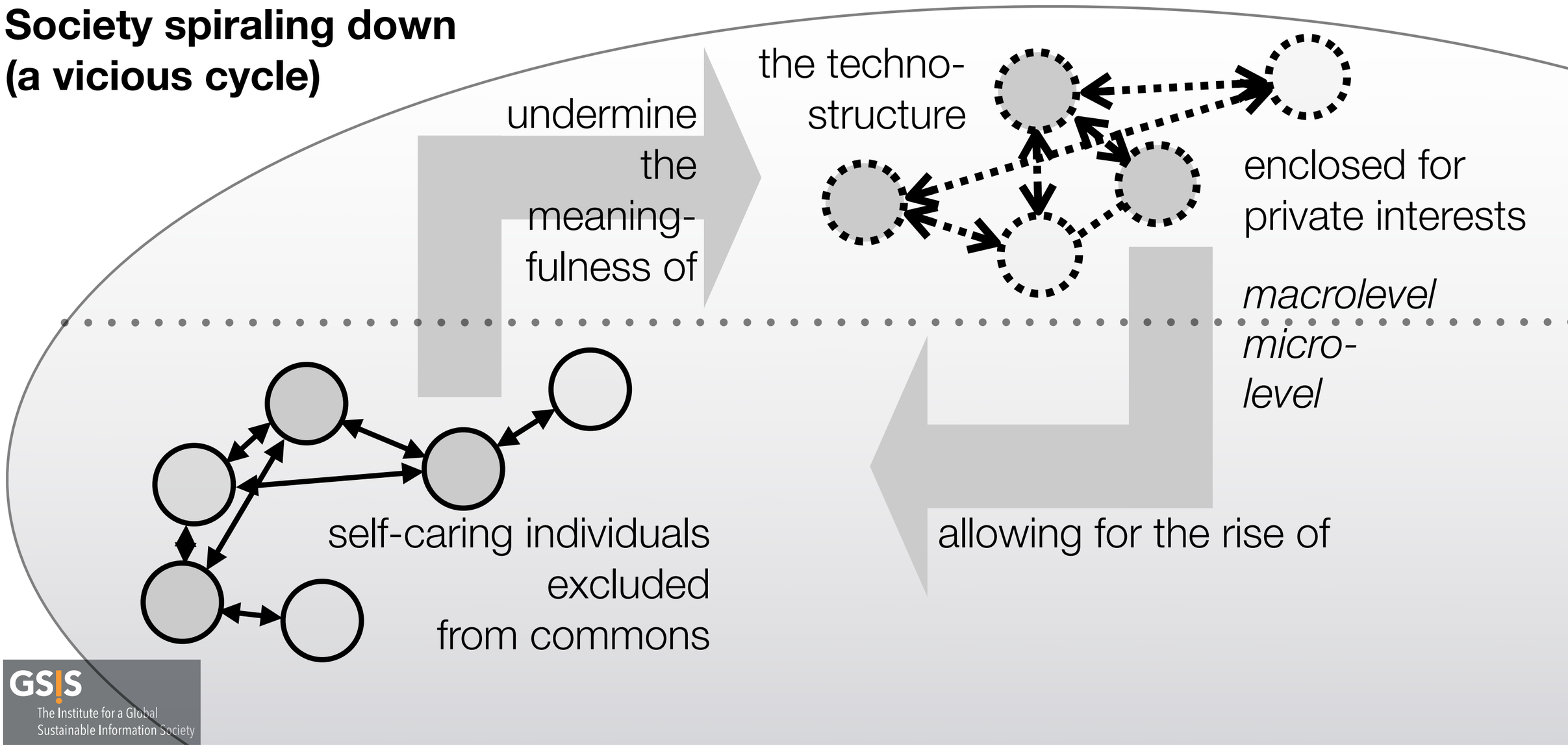
Society spiraling down (a vicious cycle)



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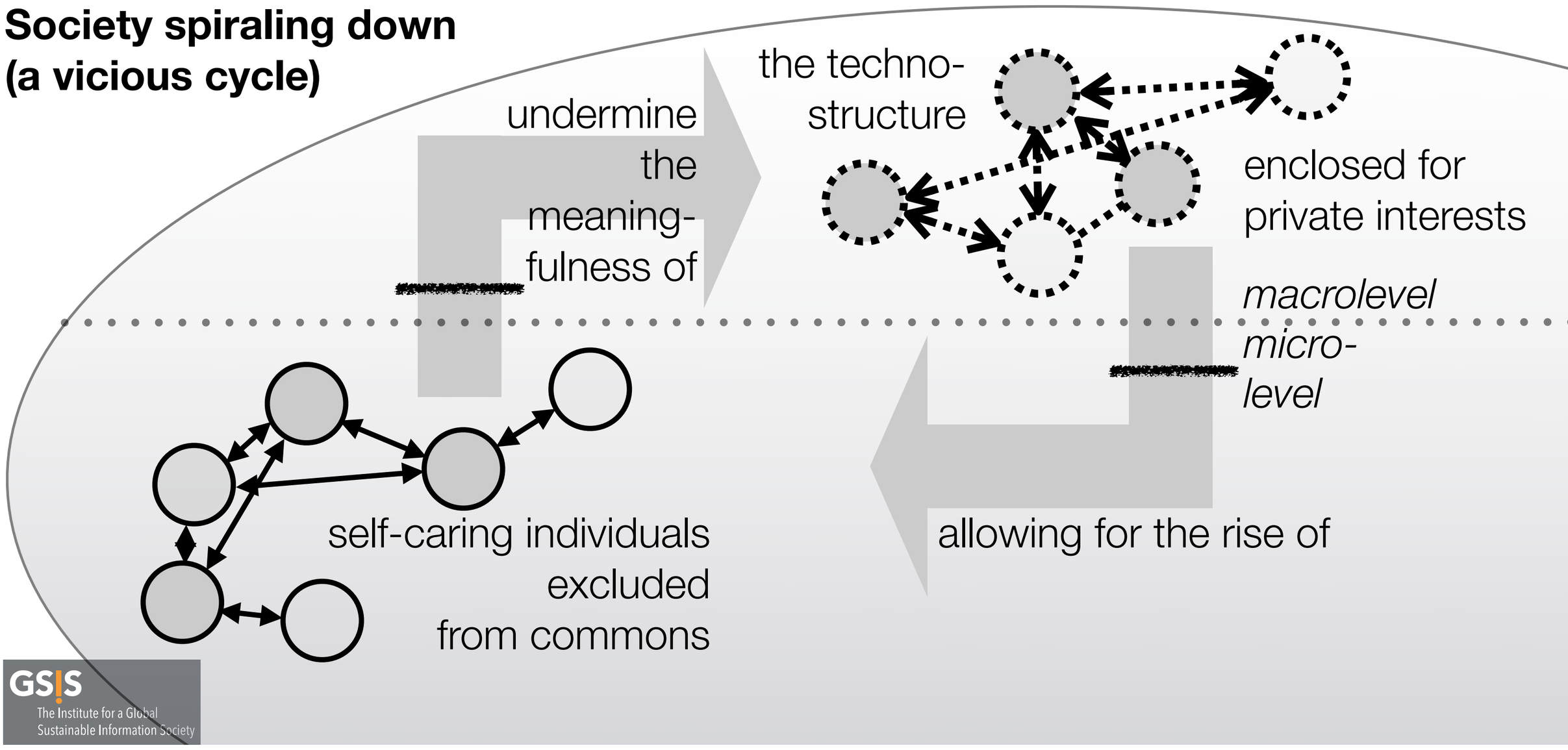

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2 The Global Sustainable Information Society

In order to flesh out
– **socially embedded**,
– **mechanistically balanced** and
– **ethically aligned**
design, we need to understand the kind of world we are living in.

