# Intelligent Thinking Guide

Translated sample from the Finnish book.


# GOODREASON

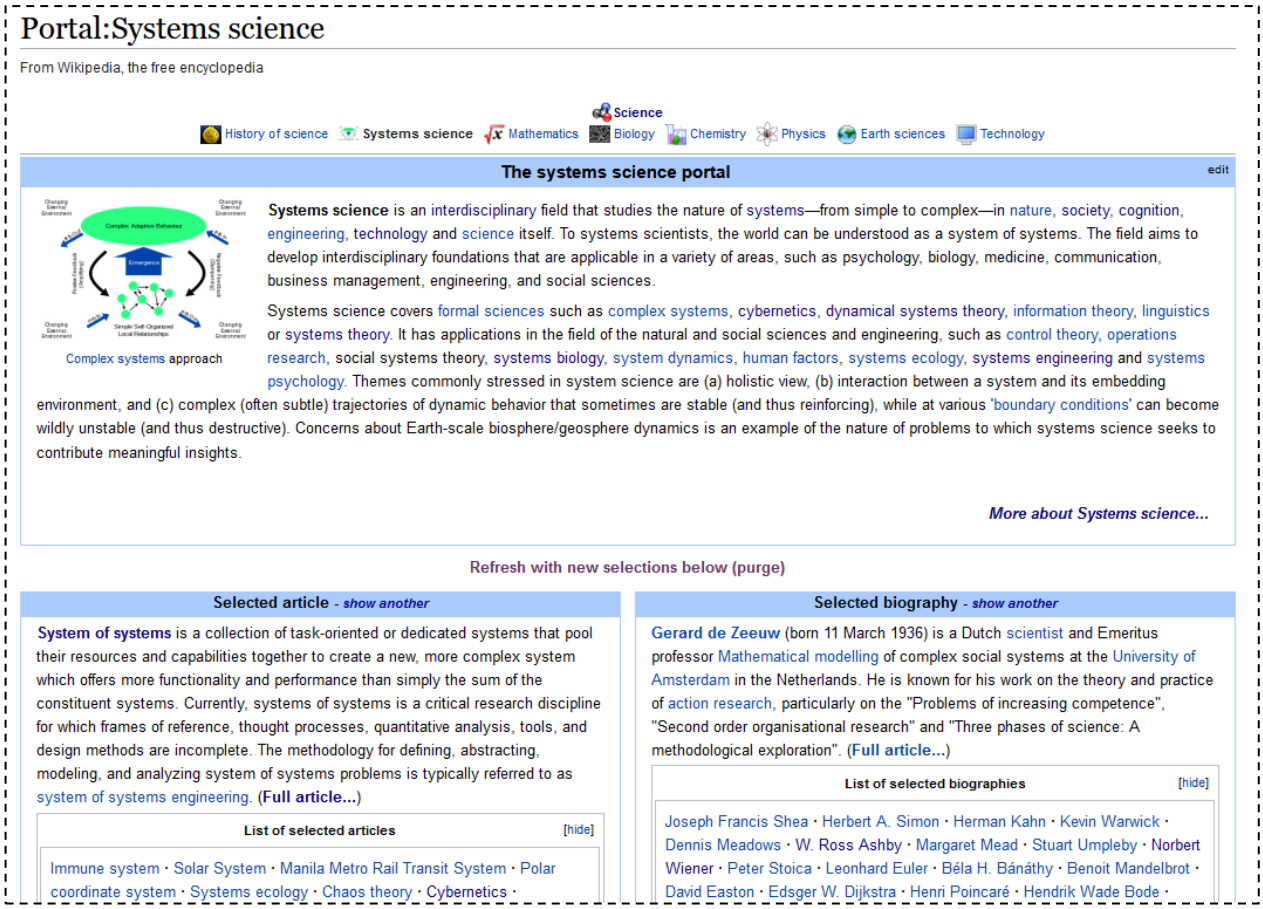
## Systemic innovation platform

Eki Laitila

## The Systems Science portal is a convincing example of systemicity

The portal on Wikipedia presents Systems Science as a discipline, together with the natural sciences. The top block describes the portal and its corresponding scientific vision as content and research goal with methods, emphasizing the approach of complex systems. In the lower blocks, an article about it will appear alternately, as well as a researcher and a list of famous people in the field throughout the ages.

**The systems science portal is recursively systemic, because it is based on nested design models.**



Portal:Systems science

From Wikipedia, the free encyclopedia

Science

History of science · Systems science · Mathematics · Biology · Chemistry · Physics · Earth sciences · Technology

**The systems science portal** edit

Complex systems approach

**Systems science** is an interdisciplinary field that studies the nature of systems—from simple to complex—in nature, society, cognition, engineering, technology and science itself. To systems scientists, the world can be understood as a system of systems. The field aims to develop interdisciplinary foundations that are applicable in a variety of areas, such as psychology, biology, medicine, communication, business management, engineering, and social sciences.

Systems science covers formal sciences such as complex systems, cybernetics, dynamical systems theory, information theory, linguistics or systems theory. It has applications in the field of the natural and social sciences and engineering, such as control theory, operations research, social systems theory, systems biology, system dynamics, human factors, systems ecology, systems engineering and systems psychology. Themes commonly stressed in system science are (a) holistic view, (b) interaction between a system and its embedding environment, and (c) complex (often subtle) trajectories of dynamic behavior that sometimes are stable (and thus reinforcing), while at various 'boundary conditions' can become wildly unstable (and thus destructive). Concerns about Earth-scale biosphere/geosphere dynamics is an example of the nature of problems to which systems science seeks to contribute meaningful insights.

*More about Systems science...*

Refresh with new selections below (purge)

**Selected article** - *show another*

**System of systems** is a collection of task-oriented or dedicated systems that pool their resources and capabilities together to create a new, more complex system which offers more functionality and performance than simply the sum of the constituent systems. Currently, systems of systems is a critical research discipline for which frames of reference, thought processes, quantitative analysis, tools, and design methods are incomplete. The methodology for defining, abstracting, modeling, and analyzing system of systems problems is typically referred to as system of systems engineering. (**Full article...**)

List of selected articles [hide]

Immune system · Solar System · Manila Metro Rail Transit System · Polar coordinate system · Systems ecology · Chaos theory · Cybernetics ·

**Selected biography** - *show another*

**Gerard de Zeeuw** (born 11 March 1936) is a Dutch scientist and Emeritus professor Mathematical modelling of complex social systems at the University of Amsterdam in the Netherlands. He is known for his work on the theory and practice of action research, particularly on the "Problems of increasing competence", "Second order organisational research" and "Three phases of science: A methodological exploration". (**Full article...**)

List of selected biographies [hide]

Joseph Francis Shea · Herbert A. Simon · Herman Kahn · Kevin Warwick · Dennis Meadows · W. Ross Ashby · Margaret Mead · Stuart Umpleby · Norbert Wiener · Peter Stoica · Leonhard Euler · Béla H. Bánáthy · Benoit Mandelbrot · David Easton · Edsger W. Dijkstra · Henri Poincaré · Hendrik Wade Bode ·

**Systems Science – portal (Wikipedia).**

In the portal, a changing picture of systems science and the "key questions" and research directions are presented as a demonstration. The portal opens countless possibilities for self-study to understand what the system is. Still, without guidance, assimilating this extensive material with its terms and teachings on one's own would require an active effort for years, and no one is ever completely ready as a systems thinker!

**The world seems to be overflowing with opportunities to apply systemology in ever new ways for the benefit of all of us.**

Tim Berners-Lee, Larry Page, Sergey Brink, Steve Jobs, Stafford Beer… they each wanted to make it easy for us with their work.

This book emphasizes the importance of scientific clarity and creativity in development and learning.

