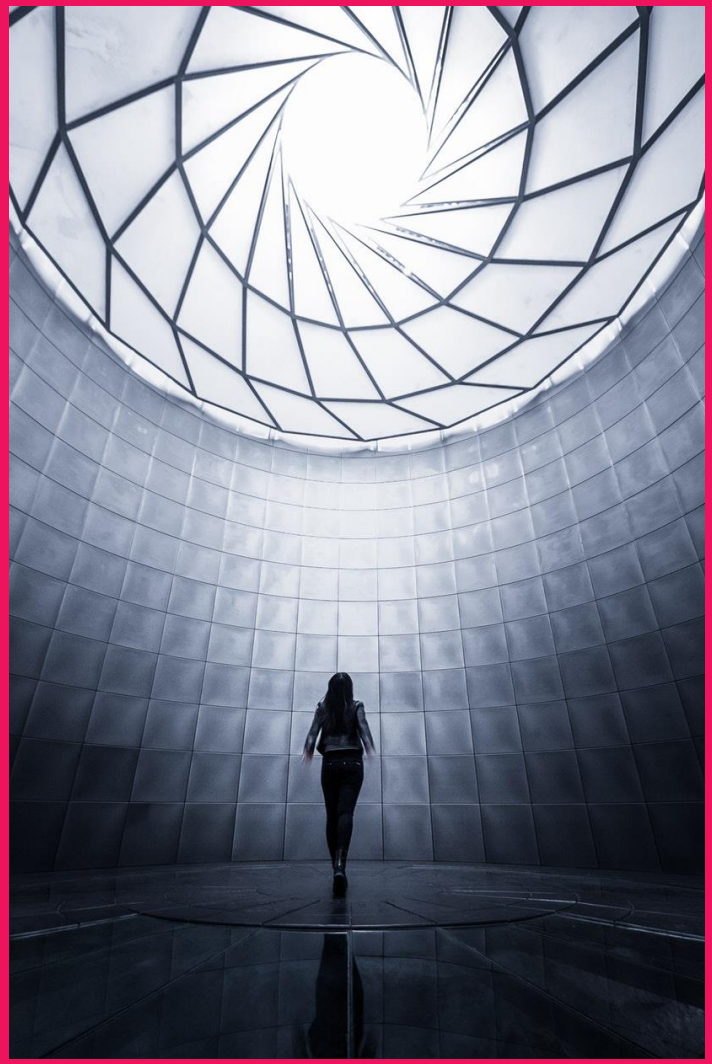
NEW HORRIZON

“To understand technosociety we have to become aware that we are now facing problem situations which originate in the very solutions to past problems of past generations.”

_____

Barbara E. Adam , Governing Futures conference 2011



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Responsible Research and Innovation (RRI)

Overview and Background for Agency Practitioners

RRI: Necessity or Option for Science, Research and Innovation Funding?

Ulrich Schoisswohl
RRI Network NewHoRRIzon

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NEW HORRIZON

What is the purpose of RRI?

RRI is meant to transform science and innovation on project and system levels.

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NEW HORRIZON

Why is this transition necessary?

An increase in societal and technological complexites calls for new forms of science & innovation governance.

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WHAT DOES THE TERM RRI STAND FOR?

understanding Responsible Research & Innovation I

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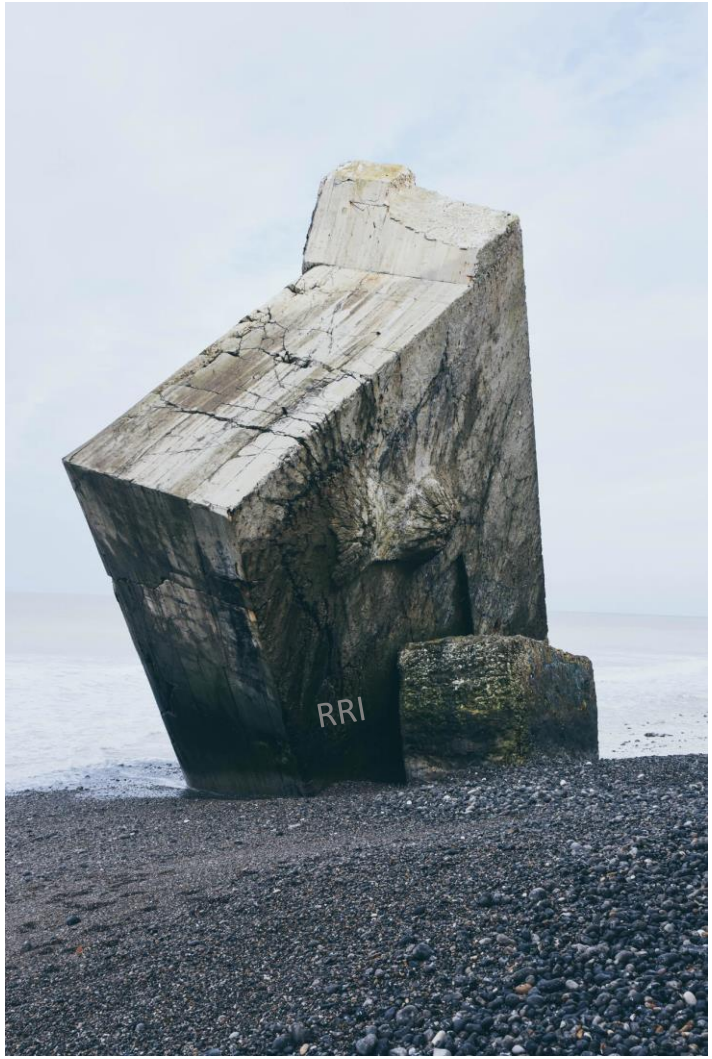

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What is RRI?

- RRI is a term promoted by the DG Research & Innovation.
- The DG funded a broad portfolio of projects on RRI.
- The aim of these projects was and is to develop recommendations, concepts and tools for the transformation of European science and innovation systems at the project and system level and to initiate change processes.

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WHAT DOES THE TERM RRI STAND FOR?

understanding Responsible Research & Innovation I

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RRI: WHAT HAPPEN SO FAR?

understanding Responsible Research & Innovation II

NEW HORRIZON

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RRI: WHAT HAPPEN SO FAR?
understanding Responsible Research & Innovation II

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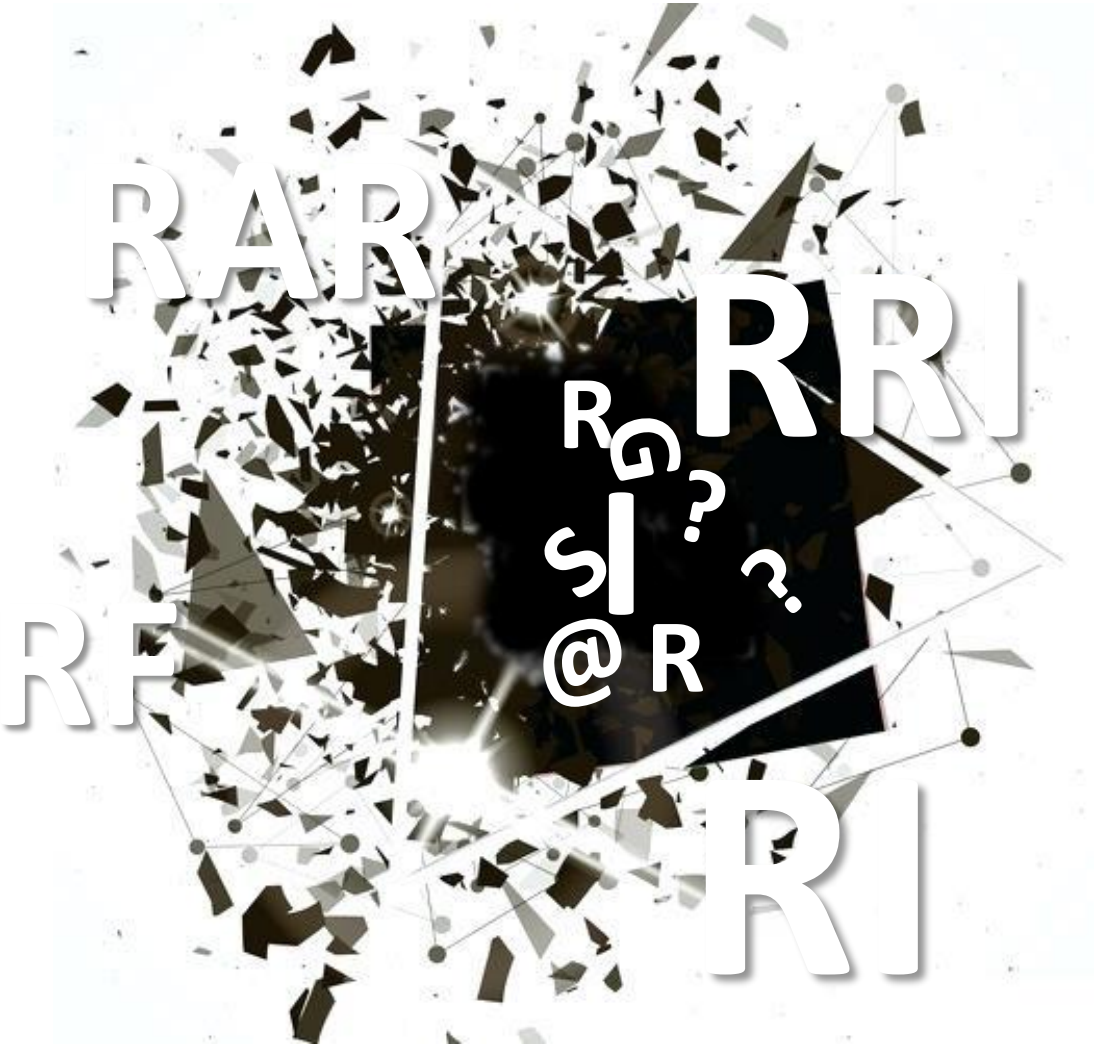

How much has the DG R&I invested in RRI so far?

FP7 – Science in Society (SiS program)

- 35 projects
- EUR 100.400.465,00

H2020 – Science with and for Society (SwafS program)

- 36 projects
- EUR 100.701.207,60

H2020 – RRI cross-cutting (2012-2017)

- 181 projects flagged “RRI”

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RRI: WHAT HAPPEN SO FAR?
understanding Responsible Research & Innovation II

NEW HORRIZON

How much has the DG R&I invested in RRI so far?