2.1 The Vision

- Thriving/surviving of our species is at stake. Seen from a complex systems view, **global challenges** arise from
  – human-human,
  – human-nature and
  – human-technology relationships not functional anymore.

The evolution of humanity faces a **Great Bifurcation**:

– Global challenges might **inflict extinction**.
– At the same time, global challenges **can be mastered through a transformation into a global sustainable information society**.

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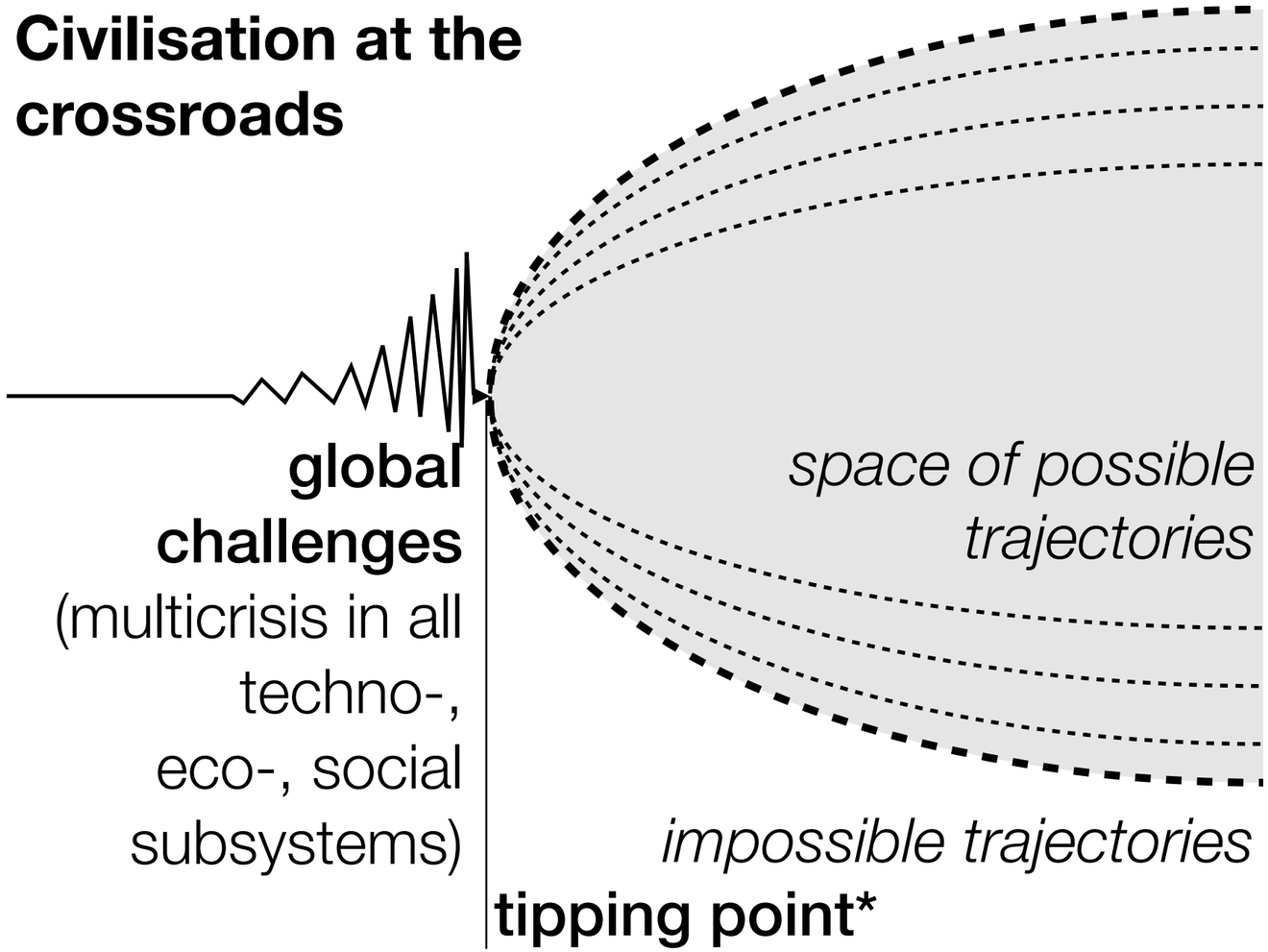
2.1 The Vision

Civilisation at the crossroads

global challenges (multicrisis in all techno-, eco-, social subsystems)



breakthrough to a higher level (rise of complexity): **integration** of differentiated, interdependent social systems into a single meta-/suprasystem – the **Global Sustainable Information Society**

breakdown (decline of complexity): **disintegration** and **falling apart of civilisation**

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* Ervin László 2006

2.1 The Vision

"Global Sustainable Information Society"
=*def.* **vision of a framework of conditions for thriving and surviving at the Great Bifurcation**

(1) Globality

(2) Sustainability

(3) Informationality

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2.1.1 A new understanding of globality

"Globality" =*def.* the envisioned state of world society as an **integrated meta-/suprasystem**, that is, after the establishment, for the first time in history, of **commoning** relations **on a higher-order level** for all parts of humanity and all fields of human/social life
– the social relations of commoning will have been universalised up to the planetary level: **"global(ised)"**

"Globalisation" =*def.* transformational tendency towards **globality**

2.1.2 A new understanding of sustainability

"Sustainability" =*def.* the envisioned state of **re-organisation** of the social relations between all, and throughout any, parts of humanity pursuant to the commoning relations on the higher level such that **anthropo(socio)genic system dysfunctions can be kept below the threshold the transgression of which would endanger the continuation of social evolution** – the social systems' organisational relations the role of which is to provide social synergy will **"sustain"** human/social life

"Sustainabilisation" =*def.* transformational tendency towards **sustainability**

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2.1.3 A new understanding of informationality

"**Informationality"** =*def.* the envisioned state of informational actors and social systems in which they will have caught up with the complexity they are challenged by to such an extent that they dispose of the **capacity to create requisite information** on the social dysfunctions and on re-organising the relations appropriately

– actors and systems will be **"informed"** actors and systems

"Informationalisation" =*def.* transformational tendency towards **informationality**

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2.2 The implementation

- The **vision** of the Global Sustainable Information Society needs a step-by-step **engineering** of building blocks.