# THE SMART THINKING GUIDE

## Hybrid-innovation **GoodReason**

A) cognitive innovation to understand science as a process

&

B) systemic innovation develops practical solution models

A methodology combining research and development emerges from these two: A & B.

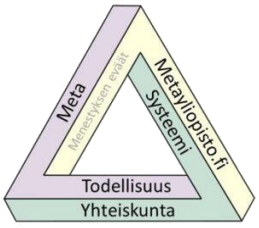
Scientific innovation means a useful invention to change research practices and systems and to create new paradigms!

R & D - concept theory based on ideas of systems science

**A CROSS-SECTION OF SCIENCE**

Eki Laitila

Metayliopisto




Responsible intelligence Metayliopisto ISBN 978-952-65007-0-6

3.11.2022 Eki Laitila, Metayliopisto ©

**Information about the book and its content**: Before this book, preliminary works mapping the essence of science have been the books: 1) Metascience, 2) Superscience, 3) Design Science and 4) Symbiosis of Science and Technology.

*Beauty of science meets roughness of reality!*

www.metayliopisto.fi

## Initial words

It has become popular, especially in the USA and Europe, to map **the principles of thinking** that should be used to achieve success for oneself and one's organization. The four most important skills for success are critical thinking, creativity and cooperation, and communication skills. All of them require a certain kind of **intelligence**. Still, when talking about intelligence, we rarely have time to think about the **underlying cognitive methods**, the tools that a person can use to improve their own level of intelligence, or at least their performance significantly, without being a genius. This book shows how to learn these methods. This learning should actually be practiced. People learn facts easily, but a more important skill in the big picture is a crystallized system skill, because it allows you to connect broad patterns to each other by reducing and excluding them. At best, this way you can create solution models that can be applied as leverage to thousands, even millions of cases. Progress in this way would open doors for eco-social development and civilization for the next generations.

The skill of critical thinking has become more and more important among these abilities, because our society is becoming quite complex. A healthy questioning skill opens up opportunities for creativity and self-development, which in turn enables working together in increasingly demanding environments.

In the book, the introductory part is its independent system model, which consists of eight sectors, **system roles**, within its scope. GoodReason is in its name. It is a methodology that promotes research and development. The innovation process described in the book at the meta level is an instance of the same model. In the demonstration part, five completely different challenges (use cases) are presented, which are analyzed using the means of **this innovation process**. Even in the innovation process, the main lines of research and development meet: a vision in the form of systems science together with the practical planning and development expertise that supports it.

The entire horizon and spectrum of thinking is described in the book, like **hybrid writing**, visually and logically from many different directions with numerous genres. *The book is not a fixed doctrine to learn*, but a framework for ideas, a platform for innovation, which can develop anyone to progress his/her thinking.

**Systems thinkers will never run out of topics.**

The activity of systems thinking has been muted even worldwide until these days. *We have had to wait for a breakthrough*. Peter Senge set the example by reforming management in the 1990s with his book The Fifth Discipline. An even more significant upheaval can be foreseen in broader sectors that prove to be too complex to manage otherwise. Among them are the escalation of global crises, the insurmountable challenges of sustainable development, the integration of the IT sector into social development and the renewal of management through cybernetics, as well as the next development leap in science **in the direction of consilience**.

Turku, Finland 3. November 2022 Eki Laitila

## GoodReason – the story of the methodology and the resulting synthesis

The undersigned has worked within the framework of Metayliopisto - forum for ten years.

> I started as a software engineer at Nokia in 1977. I became interested in artificial intelligence already in the 1980s and programmed artificial intelligence software projects in the 1990s, when I got to know the cutting edge of research and development in the field of logic programming at annual international conferences in London.
>
> In the 2000s, I founded a startup to develop software work. It was awarded in the Sitra competition at the beginning of 2018 as Finland's most innovative software company. During its few years of operation, the topics of its business idea and development program were maintenance, grammar technology and translators, high-level software industry tools. It progressed to the pilot stage. In that project, I learned to delve into top technology on my own.
>
> I defended grammar technology (2008), developing a pilot project for a few well-known Finnish ICT companies as a practical project. Continuing from my thesis, I started to study general problem solving, and through that I found a connection to systems thinking with such an emphasis that IT technology is a special strength in system development and a promising area of specialization. An inkling of the unique cognitive innovation that would be needed began to build on the basis of systems thinking.
>
> Modeling problems and challenges and projects started to look the most promising direction of promotion. When a school of cybernetics supporting universal thinking and its solution models was found online, it started to seem that their theories and the challenges of everyday life have a lot in common.
>
> But since the universities in Finland were not interested in the practical application of cybernetics (a universal knowledge field of control and regulation and learning), I wanted to fill the knowledge gap myself. I founded a business model called Metayliopisto, which was modeled after an open concept called Metauniversity in India. This idea started to become clearer when I was prototyping my own web site Metayliopisto.fi.
>
> I have not been alone in my dreams, because the systems industry communities worldwide (a dozen or so significant entities) have all come to a similar critical assessment of the state of the education system and society. We are of the opinion that the public sector, universities and companies fail time and time again in their intentions to develop and develop, because they are burdened by a long history. Reductionist, simplified culture lies in the background in the form of mechanistic efficient thinking and the prevailing cultural concept. The social sector's getting stuck in a mode that worships efficiency and narrows thinking is a result of a political ideology that started in the 1980s. Another troublesome aspect is the depletion of learning opportunities, there are no longer test laboratories like Nokia, because all the biggest waves of development, megatrends, have already been created - after all, industry, cars, electricity and IT have already been invented. There are no decent locomotives visible, unless the green transition is regarded as such.
>
> Due to political choices, since 2007 research in Finland has changed to a “not so open” - state, and the competition has become too intense in many fields, not to allow co-operation. Research has lacked a clear focus, a priority area, a mission, because the principle of continuous growth does not hold as it did before. We are already daring to criticize this trend more and more, because the limits of growth are coming up due to the state of nature, and the world economy is in trouble for many reasons. In world trade, you can hardly talk about the genuine competition of the market economy, when interventions called geoeconomics are done in dozens of different ways in each country every now and then.

**Systemic change** has come to the fore every year more and more forcefully in the form of solutions for the sustainable development agenda. There is still a lack of understanding of how systems thinking would work in that big task.

Since the 1950s, **systems thinkers and cybernetics have been interested in social models** that are sustainable, reduced and easy to manage. Systems science already then took the development of interdisciplinary cooperation as a goal. It is still the same unfulfilled promise as the IT industry was in the 1950s. Still, the entire IT field can be seen as a part of systems science (egg and chicken - the layout), and all the people involved in science would need a common language in order to learn to work with each other in the best way.