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- EUR 100.701.207,60

H2020 – RRI cross-cutting (2012-2017)

- 181 projects flagged “RRI”

RRI started out as a policy-idea and is turning into an emerging academic field!

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RRI: AUSTRIAN PARTICIPATIONS SO FAR

undestanding Responsible Research & Innovation II

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WHAT ARE THE STRATEGIC GOALS OF RRI?

understanding Responsible Research & Innovation III

NEW HORRIZON

What are the strategic goals of RRI?

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WHAT ARE THE STRATEGIC GOALS OF RRI?
understanding Responsible Research & Innovation III

NEW HORRIZON

What are the strategic goals of RRI?

- Science and innovation need to be more strongly aligned with the **needs, expectations and values** of the European citizens.
- Science and innovation need to provide a **systemic contribution** to shaping a desirable and democratic society, which is **economically, ecologically and socially sustainable for many generations** to come.

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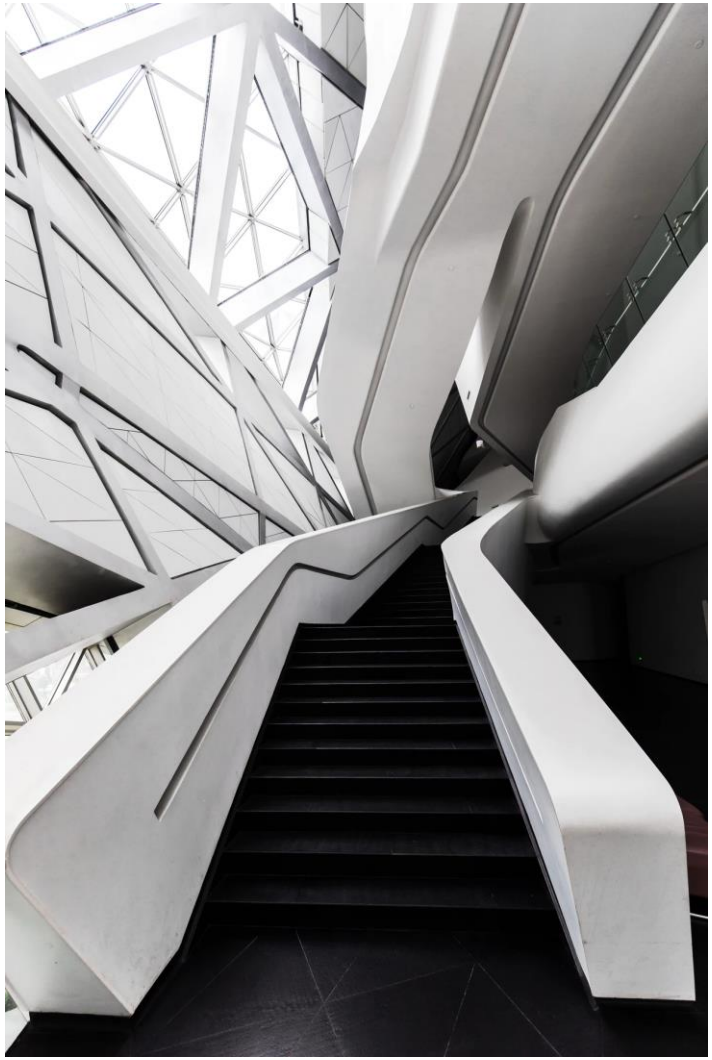
WHAT ARE THE OPERATIVE GOALS OF RRI?

understanding Responsible Research & Innovation IV

NEW HORRIZON

What are the current operative goals of RRI?



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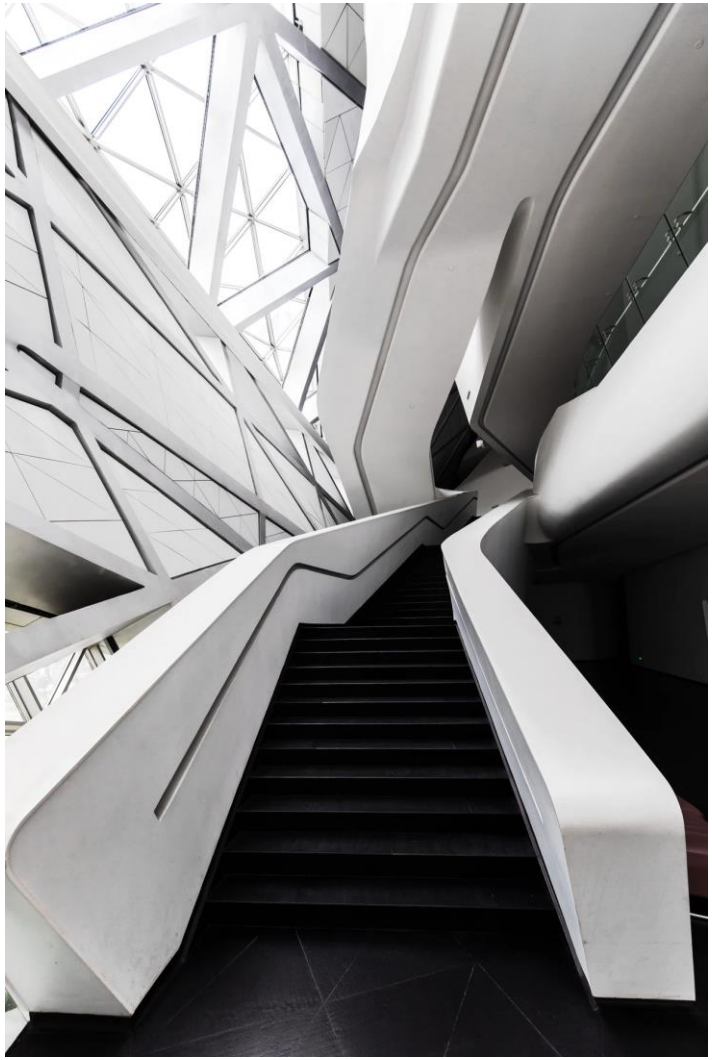
WELCHE OPERATIVEN ZIELE VERFOLGT RRI?

Responsible Research & Innovation verstehen IV

NEW HORRIZON

What are the current operative goals of RRI?

- increasing the **quality** of scientific output
- increasing the **impact** of publicly funded innovation processes
- identification and testing of measures to increase the **European citizens involvement** in science and innovation
- Development of new scientific and methods and innovation logics to tackle todays‘ **societal and global challenges**.



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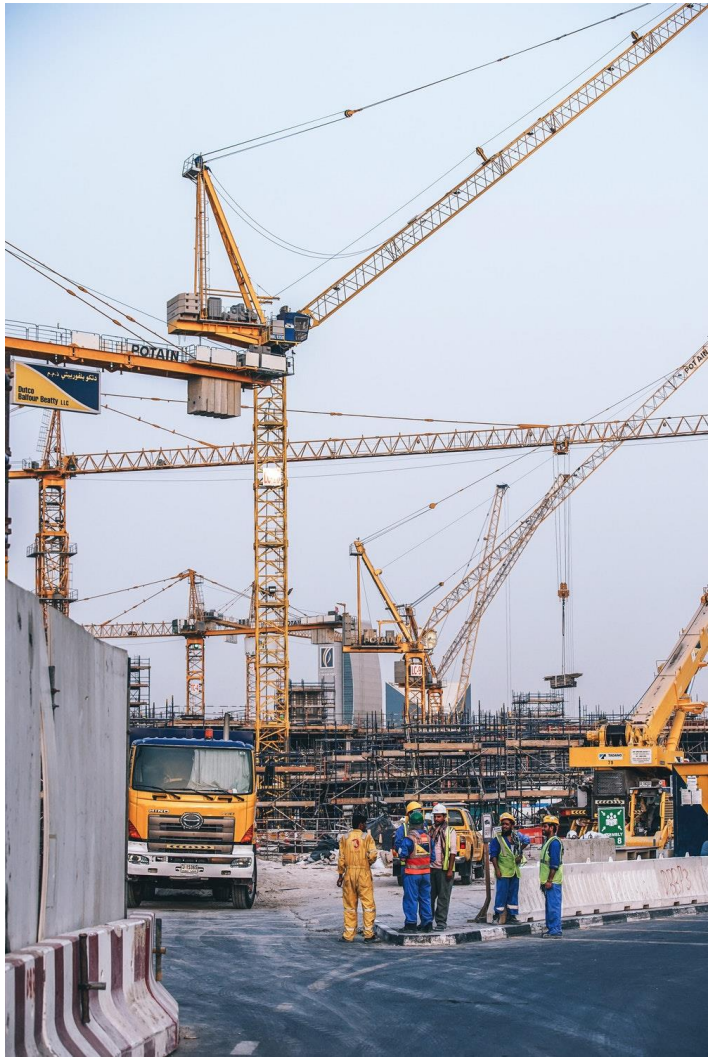
WHICH PROBLEM CONSTELLATIONS IS RRI ADDRESSING?

understanding Responsible Research & Innovation V

NEW HORRIZON

Which construction zones within the science and innovation system is RRI working on?



