Transdisciplinarity and Systems Thinking

Transdisciplinary Research Methods & SCCIIL Interdisciplinary Center
Gothenburg University
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Contents

1 Transdisciplinarity

	disciplines
aims	*objective (praxiology):*
	to provide scientific knowledge by the application of which **problems** can be solved (technological knowledge)
scope	*object of study (ontology):*
	a piece of reality, its processes and structures, the scientific knowledge of which is needed to underpin problem solving (theoretical knowledge)
tools	*objectivating approach (epistemology):*
	ways of generating scientific knowledge by **generalisations** that give a true understanding of the processes and structures of that piece of reality (methodological knowledge)

1 Transdisciplinarity

	transdisciplinarity
aims	*objective (praxiology):*
	to provide scientific knowledge for solving **complex problems** (technological knowledge)
scope	*object of study (ontology):*
	pieces, processes and structures, of **a bigger picture of reality** the scientific knowledge of which is needed to underpin complex problem solving (theoretical knowledge)
tools	*objectivating approach (epistemology):*
	ways of generating scientific knowledge by looking for **similarities across disciplines** (methodological knowledge)

1.1 Complex problems

technological knowledge

including stakeholders through offering **participation** in the research and development and the diffusion process of innovations

1.2 A bigger picture of reality

theoretical knowledge

focussing on **interdependencies** between factors across
– space (long-range effects),
– time (long-term effects), and
– matter (side effects)

