

Design & Science - approaching each other

Wolfgang Jonas

HBK Braunschweig /

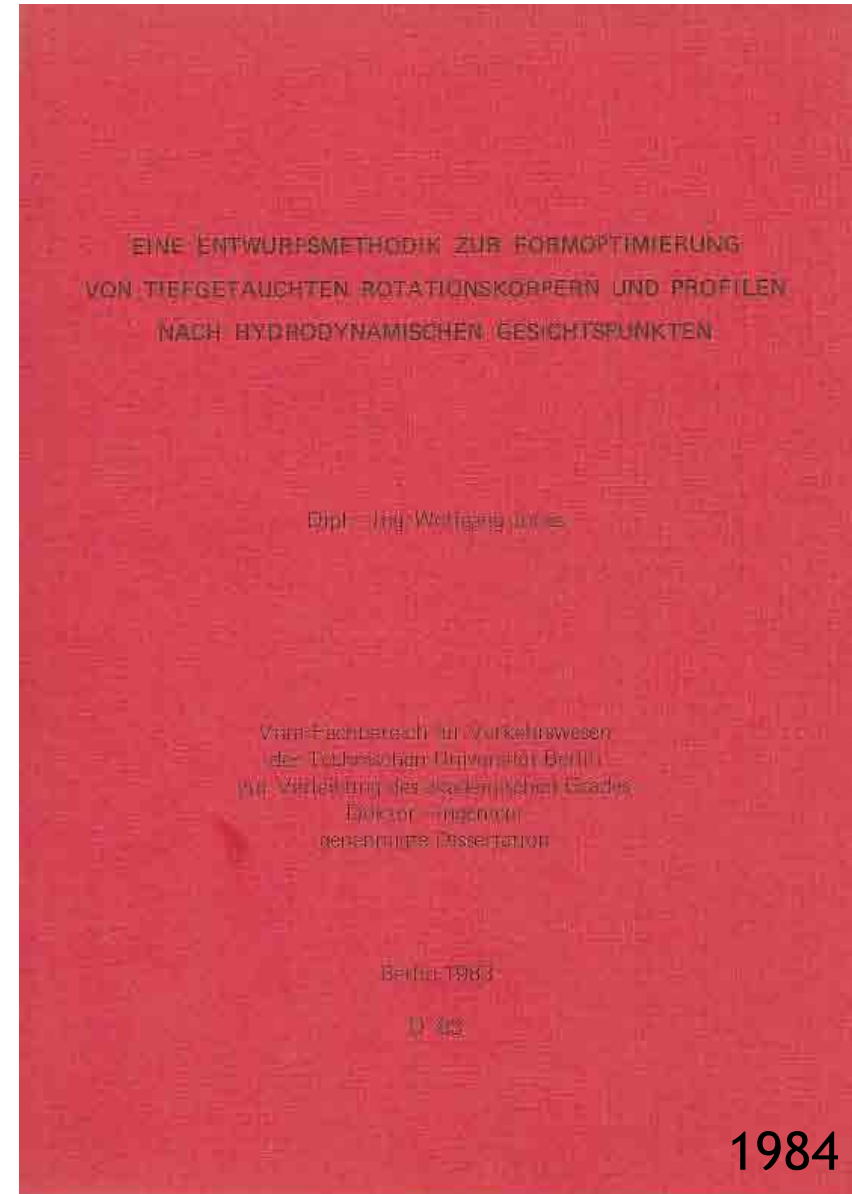
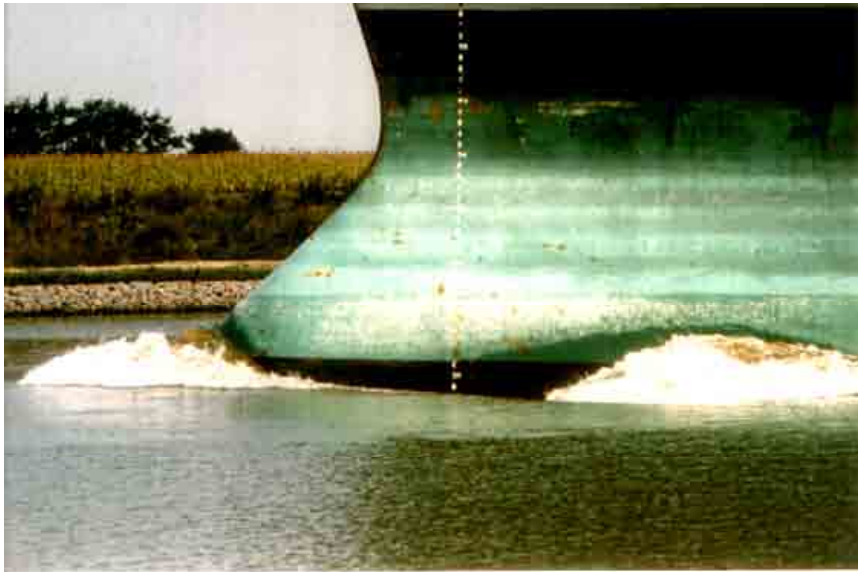
Braunschweig University of Art, Germany

At the End of Science and Beyond,

Kiel 12/10/26-27

*„There is no purer myth than the notion of a science
which has been purged of all myth.“* Michel Serres

0 Introduction



0 Introduction



Wolfgang Jonas



Design – System – Theorie

Überlegungen zu einem
systemtheoretischen Modell
von Design-Theorie

1994

0 Introduction

The screenshot shows the homepage of the Institut für Transportation Design (ITD). At the top, there is a navigation bar with the text 'Institut für Transportation Design' and the 'iD' logo. Below this is a search bar and a breadcrumb trail: 'Sie sind hier: Startseite'. The main heading is 'Institut für Transportation Design', followed by a paragraph: 'Das Institut für Transportation Design (ITD) wurde im Jahr 2007 von Stephan Rammler gegründet. Das Institut beschäftigt sich mit der Zukunft der Mobilität. In Forschung und Lehre geht das ITD weit über das reine Produktdesign von Verkehrsmitteln hinaus und befasst sich mit der Gestaltung von Mobilitätsdienstleistungen sowie mit der Erforschung neuer Mobilitätssysteme.' Below this are three featured articles: 'Maritime Mobility' (with a photo of a boat), 'Zweiradkultur' (with a photo of a bicycle), and 'Welche Designer braucht die Welt?' (with a photo of a group of people). Each article has a 'weiter' link. On the left side, there is a vertical navigation menu with links for 'deutsch / english', 'Startseite', 'Institut', 'Forschung', 'Studium', 'Veranstaltungen', 'Links', 'Jobs', 'Kontakt & Anfahrt', and 'Impressum'. At the bottom, there are three dark grey boxes with white text: 'Schaufenster Elektromobilität' (Das ITD ist dabei), 'Bert Spindler gewinnt Designpreis 2012' (Masterstudent mit dem Designpreis der Ikea-Stiftung...), and 'Alltagsutopien für das Braunschweiger Land' (Ein Kooperationsprojekt zwischen dem LOT-Theater...), each with an 'Information' button. The fourth box is 'Pedelec-Studie 2012-14' (Unterstützen Sie das Projekt: Das ITD sucht Kooperationspartner und Teilnehmer/innen), also with an 'Information' button.

Institut für Transportation Design

deutsch / english

› Startseite

› Institut

› Forschung

› Studium

› Veranstaltungen

› Links

› Jobs

› Kontakt & Anfahrt

› Impressum

Sie sind hier: Startseite

Institut für Transportation Design

Das Institut für Transportation Design (ITD) wurde im Jahr 2007 von Stephan Rammler gegründet. Das Institut beschäftigt sich mit der Zukunft der Mobilität. In Forschung und Lehre geht das ITD weit über das reine Produktdesign von Verkehrsmitteln hinaus und befasst sich mit der Gestaltung von Mobilitätsdienstleistungen sowie mit der Erforschung neuer Mobilitätssysteme.

Maritime Mobility

"Bordelle und Kolonien sind zwei extreme Typen der Heterotopie, und wenn man daran denkt, dass das Schiff ein schaukelndes Stück Raum ist, ein Ort...

» weiter

Zweiradkultur

Das Fahrrad als eines der bildungs- und kulturunabhängigsten sowie beliebtesten Fahrzeuge ist auf dem Weg die Basis für neuartige - auch elektromobile...

» weiter

Welche Designer braucht die Welt?

Symposium zum Thema Social Design
Welche Designer braucht die Welt? - Eine prägnante, für den Designer existentielle Fragestellung, auf die wohl...

» weiter

Schaufenster Elektromobilität

Das ITD ist dabei.

Unsere Pferdestärken werden elektrisch. eMobilität in Niedersachsen.

Bert Spindler gewinnt Designpreis 2012

Designpreis 2012
Masterstudent mit dem Designpreis der Ikea-Stiftung...

Information

Alltagsutopien für das Braunschweiger Land

Ein Kooperationsprojekt zwischen dem LOT-Theater...

Information

Pedelec-Studie 2012-14

Unterstützen Sie das Projekt:
Das ITD sucht Kooperationspartner und Teilnehmer/innen.

Information

0 Content

Why Design?

- 1 Design as a reference regarding the question of Science?
- 2 There is a considerable extension of the concept Design!
- 3 Design has / claims extremely broad subject matters
- 4 Relevant / selected definitions of design / design research / inquiry
- 5 The Age of Anthropocene requires new approaches
- 6 Indications of convergence of Design and Science

Systems, contexts and interfaces

- 7 Alice and the Red Queen
- 8 Design as the interface-building discipline
- 9 Systems and contexts in Science and Design
- 10 Knowledge gaps between systems and contexts
- 11 Science has to protect the modern myth

Common phenomena in Design and Science

- 12 Problems of prediction and control in Design and Science
- 13 Evolutionary patterns in natural and artificial processes
- 14 Evolutionary patterns suggest circular processes
- 15 Experiential learning / pragmatism as epistemological assumption
- 16 3-stage knowledge generation models - introducing abduction

New transdisciplinary perspectives

- 17 Mode-2 integrates Design and Science by means of PROJECTION
- 18 Strong Transdisciplinarity provides an axiomatic basis
- 19 Conclusion: Not merging but reflected interrelation of Design and Science
- 20 Epilogue: Alice entering the room behind the looking glass

1 Design as a reference regarding the question of Science?



2 There is a considerable extension of the concept „Design“!

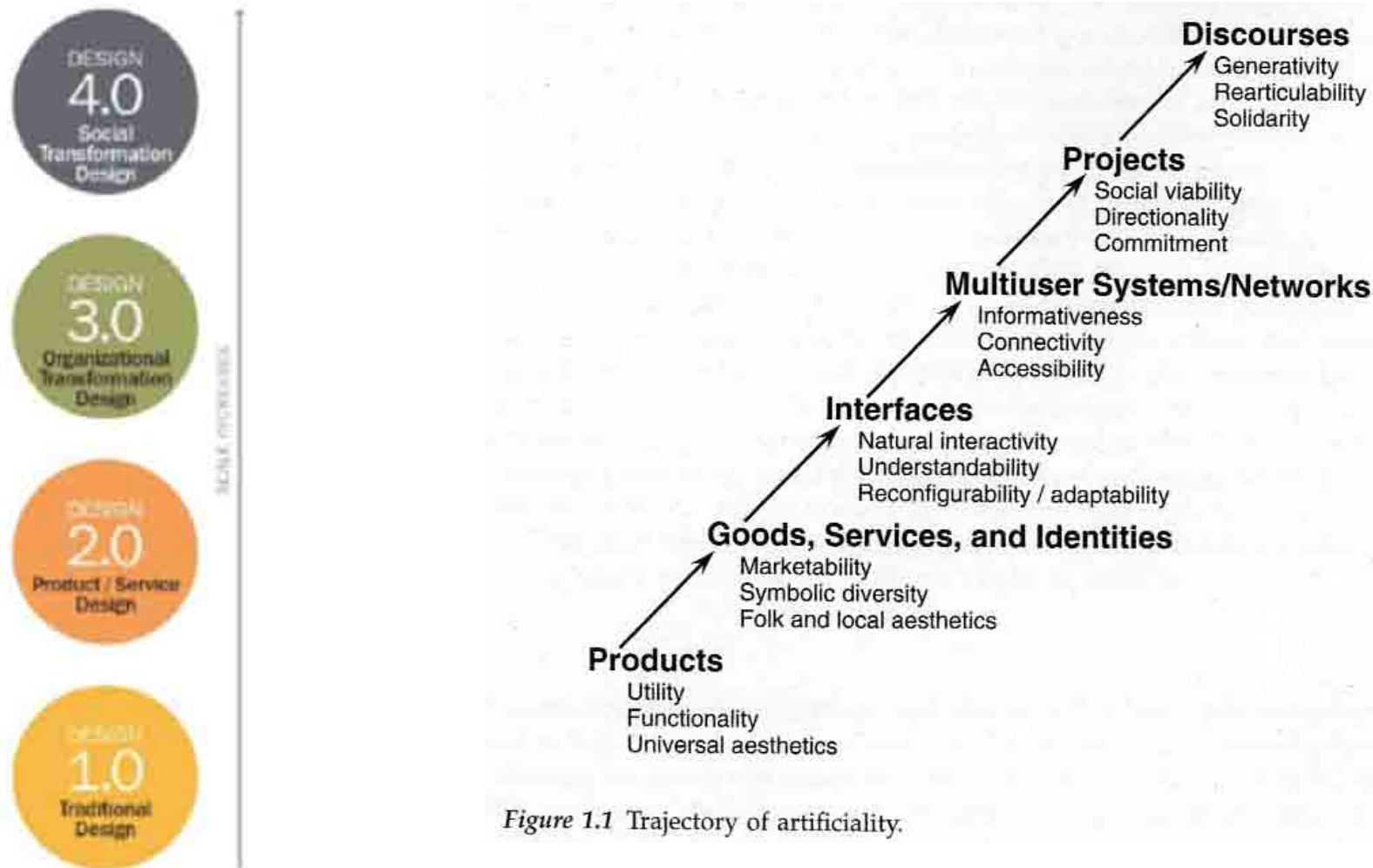


Figure 1.1 Trajectory of artificiality.