## About history of systems topology and thinking

For the information of those who are convinced of research starting only from the basic sciences, the "systems field" as a whole, including general systems theory, systems thinking and cybernetics, as well as the IT field with its many amazing stages, started with a group of top mathematicians, supported by a group of physicists and biologists. In the Macy conferences in the 1940s, initial beliefs and knowledge of what systems science would be, began to emerge. A systematic presentation of it has been prepared within the framework of the **SystemsPhilosophy forum in 2018** (PICTURE 2).[1]

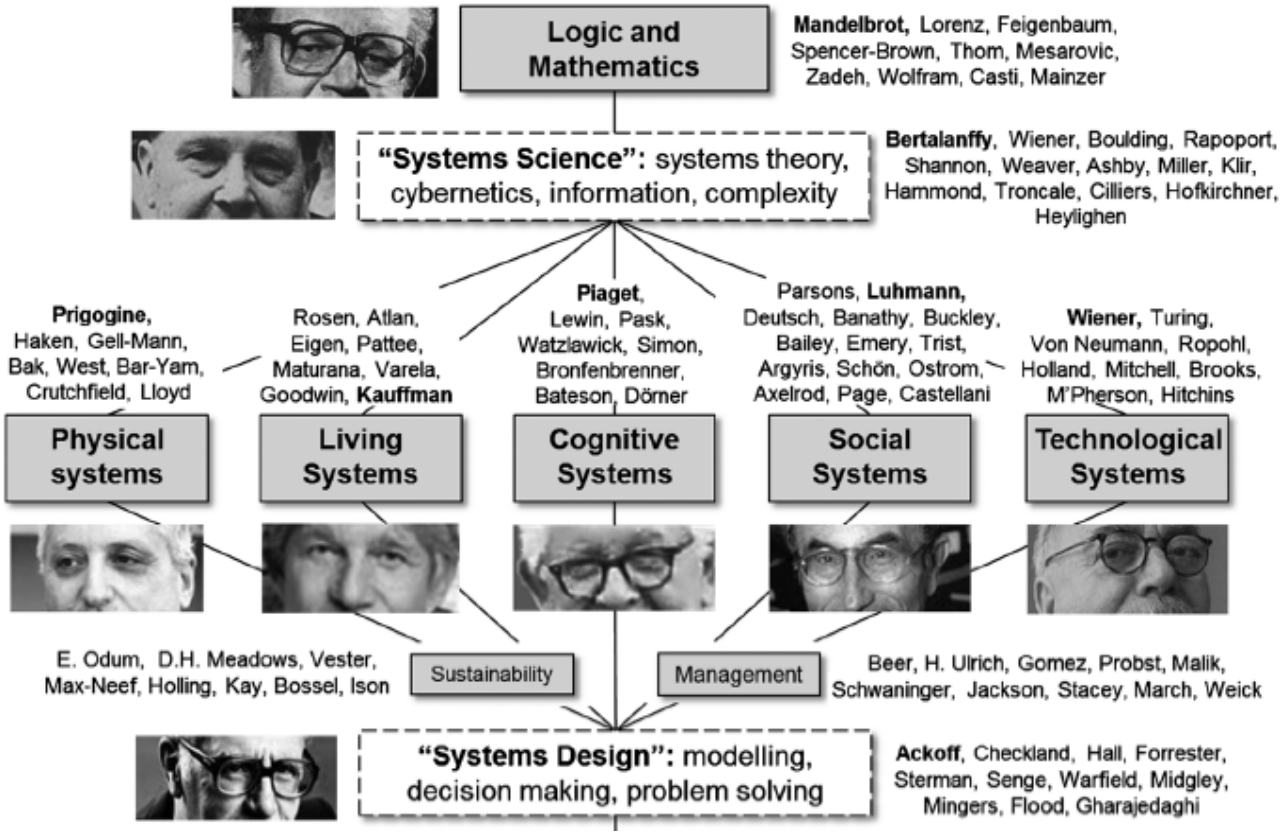



**FIGURE 2 Development of the systems industry: 100 most important names and 10 perspectives..**

The five types of systems in the middle row of the picture are **technical** (e.g., the IT sector), **social** (society), **cognitive** (psychology), **living** (biology) and **physical** systems (machines and the environment). By combining those five models, we are approaching most fundamental theories of sustainability and management. In the paradigm of design science, solutions are principles and methods. As a result, the skill of abstraction and modeling gives us conviction about decision-making and problem-solving in all similar, systemic challenges - the wheel should not be reinvented.

**Metadisciplinarity** (trans/cross/inter/intra/multidisciplinarity) is a built-in characteristic of the systems field, and its absolute strength. However, for an ordinary person, understanding the mutual characteristics of the five system types in the picture is not self-evident. These hundred top names and their followers have reached a rare consensus, even though researchers from different fields typically argue and go their separate ways in science. However, the main purpose of science throughout the ages has been to find unifying theory through its arguments, new perspectives (such as IT was born for our joy), and models that make people easier for all fields. The system field further diversifies the relationship between the researcher and the researched into a dialogue between the subject and the object, which challenges the authoritarian teaching paradigm, where there is no place for criticism.

[1]D. Rousseau & J. Billingham. A Systematic Framework for Exploring Worldviews and Its Generalization as a Multi-Purpose Inquiry Framework. *Systems* **2018**, *6*(3), 27; https://doi.org/10.3390/systems6030027

# Starting points and commitments for the innovation of the book

Much of the concepts in this book are meant to abstract reality. The book approaches the limits of reality and new possibilities with the principles of systems thinking (SSM) in accordance with the role developed by the author. Thanks to that, many truths can be deduced without having to prove them empirically. This directly inferred part – the systemic laws – is called a priori – knowledge, and the benefit comes from the successful abstraction and limitations made. The content and nature of the information are decisive.

Thanks to research sources and search robots that are quickly becoming more common, computers can be used to investigate various syntheses and symbioses in addition to analyses. Interdisciplinary and cross-industry hybrid thinking, emphasizing symbioses, is still new, but it might be the "best" that science and technology can present as their realized achievements in the future. After all, the bio industry with its many related products is already an excellent example of that. As a concept, symbiosis is the core of diversity and multidisciplinarity. The pursuit of symbiosis is the maximization of common benefit.

The book is based on, among other things, the following information sources and references and perspectives:

1. **Stanford University** is the best institution promoting innovation, in the context of Silicon Valley

   - Metascience research, MetaScience - conference series initiated by John Ioannidis and Brian Nosek
   - Symbolic Systems – principle (joint project of seven faculties in Silicon Valley, USA)

2. The study of **cybernetics**, with huge theories and power struggles behind it

   - Laws of cybernetics (Stafford Beer, Derek Hitchins, Barry Clemson, Maurice Yolles...)
   - Viable System – theory (Beer, Jon Walker: VSM Guide)

3. **Systems science** and philosophy of systems in search of the essence of all knowledge

   - Grand Systems Theory (Ludvig von Bertalanffy) and System of Systems – principle (Jackson)
   - especially David Rousseau & Julie Billingham: A Systematic Framework for Exploring Worldviews and Its Generalization as a Multi-Purpose Inquiry Framework https://www.mdpi.com/2079-8954/6/3/27

4. Systems **engineering** research community INCOSE: high tech – field theory and research

   - The SEBOK book defines the Software Engineering area
   - Conception as a new science, SCIENCE II: (Derek Hitchins, Joseph Kassler)
   - Third Order Cybernetics, Metacybernetics (Umpleby, Yolles)

5. Systems thinking **methodologies**, challenges and possibilities of human approach

   - Soft Systems Methodology (Peter Checkland and Peter Senge)
   - Systemic leverage points (Donella Meadows)

6. **Conceptual** modeling, the power of expression that makes progress possible

   - Knowledge Representation Language (John Sowa)
   - Semantics, semiotics, object modeling (C.S Peirce, Model driven engineering communities)

7. Logic, metalogic and proof (Prolog), a tool for **declarative presentation**

   - Scientific reasoning and programming (John Robinson, Robert Kowalski, Alain Colmerauer)
   - Visual Prolog – programming language (Prolog Development Center)

8. **Philosophy** of science and traditional science, what knowledge is and how to create science

   - Hierarchy of science, such as the Dissertation Guide in the Field of Technology and Engineering

9. Business needs and **ecosystem** modeling, ExO - organizations and Moore's law

   - Developing an idea up to a massive transformation (Google principles)

10. **IT industry** visioning and software engineering special methods: evolving IT industry discoveries

    - Modern API – methods for integrating information and services (Microsoft: Webservice)
    - Overall architecture as a method of conceptualization (Zachman)