1.3 Similarities across disciplines

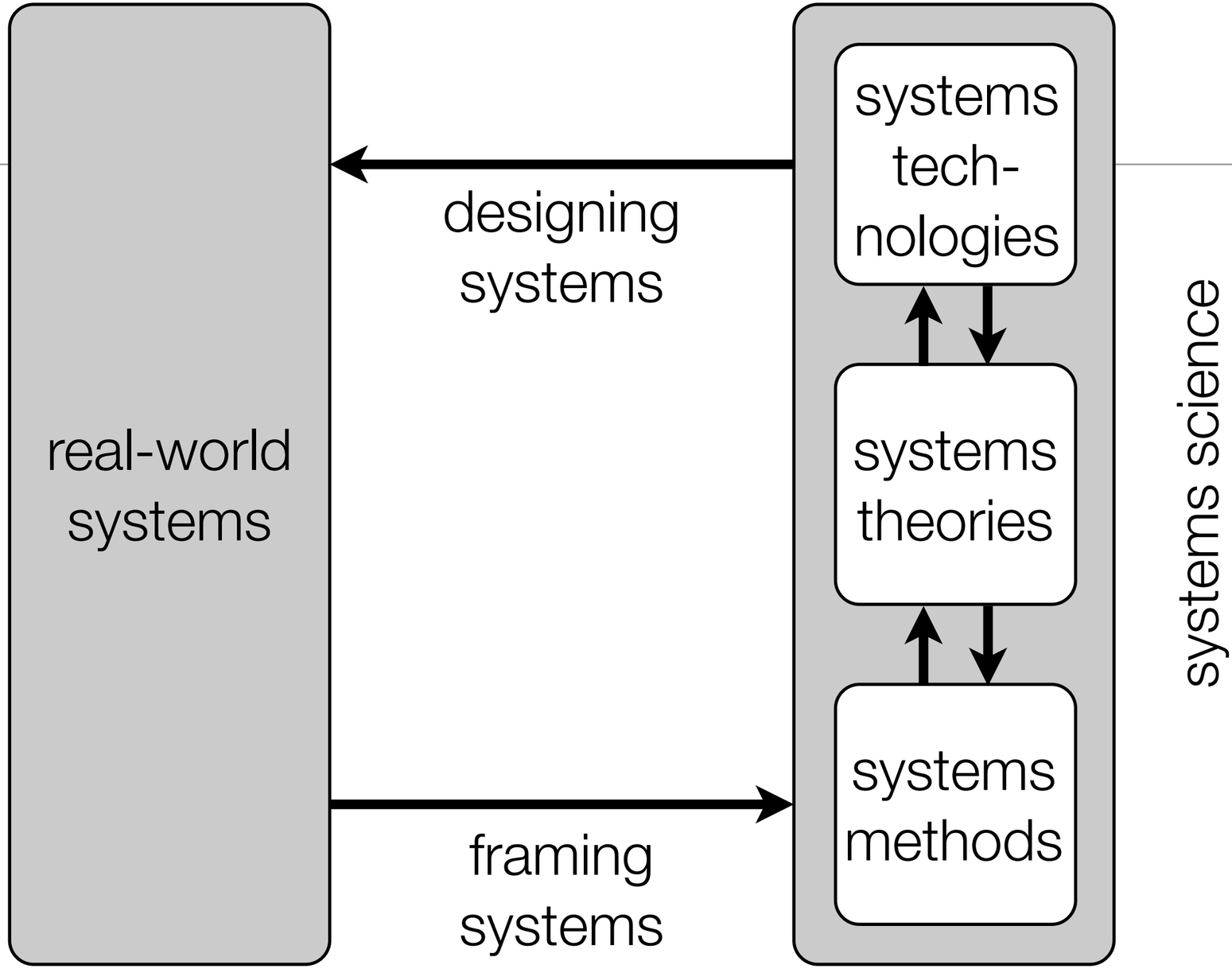
methodological knowledge

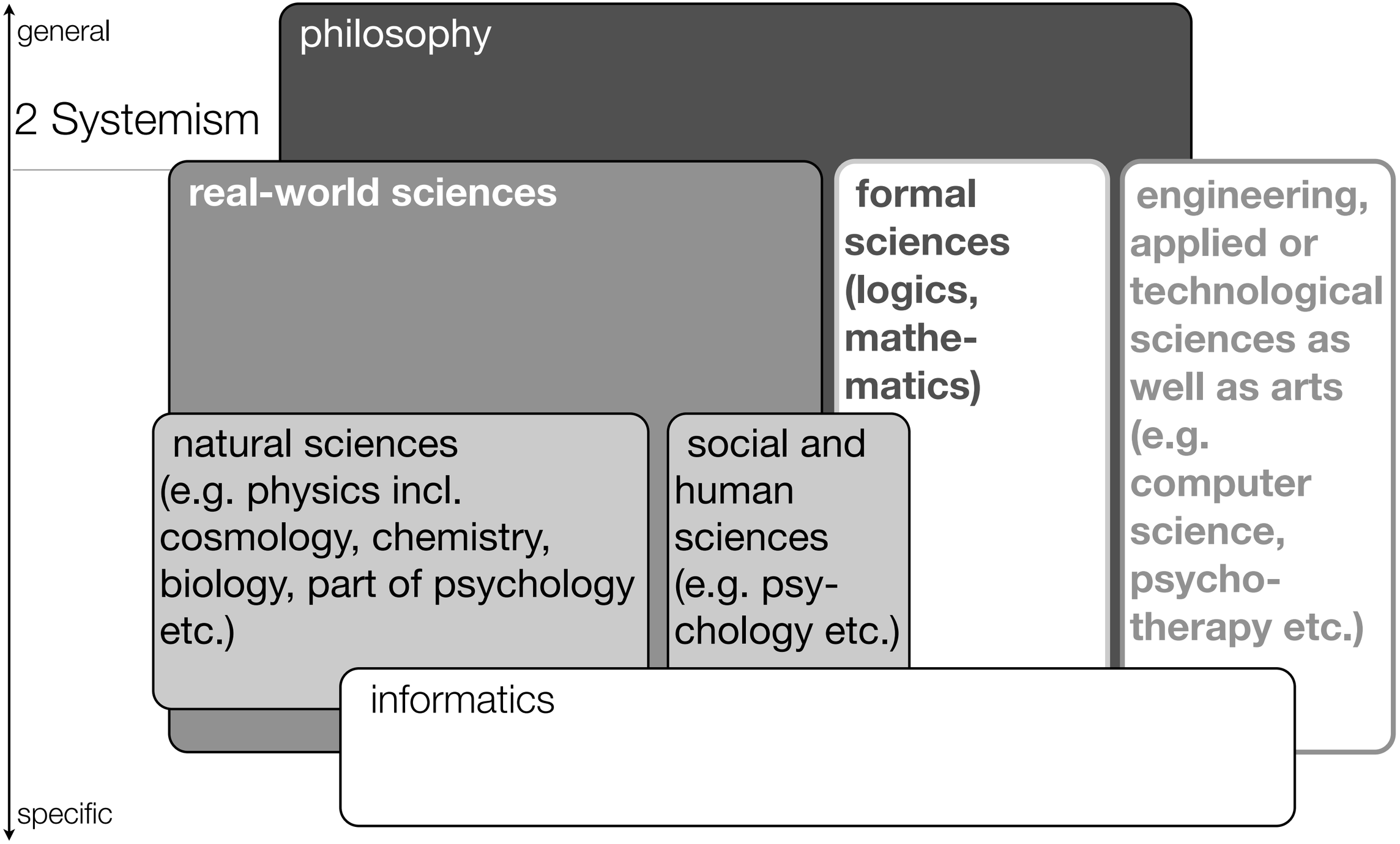
constructing a common **code** for the translation from one domain to another