2 There is a considerable extension of the concept „Design“

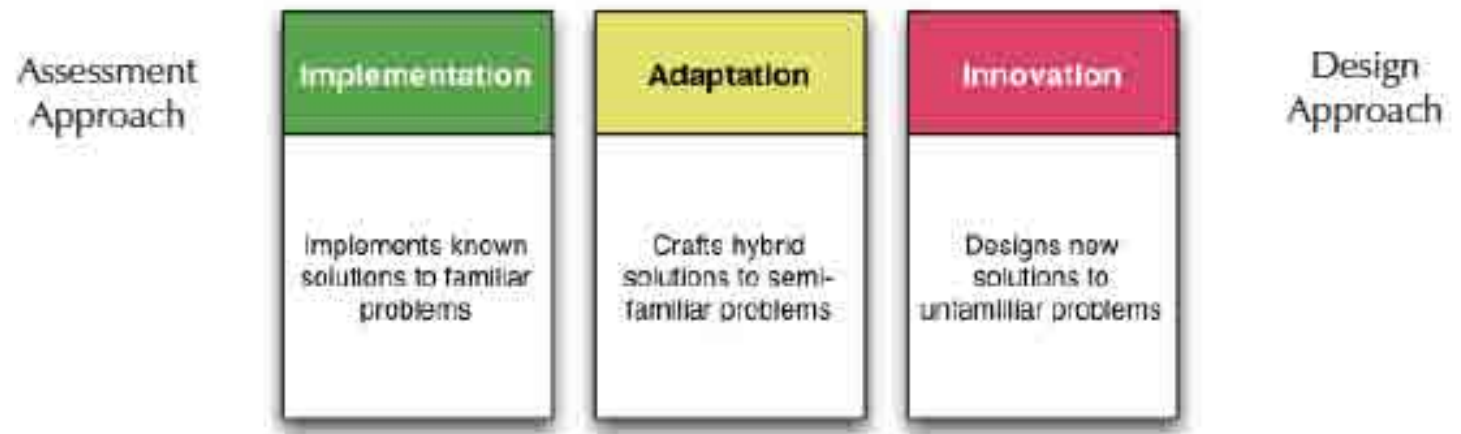
For example:

A Framework Document for Evidence-Based Programme Design on Reintegration

Derek B. Miller and Lisa Rudnick

Produced by the United Nations Institute for Disarmament Research in support of the Inter-Agency Working Group on Disarmament, Demobilization and Reintegration

Figure 1: Approaches and their Uses



3 Design has / claims extremely broad subject matters

Authors	Subject matters / Areas of Interest		
Platon	The beautiful (τὸ καλὸν)	The true (τὸ ἀληθές)	The good (τὸ ἀγαθόν)
Vitruvius	The beautiful (Venustas)	The solid (Firmitas)	The useful (Utilitas)
Immanuel Kant	Judgement	Reason	Moral
David Pye (1978)	The beautiful	The efficient	The useful
Bruce Archer (1979)	Products	Process	People
Nigel Cross (2001)	Phenomenology study of the form and configuration of artefacts, the 1920s	Praxiology study of the practices and processes of design, the 1960s	Epistemology study of designerly ways of knowing, the 2000s
Alain Findeli (2008)	Aesthetics	Logic	Ethics
Wolfgang Jonas	Forms	Processes	Knowledges

Quelle: Jonas

4 Relevant / selected definitions of design / design research / inquiry

Herbert Simon, 1969:

“Everyone designs who devises courses of action aimed at changing existing situations into preferred ones.”

Bruce Archer, 1981:

“Design research... is systematic enquiry whose goal is knowledge of, or in, the embodiment of configuration, composition, structure, purpose, value and meaning in man - made things and systems.”

Alain Findeli, 2008:

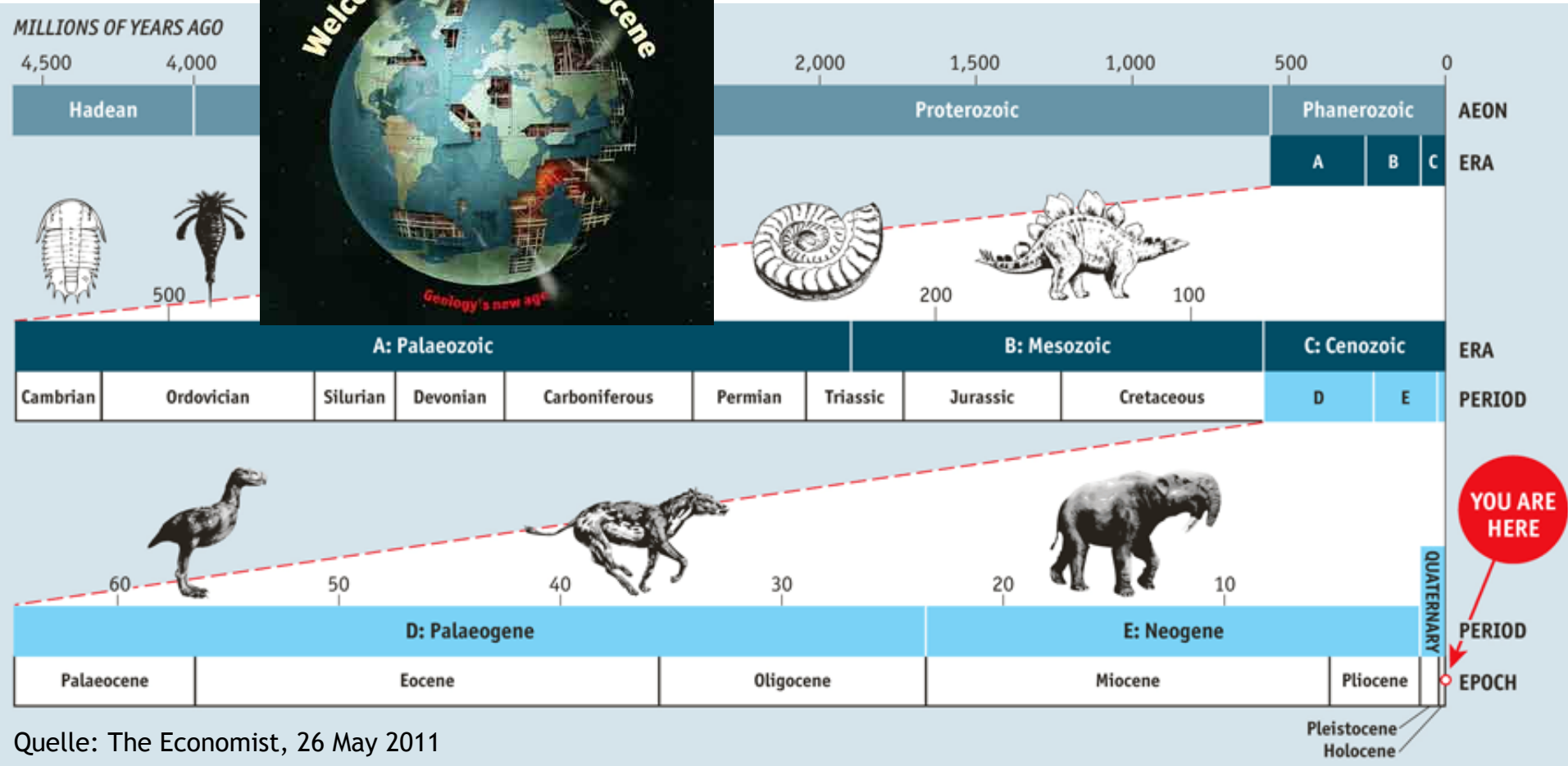
“Design research is a systematic search for and acquisition of knowledge related to general human ecology considered from a 'designerly way of thinking' (i.e. project-oriented) perspective.”

4 Relevant / selected definitions of design / design research / inquiry

*"Inquiry (**design, W.J.**) is the transformation of an indeterminate situation into a unified whole through the controlled and directed determination of its constituent parts and relations."*

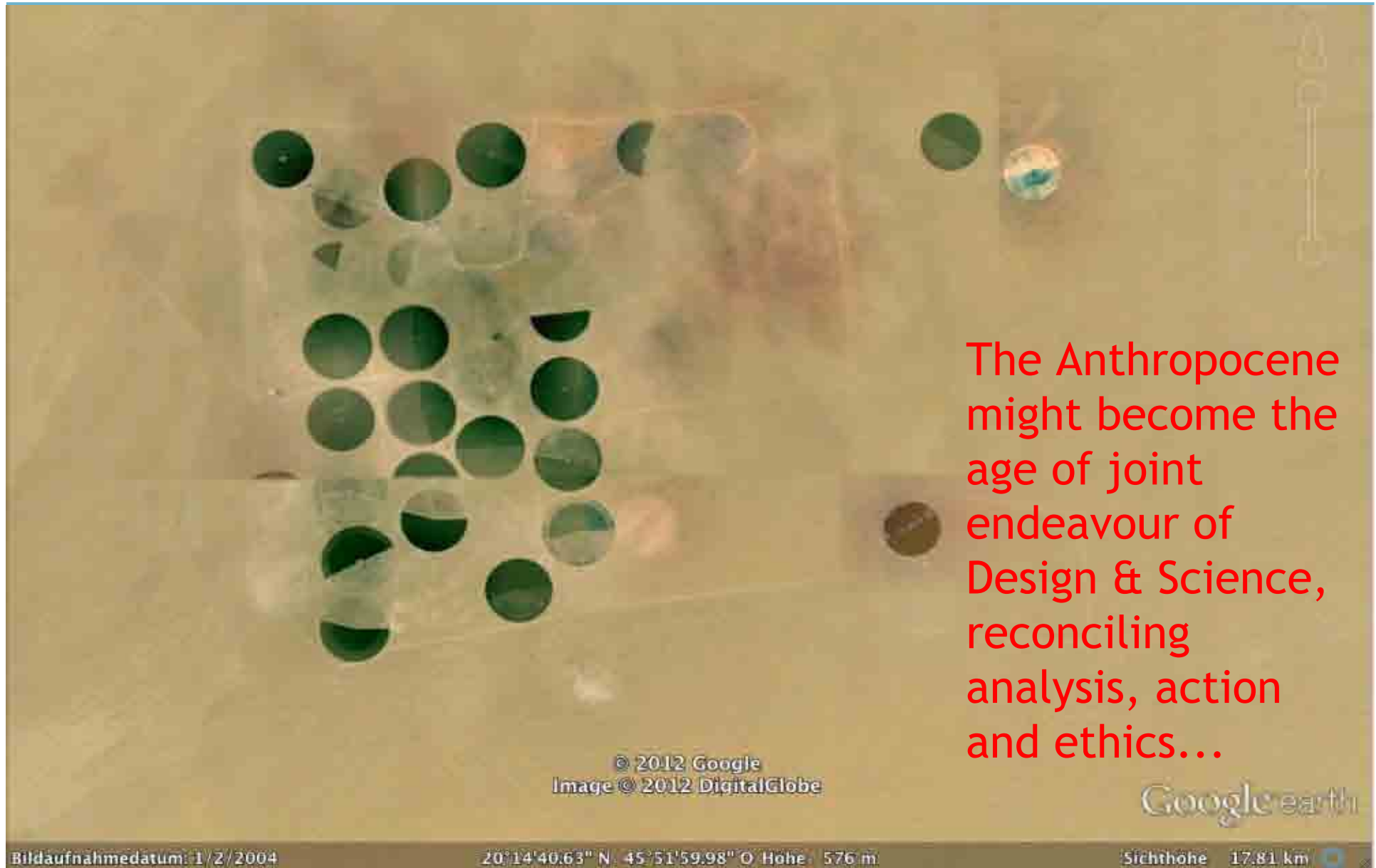
John Dewey 1938

5 The Age of Anthropocene requires new approaches



Quelle: The Economist, 26 May 2011

5 The Age of Anthropocene requires new approaches



The Anthropocene might become the age of joint endeavour of Design & Science, reconciling analysis, action and ethics...