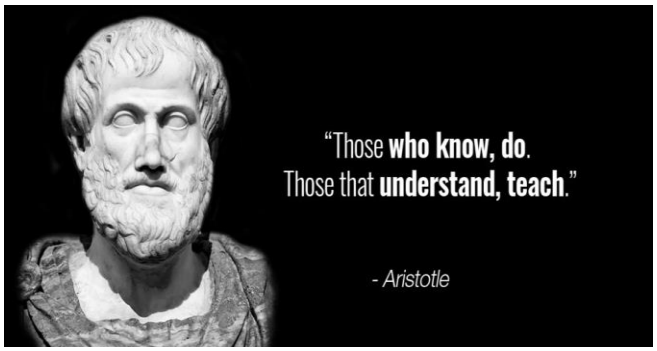
11. **Sustainable development**, what state we want to take nature to, and how to preserve vitality

    - Natural Systems Design Science: Jessie Henshaw
    - J. Henshaw, Natural Systems: https://www.synapse9.com/

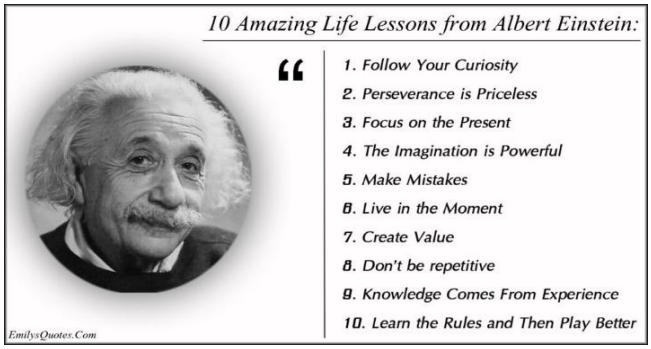
12. **Global problems and crises**, how to get rid of disasters

    - World Economical Forum, Strategic Intelligence https://intelligence.weforum.org/

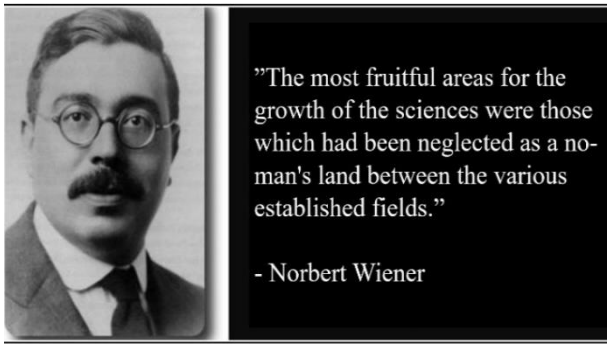
# Great thinkers with their thoughts have helped me for this book



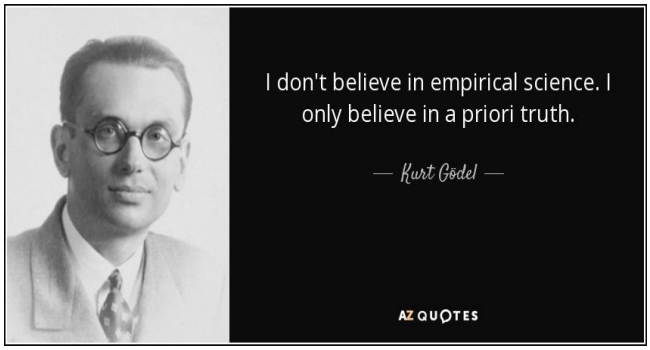

Father of Western Science: Metaphysics and Holon (system).



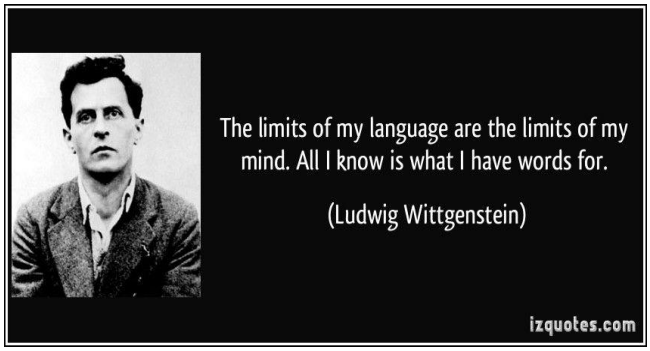

The most important physicist of the 20th century, Relativity theory.



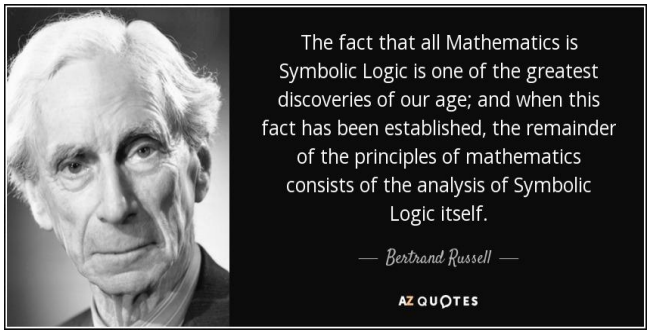

Founder of cybernetics.



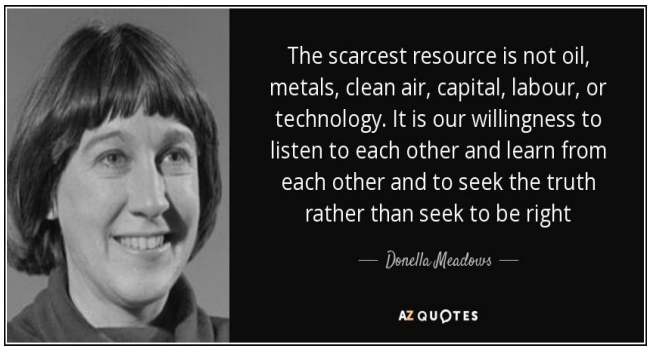

"The greatest logician since Aristotle".




"Greatest philosopher of the 20th century".




Creator of logical empiricism and atomism, philosopher.




Systems thinking pioneer: "The Limits to Growth"


Management: Society for Organizational learning.

## THE PARADIGM OF LEARNING AND DEVELOPMENT IS BASED ON LANGUAGE

The key words of the language of new thinking show how the terminology has been understood in a limited way in traditional society (-) and in schools up to the highest degrees, compared to a broad system concept (+). The following comparisons illustrate how big and far-reaching the change in the system sector is:

1. *Universal*: a completely general, abstract theory
   - – Reductionist culture does not favor broad concepts, even though globalization promotes them.
   - + An open system concept makes it possible to generalize problems, and then solve them.
2. *System*: the most important concept of abstraction, the object
   - – The concept of system is not valued, even though a poorly managed society (system) is a brake.
   - + Society is already a socio-technical system; other perspectives must be included in it.
3. *Model*: a model of the system or reality
   - – Few citizens have modeling abilities, even though the model provides information about reality.
   - + Modern IT software is already made by modeling; these skills should be spread everywhere.
4. *Super*: superiority, superior concept, abstraction
   - – Intersectional thinking does not accept superiority, a mistake that leads to the decline of the system.
   - + Of course, production and logistics and energy consumption must be optimized, by the best means.
5. *Discipline*: field of science and practice, "learning"
   - – In school thinking, the teacher is a great authority; only from him/her can you get the right doctrine.
   - + Systems thinking is a multidisciplinary, interdisciplinary development. The boundaries of the fields are starting to disappear.
6. *Meta*: upper level, second concept descriptor, beyond, transcend
   - – In specific communication, facts are decisive, facts are disputed until one of them wins.
   - + Metamodelling divides topics into levels, where both specific and universal features can be found.
7. *Hybrid*: a lever effect connecting the fields of study and pragmatics
   - – The word hybrid has become a curse word with a bad connotation and is therefore avoided.
   - + The joint use of scientific fields and practical methods is hybrid development at its best.
8. *Cyber*: feature of virtuality and control
   - – The word cyber has also been turned into a swear word, which makes citizens angry.
   - + Cybernetics means control and control, that wisdom would be useful everywhere.
9. *Holarchy*: an entity, a set of holons
   - – A traditional organization is hierarchical, bossy and punishes self-initiative.
   - + Holarchy does not emphasize leadership, but its members specialize and develop in their positions.
10. *Synthetic*: artificially created, unifying
    - – Fossil oil got a competitor from synthetic oil. Fossil energy will soon be phased out.
    - + Thanks to science, new, synthetic fields of study and science are formed, such as synthetic biology.
11. *Viable*: sustainable, viable, self-healing
    - – One cannot explain how a *sustainable* organizational model would be defined and construct.
    - + Viable (sustainable) organization is a recursive mode of operation that manages itself in different conditions.
12. *Transform*: change, transformation, progress
    - – In the chaos of a stochastic world, changes happen power-oriented or by chance.
    - + Change can be derived scientifically, as well as by best practice business models.