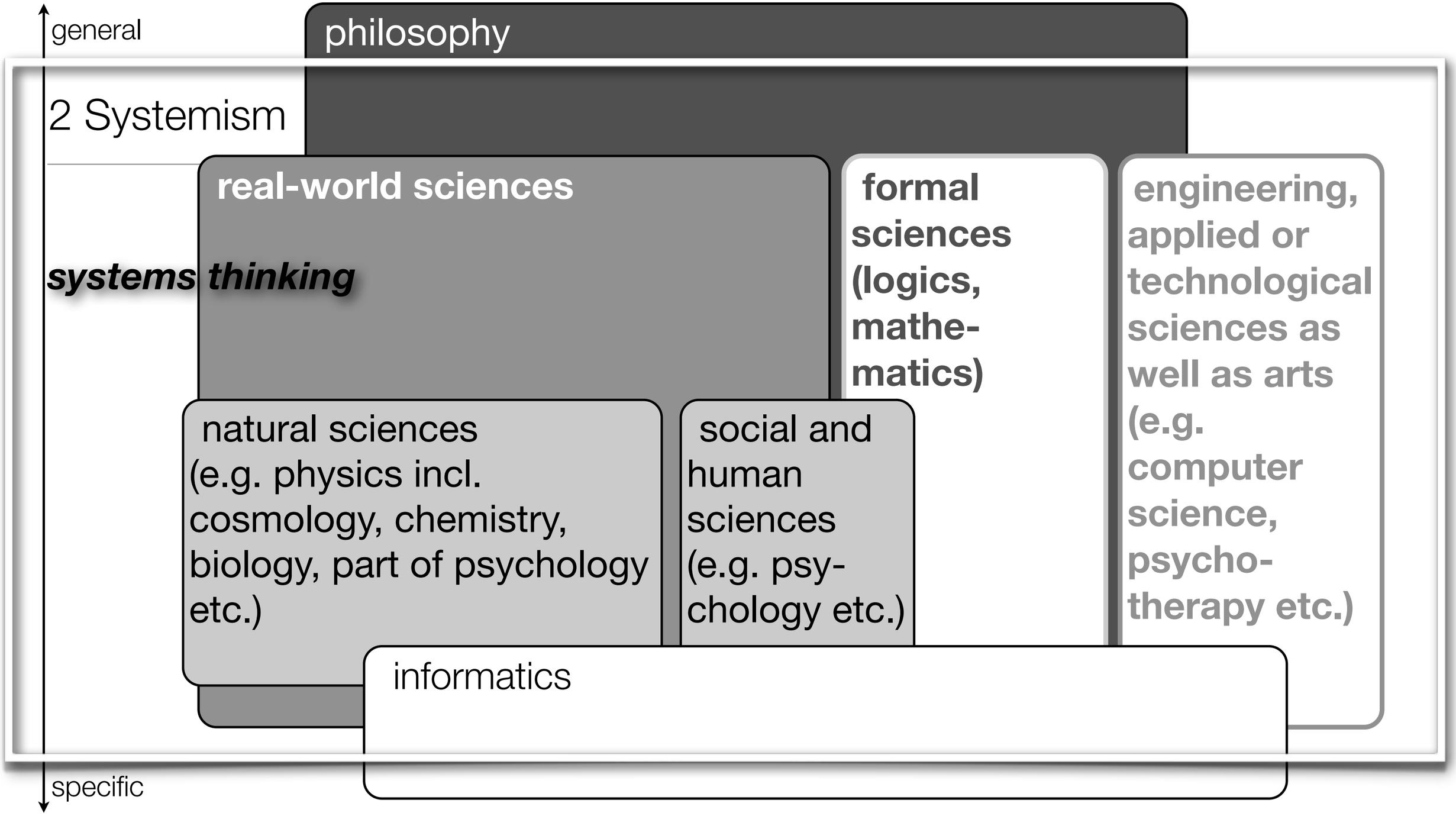
2 Systemism

	systems science
aims	*objective (praxiology):*
	to solve complex problems by **designing systems**, by managing, intervening in, transforming systems (systems technologies)
scope	*object of study (ontology):*
	„mechanisms“ of real-world systems that might be designed (systems theories)
tools	*objectivating approach (epistemology):*
	ways of **framing isomorphisms** that characterise the „mechanisms“ of real-world systems across disciplines (systems methods)