© 2012 Google
Image © 2012 DigitalGlobe

Google earth

Bildaufnahmedatum: 1/2/2004

20°14'40.63" N 45°51'59.98" O Höhe: 576 m

Sichthöhe 17.81 km

6 Indications of convergence of Design and Science

Science >>>

Indications / evidence for the shift of Science towards **dynamic designerly processes** of socially relevant innovation...

The scientific concept of “problems of organized complexity” (Weaver 1948).

The forgotten controversy at the beginning: Cartesian rationalism vs. Montaignean scepticism (Toulmin 1992).

The increasing importance of generative and synthetic forms of research in the sciences, for example in engineering, nano- and genetic design (Pfeifer xxxx).

The evidence generated by empirical laboratory studies (Knorr-Cetina xxxx, Rheinberger xxxx, ...).

The considerations of STS and ANT: “We have never been Modern” (Latour 1998). The emerging concept of **Mode 2 Science and Transdisciplinarity Studies** (Nowotny et.al. 2001, Nowotny 2006).

Design-based research in management, pedagogy, nursing, etc.

Grounded theory building as creative action in the social sciences (Strauss xxxx).

<<< Design

Indications / evidence for the shift of design towards the **creation of socially robust knowledge**...

The concept of the “Sciences of the Artificial” (Simon 1969).

Designerly insights into the paradoxes of rational action (Rittel xxxx).

The increasing importance of design beyond the product: services, systems, organizations, scenarios, social design.

The concept of the “trajectories of artificiality” (Krippendorff 2006).

The concepts of Practice-led research, Project-grounded research, Research Through Design. **Design as evolutionary learning process.**

The hype concept of “Design Thinking” (Brown 2009).

The approach of “Design Fiction” (Bleecker, Lukic xxxx) and “Critical Design” (Dunne, Raby xxxx).

The exploration of the concept of abduction in Design (Chow 2008, 2012, Chow & Jonas 2010).

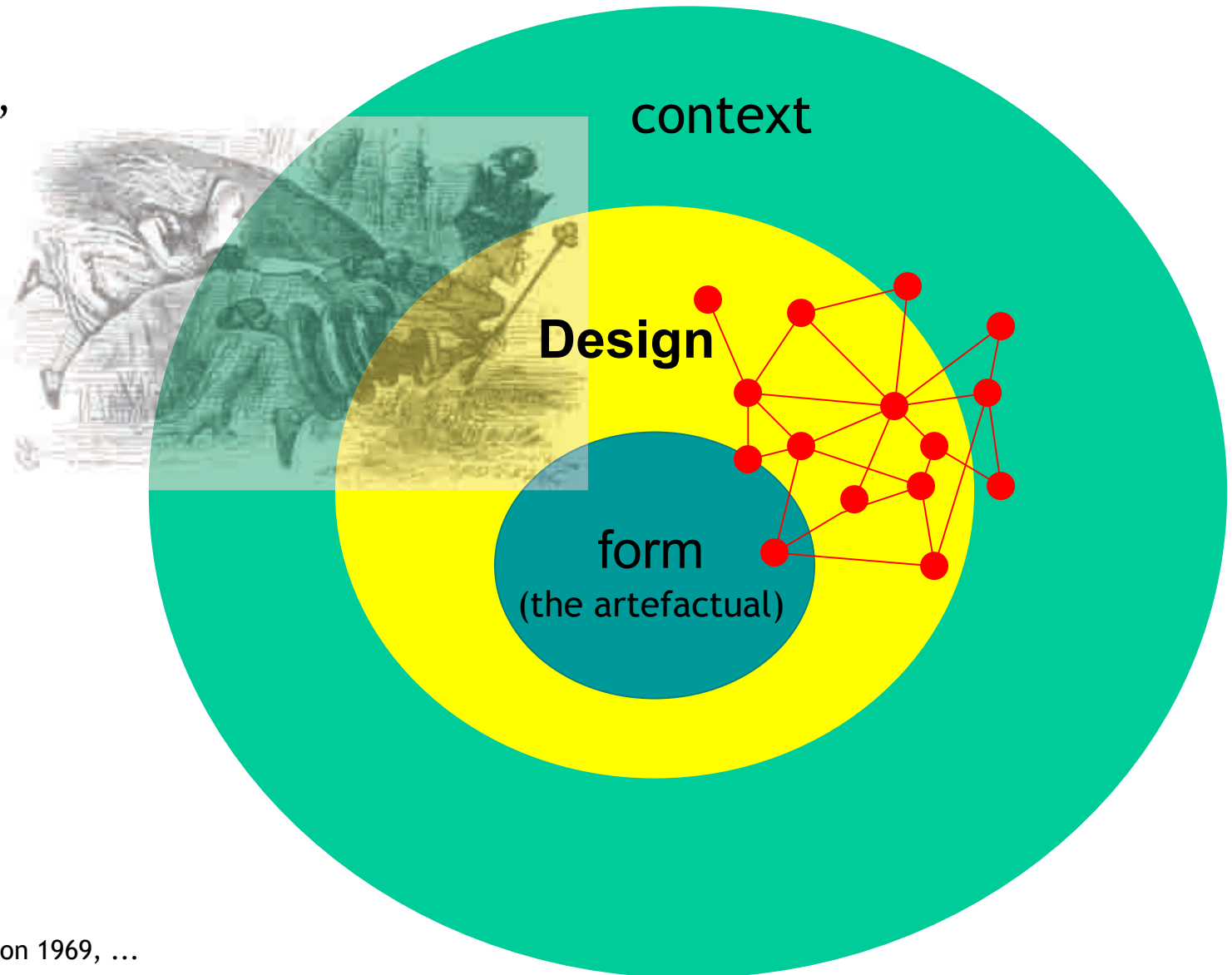
7 Alice and the Red Queen



The paradox of the Red Queen,
or: Progress in socio-cultural development?

8 Design as the interface-building discipline

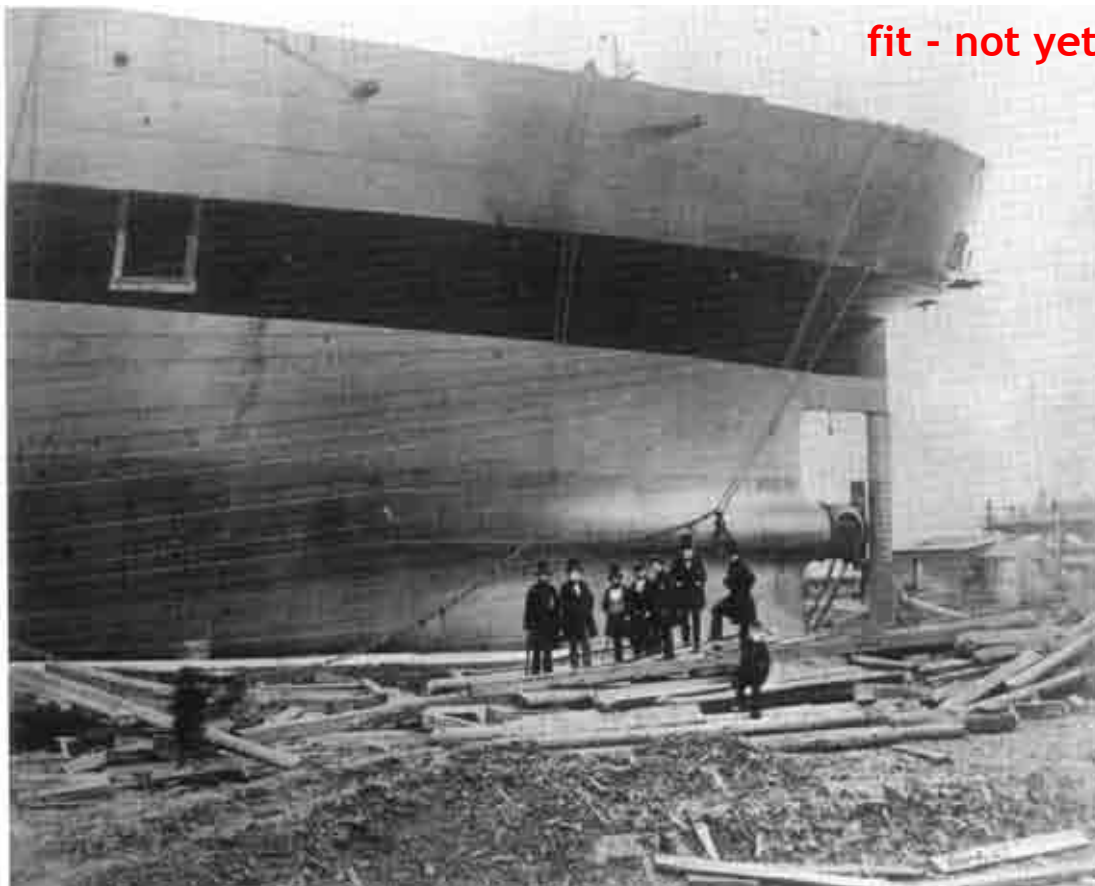
Design (evolution, learning, ...) is operating in the **hybrid** interface region, connecting contextual **opportunities** and **threats** with artifactual **strengths** and **weaknesses**



8 Design as the interface-building discipline

Example:

fit / non-fit - the concept of interface (Alexander, Simon)