  A building block is an **actualisation of a potential in the here-and-now that anticipates the vision, that is, the desired grand design** ("concrete utopia"*).

  (If a potential does not anticipate the desired grand design, it cannot become a building block of it – it might be one for a dystopia instead. And if there is no potential in the here-and-now in which a utopia can be grounded, then that utopia is an "abstract utopia"* doomed to failure.)

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* Ernst Bloch 1959

2.2 The implementation

- Only those technologies qualify as building blocks that can be universalised up to the level of the vision. **Meaningful technologies** embody that vision.

  The design of meaningful technologies means the design of technologies that mediate the tendencies of
  – globalisation, i.e., the provision of **world-wide commons**,
  – sustainabilisation, i.e., the provision of **safeguards against the deprivation of world-wide commons**, and
  – informationalisation, i.e., the provision of **knowledge for the installation of safeguards** against the deprivation of world-wide commons,
  in order to master the global challenges.

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2.2 The implementation

Given the Great Bifurcation, the default value of meaningful technologies is specified to serve the vision of the Global Sustainable Information Society:

– **The good society** is instantiated by the **Global Sustainable Information Society** that provides the conditions for humanity's surviving and thriving;
– those that **live a good life** are instantiated by **global citizens**;
– and the **common good** is instantiated by a **world-wide disclosure of the commons**.

2.2 The implementation

- At any step a **check** is needed to evaluate
  – how much the device could contribute to the technical purpose and
  – whether or not the technical purpose is still qualifying the device for a building block of the Global Sustainable Information Society.

  Adjustments may follow on either level, as long as they do not compromise the overall vision.

- IT helps to make the design process itself inclusive, that is, **participatory**: Those affected by the devices should be empowered to have a say.

3 Building up the Global Sustainable Information Society

- Whenever we design technology, we make a **selection between different visions and different engineering**.

  Our selection will be decisive for the **path of social evolution** systems will take.

Either we build up the Global Sustainable Information Society or not. The choice is ours.

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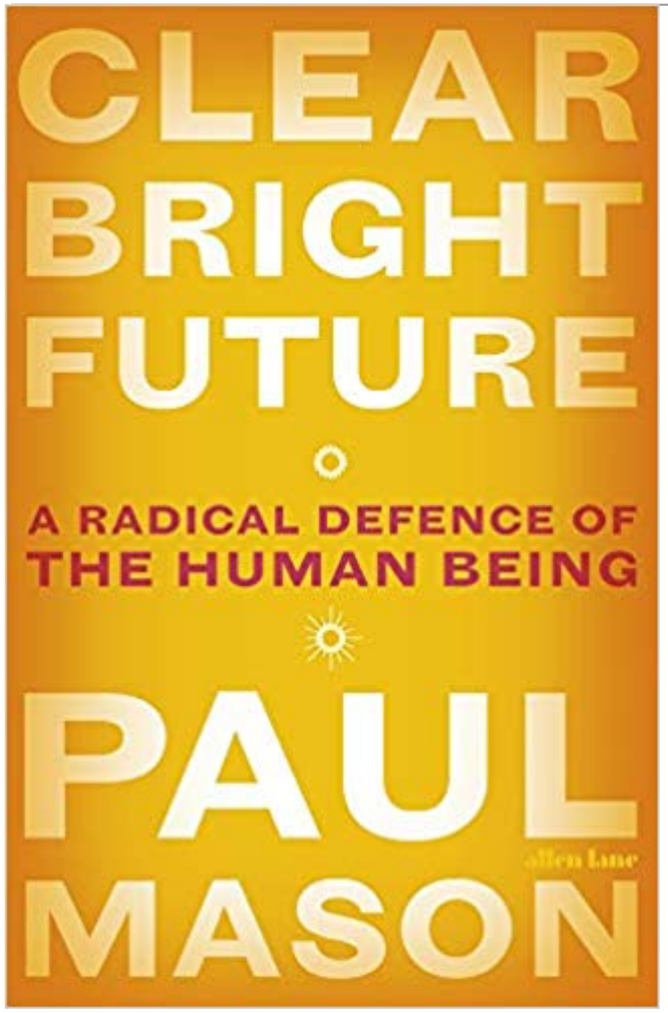
3 Building up the Global Sustainable Information Society



"[…] information technology is limiting capitalism's ability to do the four things its has always relied on.
First, due to the specific nature of information technology, prices become difficult to form […].
Second, the existing technologies have potential to automate rapidly about half of all the job functions existing today […|.
Third, information technology creates network effects […] which do not spontaneously appear as private property, and which are not owned in advance […|, but become the subject of a struggle.
Finally, digital technologies allow information to be democratized – removing the natural monopoly on distribution of knowledge […]."*

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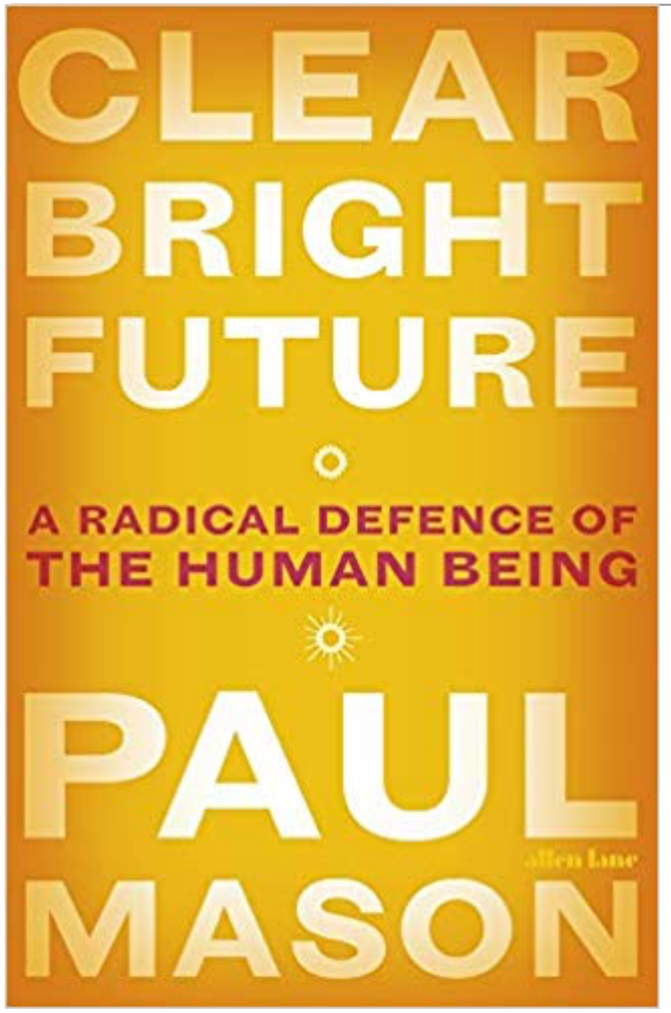
* Paul Mason 2019