modelling systems




general
2 Systemism
specific
philosophy
real-world sciences
formal sciences (logics, mathe-matics)
engineering, applied or technological sciences as well as arts (e.g. computer science, psycho-therapy etc.)
natural sciences (e.g. physics incl. cosmology, chemistry, biology, part of psychology etc.)
social and human sciences (e.g. psy-chology etc.)
informatics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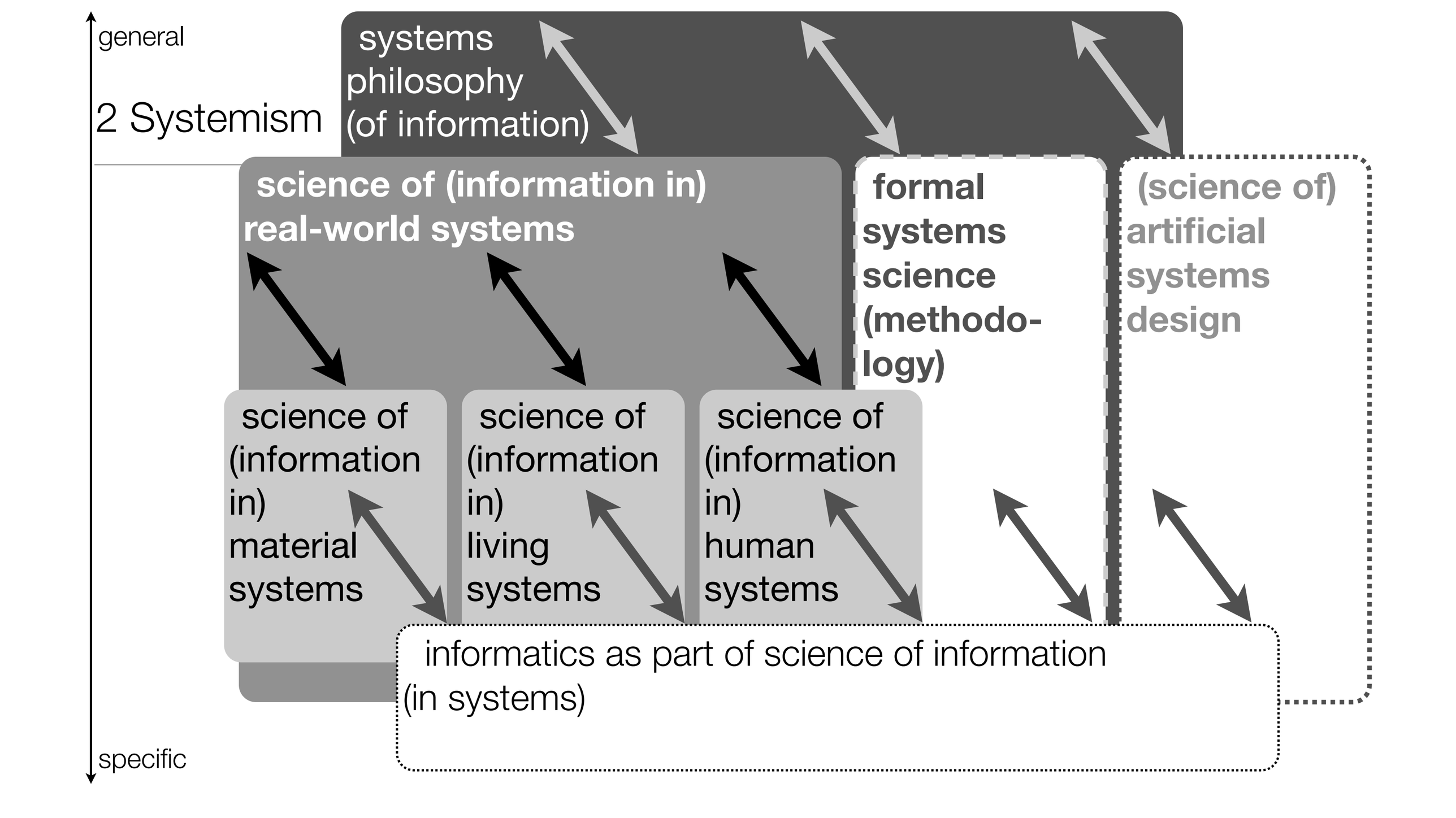
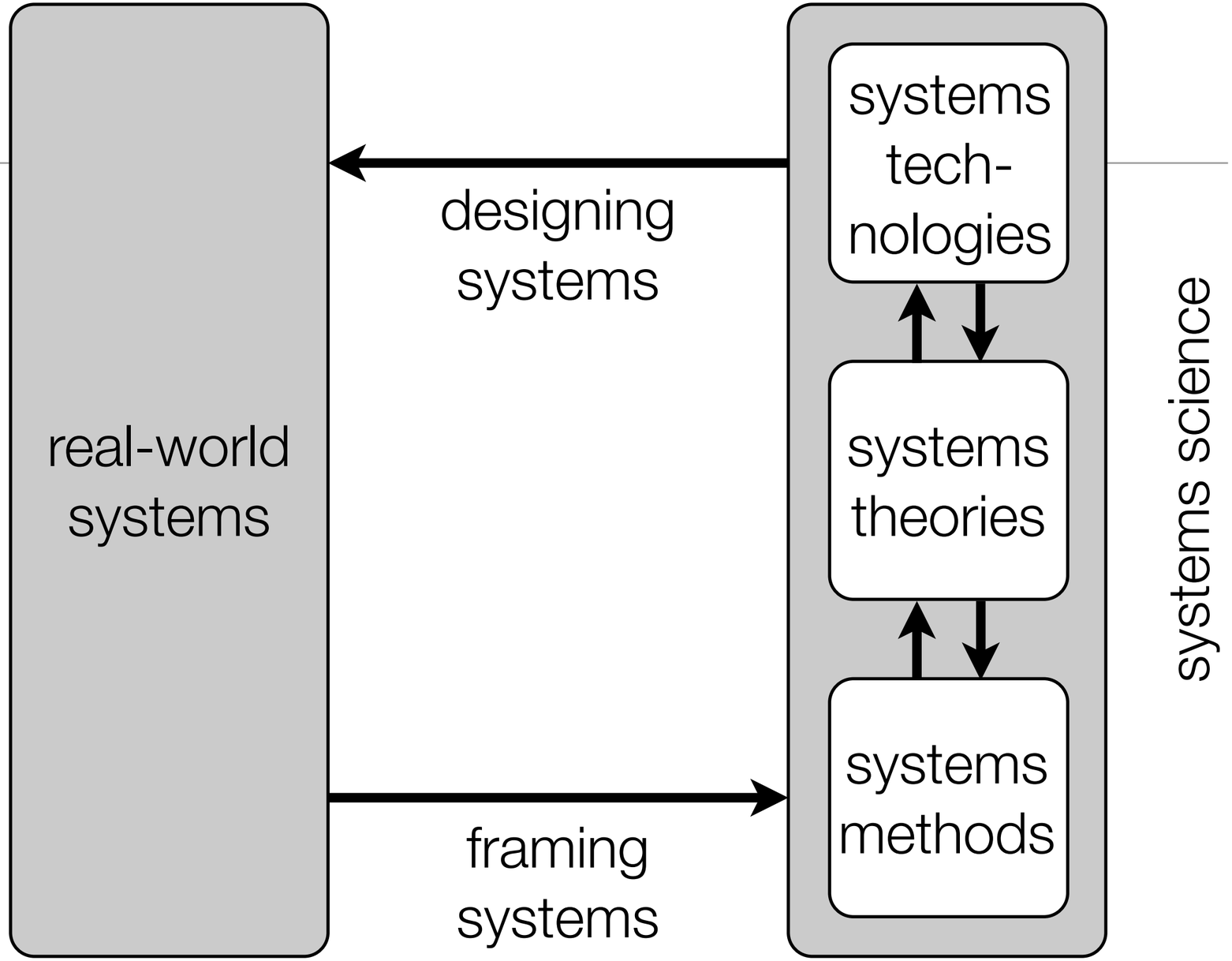

general
2 Systemism
specific
systems philosophy (of information)
science of (information in) real-world systems
formal systems science (methodo-logy)
(science of) artificial systems design
science of (information in) material systems
science of (information in) living systems
science of (information in) human systems
informatics as part of science of information (in systems)