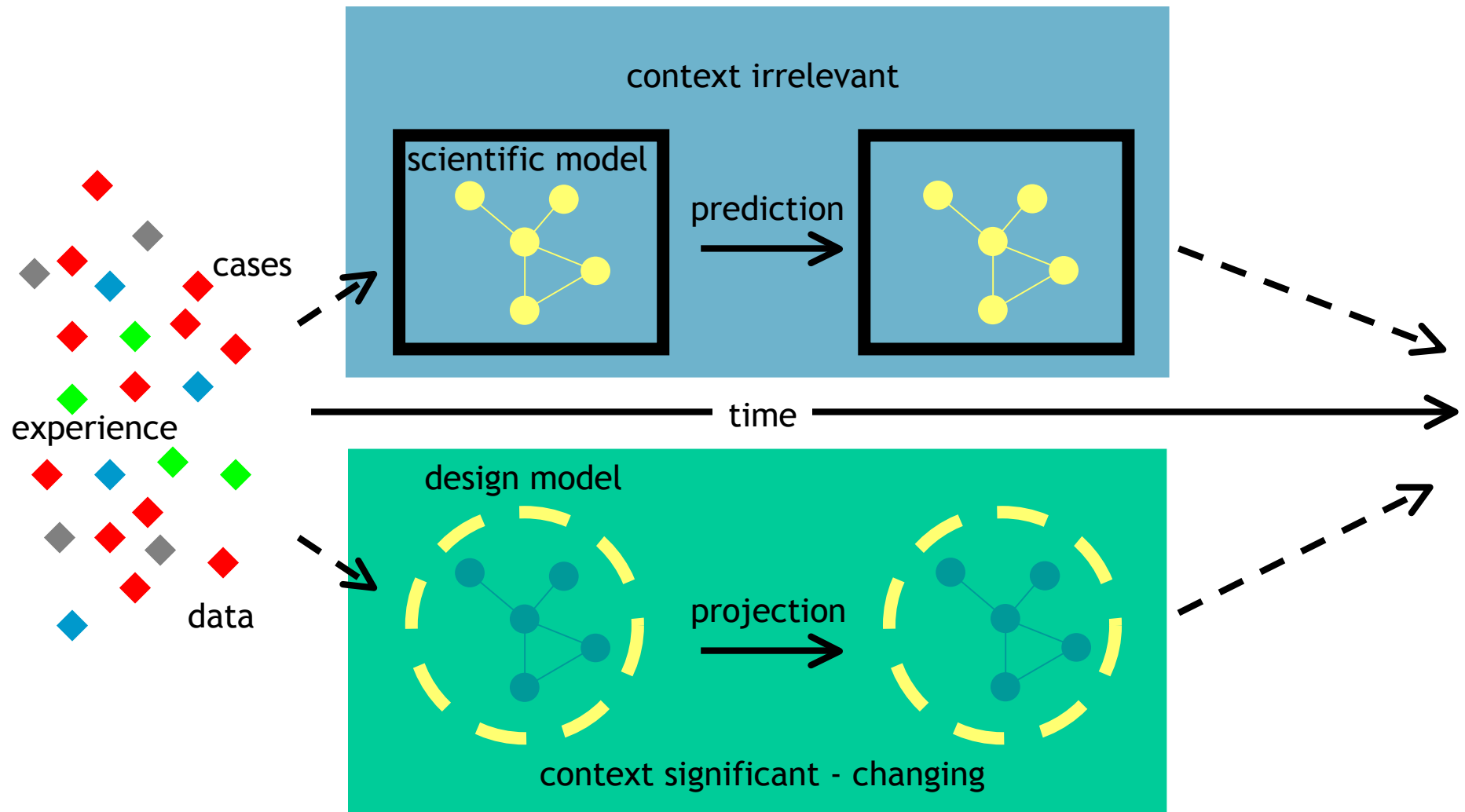


Great Eastern, Millwall Docks, London, 1857/58

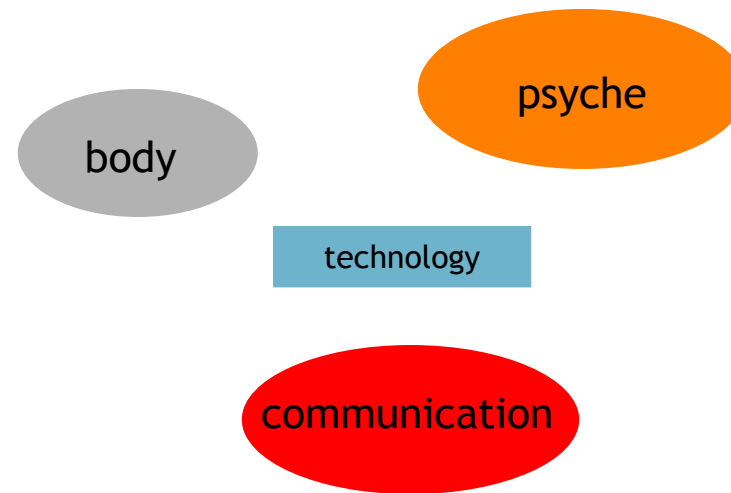


Schiffswerft Dawartz, Tönning, 1965

9 Systems and contexts in Science and Design



10 Knowledge gaps between systems and contexts

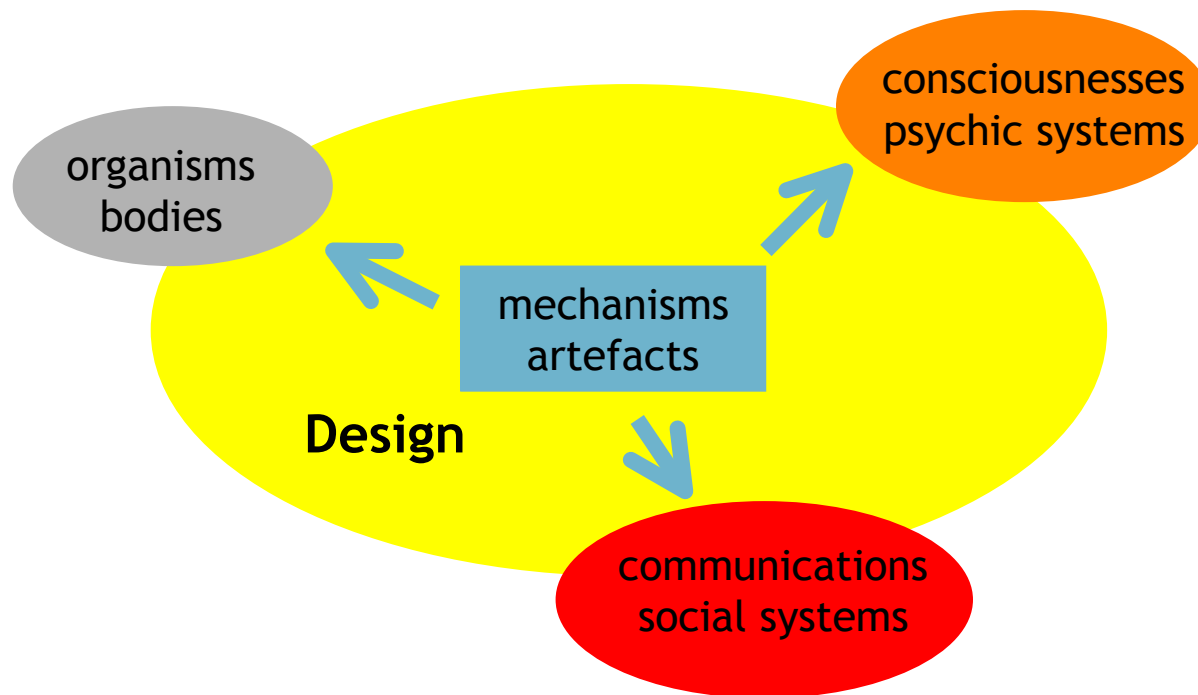


Knowledge gaps between consciousnesses, bodies and communications

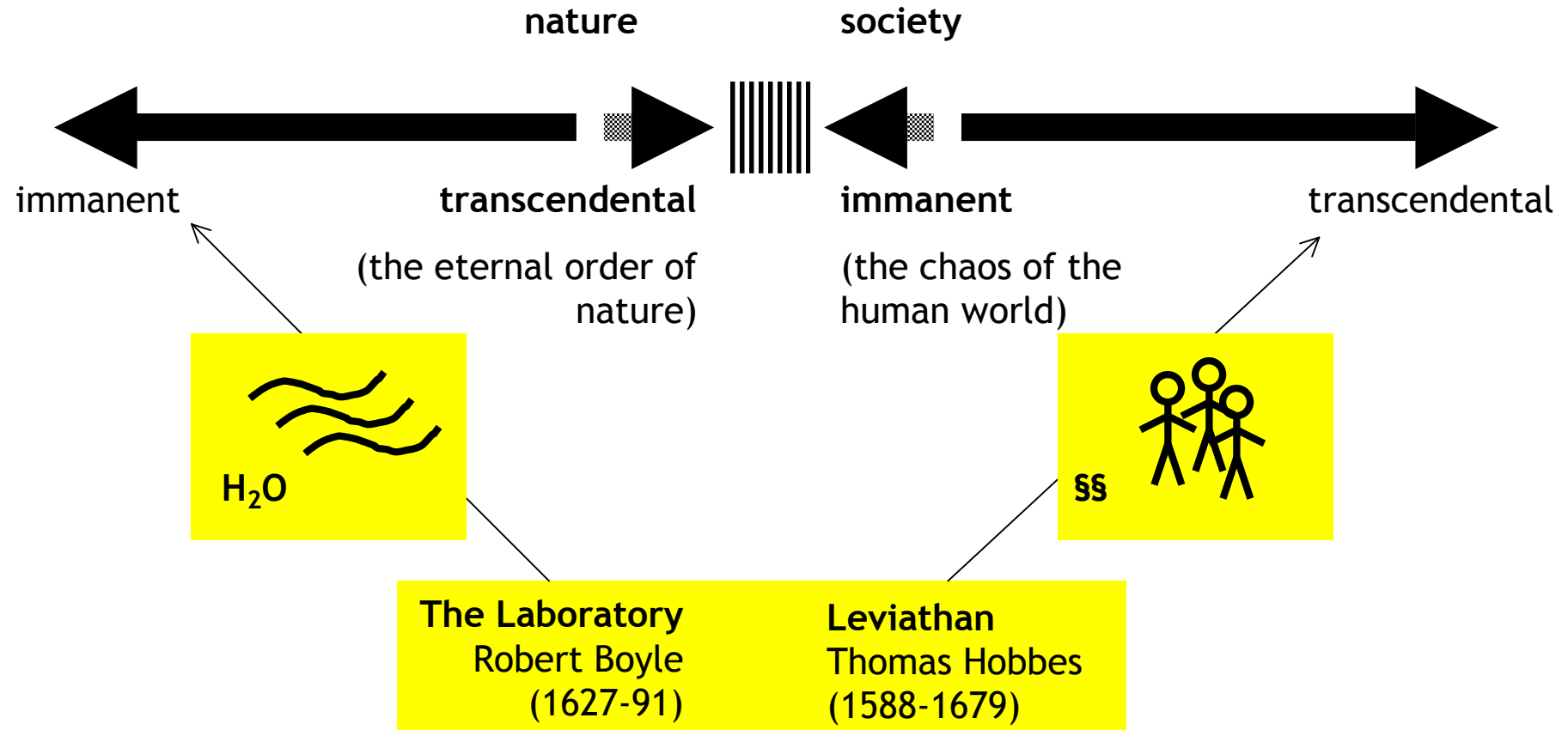
10 Knowledge gaps between systems and contexts

Design tries desperately (and competently) to bridge these gaps by means of artefacts ...

... there would be no need for Design without these knowledge gaps (there would be just causal / functional links)



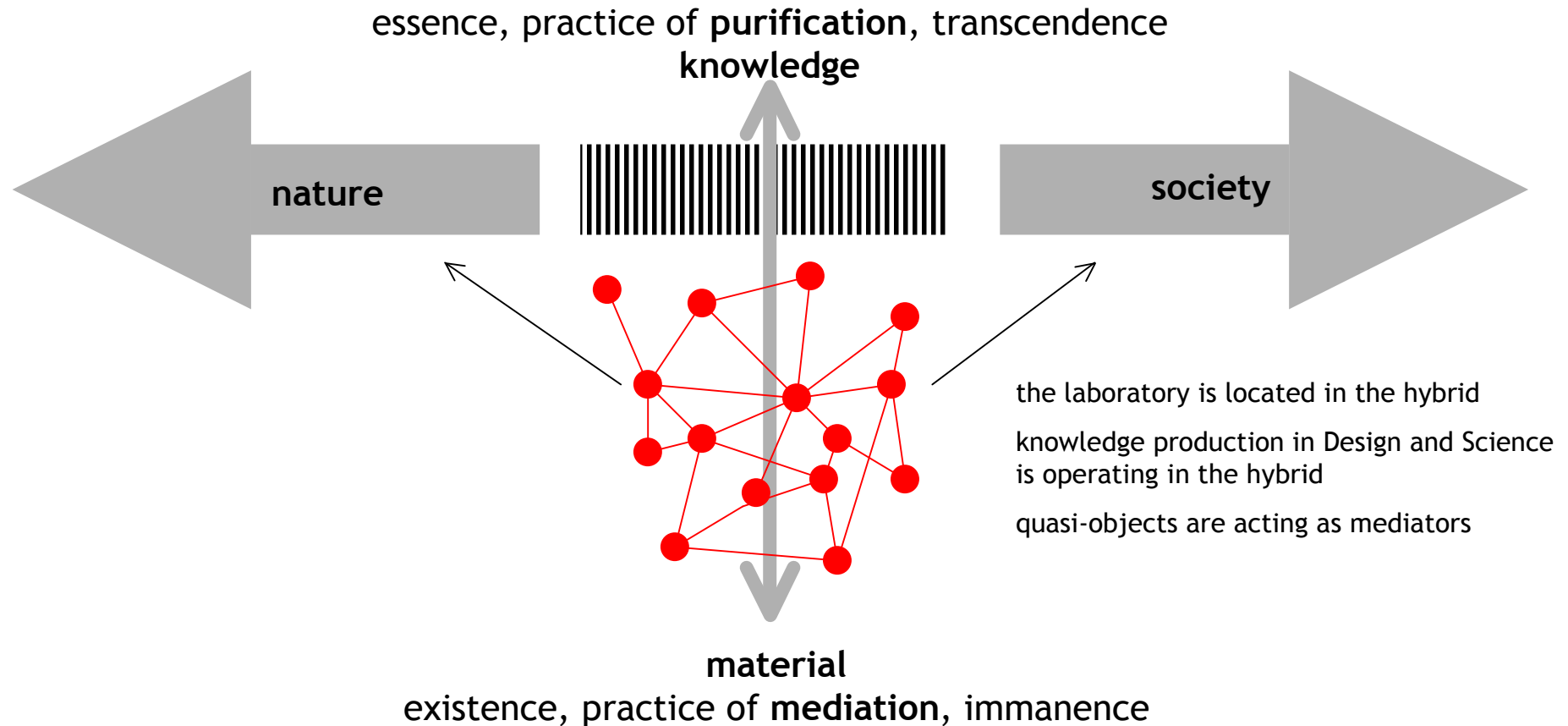
11 Science has to protect the modern myth



Latour's first 2 paradoxical constitutional guarantees of modernity:

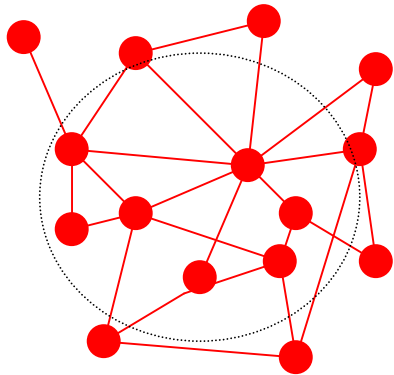
1. Even when we construct nature, it is as if we did not.
2. Even when we do not construct society, it is as if we did.