From the plus (+) features, piece by piece, an understanding of what systems science is and what systems thinking is like is built up. When someone stuck in a traditional system always runs into the same problems with their insufficient abstraction skills, without becoming better themselves, a person motivated by systems thinking sees the world as a great challenge to eliminate problems, model society in many different ways, independently of fields, interdisciplinary, so that we really approach sustainable development, nature values and a positive image of people.[2]

[2] Michael GoodMan: https://thesystemsthinker.com/systems-thinking-what-why-when-where-and-how/

## KIRJASARJA

Writing makes **it possible for** the author **to figure** himself **in and out with** his topic.

Parsing is not possible without proper mental images. In all Metayuliopisto's books, including books on responsible artificial intelligence, the content and solution models are structured in the form of a systemic model, and thus they have developed forward to support the ideas of the following books so that the same essence of systemic philosophy with its architecture becomes a supporting force, a methodology, from different perspectives.

According to the latest book, innovation is the result of technology designed with the principles of design science and superscience (cybernetics) as the initial assumptions of metascience.

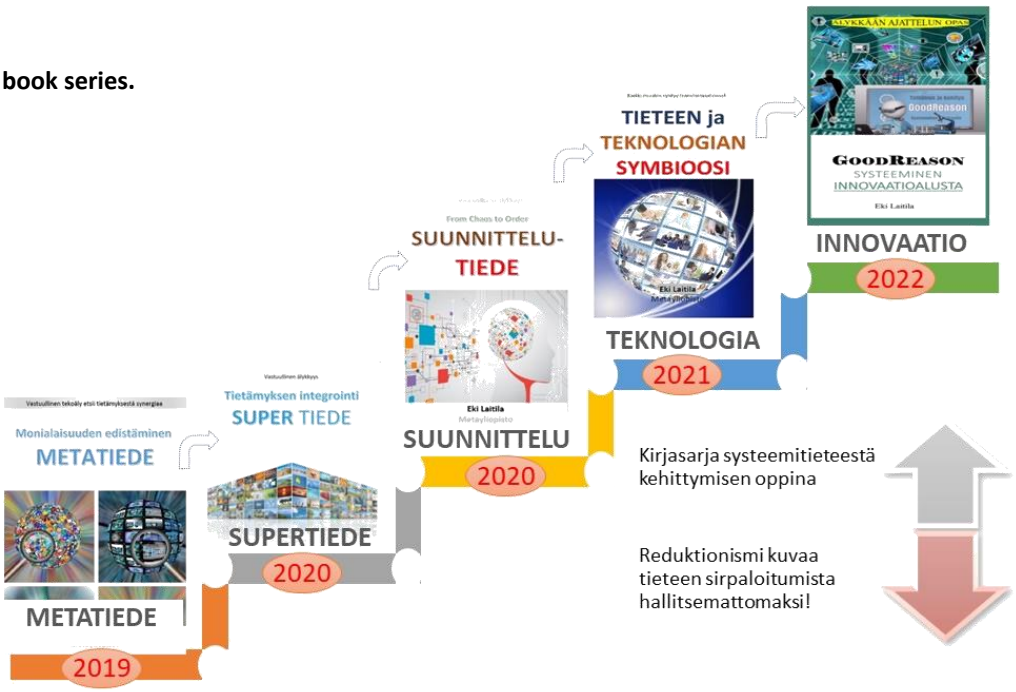
By writing this chain (FIGURE 3), it became possible to define a systemic innovation platform that is suitable for human thinking, the study of social structures and partly to support management and IT development.

The possibilities of systemicity and the limitations of cognition have been studied, e.g. regarding the application of wiki systems as tools for human thinking: A systemic and Cognitive view on Collaborative knowledge building with wikis.[3]

> "*Wikipedias offer new opportunities for learning and building knowledge based on cooperation, as well as understanding these processes. To describe the construction of knowledge based on learning and cooperation, three aspects are needed: the social processes promoted by the wiki, the cognitive processes of the users and how both processes affect each other in the social system of the wiki and in the cognitive systems of the users*."

The route shown in the picture (FIGURE 3) differs decisively from the traditional concept of science, where one aims to focus on one field and views according to the disciplined rules of the field. Systems thinking, on the other hand, does not try to force a "hypothesis" into the goals of the completed research. Instead, the systems field could promote **a new kind of scientific philosophy** that includes the needs of man and society at its metalevels.

**FIGURE 3. Metayliopisto book series.**




[3]U. Cress, J. Kimmerle: A systemic and cognitive view on collaborative knowledge building with wikis. *Computer Supported Learning* **3**, 105–122 (2008). https://doi.org/10.1007/s11412-007-9035-z https://link.springer.com/article/10.1007/s11412-007-9035-z

## Systems field - crystallizations and the puzzle of systems science

The basic ideas in this book are as follows[4]:

A. Innovativeness begins with the human mind and creativity as described by cognitive science.
B. The system and its roles with default meanings and symbols effectively communicate the idea.
C. Visual suggestions for diagrams make it easier to draw systems with Powerpoint.
D. Cybernetics creates a connection to leadership and controllability and sustainable thinking.
E. Through modeling, IT thinking, the multi-agent principle and cognitive science find each other.
F. The system model and compact architecture make even a large organization a clear pattern.
G. A compact presentation and crystallization of systems science helps to get the most out of this subject.
H. There are thousands of successful examples of multidisciplinary projects in our material.