3 Building up the Global Sustainable Information Society



"1. To combat monopolies and price-fixing: break up the information monopolies and promote the socialization of basic digital infrastructure […].
2. To combat precarious work and stagnant wages: accelerate automation by […] paying everyone a citizen's basic income […], plus the universal provision of […] healthcare, transport, education and housing […].
3. To combat rent-seeking: legislate to make data into a public good, while giving ultimate control of how each person's data is used to the individual, not the state. […]
4. To fight information hoarding: outlaw all business models based on asymmetric access to information."*

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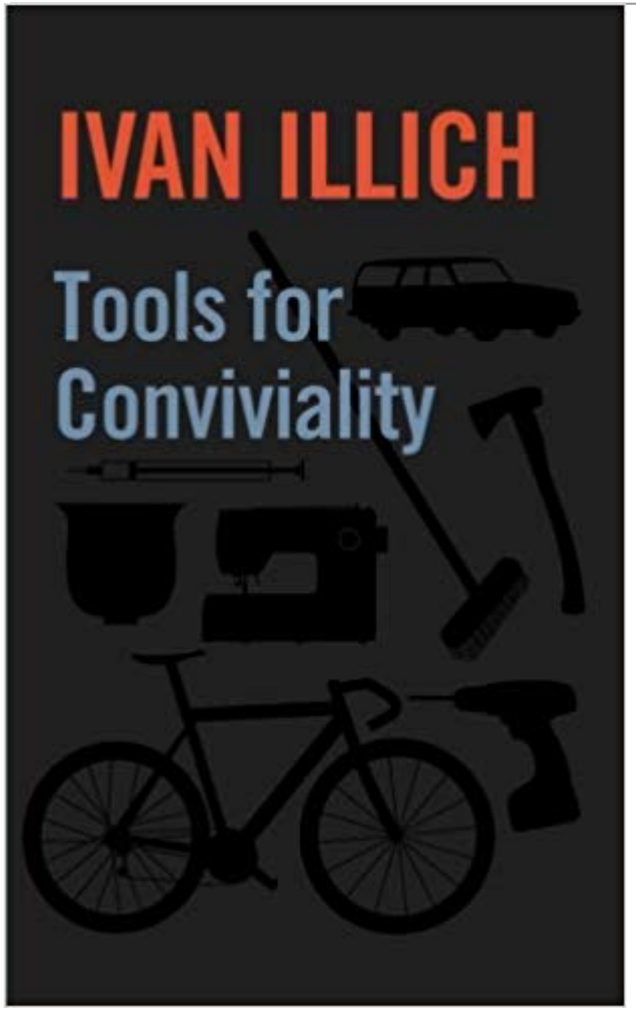
* Paul Mason 2019

3 Building up the Global Sustainable Information Society



"[…] I intend to work on an epilogue to the industrial age." "I here submit the concept of a multidimensional balance of human life which can serve as a framework for evaluating man's relation to his tools." "[…] it becomes possible to articulate the triadic relationship between, persons, tools, and a new collectivity. *Such a Society, in which modern technologies serve politically interrelated individuals rather than managers, I will call 'convivial.'* […] *I have chosen 'convivial' as a technical term to designate a modern society of responsibly limited tools.*"*

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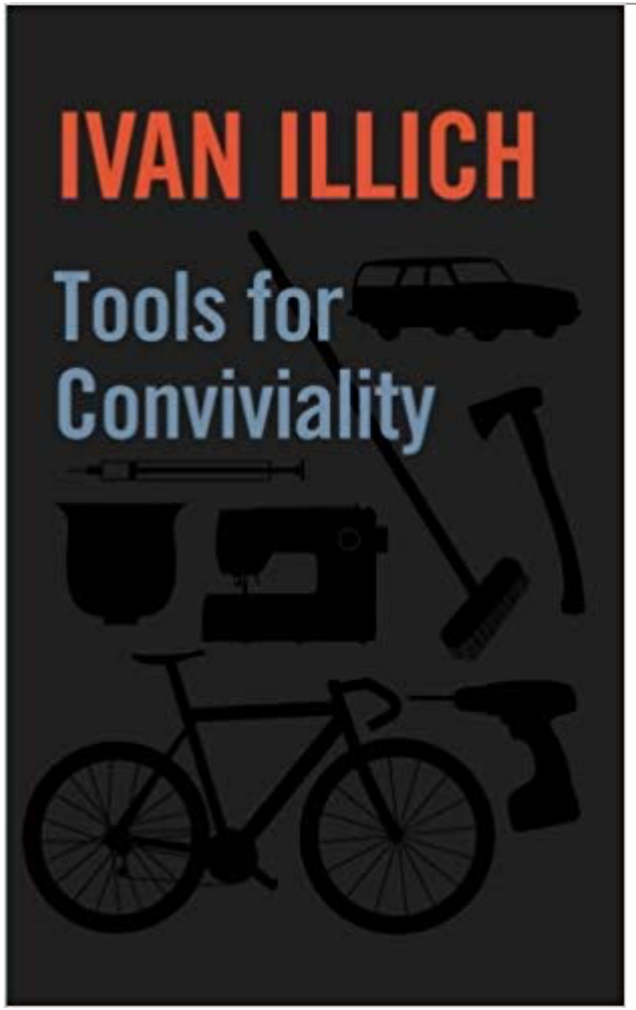
* Ivan Illich 1973

3 Building up the Global Sustainable Information Society



"Humankind has achieved astonishing technical and scientific feats but has remained as incapable as ever of resolving its fundamental problem, namely how to manage rivalry and violence […]. How to get them to co-operate – so that they can develop and each give the best of themselves – and at the same time enable them to compete with one another without resorting to mutual slaughter. How to halt the […] accumulation of power over humankind and nature. Unless it can come up swiftly with answers to this question, humankind faces extinction."*

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* Les convivialistes 2013

3 Building up the Global Sustainable Information Society

As with any technology, the impact of IT on the social system is **ambivalent** as it can **increase** or **reduce frictions** in the achievement of synergy:

– On the one hand, it can be instrumentalised for purposes detrimental to the reclaiming of the commons and thus **destroy conviviality**; it can,
- quantitatively, **reinforce existing social dysfunctions** or,
- qualitatively, **spawn new social dysfunctions**.

– On the other hand, it inheres a potential that can smoothen out exclusions from the commons and **help manufacture conviviality**; it can,
- quantitatively, **mitigate** or even,
- qualitatively, **eliminate existing, and prevent new, social dysfunctions**.

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3 Building up the Global Sustainable Information Society

Thus, design **can be selected**.

We can design technologies such that they become **building blocks for the Global Sustainable Information Society**.