11 Science has to protect the modern myth



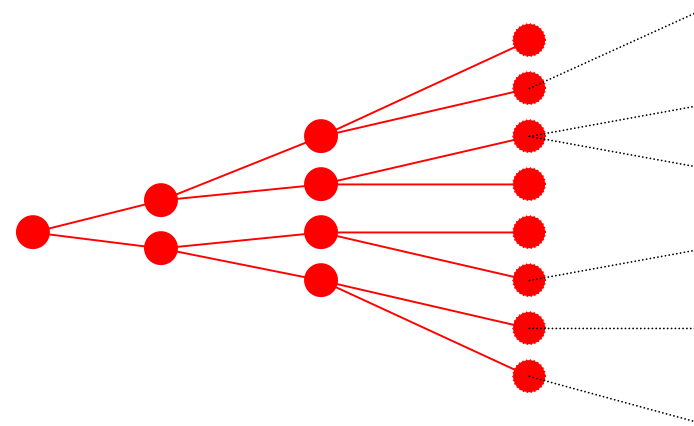
Latour's third paradoxical constitutional guarantee of modernity:
3. Nature and society must remain absolutely separate; the work of purification must therefore remain separate from the mediation work

12 Problems of prediction and control in Design and Science



Both Science and Design deal with **systemic wholes**:

- not completely determinable
- limited control



Both Science and Design have **evolutionary character**:

- based on the past, experimenting with the new
- limited predictability

13 Evolutionary patterns in natural and artificial processes

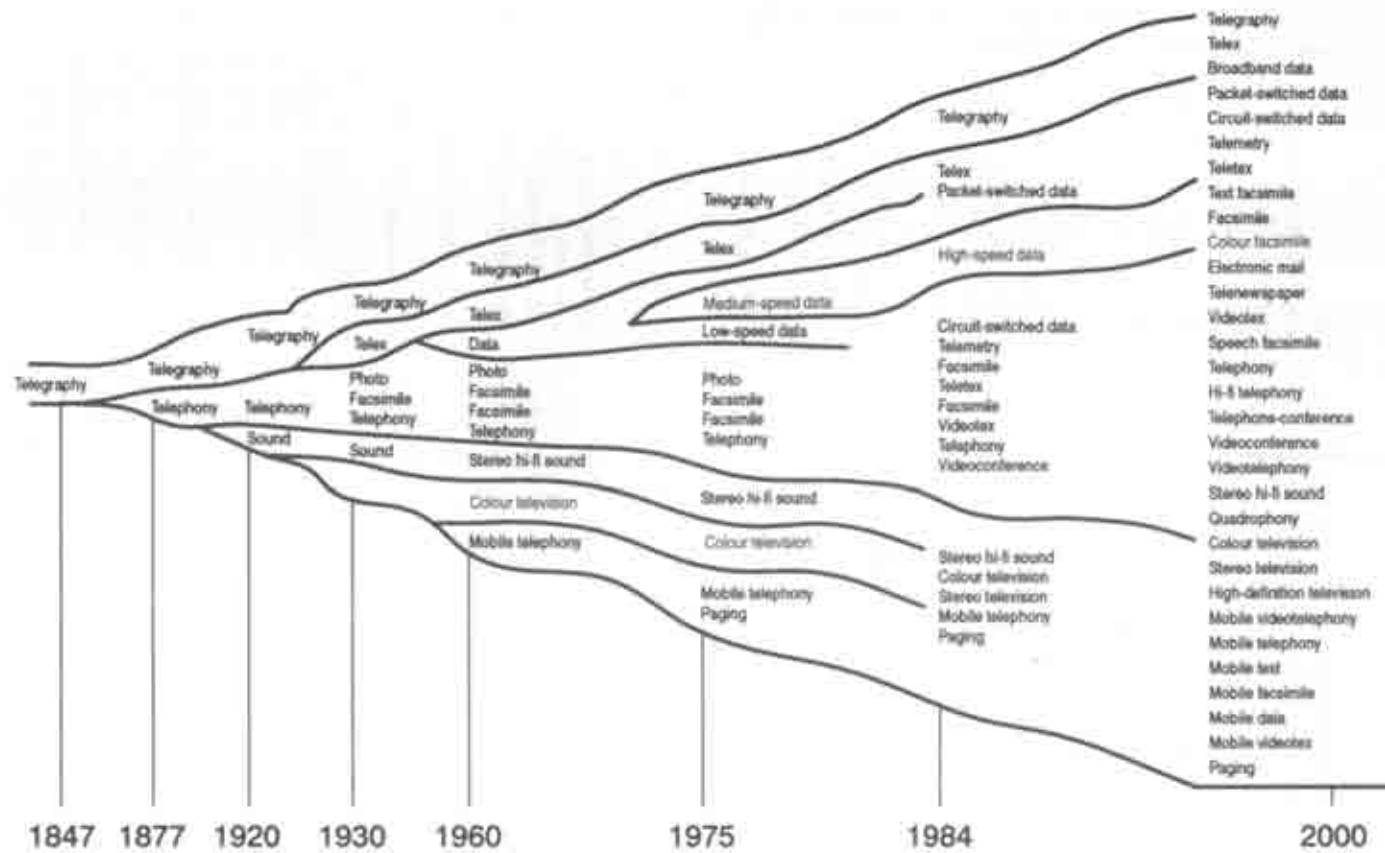


Figure 1.4 The expanding range of telecommunications services: prospects for the year 2000

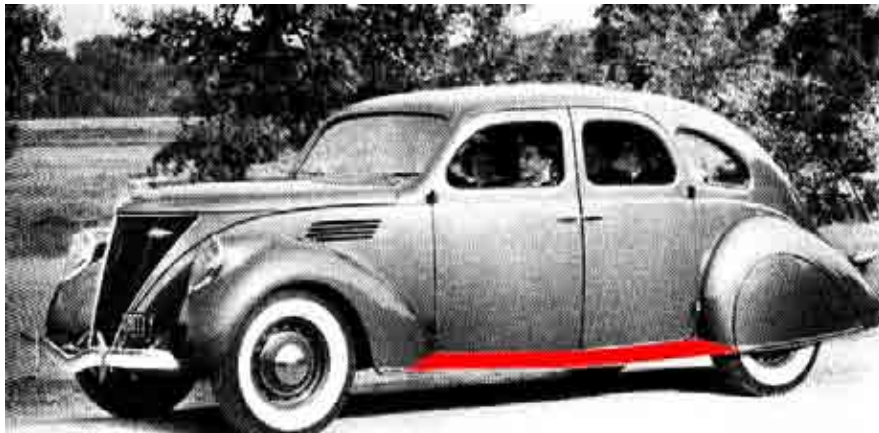
Source: Adapted from Ungerec, 1988

Socio-techno-cultural processes reveal evolutionary patterns ...

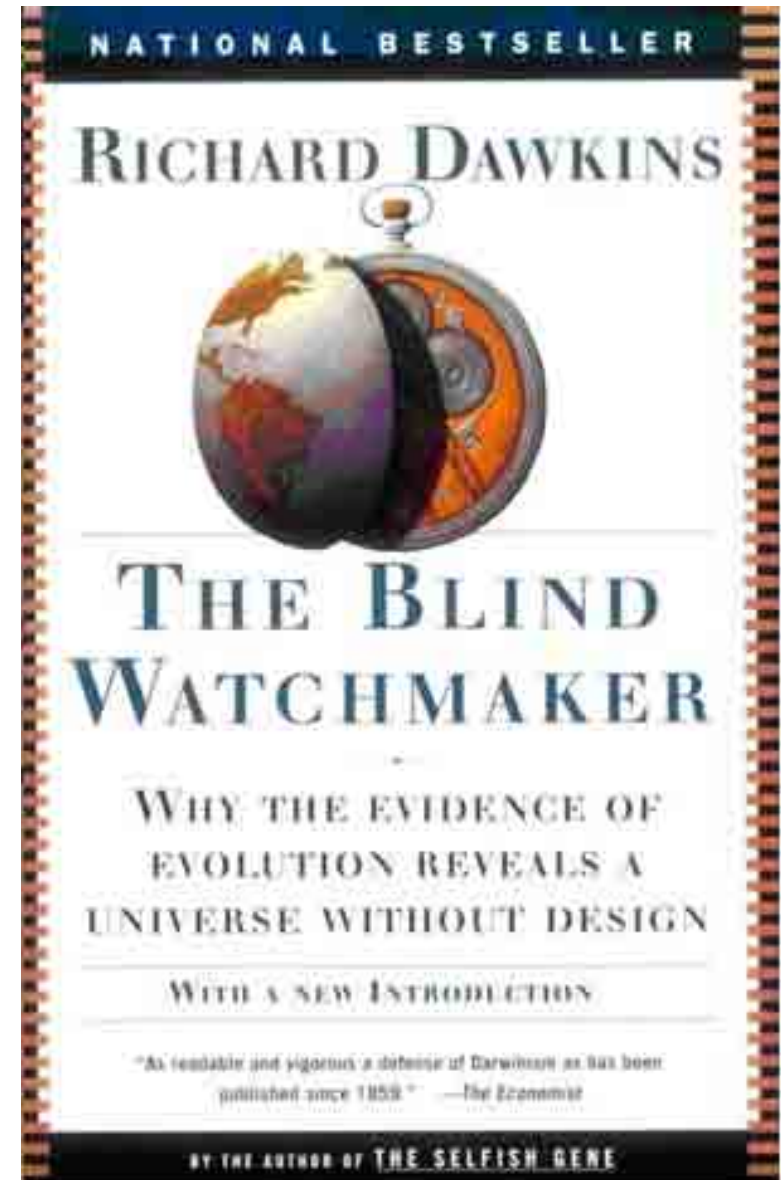
Quelle: xxxx

13 Evolutionary patterns in natural and artificial processes

The myth of creation from scratch:
Nature, Design (and Science) is always
building on what is.