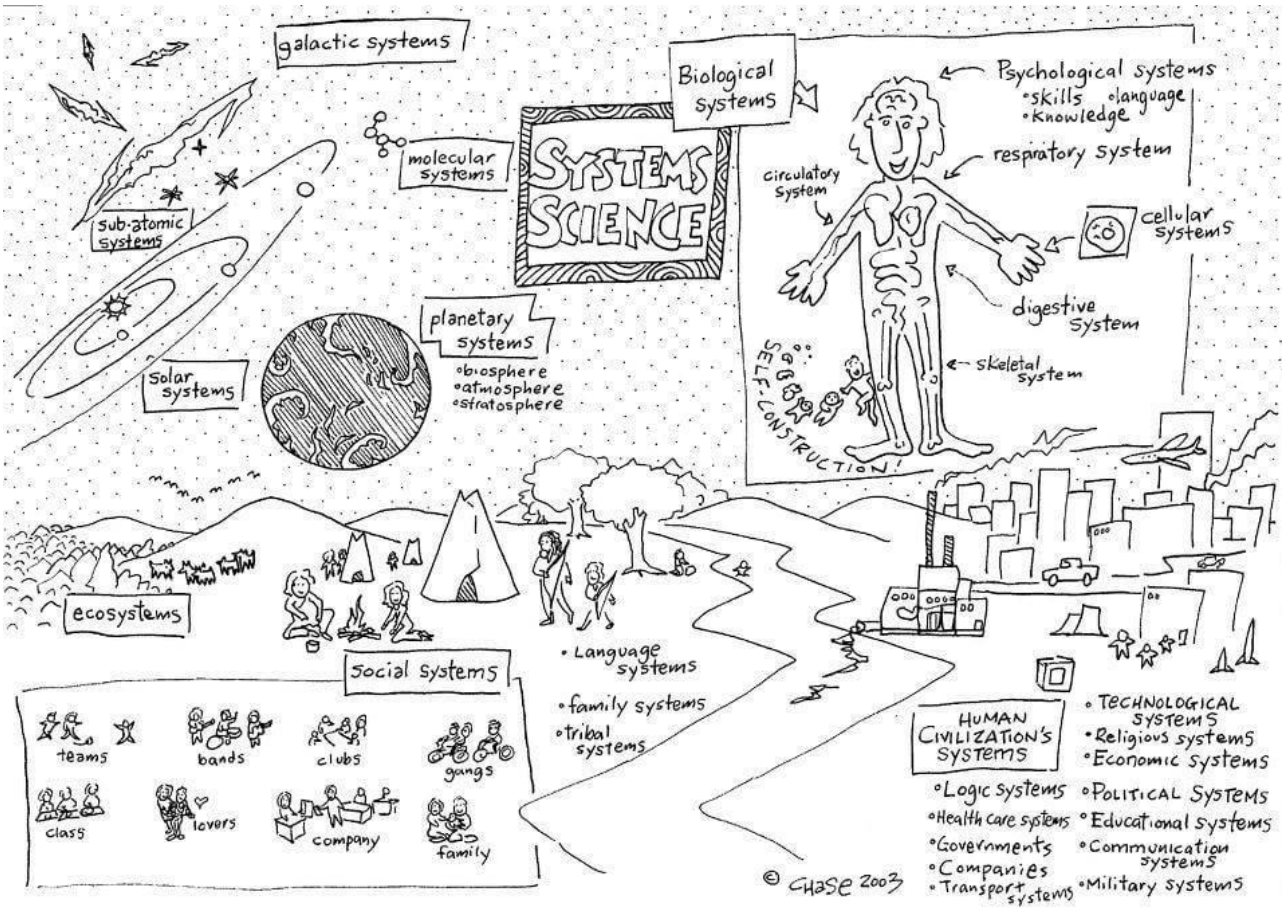



**FIGURE 4. Everything is a system (Christoffer Chase): "system of systems".**

In the cybernetic world view, objects are seen as systems. In the review, functioning systems and those that are not interesting can be skipped, focusing only on those that need monitoring or are otherwise informative. Stability and taking care of one's own land is important for all the bodies of society, especially infrastructure, because if one's own field is not in order (traffic, water, energy...), even more developed bodies (systems) cannot function. System of systems – the principle is so clear that everyone can get the idea from the picture (FIGURE 4).

[4]Within the framework of Metayliopisto, 10 books have been made in the field of systemology, starting with the basics of systems thinking. Hundreds of out video presentations approach challenges of technology, society, cybernetics, etc.

# PART 5 – "THE BEST PIECES"

**A META-NARRATIVE**: Part 5 of this book presents some clarifying and complementary perspectives related to the previous parts (1,2,3 and 4). It should be mentioned that meta-level concepts describe the real world in relation to it and others, but traditional science doesn't have any clear principles for abstraction.

The concepts in the picture have the following backgrounds and meanings:

- While philosophy examines the nature of reality, the conditions of a good society and knowledge, and the nature and beauty of being human, **metaphilosophy**, or the philosophy of philosophy, is the study of the definition, field of application, methods and goals of philosophy.

- While cybernetics investigates control-based, goal-oriented systems, **metacybernetics** investigates higher-level cybernetic systems and the control models between them with feedback.

- While physics studies natural forces and basic forces, **metaphysics** studies effects that manifest in nature and the human mind as higher-level abstractions and laws.

- While paradigm means rethinking to a significant extent in people's behavior, **metaparadigm** (a less frequently used term) means the combined effect of paradigms in a certain phase of the world state.

In all these four definitions, the clue is about a *systemic multi-level reference*, **the study of the study** of the target area, which is known to be the main purpose of systems theory (evaluation of the behavior of a complex system). And while a system is a conceptual reference to its object, according to its symbolic nature, a metasystem is a generalization of systems, which can refer to innumerable different ones. In the IT field, systems mean objects related to reality (concrete). The object hierarchy is formed as references to the metalevel stream, references to references, etc. The metametalevel ultimately forms a concept of the ontology, i.e. the listed concepts.


**FIGURE 100. With these keys 😊 to understand the world better (Näillä näppäimillä).**

How do we get from meta-concepts and systems science to the concrete?

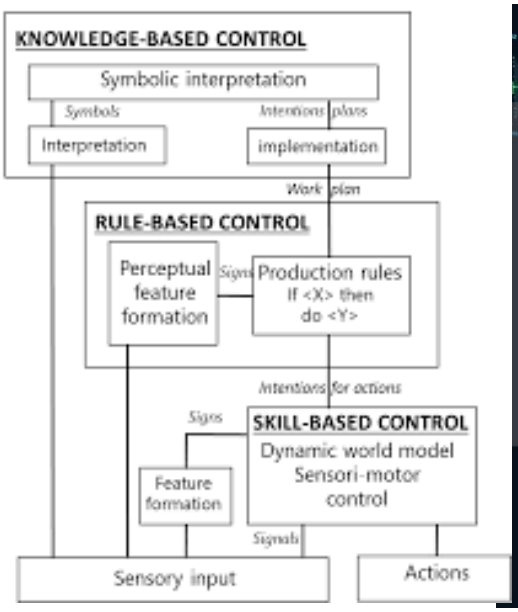
The answer is simple: The system already describes reality. In addition, a systemic generalization corresponding to the meta-concept, i.e. a basic class (class), will be developed. References to real objects (object/instance) are placed there. This method has been used since the 1990s in software development - with success. The same principle can be applied to statistics, taxonomies (libraries), defining knowledge and research.

Meta-thinking creates important knowledge of the future, because complex problems can only be explained by generalization. Due to that finding, work and effort are saved, in the same way that digitalization has succeeded in rationalizing vast amoung of human workplace during many decades since 1970.

## An example: The cutting-edge application of cognitive science, SRK, saving lives

In relation to the previous topic (Principia Cybernetica Web), Jens Rasmussen created early, in the 1980s, a cognitive model called SRK, whose parts are: **Skill (S)**, **Rule (R)** and **Knowledge (K)**.[5]

As you can see from the picture (FIGURE 165), this application, which was born simply by thinking and **ideating about the ways in which a person acts and thinks** (the concept of **cognition**), has led to training and research and teaching in demanding professions where the greatest precision, speed, concentration and absolutely sure operations are required, always, because human lives are at stake in airplane cockpits. The same SRK classification can be used, for example, in building source code analyzers (*Symbolic Analysis for Program Comprehension, Eki Laitila's PhD dissertation*).