3 Transdisciplinarity through systemism

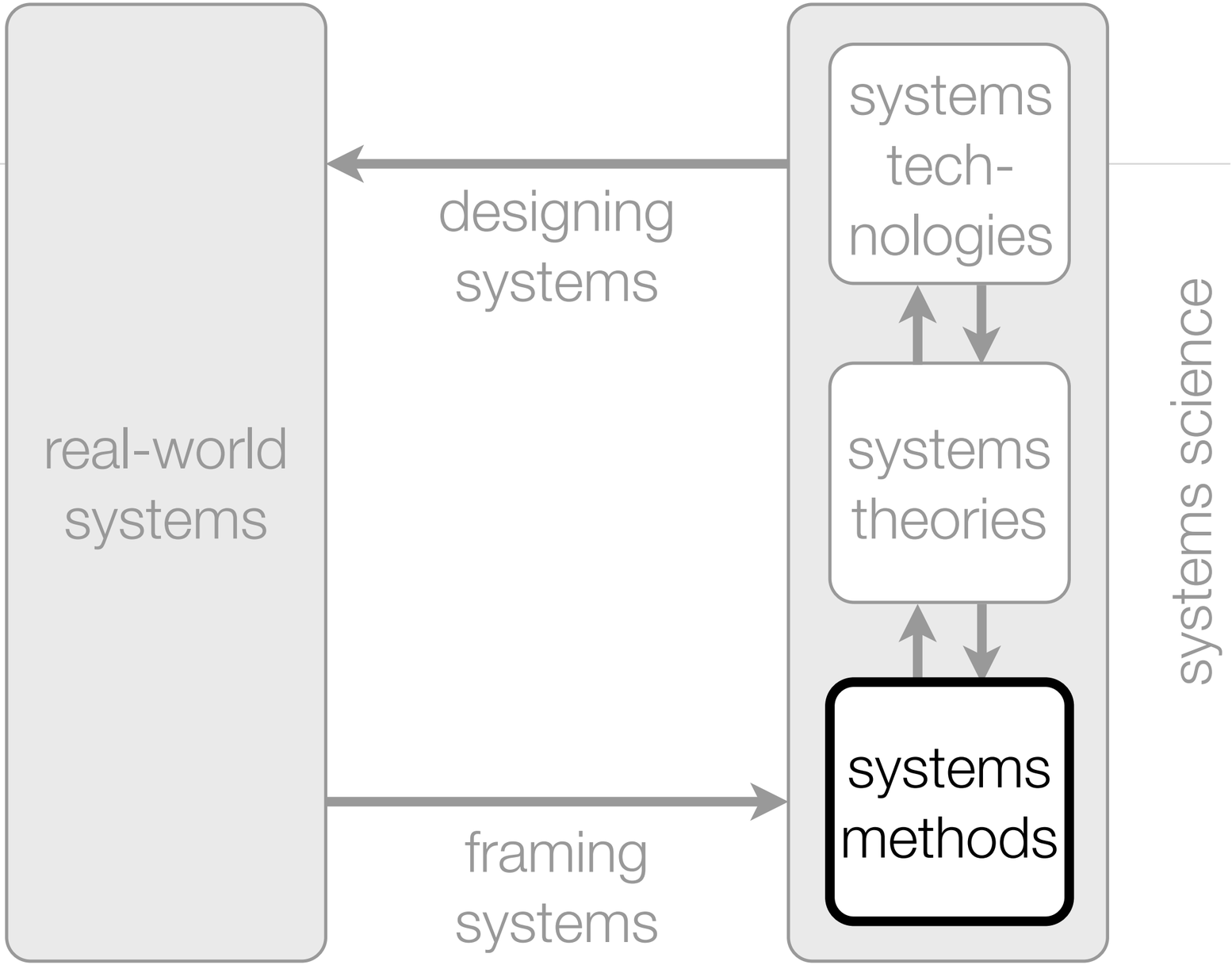
systemism (systems thinking) has the power to transform all disciplines

(1) by its way of thinking: integration
(2) by its world picture: self-organisation
(3) by its world view (weltanschauung): synergy