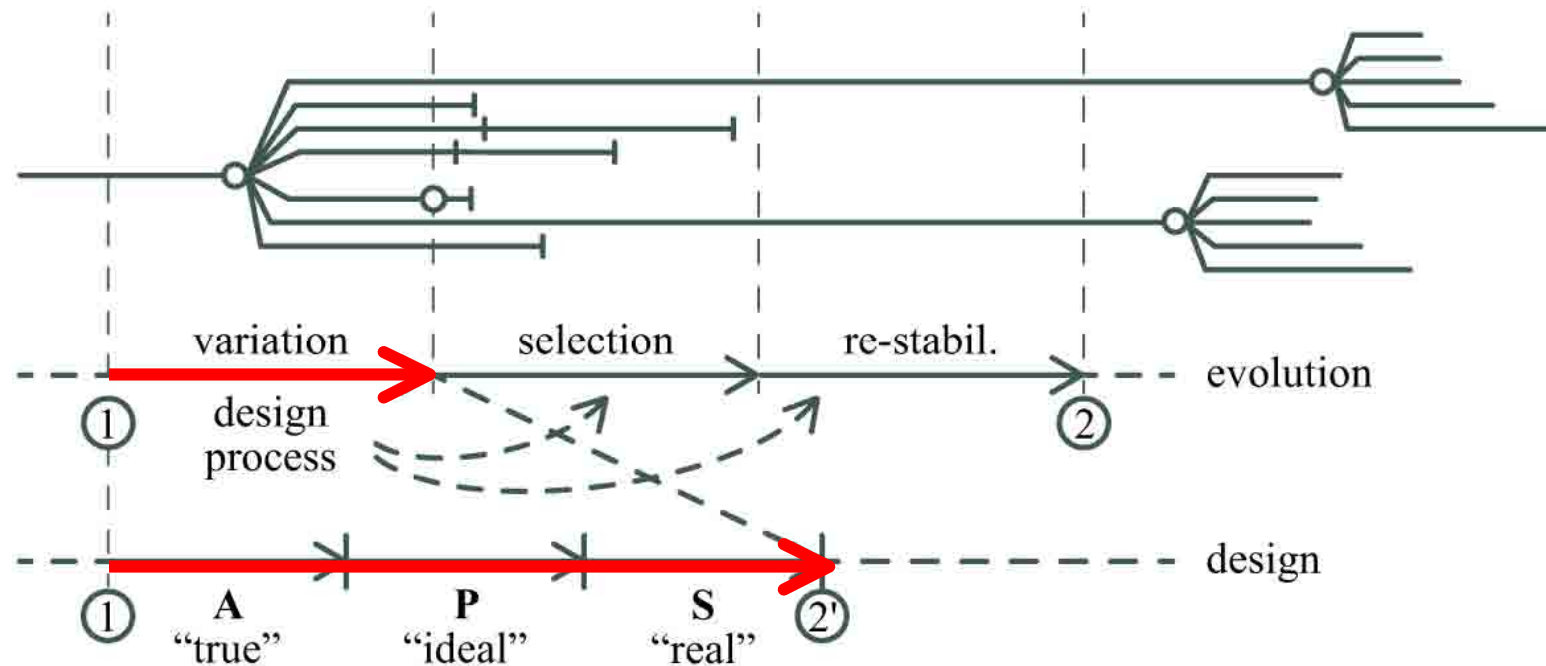
*Bild 547: Skelett des Grönlandwals, in den Körperumriß
eingezeichnet. Rot Rest des Beckengürtels*



Quelle: Jan Michl, "On Seeing Design as Redesign", 2000

13 Evolutionary patterns in natural and artificial processes

Design (and Science) is creating **variation** in sociocultural evolution ...

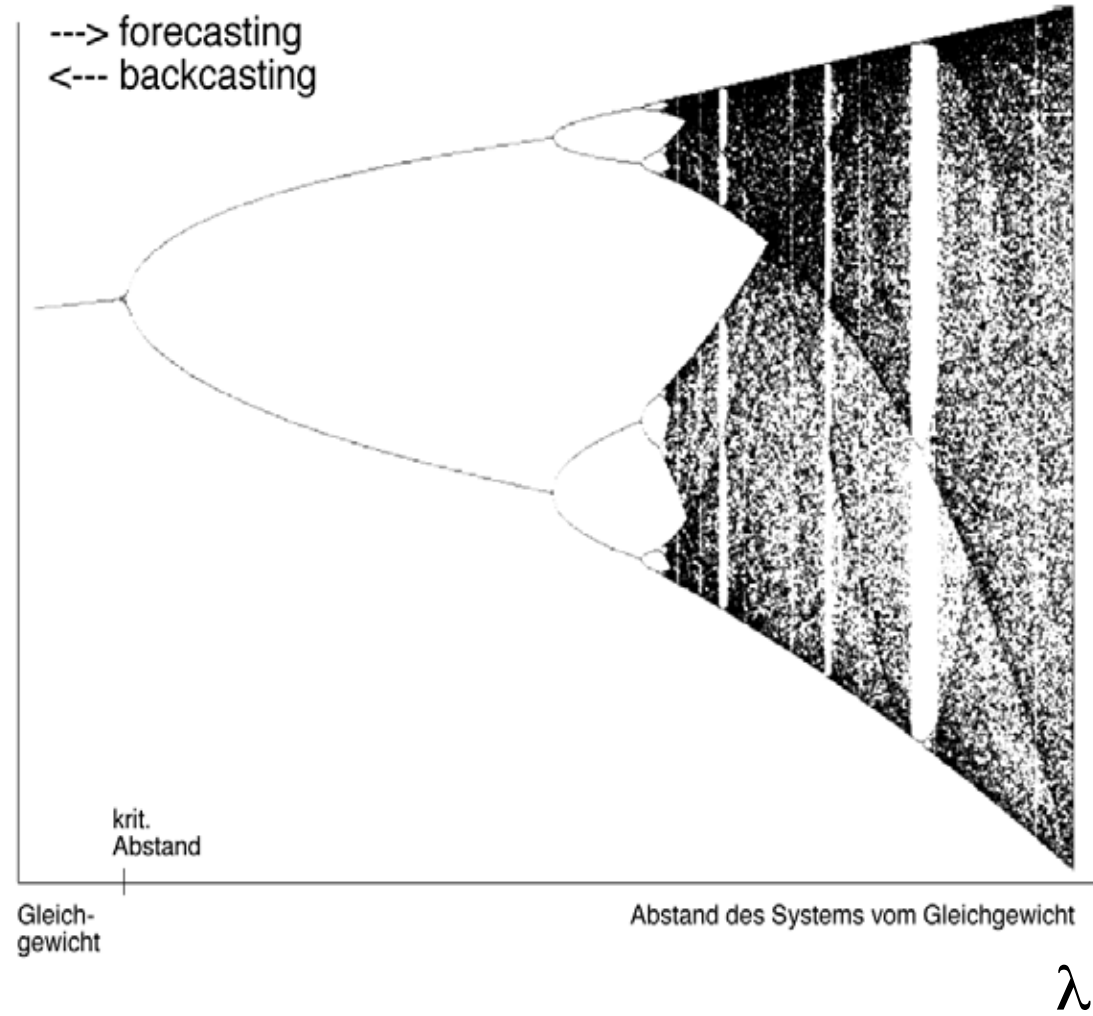


The conscious **Design process** (A - P - S) is just the **variation** part of the evolutionary **trial&error process**. By means of research Design tries desperately to achieve control of the **selection-** and **re-stabilization** phases

14 Evolutionary patterns suggest circular processes

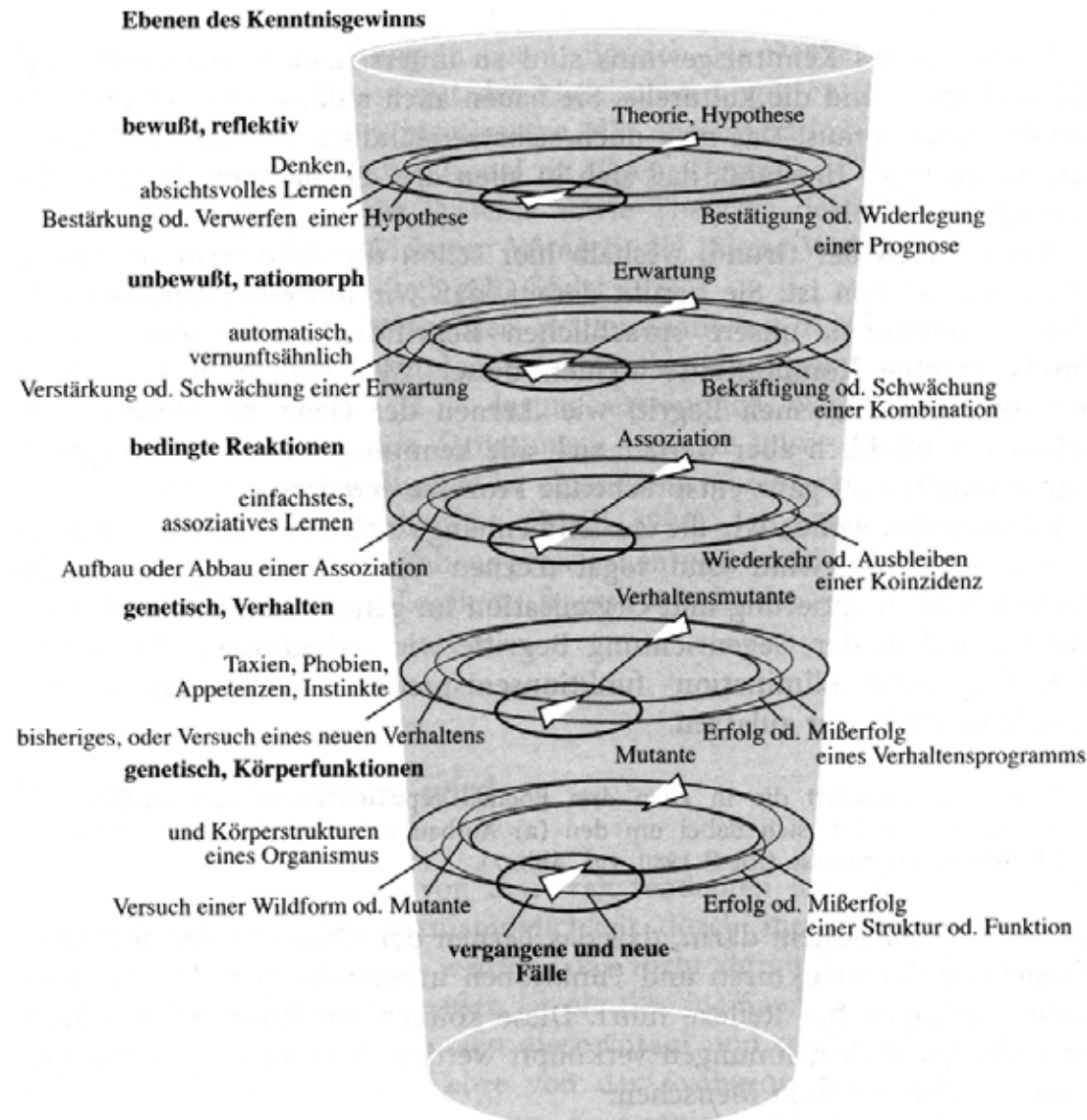
Circular processes produce evolutionary patterns ...

$$X_n(\lambda)$$



Feigenbaum-diagram
(logistic equation):
 $X_{n+1}(\lambda) = 4\lambda X_n(1 - X_n)$

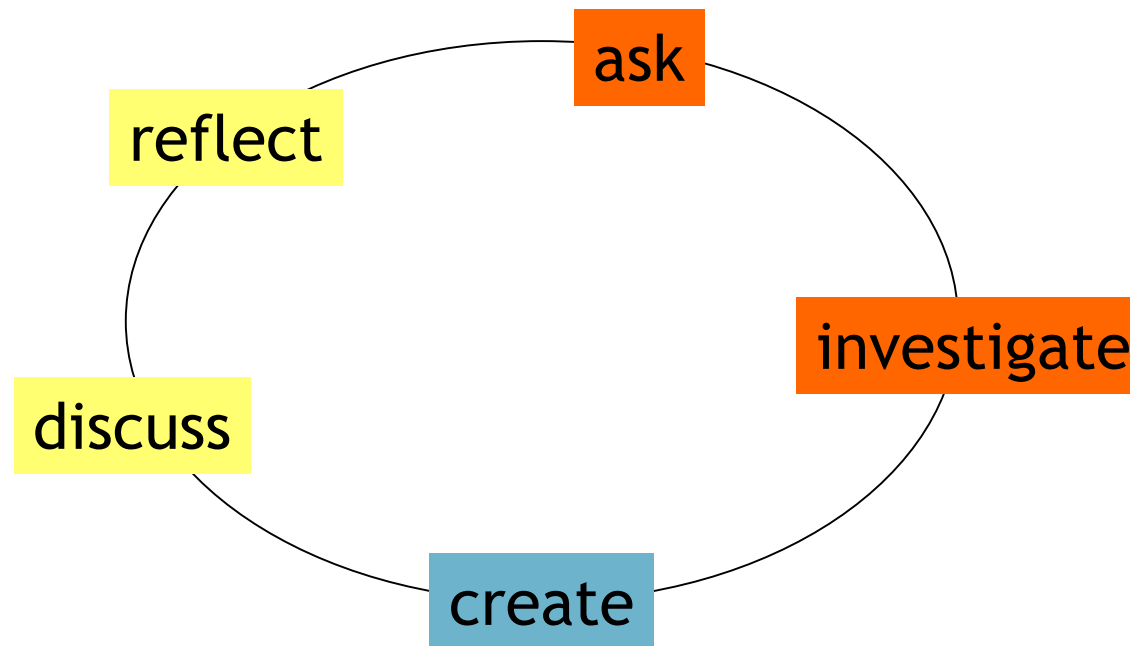
14 Evolutionary patterns suggest circular processes