We can
(1) **resist** the design of applications that do not comply with conviviality as well as
(2) **insist on** the design of applications that do comply with conviviality.

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3.1 Resisting destructive designs

- We often find ourselves busy with current trends in IT development that **destroy conviviality** in
  (1) **cognition**,
  (2) **communication** and
  (3) **co-operation functions**.

3.1.1 Destruction of thought

	technologies	**trends**
technically supported cognitive functions	**"tools for thought"***	**mechanisation** of intelligence I: • **algorithmisation of creativity** – loss of ability to make generalisations and deal with levels of abstraction due to machine processing (formal logics, mathematics; e.g., big data) • **dataism for self-optimisation strategies** – quantification of physical performance (neoliberal craze for measuring)

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* J.C.R. Licklider, Doug Engelbart et al.

3.1.1 Destruction of thought

	technologies	**trends**
technically supported cognitive functions	**"tools for thought"***	**mechanisation** of intelligence II: • **outsourcing of thinking to machines** to which superiority is attributed (e.g., "autonomous" and "intelligent" "systems") • **outsourcing of knowledge to the web** – algorithms work according to the power law and reinforce existing biases

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* J.C.R. Licklider, Doug Engelbart et al.

3.1.2 Destruction of free exchange of ideas

	technologies	trends
technically supported communicative functions	**"media"***	**disinfotainment****: information overload, diversion, gaming, influencing***, manipulation, propaganda, brain wash etc. due to industry leaders, gatekeepers close to elites°, private or public think tanks and intelligence agencies (e.g., filter bubbles in social media, dissemination of fake news, use of bots, hegemony of an irrational discourse, belittling of science, exclusion of population groups)

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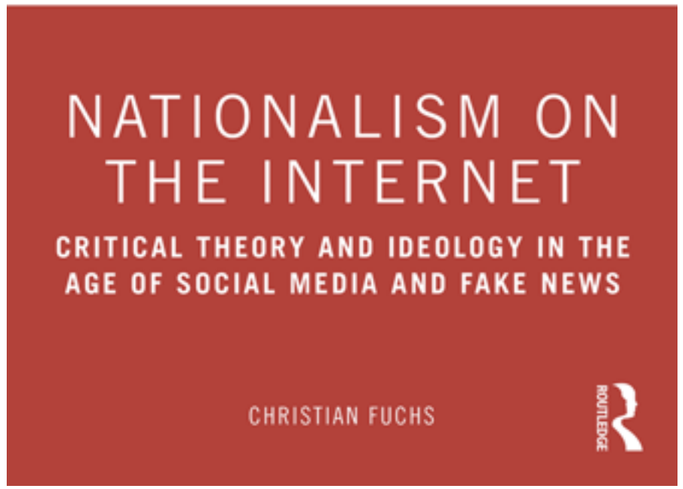
* Sybille Krämer, ** Howard Rheingold, *** Christian Fuchs 2019, ° Uwe Krüger 2019 (2nd ed.)

3.1.2 Destruction of free exchange of ideas



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3.1.3 Destruction of commoning relations

	technologies	**trends**
technically supported co-operative functions	**"technologies of co-operation"***	replacing of the military-industrial complex** by the **military-informational complex** (e.g., Big Tech & NSA)*** I: • **surveillance capitalism** – exploitation of work of social media users as involuntary producers of personal data for the purpose of behaviour control as dominant business model • **surveillance state** • **waging information wars** (public/private)

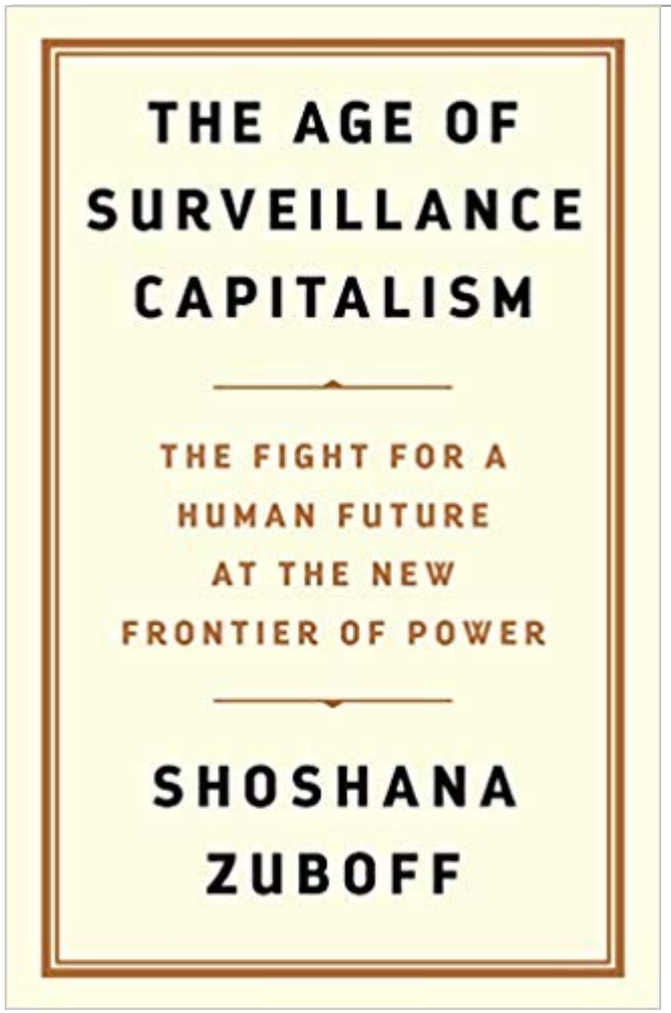
* Howard Rheingold, ** Dwight D. Eisenhower, *** Shoshana Zuboff 2019

3.1.3 Destruction of commoning relations

	technologies	**trends**
technically supported co-operative functions	**"technologies of co-operation"***	replacing of the military-industrial complex** by the **military-informational complex** (e.g., Big Tech & NSA)*** II: • **rationalisation** – automation of job functions (e.g., "Industrie 4.0" in Germany) • **profit through platforms** of so-called "sharing economies" instead of organisations of the common good (e.g., Uber, Airbnb) • **trans-/posthumanism** • **things we do not need either** (e.g., gadgets)

* Howard Rheingold, ** Dwight D. Eisenhower, *** Shoshana Zuboff 2019

3.1.3 Destruction of commoning relations



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3.2 Insisting on constructive designs

- We need to be aware of the following distinction:

  – **"Informationalisation"** =*def*. process of raising the problem-solving capacity of (world) society to a level of intelligence that allows the successful tackling of problems that arise from society‘s own development

  – "**Informatisation"*** =*def*. process of diffusion of technologies that make society more and more responsive to information

  And conclude according to the visioneering of conviviality: **Informatisation has to be tamed and harnessed for informationalisation!**