modelling systems



modelling systems (1): a new, trans-disciplinary way of thinking



3.1 Integration

the systems way of thinking:
integrativism

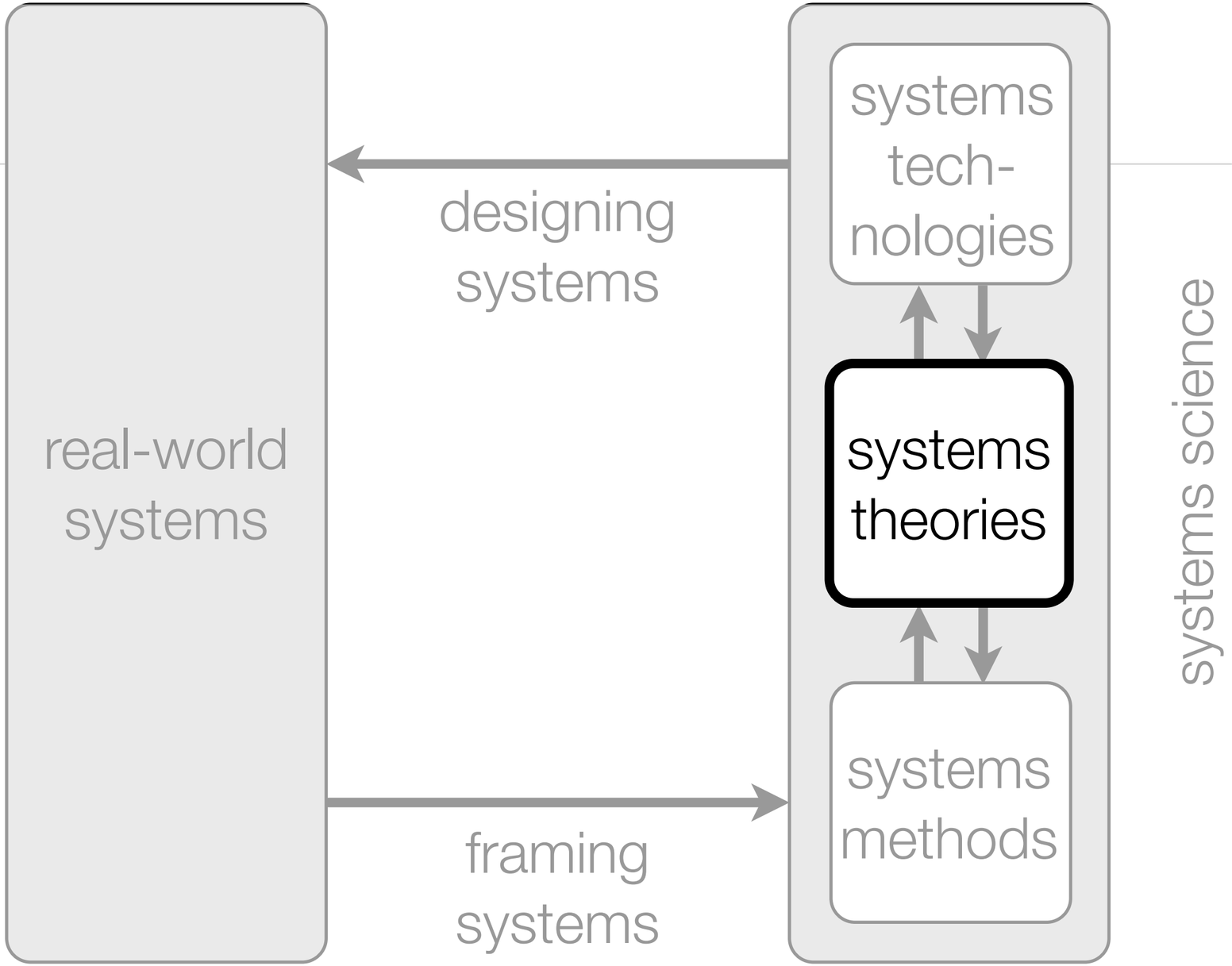
– that is, framing systems by equilibrating **integration and differentiation** when looking for isomorphisms

– transdisciplinarity through a new way of thinking (systems methods)

3.1 Integration

		complexities	**identity and difference**
reduction-ism		levelling down higher complexity	identity at the cost of differences (uniformity not diversity)
holism	**absolut-ism**	levelling up lower complexity	identity for the benefit of one difference (uniformity not diversity)
relativism		disjoining degrees of complexity	difference at the cost of identity (plurality not unity)
integrativism (systems way of thinking)		linking complexity degrees through concretisation	identity and difference integrated (unity through diversity)