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WHICH PROBLEM CONSTELLATIONS IS RRI ADDRESSING?

understanding Responsible Research & Innovation V

NEW HORRIZON

Quality of science

- Peer-review
- incentive system
- reproducability
- publication system
- loss of data

Impact of Innovation

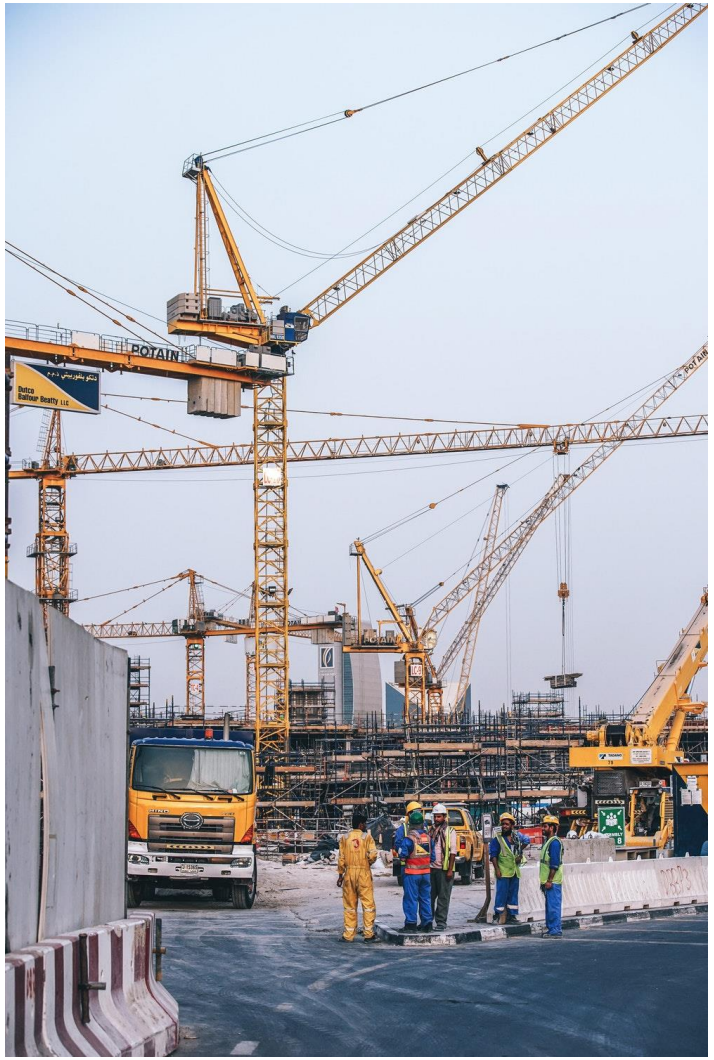
- limited impacts
- stranded innovations
- unexpected impacts

Desirable science and innovation

- public acceptance
- polarized publics
- technology lock-out
- declining trust in the system

Societal and global challenges

- digitalisation
- sustainability
- climate changel



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FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

NEW HORRIZON

What do these four problem constellations have in common?

They are more like an ecosystem than like a designed system!

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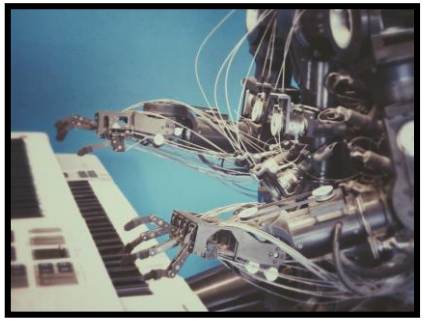
FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

NEW HORRIZON



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DESIGNED SYSTEMS

https://unsplash.com/photos/qLW70Aoo8BE

ECOSYSTEMS

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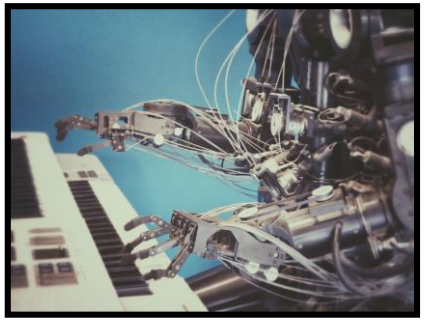
FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

NEW HORRIZON



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DESIGNED SYSTEMS

- **monolithic:** unified intention, unified design

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ECOSYSTEMS

- **non-monolithic:** diverging intentions, no unified design

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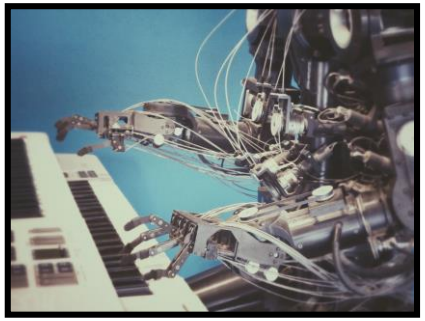
FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

NEW HORRIZON



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DESIGNED SYSTEMS

- **monolithic**
- **non-historic:** system is built from scratch

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ECOSYSTEMS

- **non-monolithic**
- **historic:** there are actualities that need to be considered

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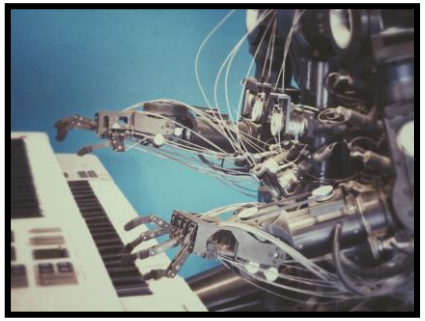
FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I



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DESIGNED SYSTEMS

- **monolithic**
- **non-historic**
- **static:** mostly static, there are modifications and updates

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ECOSYSTEMS

- **non-monolithic**
- **historic**
- **dynamic:** appear, change, disappear, reappear

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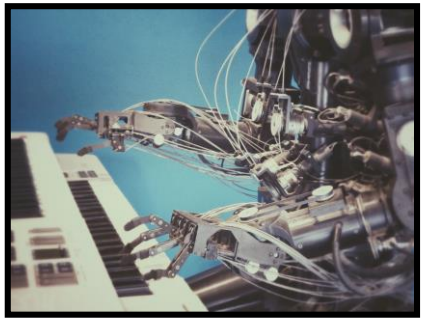
FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I



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DESIGNED SYSTEMS

- **monolithic**
- **non-historic**
- **static**
- **few players:** know what they need to do

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ECOSYSTEMS

- **non-monolithic**
- **historic**
- **dynamic**
- **many players:** don't know what they need to do

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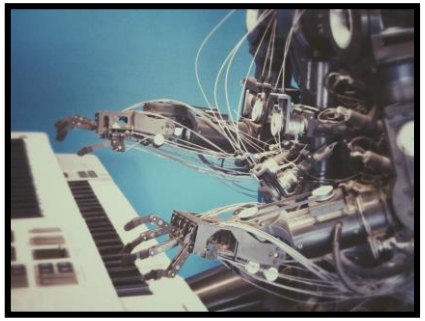
FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

NEW HORRIZON



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DESIGNED SYSTEMS

- **monolithic**
- **non-historic**
- **static**
- **few players**
- **rational:** the system works like it is supposed to

https://unsplash.com/photos/qLW70Aoo8BE

ECOSYSTEMS

- **non-monolithic**
- **historic**
- **dynamic**
- **many players**
- **non-rational:** the system works like the people decide

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FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

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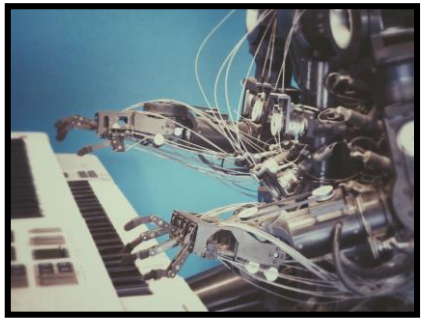

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DESIGNED SYSTEMS

- monolithic
- non-historic
- static
- few players
- rational
- relatively small

https://unsplash.com/photos/qLW70Aoo8BE

ECOSYSTEMS

- non-monolithic
- historic
- dynamic
- many players
- non-rational
- **huge** 61.171 VTE, 3.385 companies in R&I [in Austria in 2011]

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FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

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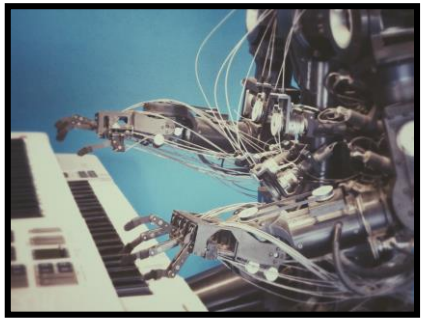

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DESIGNED SYSTEMS

- **monolithic**
- **non-historic**
- **static**
- **few players**
- **rational**
- **relatively small**

=> **causal**: it is relatively easy to predict the impact of an intervention

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ECOSYSTEMS

- **non-monolithic**
- **historic**
- **dynamic**
- **many players**
- **non-rational**
- **huge**

=> **emergent**: it is very difficult to predict the impact of an intervention

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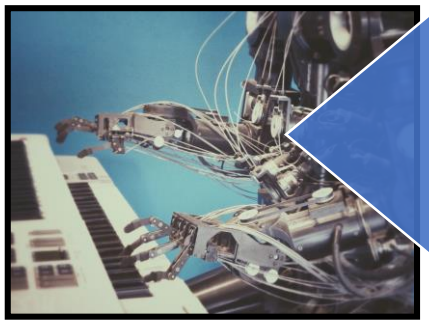
FOUR PROBLEM CONSTELLATIONS ONE MOTIVE

RRI: understanding the underlying dynamics I

NEW HORRIZON



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tame problems

wicked problem situations

https://unsplash.com/photos/qLW70Aoo8BE

DESIGNED SYSTEMS

- **monolithic**
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ECOSYSTEMS

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REQUIREMENT: A DIFFERENT KIND OF SOLUTION

RRI: understanding the underlying dynamics II

NEW HORRIZON

What is the difference between a tame and a wicked problem?

6 differences making a difference.

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REQUIREMENT: A DIFFERENT KIND OF SOLUTION

RRI: understanding the underlying dynamics II

NEW HORRIZON

tame problems

1) A well-defined and stable problem definition can be found.

1) The problem situation is only understood once the solution is available.

wicked problem situations

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REQUIREMENT: A DIFFERENT KIND OF SOLUTION

RRI: understanding the underlying dynamics II

NEW HORRIZON

tame problems

2) It is clear when the problem is solved.

2) The problem situation is never really solved.

wicked problem situations

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REQUIREMENT: A DIFFERENT KIND OF SOLUTION

RRI: understanding the underlying dynamics II

NEW HORRIZON

tame problems

3) The solution is either right or wrong.

3) Solutions are neither right nor wrong.

wicked problem situations

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REQUIREMENT: A DIFFERENT KIND OF SOLUTION

RRI: understanding the underlying dynamics II

NEW HORRIZON

tame problems

4) Each problem belongs to a class of problems which are solved similarly.

4) Each problem situation is new and unique.

wicked problem situations

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REQUIREMENT: A DIFFERENT KIND OF SOLUTION

RRI: understanding the underlying dynamics II

NEW HORRIZON

tame problems

5) Solutions can be easily tested and adapted.

5) Each solution can be tested only once.

wicked problem situations

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REQUIREMENT: A DIFFERENT KIND OF SOLUTION

RRI: understanding the underlying dynamics II

NEW HORRIZON

tame problems

6) To every problem there is an obvious set of alternative solutions.