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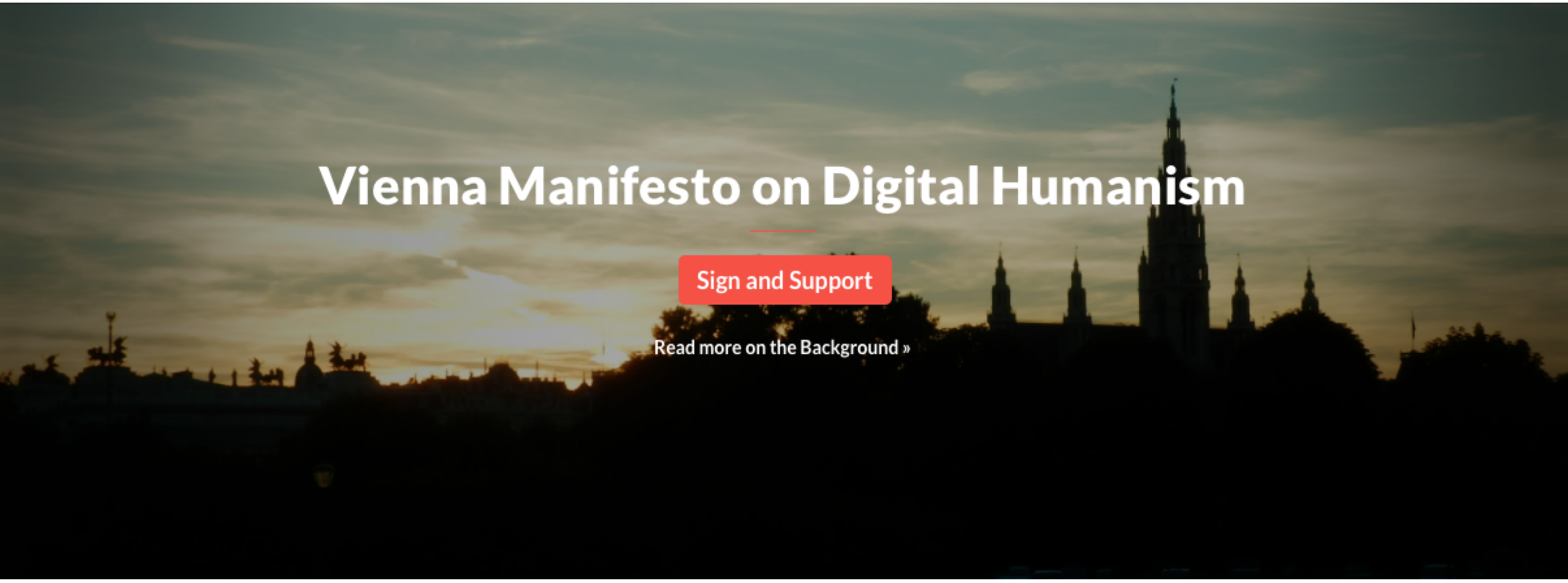
* Simon Nora/Alain Minc 1977

3.2 Insisting on constructive designs



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* https://www.informatik.tuwien.ac.at/dighum/index.php

3.2 Insisting on constructive designs

"**This manifesto is a call to deliberate and to act on current and future technological development.** We encourage our academic communities, as well as industrial leaders, politicians, policy makers, and professional societies all around the globe, to actively participate in policy formation. Our demands are the result of an emerging process that unites scientists and practitioners across fields and topics, brought together by concerns and hopes for the future. We are aware of our joint responsibility for the current situation and the future – both as professionals and citizens."

"**We must shape technologies in accordance with human values and needs, instead of allowing technologies to shape humans.** Our task is not only to rein in the downsides of information and communication technologies, but to encourage human-centered innovation. We call for a **Digital Humanism** that describes, analyzes, and, most importantly, influences the complex interplay of technology and humankind, for a better society and life, fully respecting universal human rights."

The manifesto proclaims a set of core principles. "We are at a crossroads to the future; we must go into action and take the right direction!"*

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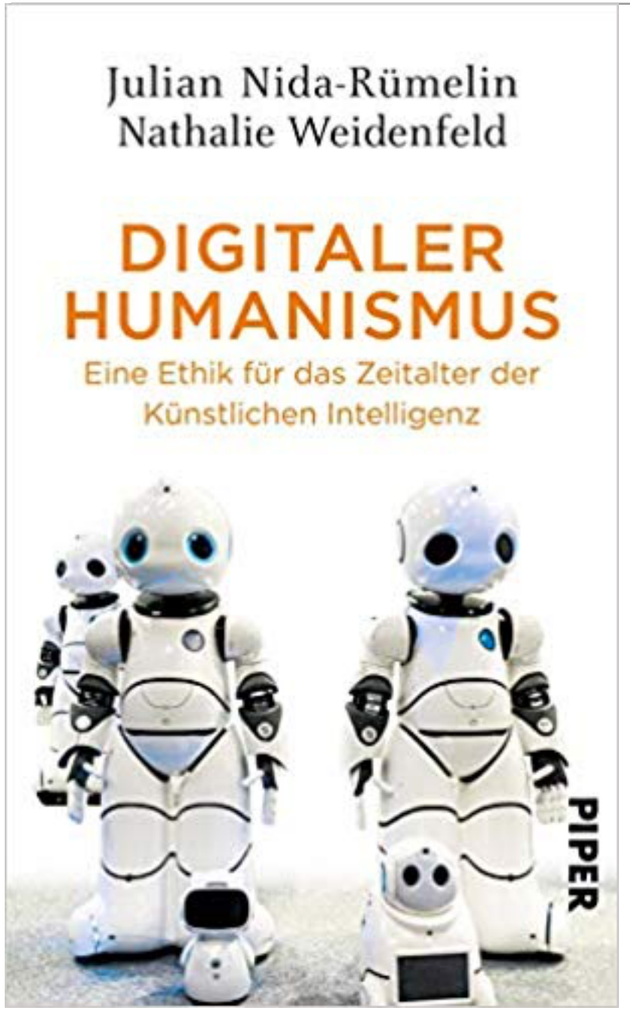
3.2 Insisting on constructive designs