modelling systems (2): a new, trans-disciplinary picture of the world



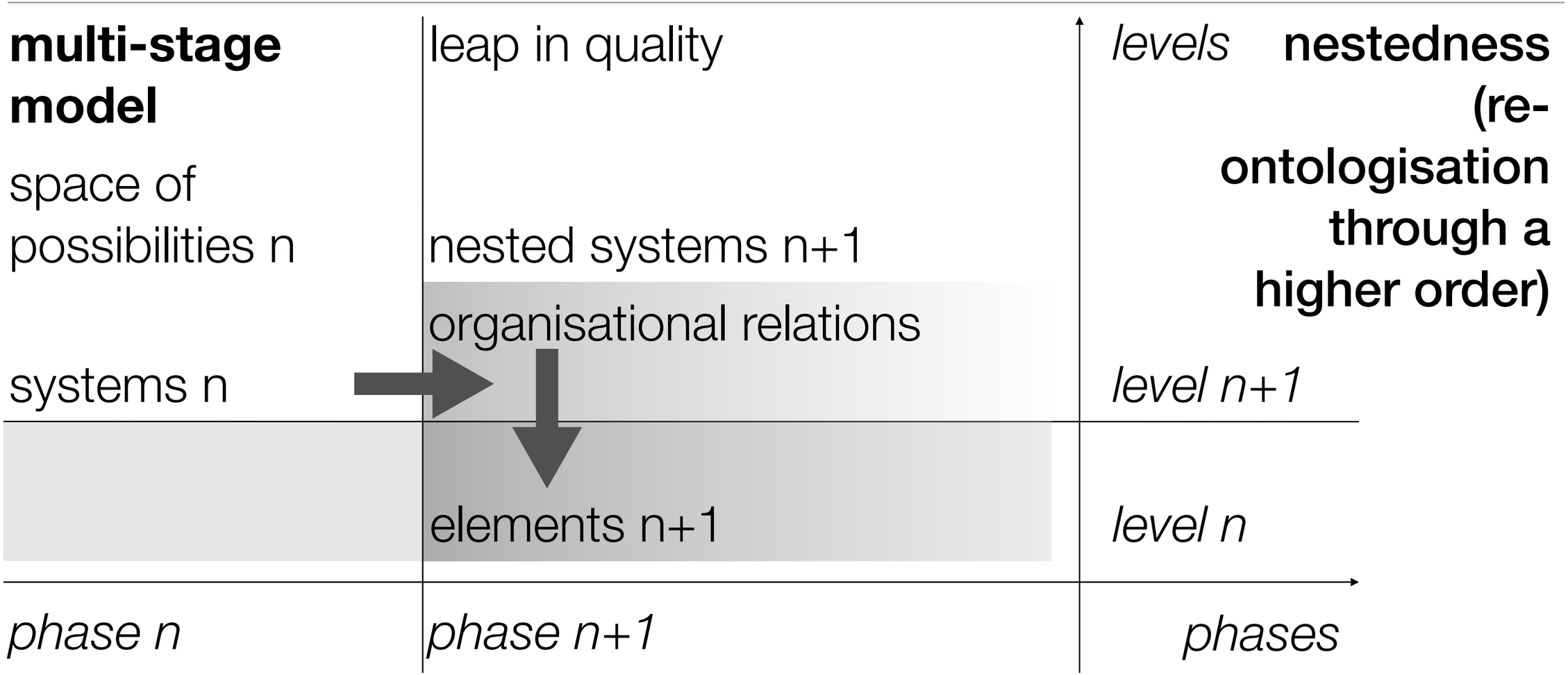
3.2 Self-organisation

the systems world picture:
the multi-stage model of evolutionary systems

– that is, focussing on any object of any domain as being part of underlying processes and structures of **evolving and nesting real-world systems** (self-organising systems)

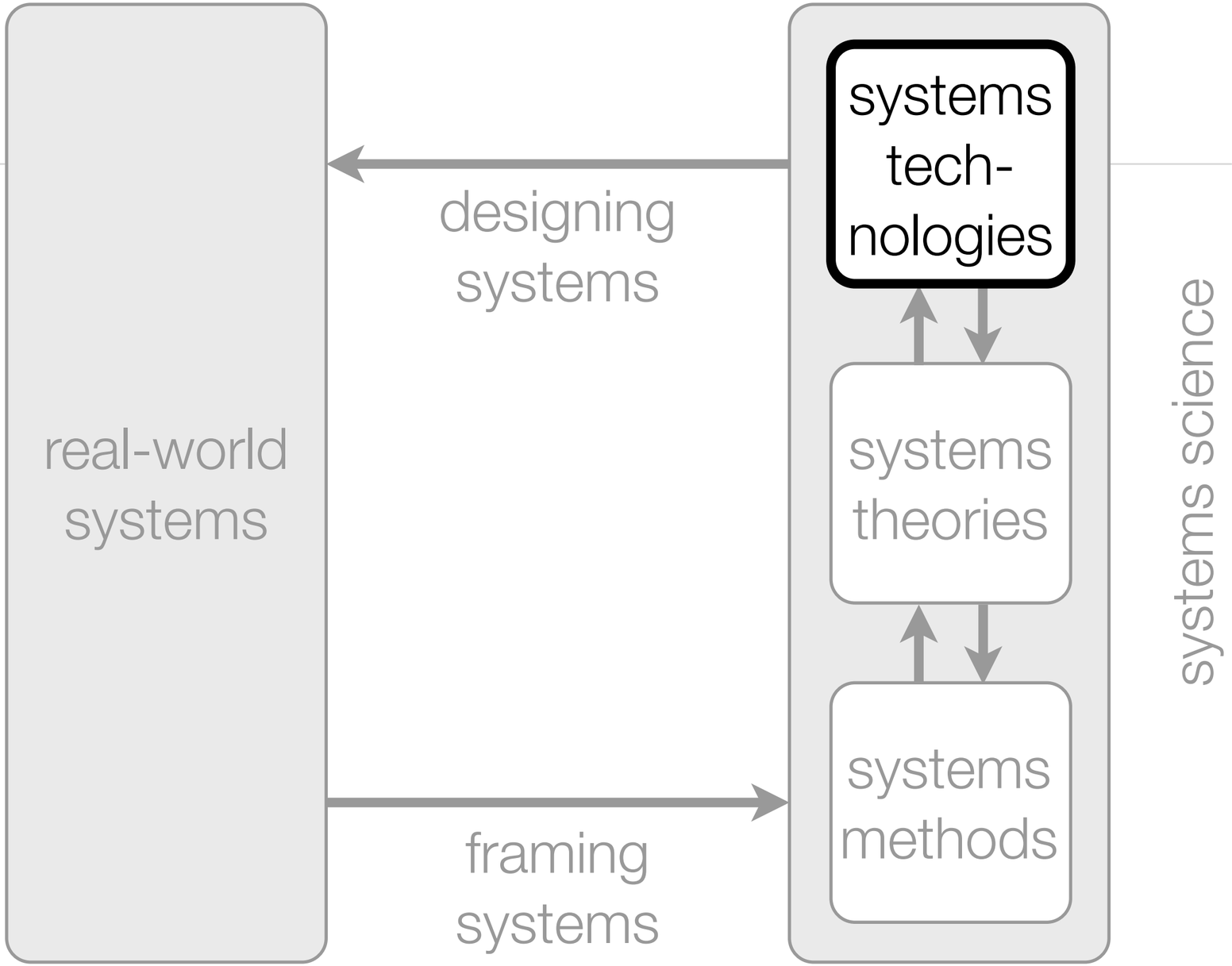
– transdisciplinarity through a new world picture (systems theory)