6) The problem situation has no obvious alternative solutions.

wicked problem situations

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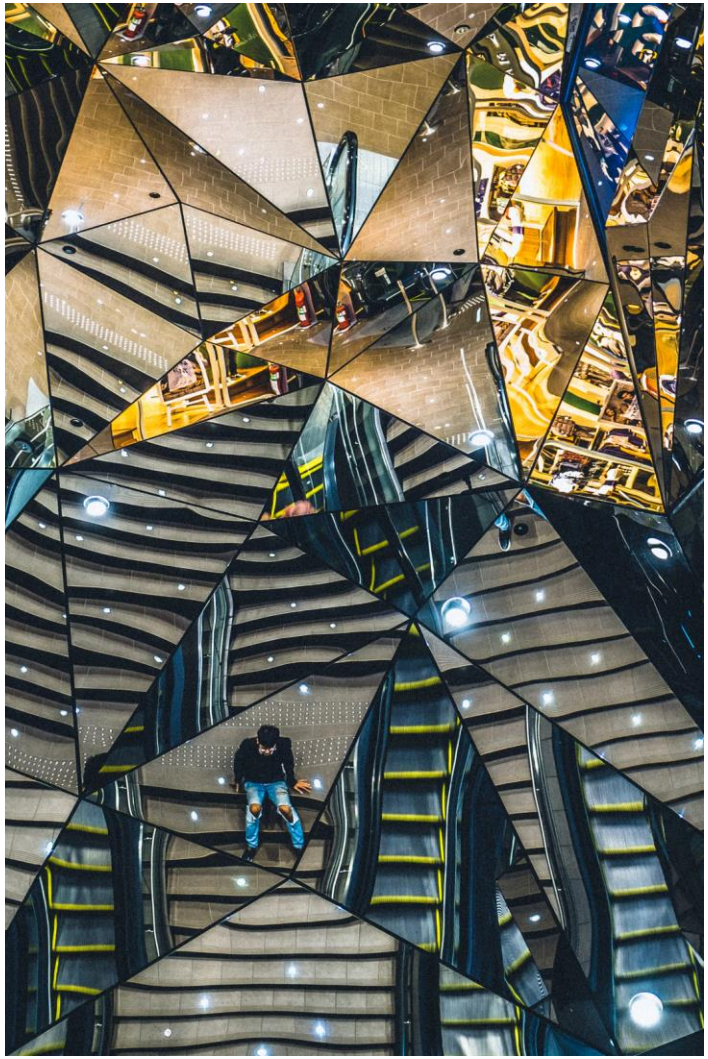
COMPLEXITY AS A CHALLENGE

RRI: understanding the underlying dynamics III

NEW HORRIZON

What are the characteristics of Wicked Problems?



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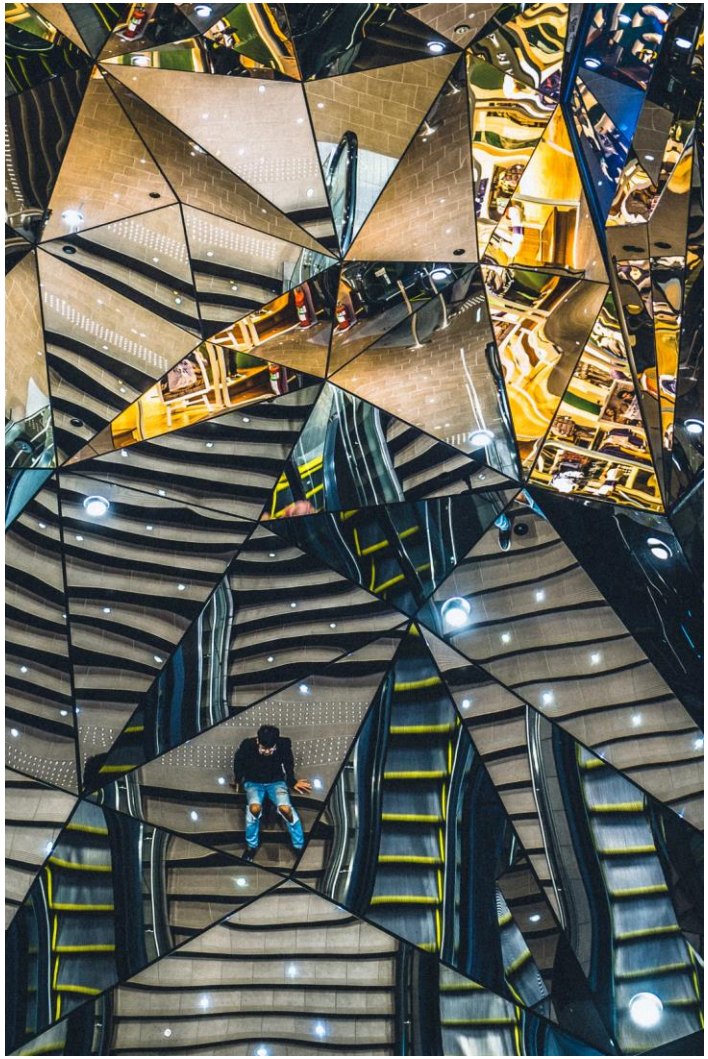
COMPLEXITY AS A CHALLENGE

RRI: understanding the underlying dynamics III

NEW HORRIZON

What are the characteristica of Wicked Problems?

Fragmentation, Wickedness, social and technological complexity.



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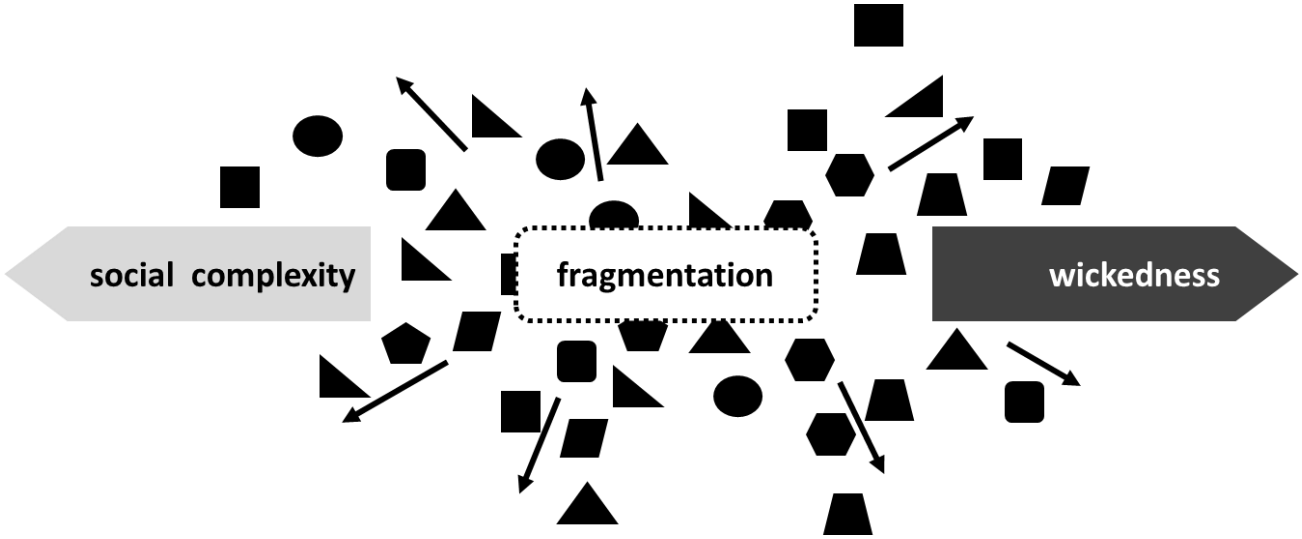
COMPLEXITY AS A CHALLENGE

RRI: understanding the underlying dynamics III

NEW HORRIZON



What is social complexity?

Social complexity is a function of the number and diversity of the actors involved.

The actors are different with respet to:

- individual experience
- personality
- style of thinking and learning
- disciplinary backgrounds
- affiliation
- etc.

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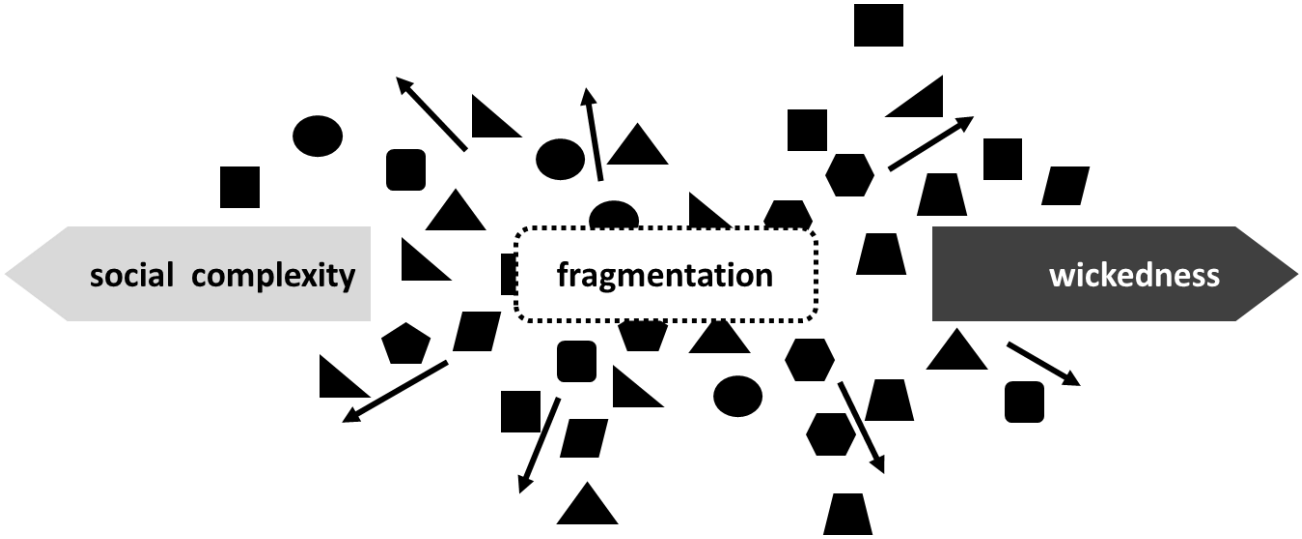
COMPLEXITY AS A CHALLENGE

RRI: understanding the underlying dynamics III

NEW HORRIZON



What is social complexity?