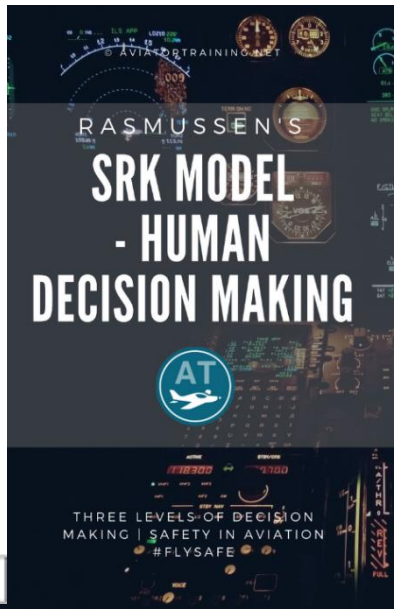
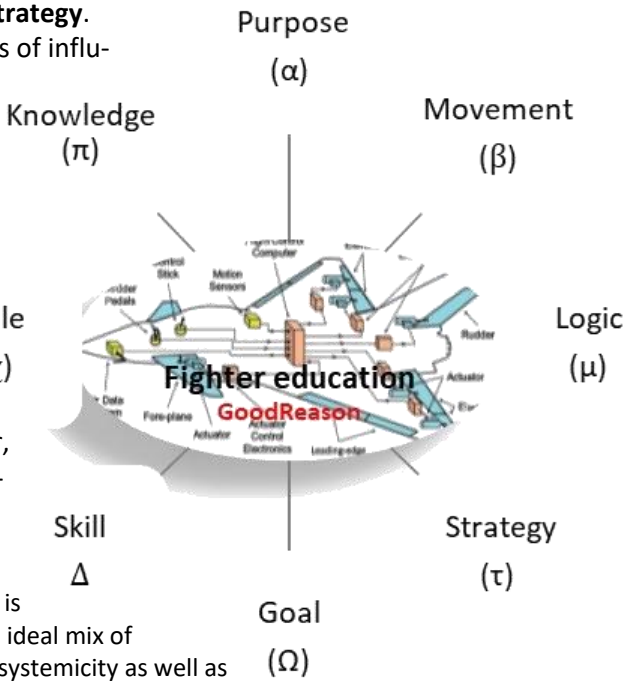




**FIGURE 165. Rasmussen SRK-principle + GoodReason – semantics.**

With these means, fighter training could be expressed as a systemic process, by means of **SRK and GoodReason**, as follows:

- Control would be (from Δ to β) in the form of **skill2movement**, reasoning (χ → μ) in the code of **rule2logic**, and training in the course of **knowledge2strategy**. Those terms (x2y), which also have opposite directions of influence, can be described in **metalanguage** in many ways, supporting documents, instructions, theories, case-specific arrangements and documents and updates.
- By using JSON language, real time formulating the relevant data can be done automatically by JSON pretty printer for any aircraft and fighter context sensitively.
- If the metatransition code (x2y) is made in a language capable of dynamic calculations, it could be used in real-time control to avoid errrors. However, real-time computation requires a corresponding inference engine or virtual machine.

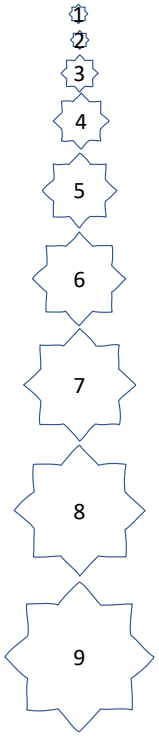



**SUMMARY**: This page demonstrates spread of basic cognitive science research to most demanding uses. Nowadays, this topic is an extremely important business and military case. This model is an ideal mix of many different technologies: education, work places, cognition and systemicity as well as data and knwoledge mining and IT applications.

[5] Jens Rasmussen. SRK Model. Human Decision Making. https://aviatortraining.net/2018/08/02/rasmussens-srk-model/

## The unity of knowledge: cognition, artificial intelligence, holarchy and methodologies

The following list presents the most important terms of systemicity, to describe the expansion of knowledge from its object towards conciliaence. The division according to the level of cognition is used in the IT sector, and all kinds of other classifications. The choices for this have been made from a wide range of basic concepts of science and practice, aiming for expressiveness and comprehensiveness. The conceptual levels of the resulting basic meta-architecture, i.e. the circles of thinking, are as follows:




1) **Data item** (as a unit of information, an independent object such as an agent)

2) **Type** (the type of information with its characteristics, facts and language)

3) **Function** (automaton, execution of rules, how the agent works, decision board...)

4) **Symbol** (a way of referring to agents and the environment in language)

5) **Consept** (the plans that the agent is created to fulfill, each idea)

6) **System** (hardware, software, IT system, environment, services)

7) **Context** (situation, business case, agent purposes, use cases, perspectives)

8) **Consciousness** (the way people think about the agent, and also reality and themselves)

9) **Paradigm**: unconscious, way of thinking, metaphysics (future, AI)

10) **Universum**

The world is a rather multidimensional system. According to Robson, there are 10 dimensions of consciousness. This list goes according to systemic properties, not reasoning.

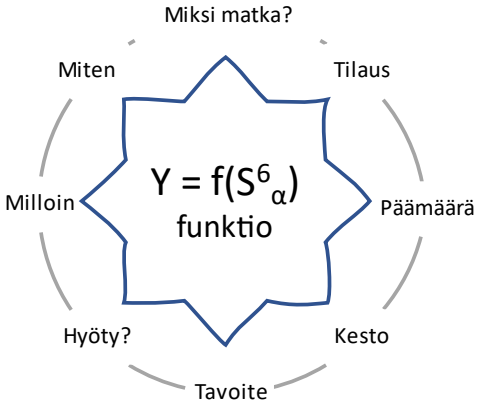
An example of this systemic classification is flight:

| | Symboliset koodaukset ja metakielet lisääntyvät nopeasti kaikkialla | |
|---|---|---|
| 1 | AY913 | https://www.helsinki-airport.com/flight-departure/AY913 |
| 2 | Finnair | https://www.helsinki-airport.com/airlines/finnair |
| 3 | Landed - On-time | Oslo (OSL) 2022-10-22 12:13 (12:25) |
| 4 | Airline | https://www.helsinki-airport.com/helsinki-airport-to-city.php |
| 5 | Matka, matkustus | |
| 6 | Lentokone | Flight Status for 2022-10-22 |
| 7 | 12:00 Helsinki, ei mukana | https://www.helsinki-airport.com/departures.php<br>https://www.helsinki-airport.com/flight-departure/AY913 |
| 8 | Ei kiinnosta | This flight is shared with ... |
| 9 | Matkustustapa (tottumus) | |
| 10 | Helsinki-Oslo | https://avinor.no/en/airport/oslo-airport/ |

Its content is built according to the context and within the limits of the purpose of its metametasystem.

**Aviation** is the pinnacle of IT industry development with its electronic orders and service interfaces. The flight (0) is described to computers, e.g., in the attached data table format.

```
"data":[
    {
        "flight_date":"2021-03-12",
        "flight_status":"scheduled",
        "departure":{
            "airport":"Adisutjipto",
            "timezone":"Asia\/Jakarta",
            "iata":"JOG",
            "icao":"WAHH",
            "terminal":null,
            "gate":null,
            "delay":null,
            "scheduled":"2021-03-12T07:00:00+00:00",
            "estimated":"2021-03-12T07:00:00+00:00",
            "actual":null,
            "estimated_runway":null,
            "actual_runway":null
        },
```