3.2 Self-organisation



evolution (emergence from a necessary condition)

modelling systems (3): a new, trans-disciplinary world view



3.3 Synergy

the systems world view:
designing systems by meaningful technology

– that is, advancing **synergy** (alleviating **frictions**)

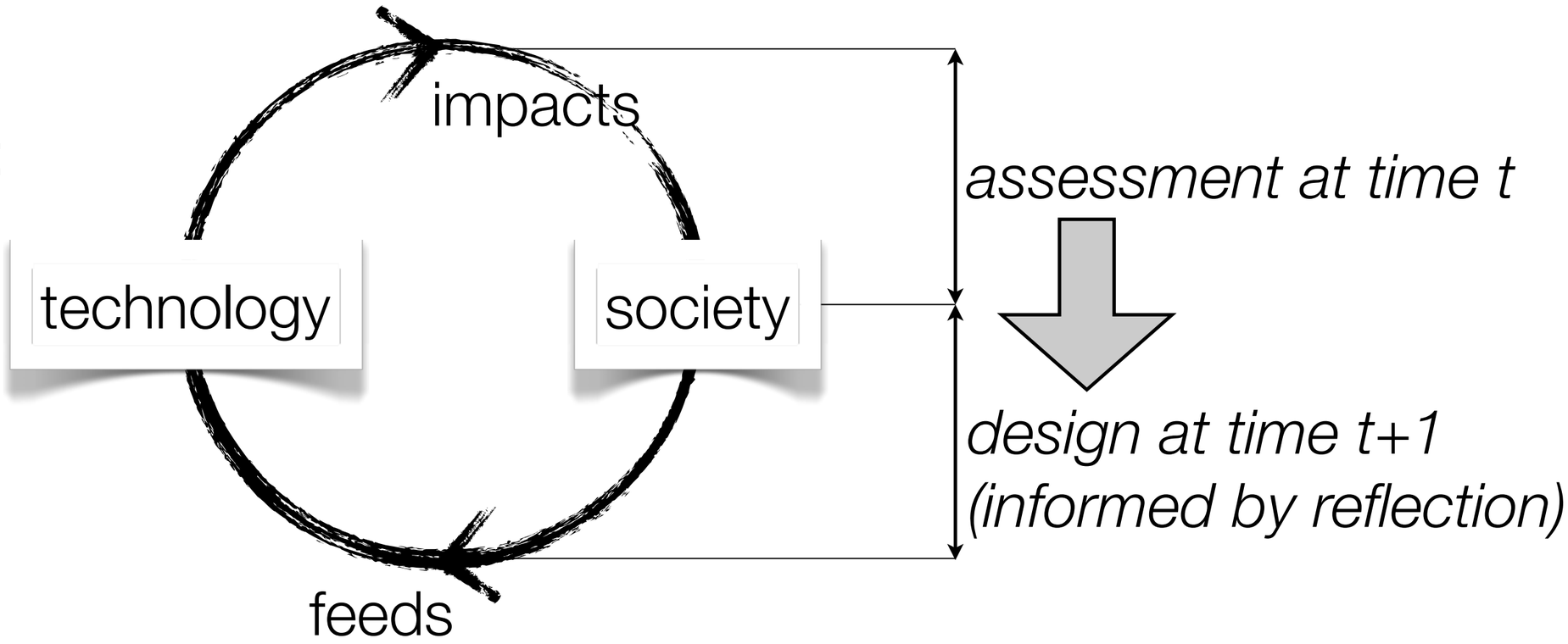
– transdisciplinarity through a new world view (systems technology)

3.3 Synergy

meaningful technology:

technology endowed with meaning by
(1) the **participation** of those affected in an **integrated technology assessment and design** process
(2) for the reflection of the expected and actual usage of technology: **social usefulness**, that is, the reflection of both
(a) the **adequacy to the purpose** (utility; operational knowledge: **know-how**) and
(b) the **purpose itself** (the function technology serves; orientational knowledge: **know why and what for**)

ad (1)
integrated technology assessment and design



3.3 Synergy

ad (2) purpose

– any (self-organised) **system** is a system by virtue of the **synergy** it supplies through its **organisational relations**
– any **social system** is a social system by virtue of organisational relations of production and provision of the **common(-good)s**, that is, the commons is the social manifestation of synergy

3.3 Synergy

ad (2) purpose

– systemic dysfunctions due to the suboptimal organisation of synergetic effects in any system, or of the commons supply in social systems, are **frictions**;
– meaningful technology is oriented towards the **advancement of synergy and hence alleviation of frictions**

3.3 Synergy

ad (2) purpose

– frictions can be alleviated through the **re-organisation of information processes and structures**;
– **meaningful I(C)T(s) in the age of global challenges** support the re-organisation of social information such that requisite data/knowledge/wisdom can be generated that contributes to the global capability of social systems to safeguard **sustainable development** and rule out self-inflicted breakdowns

3.4 Conclusion

	systemic transdisciplinarity
aims	*objective (praxiology):*
	to provide scientific knowledge for solving **problems of friction**, in particular, concerning the **commons** (systems technologies)
scope	*object of study (ontology):*
	parts of the overall **interconnectedness of evolving and nested real-world systems** the scientific knowledge of which is needed to advance synergy (systems theories)
tools	*objectivating approach (epistemology):*
	ways of generating scientific knowledge by equilibrating **integration and differentiation** to understand synergy (systems methods)