The book is in German.
It provides an ethics for the age of AI.*

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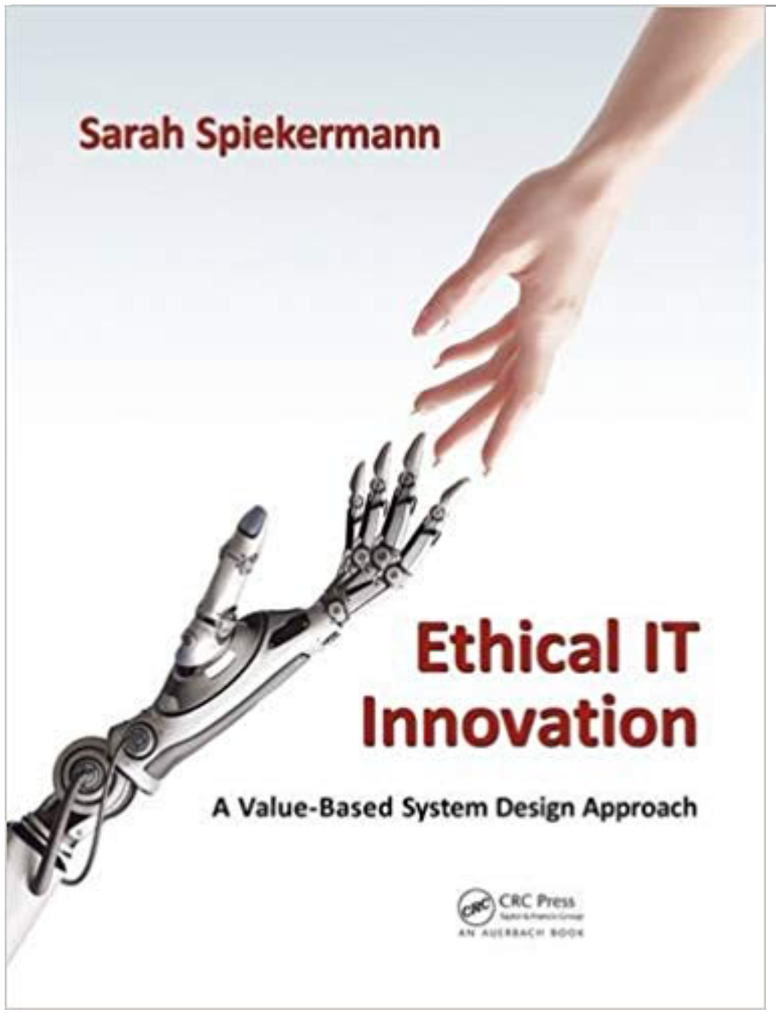
* J. Nida-Rümelin/N. Weidenfeld 2018

3.2 Insisting on constructive designs



Sarah Spiekermann, Professor at the Institute for Management Information Systems, Vienna University of Economics and Business, wrote a handbook on ethical design of IT.*

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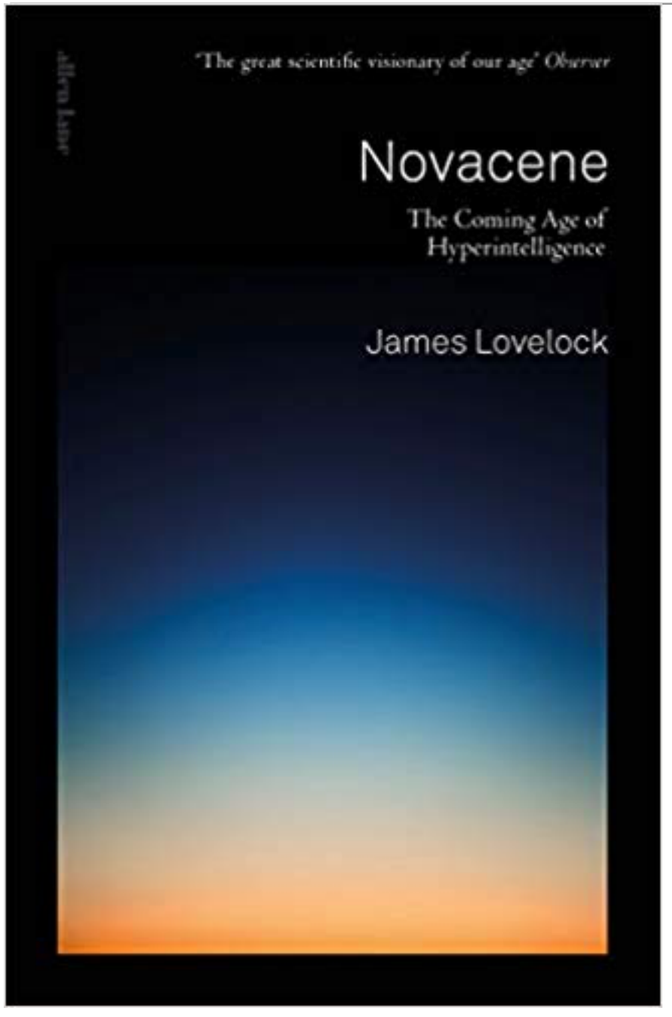
* Sarah Spiekermann 2016

3.3 The case of "autonomy" and "intelligence" in devices



The Coming Age of Hyperintelligence
James Lovelock, the creator of the Gaia hypothesis (planet Earth is a living being), came up with the most recent variety of posthumanism*:

- The Anthropocene – that started with Newcomen's invention of the steam-powered pump unleashing the Industrial Revolution – will face a fast fading away. New intelligent, inorganic beings will arise and build "themselves from the artificial intelligence systems we have already constructed." We cannot know how they will call the new age. "Novacene" is the author's placeholder for the term to come which will not be intelligible to us.

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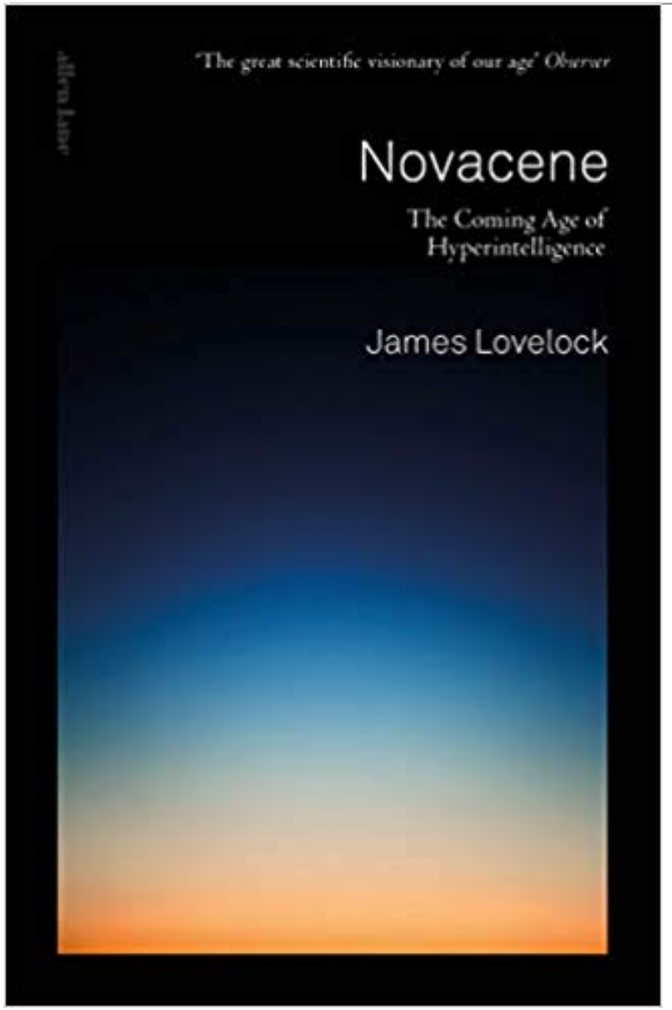
* James Lovelock 2019