Social complexity is a function of the number and diversity of the actors involved.

What is Wickedness?

Wickedness is a characteristic of the problem/solution space and the cognitive dynamics involved in fining a solution.

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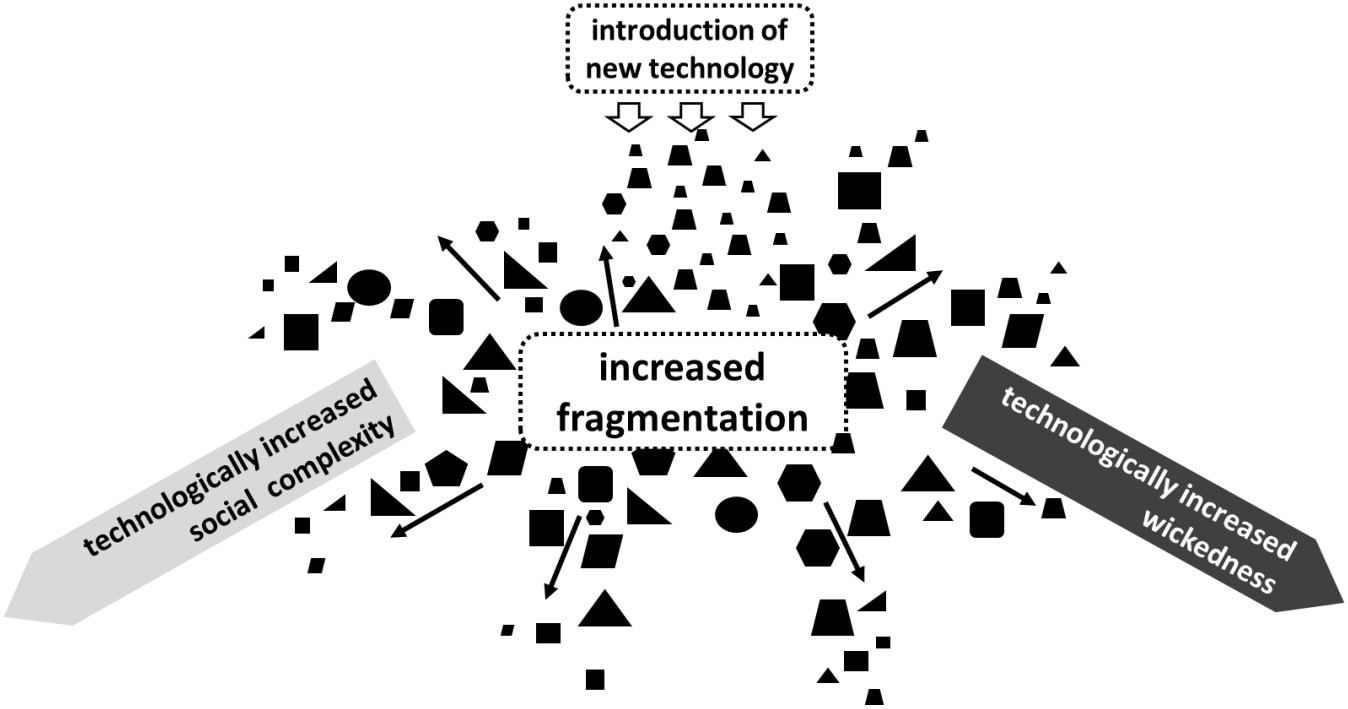
COMPLEXITY AS A CHALLENGE

RRI: understanding the underlying dynamics III

NEW HORRIZON



How does technological complexity impact on fragmentation?

i. New technologies allow for new pathways of action.
ii. Some actors pick up on these new pathways others don't.
iii. As a consequence social complexity increases.
iv. Hence, fragmentation increases.

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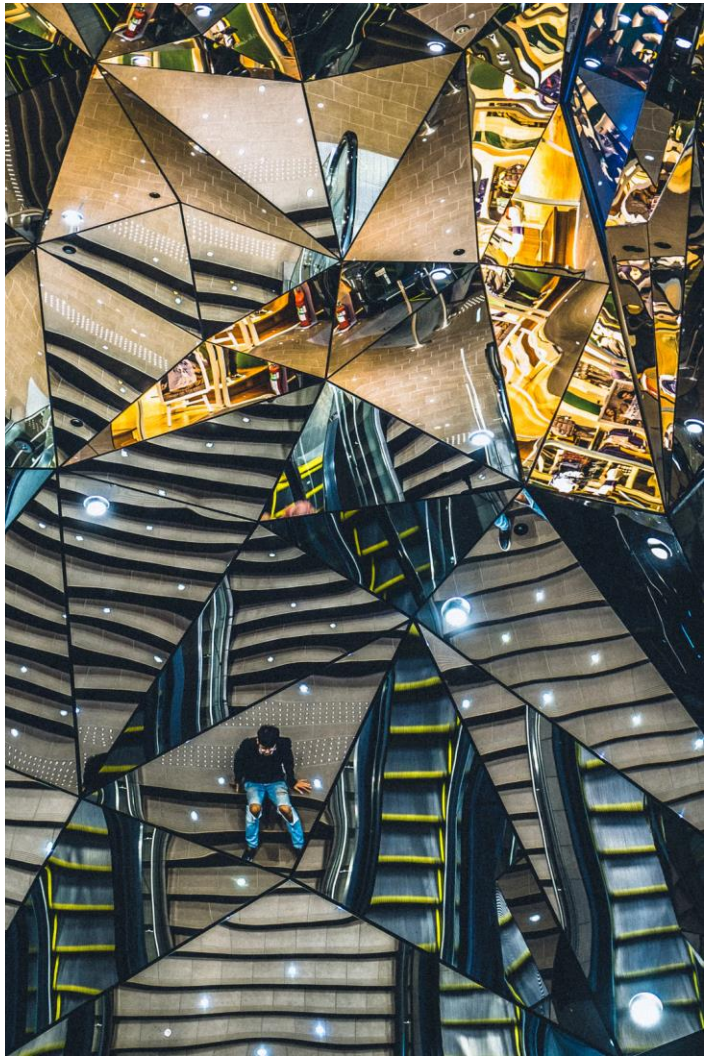
FRAGMENTION, THE EXPERIENCE OF COMPLEXITY

RRI: understanding the underlying dynamics IV

NEW HORRIZON

How is fragmentation experienced?



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FRAGMENTION, THE EXPERIENCE OF COMPLEXITY

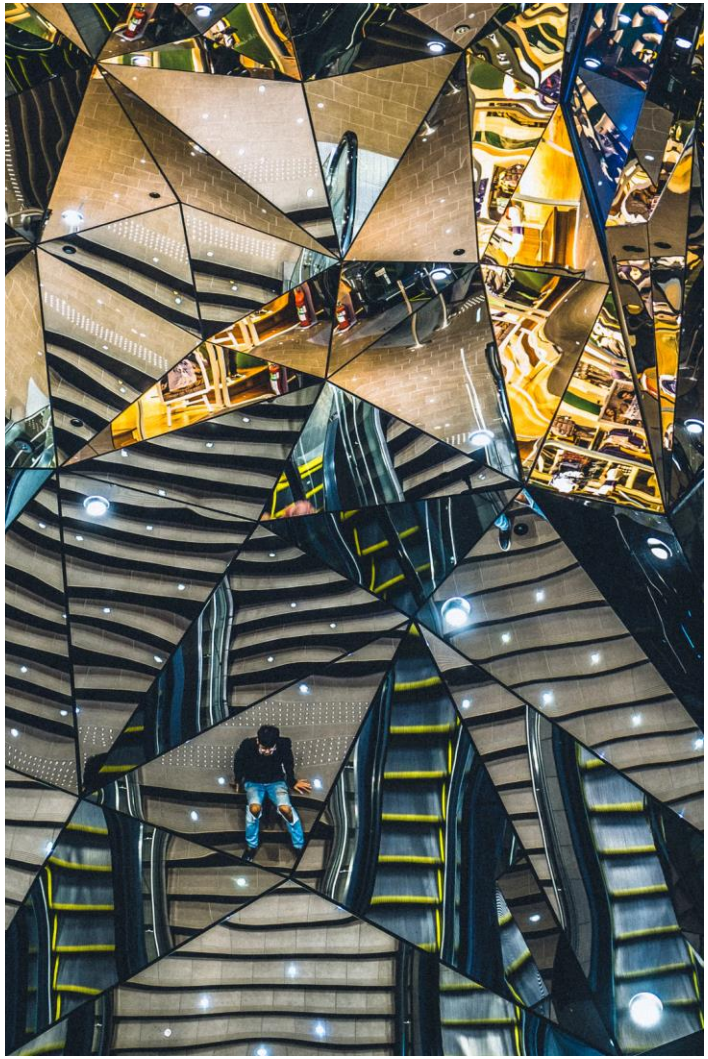
RRI: understanding the underlying dynamics IV

NEW HORRIZON

How is fragmentation experienced?

Involved actors…

- … feel more separate than united.
- … realize that information and knowledge on the problem situation is fragmented.
- … have diverging perspectives, understandings and intentions.
- … are convinced that only their understanding of the problem situation is correct.



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REDUCTION OF SOCIAL COMPLEXITY

RRI: understanding the underlying dynamics V

Social complexity can be reduced, right?