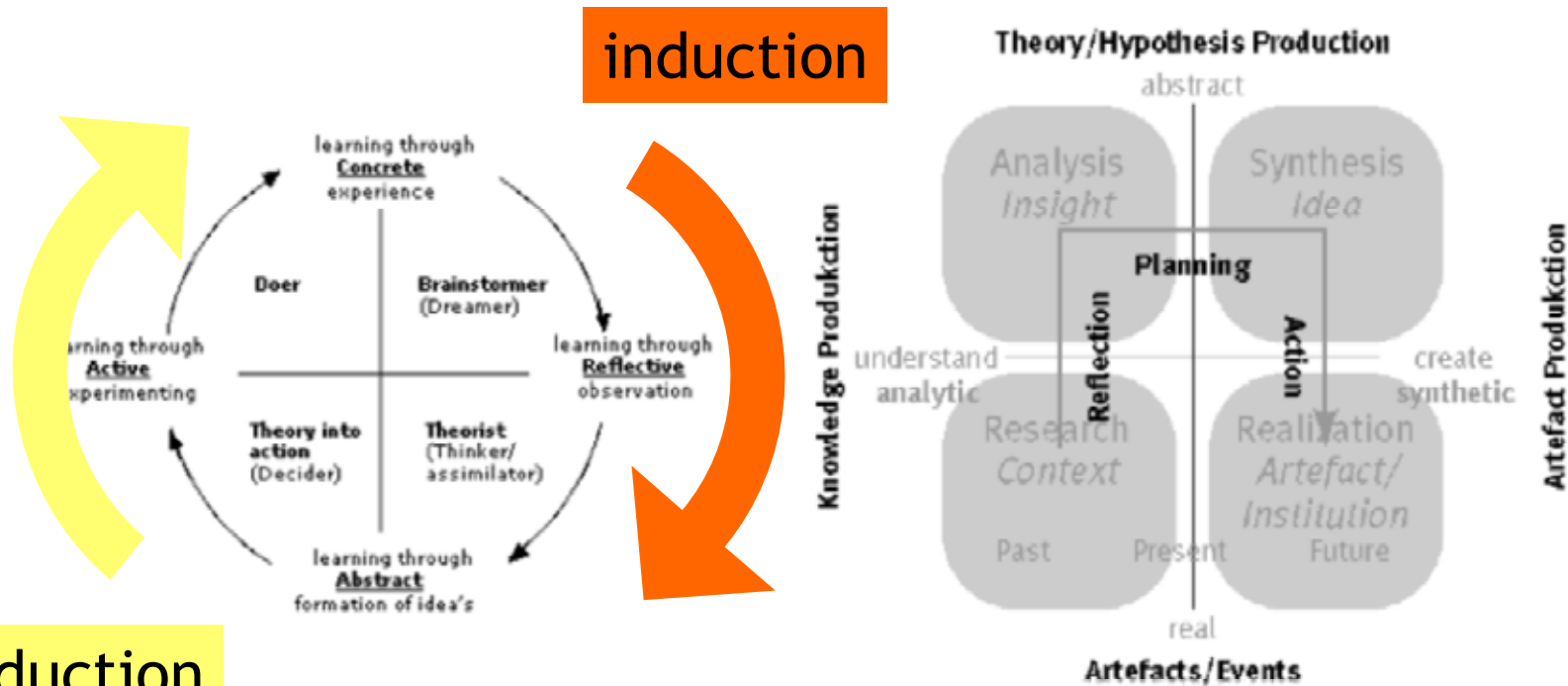
Quelle: Rupert Riedl (2000) Strukturen der Komplexität. Eine Morphologie des Erkennens und Erklärens

15 Experiential learning / pragmatism as epistemological assumption

Dewey's 5-step learning cycle



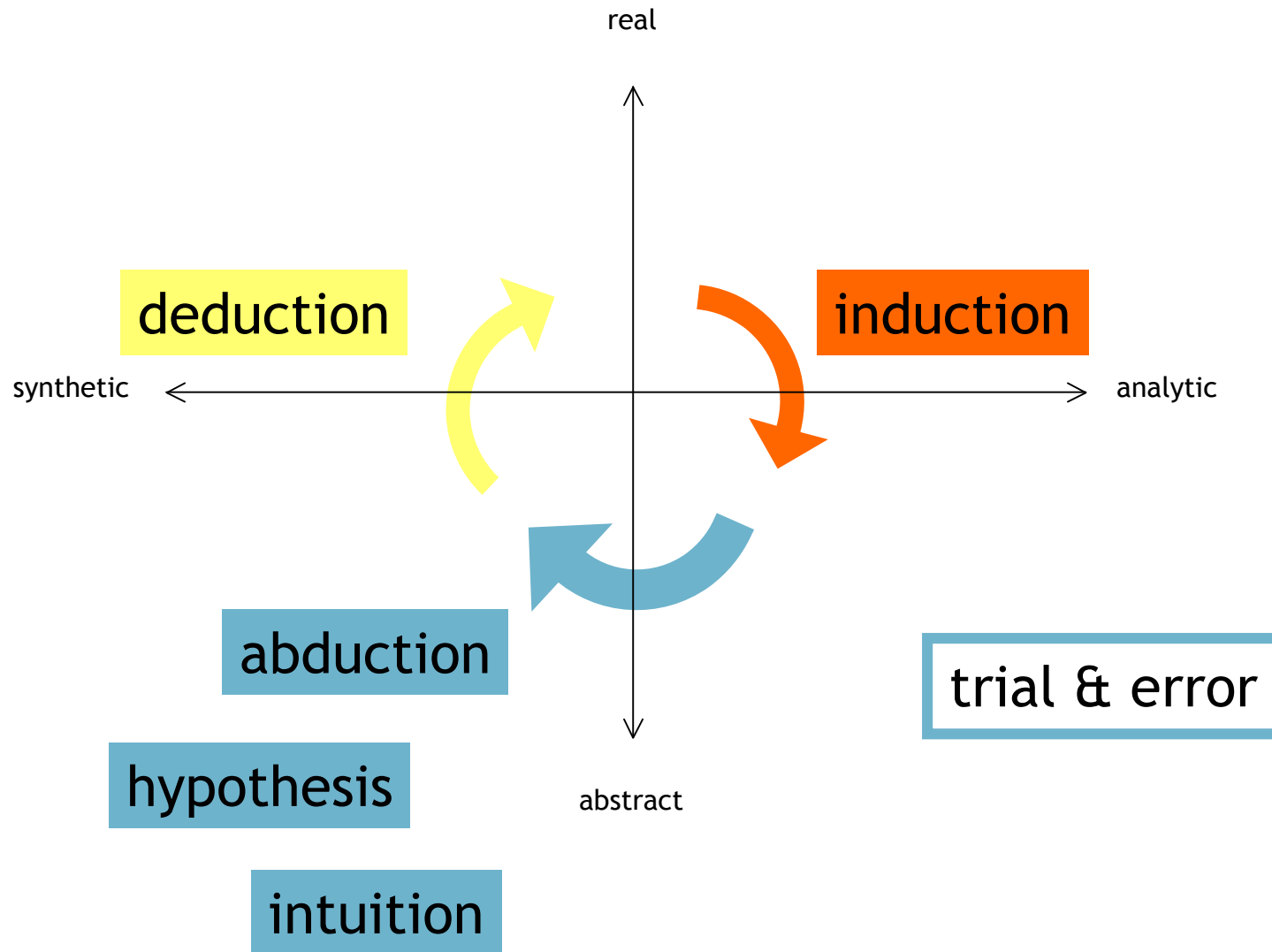
15 Experiential learning / pragmatism as epistemological assumption



David Kolb, 1984

Institute of Design, Chicago

16 3-stage knowledge generation models - introducing abduction



16 3-stage knowledge generation models - introducing abduction

Authors	Phases /components / domains of knowledge production		
Jones (1970)	Divergence	Transformation	Convergence
Archer (1981)	Science	Design	Arts
Simon / Weick (1969)	Intelligence	Design	Choice
Nelson & Stolterman (2003)	The True	The Ideal	The Real
Jonas (2007)	ANALYSIS	PROJECTION	SYNTHESIS
Fallman (2008)	Design Studies	Design Exploration	Design Practice
Brown (2009)	Inspiration	Ideation	Implementation
Transdisciplinarity Studies	System knowledge	Target Knowledge	Transformation Knowledge
	Induction	Abduction	Deduction

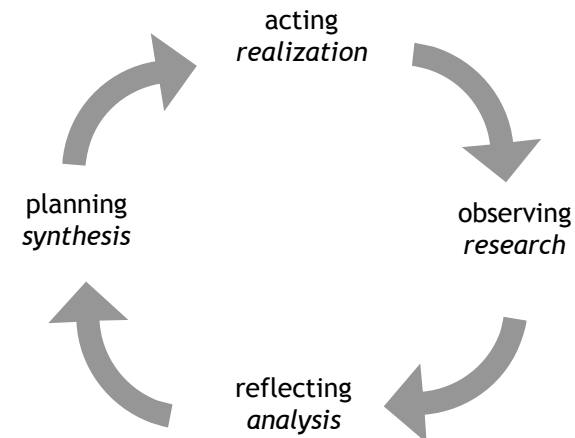
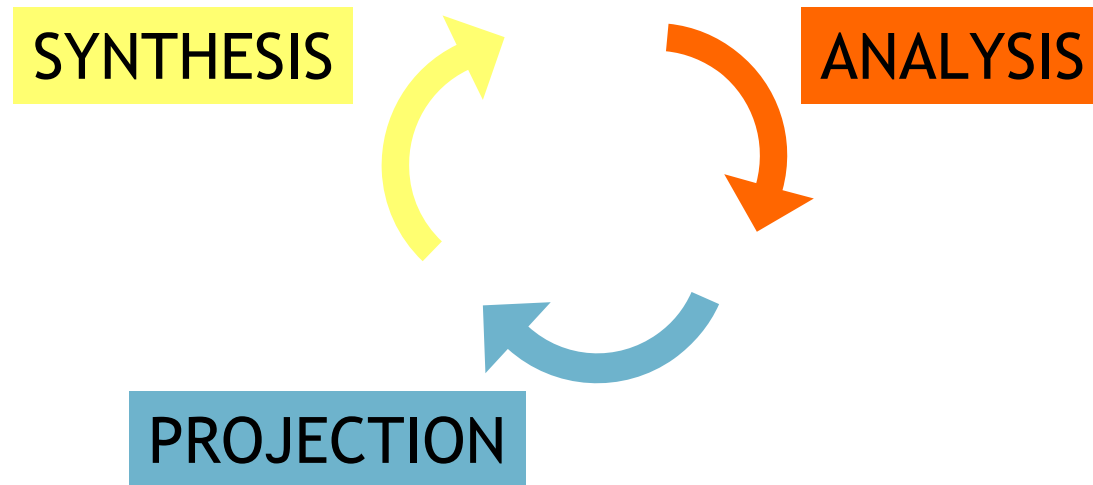
17 Mode-2 integrates Design and Science by means of PROJECTION

	ANALYSIS induction	PROJECTION abduction	SYNTHESIS deduction
„Normal Design“			
Design Research / Mode-2 Science / Transdisciplinarity	System knowledge	Target knowledge	Transformation knowledge
Scientific Research / Mode-1 Science			

17 Mode-2 integrates Design and Science by means of PROJECTION

a digression ...