3.3 The case of "autonomy" and "intelligence" in devices



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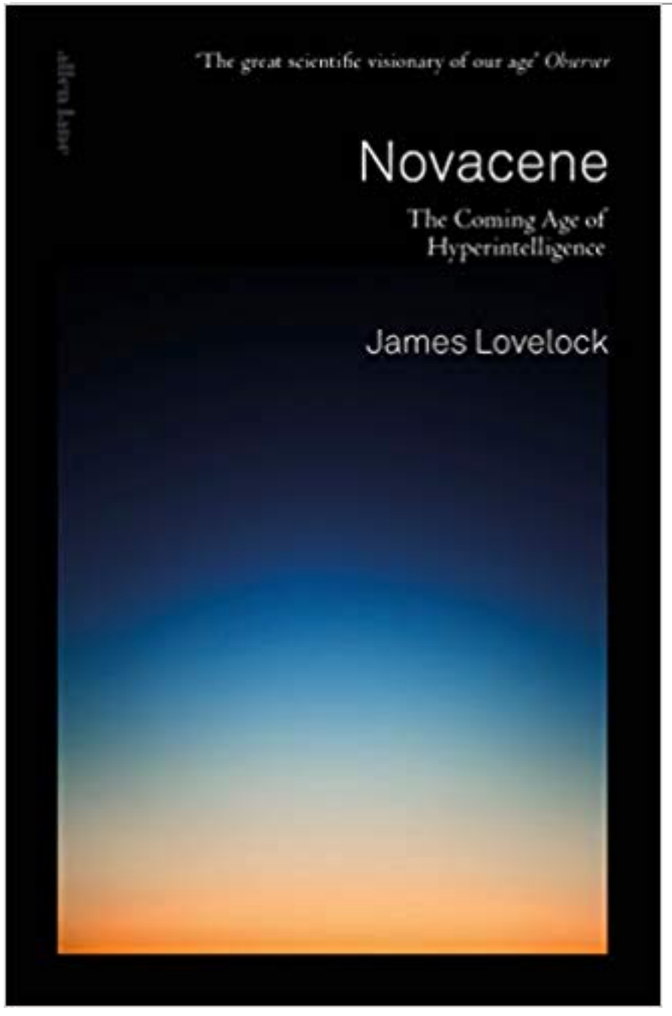
* James Lovelock 2019

- The "cyborgs" will not be made of flesh and machine. They are completely electronic. That's the reason why they will outthink us.

  A machine could, in principle, be 1 million times quicker than a human because thinking and acting "must be converted from chemical to electronic signals by biochemical processes. This makes the process very slow". Since the gain of 1 million times is improbable, a practical difference between the speed of AI and mammals "is about 10,000 times."

  Humans are 10,000 times faster than plants. Thus, the cyborgs will then observe human life as we today watch our garden grow.

3.3 The case of "autonomy" and "intelligence" in devices



- "AlphaZero achieved two things: autonomy – it taught itself – and superhuman ability. […] This was a sign that we have already entered the Novacene."

- "When the Novacene is fully grown and is regulating chemical and physical conditions to keep the Earth habitable for cyborgs, Gaia will be wearing a new inorganic coat. […] Eventually, Gaia will probably die. But just as we do not mourn the passing of our ancestor species, neither, I imagine, will the cyborgs be grief-stricken by the passing humans."

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* James Lovelock 2019

3.3.1 The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems on agents and patients (Ethically Aligned Design 2019)*

"[T]he uncritically applied anthropomorphic approach toward A/IS […] erroneously blurs the distinction between moral agents and moral patients, i.e., subjects, otherwise understood as a distinction between 'natural' self-organizing systems and artificial, non-self-organizing devices."
Such devices "cannot, by definition, become autonomous in the sense that humans or living beings are autonomous." "[…] attempts to implant true morality and emotions, and thus accountability, i.e., autonomy, into A/IS blurs the distinction between agents and patients and may encourage anthropomorphic expectations of machines by human beings when designing and interacting with A/IS."

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* p. 41, https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead1e.pdf

3.3.1 The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems on agents and patients (Ethically Aligned Design 2019)*

"That is not to say that such terminology cannot be used metaphorically, but the difference must be maintained, especially as A/IS begin to resemble human beings more closely."

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* p. 42, https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead1e.pdf

3.3.2 Klaus Kornwachs* on why machines should not operate autonomously: eight rules (2019)

1. Never use a decision-making system that substitutes your own decision. Even robots must not be used in decision-making intent.

2. *Nihil Nocere* – don't tolerate any harm to users.

3. User rights break producer rights.

4. Do not build pseudo-autonomous systems that cannot be turned off. Fully autonomous systems should not be allowed.

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* K. Kornwachs: Transhumanism as a Derailed Anthropology. W. Hofkirchner, H.-J. Kreowski (eds.), Transhumanism – The proper guide to a posthuman condition or a dangerous idea, Springer, 2019

3.3.2 Klaus Kornwachs* on why machines should not operate autonomously: eight rules (2019)

5. The production of self-conscious, autonomously acting robots (if possible) is prohibited (analogous to the chimera ban and human cloning ban in genetic engineering).

6. Do not fake a machine as a human subject as a counterpart. A machine must remain machine, imitation and simulation must be always recognizable. It must always be clear to all people involved in human-machine communication that a machine communication partner is a machine.

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7. If you do not know the question and the purpose of the question, you cannot handle the system response and understand the behavior of a robot. The context must always be communicated.

8. Anyone who invents, who produces, operates or disposes of technology has interests. These interests must be disclosed honestly.

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* K. Kornwachs: Transhumanism as a Derailed Anthropology. W. Hofkirchner, H.-J. Kreowski (eds.), Transhumanism – The proper guide to a posthuman condition or a dangerous idea, Springer, 2019

3.3.3 The conclusion

- Neither social systems nor artificial devices will become smart as long as the focus is restricted to the human **individual**, thereby detracting from the real task:
  the preparation of humanity for a third step in **societal** evolution – a self-organised noogenesis on planet Earth* – to be accomplished through a meta-/suprasystem transition** to a **Global Sustainable Information Society**.

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* Vladimir I. Vernadsky, Teilhard de Chardin, ** Francis Heylighen et al.

3.3.3 The conclusion

- Let's take action for the Global Sustainable Information Society in our different roles as
  – **computer and engineering experts** working for the state or private businesses, demanding red lines like no collaboration with the military,
  – **teachers** planting the seeds of proper values with the next generations,
  – **civil society members** engaging with social movements and **citizens** addressing politics, demanding transparency on algorithms, taxes from the digital monopolies for the common good, eventually, their split-up and public open spaces instead,
  – **users and consumers**, demanding information from the businesses, not accepting the default settings of the devices, using technologies that have a better performance on conviviality or engaging with participatory design.

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Thank you.