Clever minds have come up with many strategies to do so…

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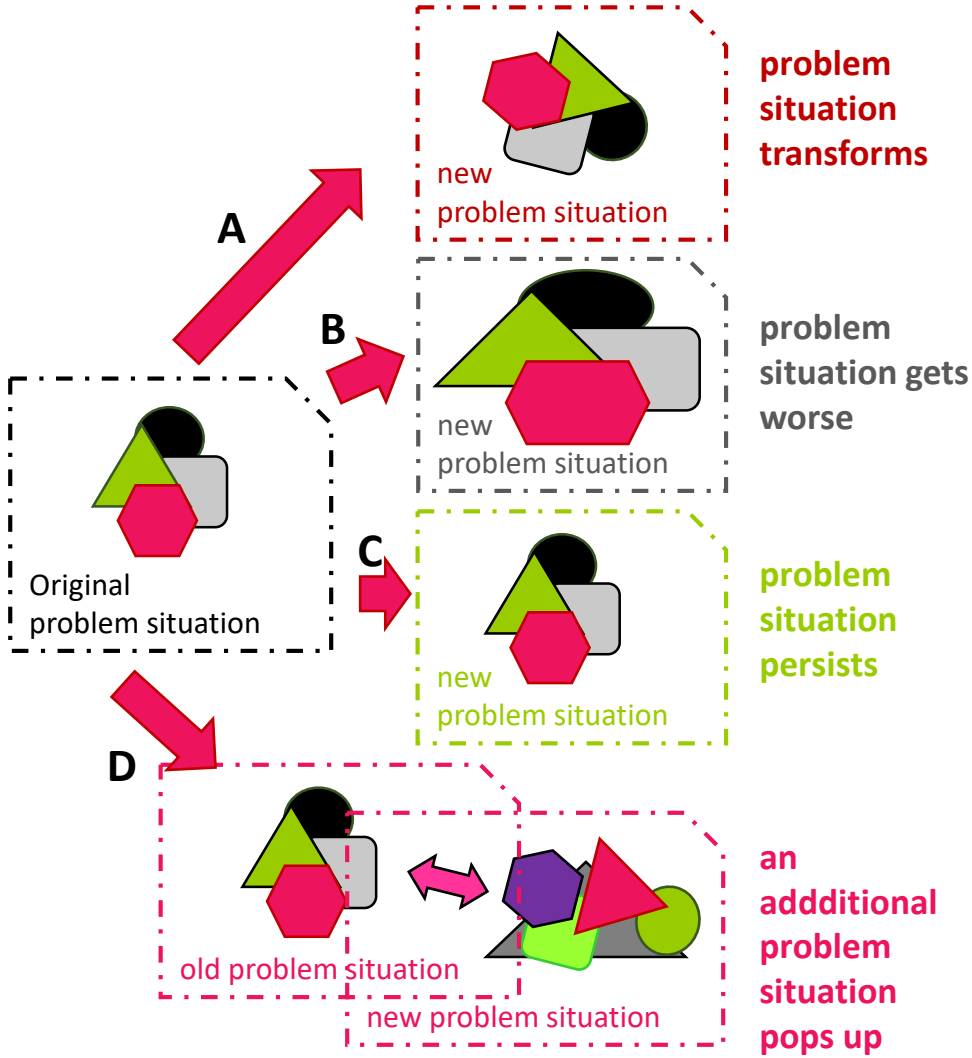
REDUCTION OF SOCIAL COMPLEXITY

RRI: understanding the underlying dynamics V

NEW HORRIZON



problem situation transforms

problem situation gets worse

problem situation persists

an addditional problem situation pops up

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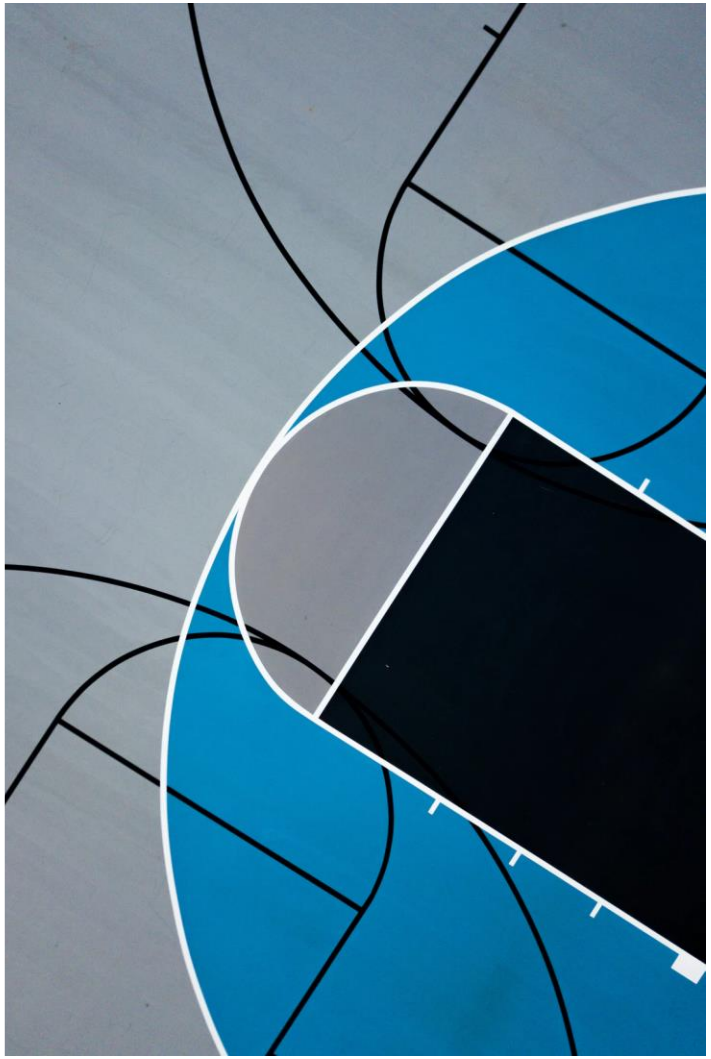
CONCLUSIONS: NOW WHAT IS RRI?

Responsible Research & Innovation: option or necessity

NEW HORRIZON

Now we know the challenges!

Let‘s try to get some orientation on the ballcourt.



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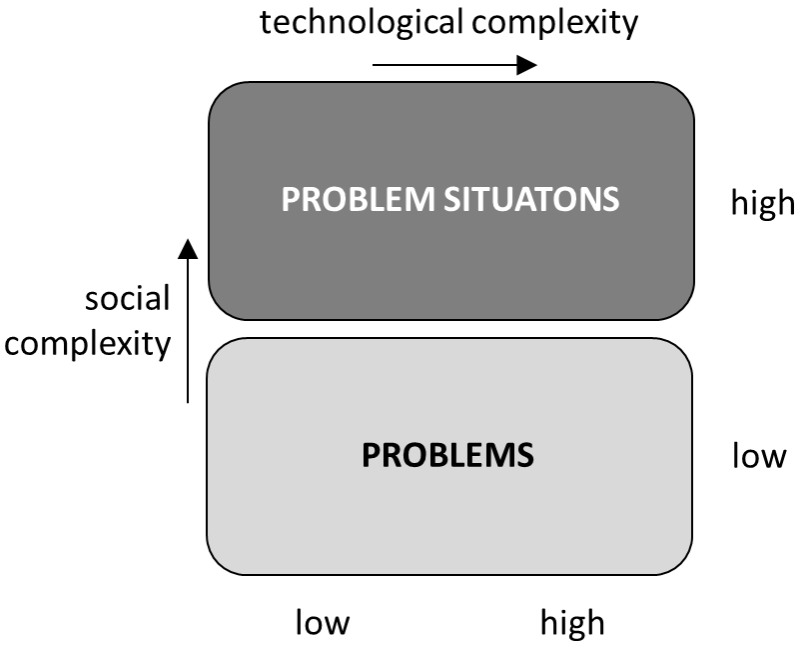
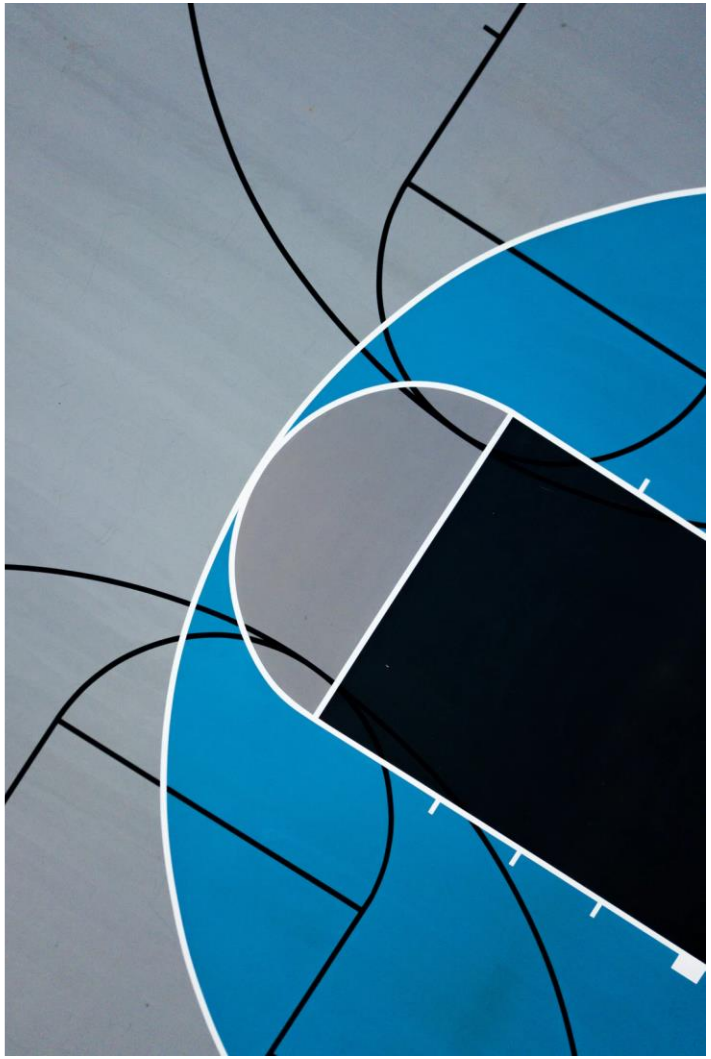
CONCLUSIONS: NOW WHAT IS RRI?