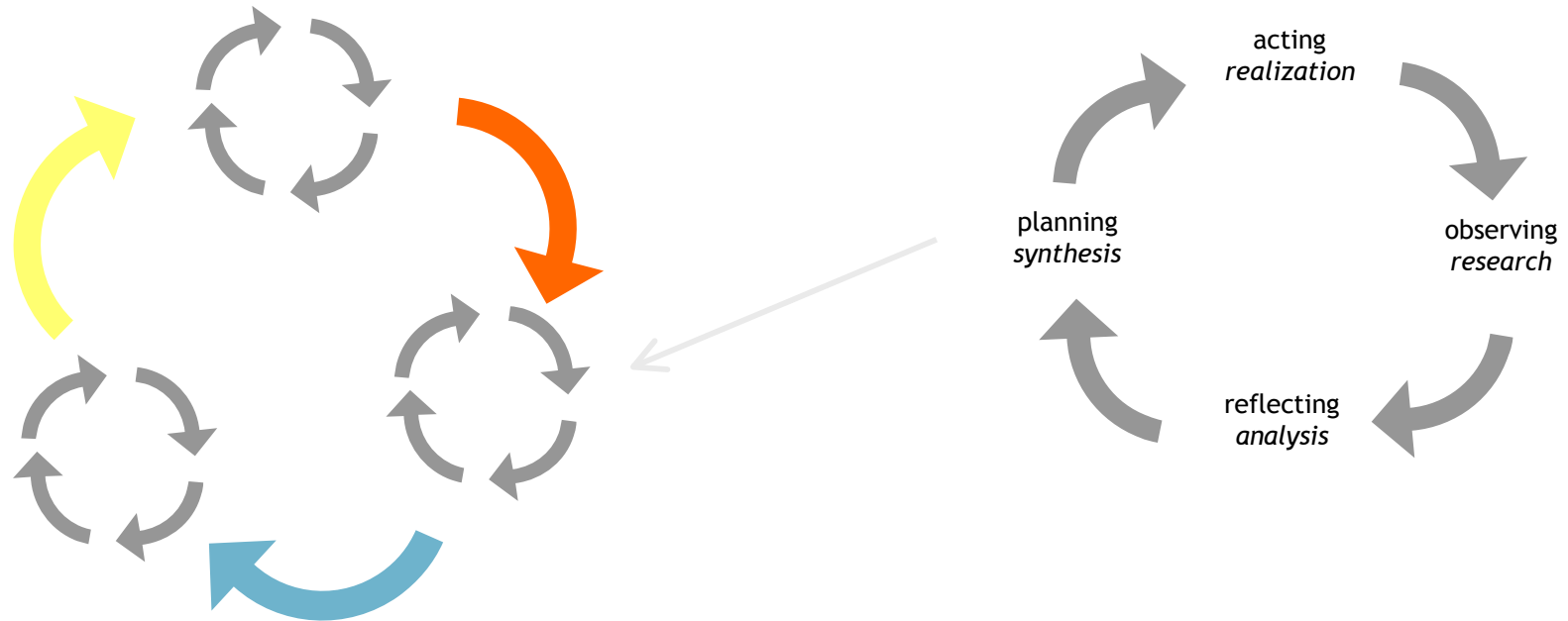
macro cycle



micro cycle

17 Mode-2 integrates Design and Science by means of PROJECTION

a digression ...



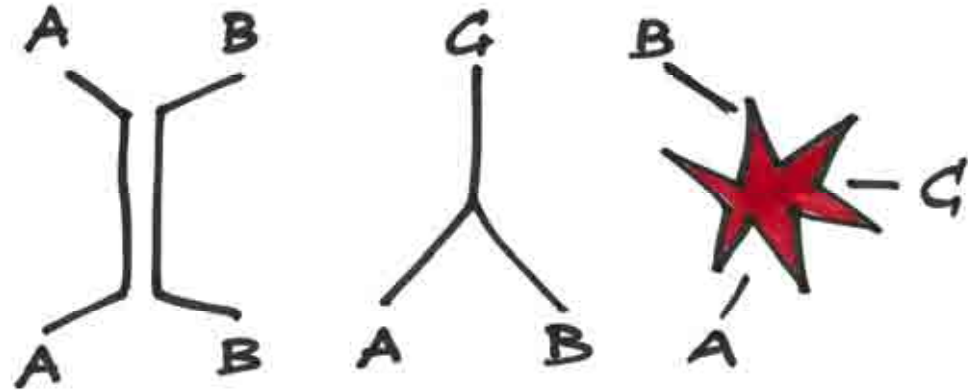
hypercycles

Operationalization by means of MAPS:
Matching ANALYSIS - PROJECTION - SYNTHESIS

<http://www.designprocess.de>

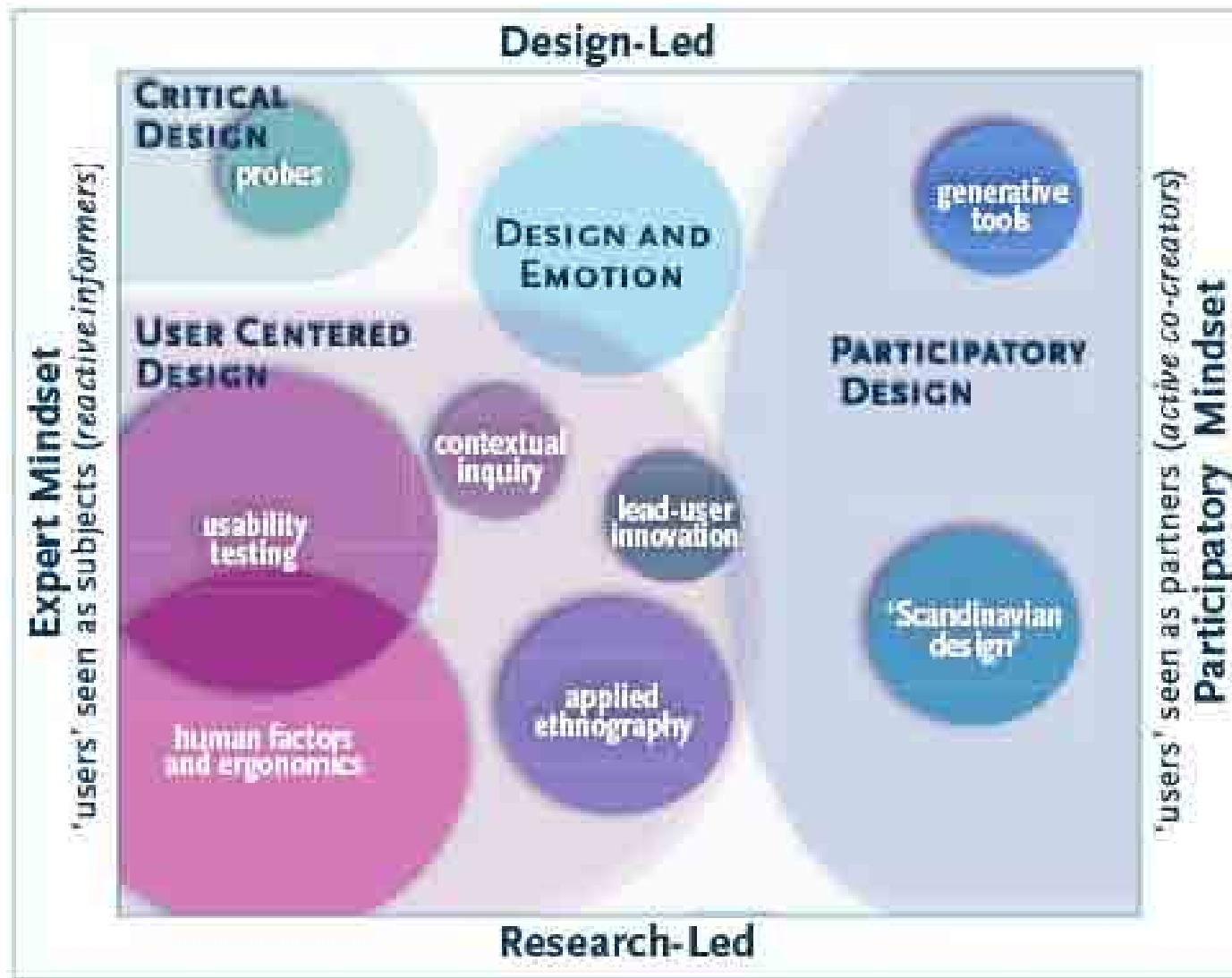
18 Strong Transdisciplinarity provides an axiomatic basis

Axioms of Transdisciplinarity



- *The ontological axiom:* In nature and society and in our knowledge thereof there exist *different levels of reality* of the subject and accordingly different levels of the object.
- *The logical axiom:* The transition from one level of reality to another is guaranteed by the *logic of the included third*.
- *The epistemological axiom:* The structure of the totality of the levels of reality is *complex*; every level is determined by the simultaneous existence of all other levels.

19 Conclusion: Not merging but reflected interrelation of Design and Science



19 Conclusion: Not merging but reflected interrelation of Design and Science

From C1 to C2...

 The current issue and full text archive of this journal is available at www.emeraldinsight.com/0368-492X.htm

K
36,9/10

1362

Research through DESIGN through research

A cybernetic model of designing design foundations

Wolfgang Jonas

School of Arts and Design, University of Kassel, Kassel, Germany

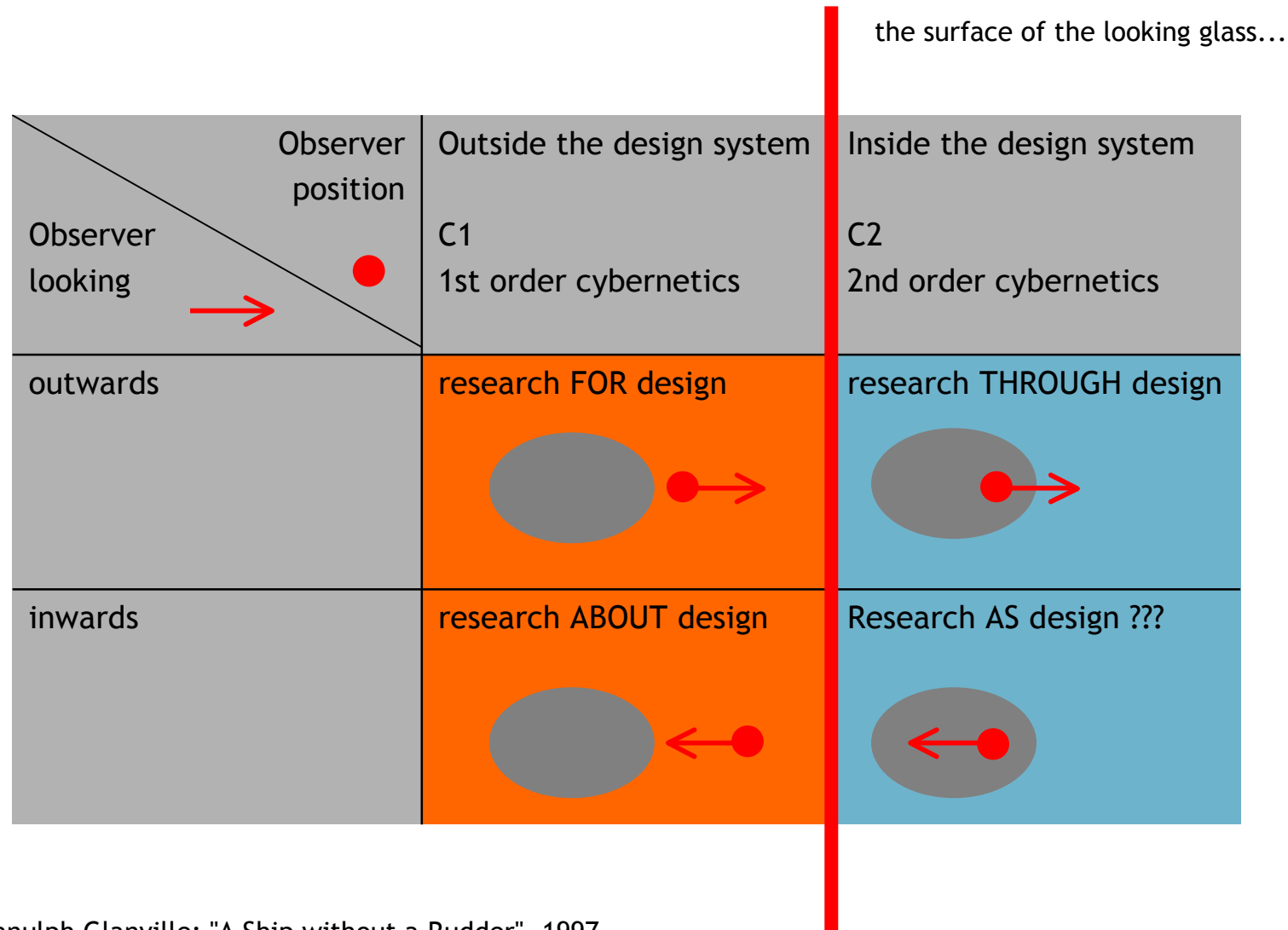
Abstract

Purpose – The paper seeks to make a substantial contribution to the still controversial question of design foundations.

Design/methodology/approach – A generic hypercyclic design process model is derived from basic notions of evolution and learning in different domains of knowing (and turns out to be not very different from existing ones). The second-order cybernetics and evolutionary thinking provide

19 Conclusion: Not merging but reflected interrelation of Design and Science

Reflecting observer / designer positions



Quelle: Ranulph Glanville: "A Ship without a Rudder", 1997

20 Epilogue: Alice entering the room behind the looking glass

Observer inside the design /
research system looking
inwards

„They don´t keep this room so
tidy as the other“, Alice
thought to herself ...