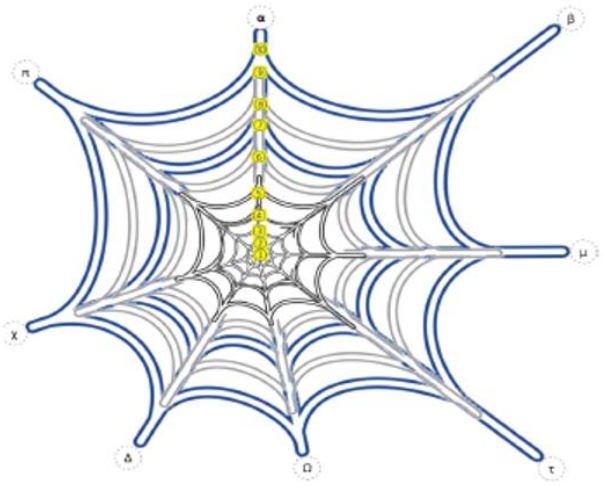

**One flight in JSON format and corresponding systemic diagram.**

Inside the software, the code generates corresponding structures automatically in many different ways. The attached format is Visual Prolog code, and it demonstrates the export of flight schedules to a visible calendar, for which there are ready-made global routines (Calendar function).

```
NewFlights =
        [
            o(mkEvent("AY913", mkTime(1, 11, 55), mkTime(1, 14, 45), "5")),
            o(mkEvent("AA8910", mkTime(-1, 11, 55), mkTime(2, 11, 00), "5")),
            o(mkEvent("BA6075", mkTime(4, 11, 55), mkTime(4, 0, 0), "5", true)),
            o(mkEvent("Check Google Air Bal-tic", unknown, false, "darkgreen", "http://google.com/"))
        ],
MyCalendar:set_array("departures", NewFlights )
```

The flight booking process itself is on the Internet, e.g., a JSON PROC-type application and function that can talk to all other similar software.

A spider diagram is a way to present mind maps better than the mind maps themselves. Connections between levels and sectors can be drawn on the diagram, especially when there is some conflict in the situation.



**The circle of deepening thinking as a spider diagram.**

When moving in different directions from the object (holon), one gradually approaches the limits of the unconscious. According to Nonaka-Takeuchi, for example, the need to move is related to wisdom (necessity), knowledge is how to move, information is the possibilities of movement, and data is a certain specific journey (the center of the picture).

Seen in this way, global air traffic and travel is a spider web opening outwards from the passenger, expressed according to system roles (α = start, β = current situation and Ω = conclusion and feedback).

***You are always at the center of your own network with your intentions!***

# "A visual, systemic tool for explaining the world": GeoEconomics

This page shows a systemic ad-hoc – model of systemic interventions picked up by a search engine, according to the principles of this book: 8+1 roles: α … Ω. From the visual form, you immediately get a natural first impression of the subject's nature. It can be compared, for example, to the World Economic Forum's mind map displays, where continuity is lost. In this free material, you can browse in nine different directions as text, videos, images and news. As search engines develop in the future, the share of such hybrid solutions will surely increase. Let's try it out ☺


**FIGURE 168. GeoEconomics – a role-playing topic (DuckDuckGo + Metateknologia software).**

The model of this image combines the best search engines (**http**), the vast information of the web, the advantages of the Good-Reason principle (α…Ω), the teachings of visuality and cognition and systems thinking, as a holarchy and a language game to serve communication, learning and publishing, as well as the intuitive construction of the viewer's own worldview.

The whole is built up in the mind of anyone by browsing the elements of the picture, interpreting them in different ways.

CATALOG

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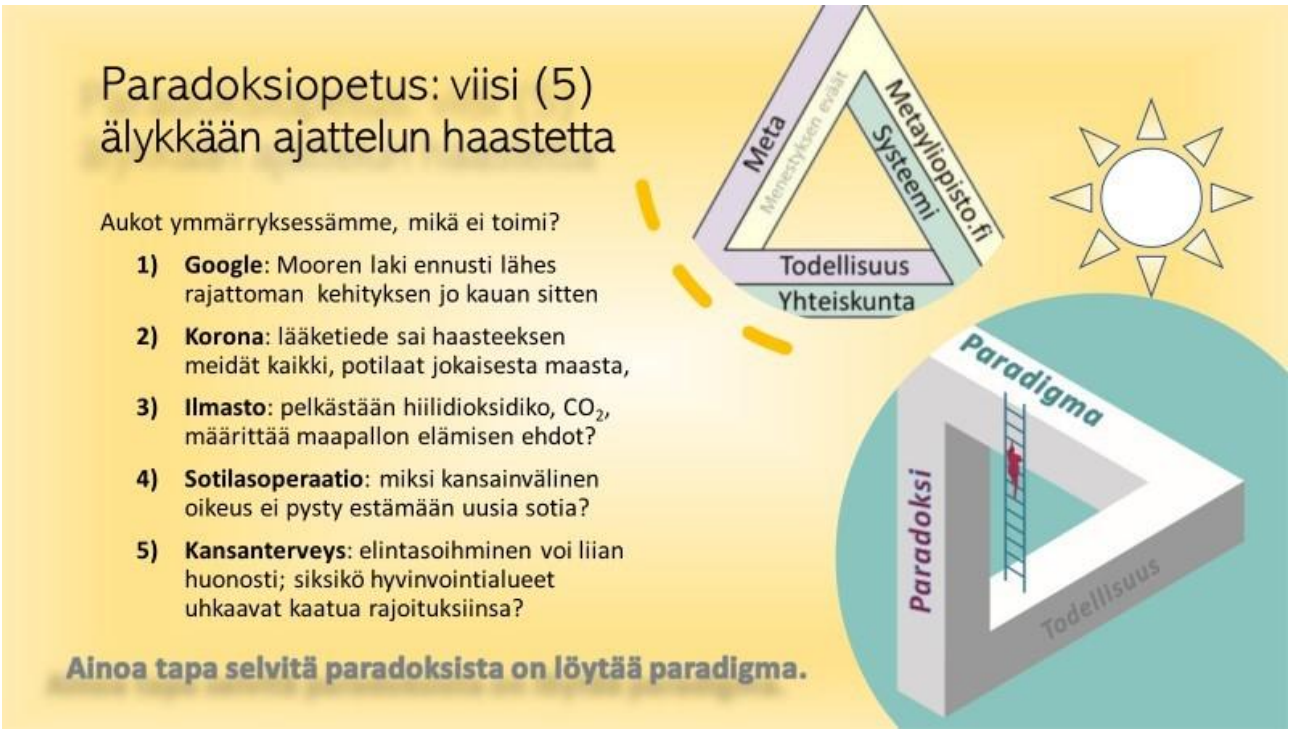
- Systems thinking: https://www.systems-thinking.org/
- The Systems thinker: https://thesystemsthinker.com/
- Metayliopisto: https://metayliopisto.fi/

# THE SMART THINKING GUIDE

The depth and versatility of thinking is known to have no limit. Researchers and inventors are constantly pursuing this possibility with their innovations. So far, the progress of systems thinking has been hindered by the inability to express what system and systemicness could really mean.

In this book, this problem of articulation is tackled powerfully, when five demonstrations are taken as the object of thorough reflection: Google as an example of success, Corona as a phenomenon that tests the effectiveness of healthcare, the different extremes of climate change and the "special operation" shaking Europe, and public health as a way of habit and division of responsibility that affects each of us.




In the book, systemic development is explained in the form of an **innovation process** - it is a system too. Innovation takes place in cycles of ten stages, which the practitioner can use creatively like Deming's cycle. The *energy sector* is an example of opportunities that can be used to make concrete progress.

Creativity is known to be the Nuller's tuple (knowledge, imagination, evaluation). To dig knowledge from different sources, the method of information reverse modeling is needed. The book's methods are used to abstract and articulate into systems dozens of topics from Wikipedia, scientific literature, and – best of all – by combining different concepts, architectures and models. By inventing, you get leverage, because when an even more revolutionary idea is revealed while exploiting the first discovery, it may gain exponential power in the future. The IT industry we have had a fairy-tale narrative, where exponential development has taken place according to Moore's law for tens of years.

Humanity is still only at the beginning to fully utilize the possibilities of science and technology. Four competences have been raised as the central thinking skills of this century (21st Century Thinking Skills): critical thinking skills, creativity, cooperation and communication skills. We should start the change from them.

Eki Laitila, FT

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