Responsible Research & Innovation: option or necessity

NEW HORRIZON





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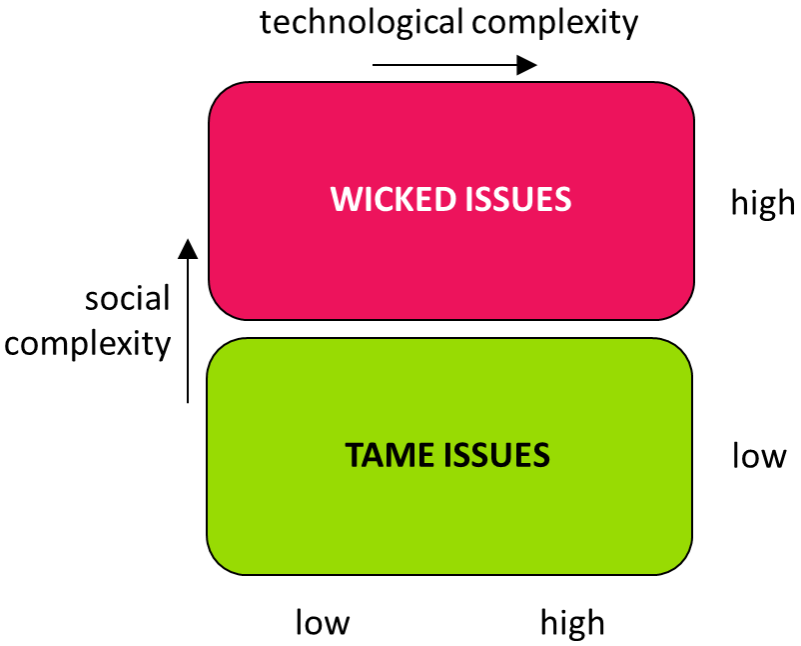

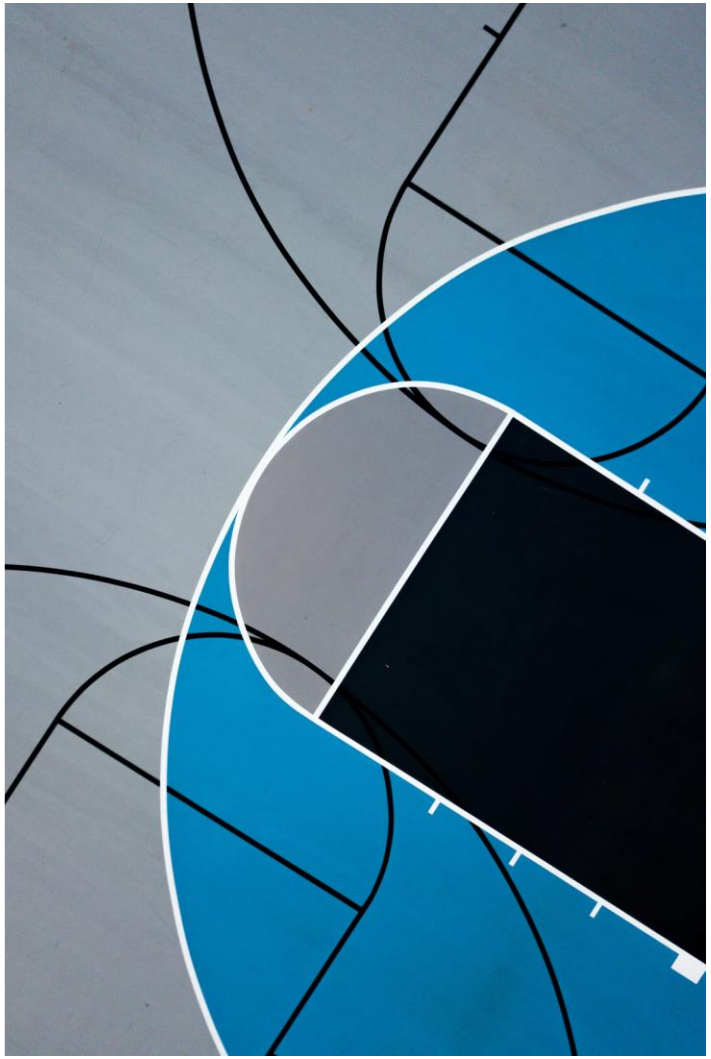

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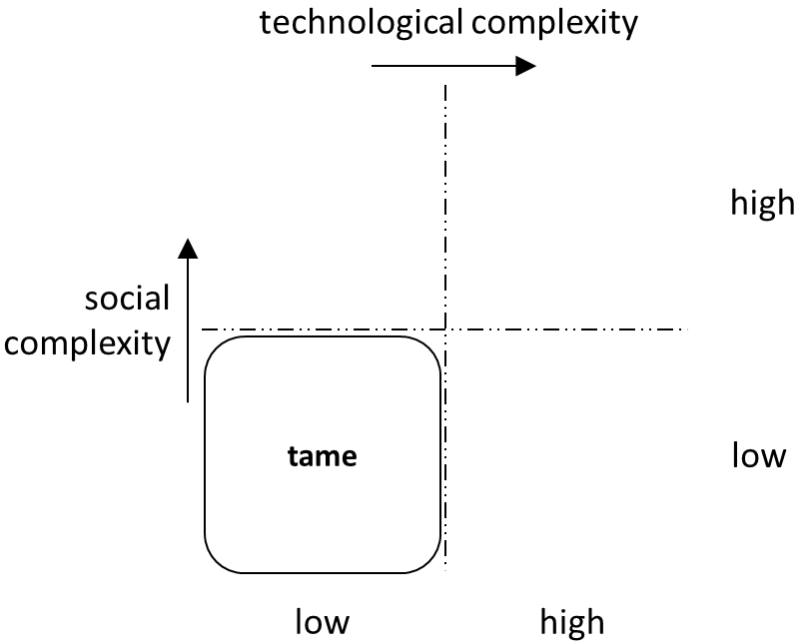
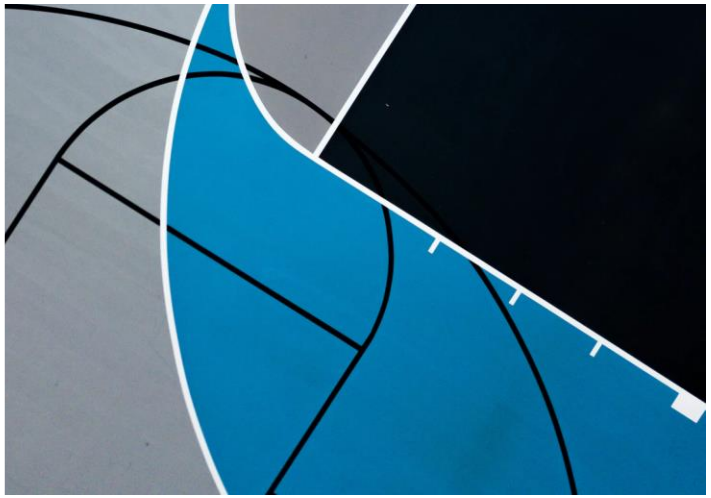


Tame problems

- ✓ low social complexity
- ✓ high technological complexity

Examples:

- building a table
- building a foot-bridge
- painting a wall



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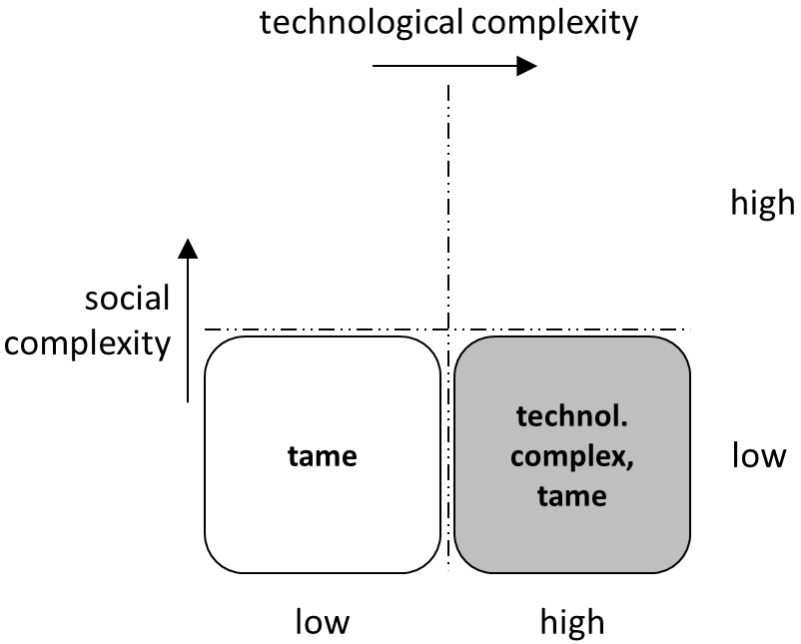
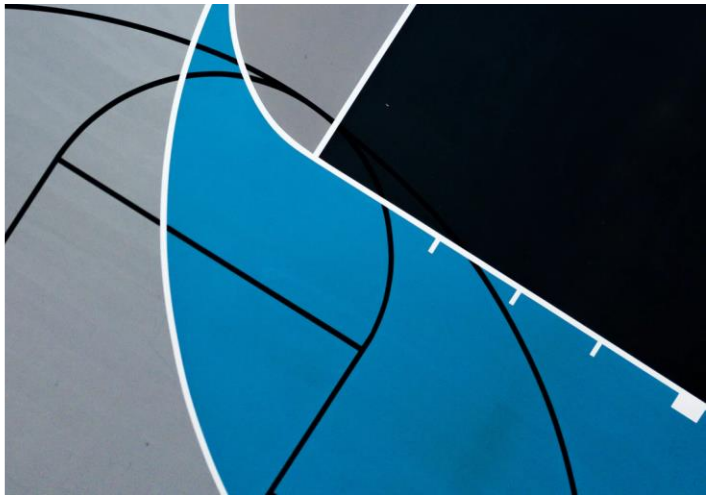


Tame problems, technologically complex

- ✓ low social complexity
- ✓ high technological complexity

Examples:

- building an atomic bomb
- building the particle accelerator CERN
- building the fusion reactor ITER



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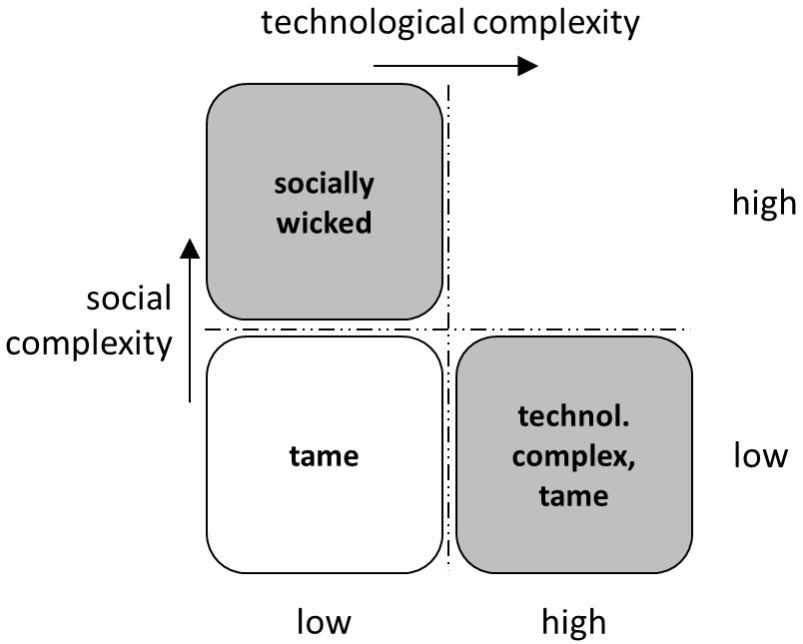
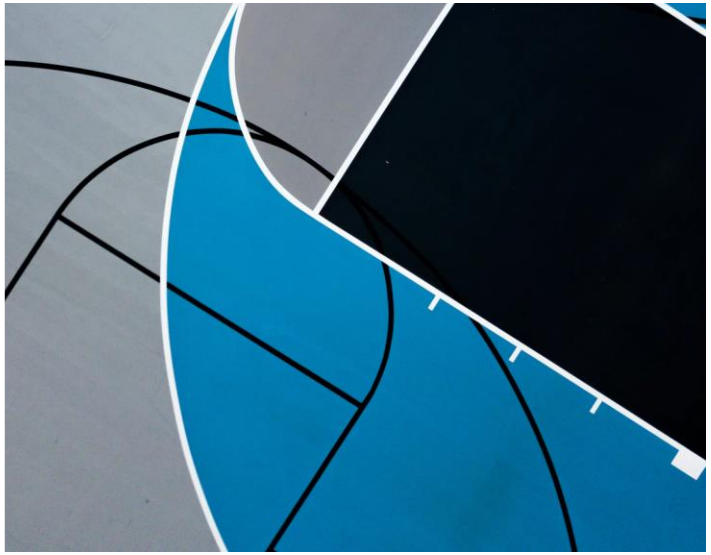


Socially wicked problem situations

- ✓ high social complexity
- ✓ low technological complexity

Examples:

- negotiating the non-proliferation treaty
- founding the United Nations



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CONCLUSIONS: NOW WHAT IS RRI?

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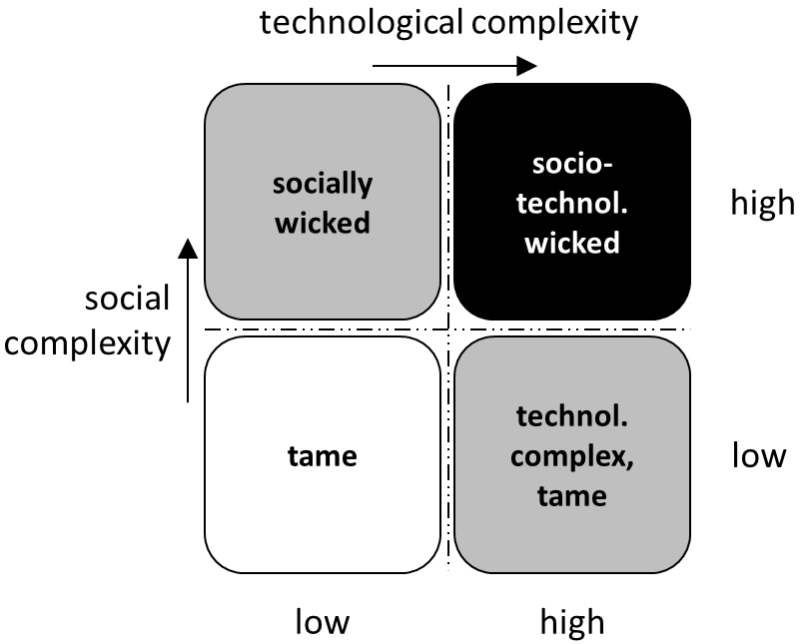

Socio-technol. wicked problem situations

- ✓ high social complexity
- ✓ high technological complexity

Examples:

- Digitalization
- Climate Change
- Data use for online advertising
- Biased algorithms

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CONCLUSIONS: NOW WHAT IS RRI?

Responsible Research & Innovation: option or necessity

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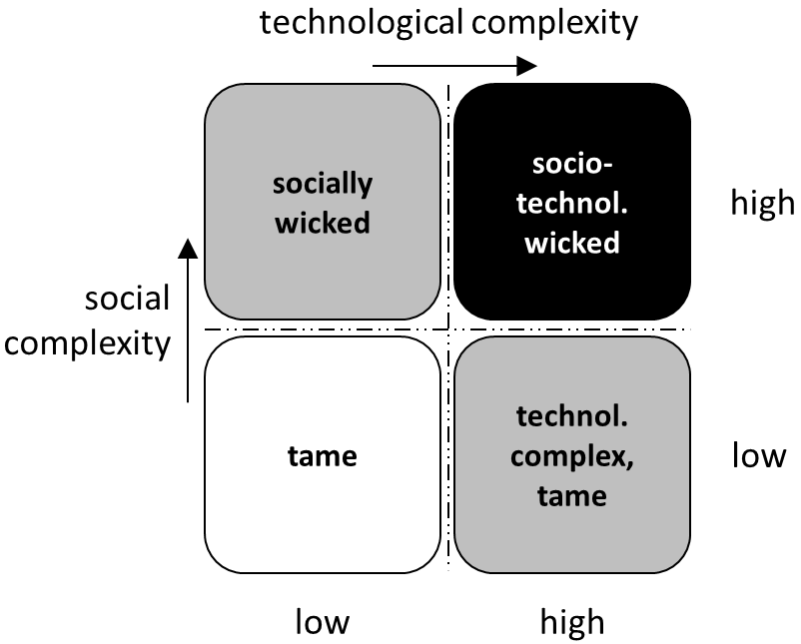

Socio-technol. wicked problem situations

- ✓ high social complexity
- ✓ high technological complexity

Examples:

- Digitalization
- Climate Change
- Data use for online advertising
- Biased algorithms

YET ALSO:

Every technological solution to a tame problem that spawns a wicked problem once embedded into society!

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CONCLUSIONS: NOW WHAT IS RRI?

Responsible Research & Innovation: option or necessity

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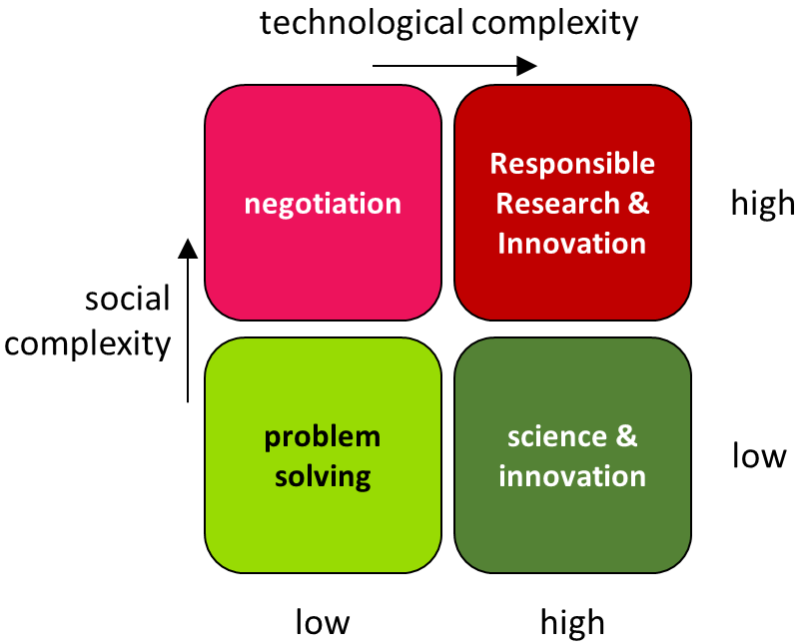

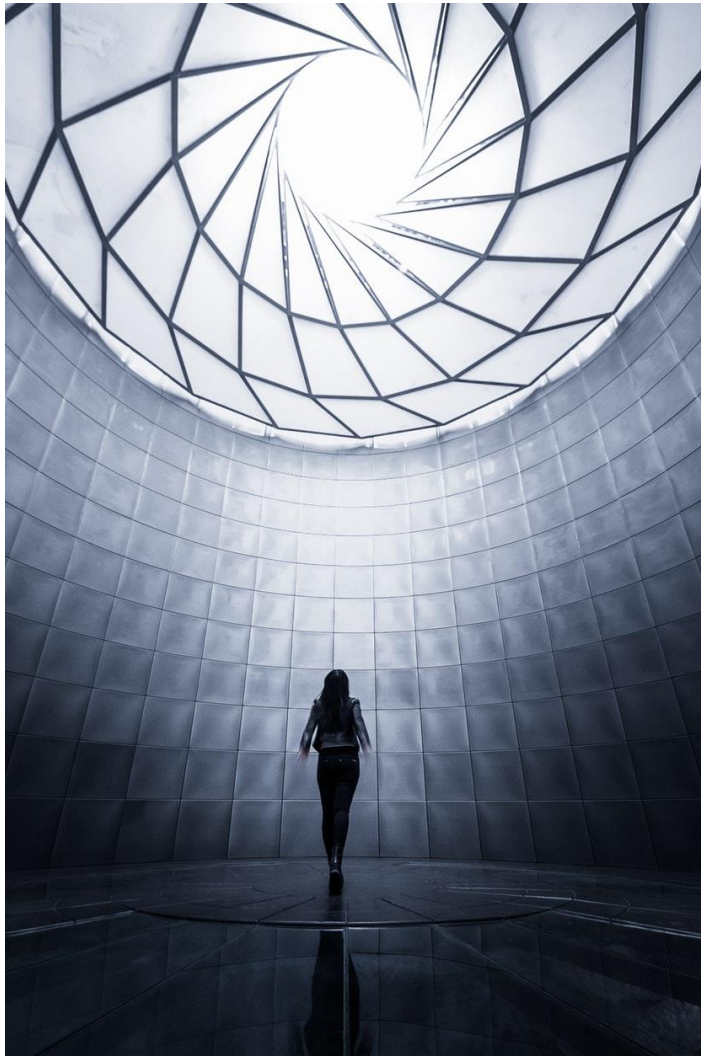

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CONCLUSIONS: WHAT'S NEXT?

Responsible Research & Innovation:
start here and do what is necessary!

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