ESRA Webinar 19 Oktober 2021

PREPARED.

Kort om Proactima

«Et tryggere og mer bærekraftig samfunn»

Analyser og rådgivning

FAGOMRÅDER:

Strategisk rådgivning og analyse

- Virksomhetsstyring og Risikostyring
- Bærekraft og ESG
- Beredskap og scurity

Teknisk og operasjonell rådgivning og analyse

- Operasjonell og teknisk sikkerhet
- Risikoanalyse
- Pålitelighet og tilgjengelighet
- Helse og Arbeidsmiljø

Kurs og opplæring

Verktøy og metoder

Vi kobler kunnskap sammen
 # tverrfaglige

Vi forenkler det komplekse
 # spisskompetanse

Vi utfordrer det etablerte
#Kompetente

Vi er nytenkende og nysgjerrige
 # innovative

Vi tilpasser oss kundens behov
 # skreddersøm

Vi holder det vi lover
 # «hel ved»

Bakgrunn

Fremtidens transportsystemer vil preges av autonome løsninger for både kollektivtransport og privat transport innenfor alle deler av transportbransjen

Det utvikles stadig nye løsninger der sikkerheten er et viktig kriterium i design og testing av de nye løsningene

Utviklingen skjer parallelt i alle deler av transportsektoren og hos de ulike aktørene, og det gjøres en rekke teknologivalg som kan sette premisser for sikkerheten i et fremtidig transportsystem

Regulering, ansvars- og eierforhold er ikke avklart eller tilpasset utviklingen og fremtidens integrerte systemer

Selv om sikkerheten i den enkelte løsningen vektlegges, er det stor usikkerhet knyttet til hvordan sikkerheten er ivaretatt i fremtidens transportsystem som helhet

Hvilke utfordringer ser vi i fremtidens mobilitetsektor ?

Hva kjennetegner fremtidens mobilitetsektor:

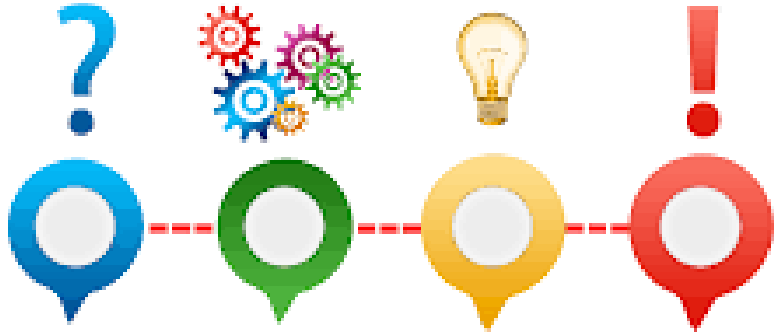
- Integrering av kontrollsystemer med IT systemer
- Lange digitale verdikjeder
- "Alle systemer" koblet sammen gjennom felles driftsplattformer og infrastruktur
- Komplekse interessentmiljøer
- Flåtestyring får en større rolle
- Autonomi: big data, algoritme og maskinlæring
- ……..

Noen nye utfordringer :

- Hvordan gi en god systembeskrivelse ?
- Risiko for hvem ? - mange stakholdere
- Nytt trusselbilde: cybersikkerhet, leverandørkjede angrep, etc.
- Storulykker/ «digital pandemi» ?
- Uklare ansvarsforhold
- Risikostyring via kontrakter ?
- Hvordan etablere ytelseskrav for komplekse / autonome systemer?

Hovedmålet er å

…utvikle kunnskap, tjenester og verktøy for effektiv identifisering, forståelse og håndtering av sårbarheter og risiko i fremtidens integrerte intelligente transportsystemer (IITS) som helhet



Proactima og SIITS

- *Samarbeidsprosjekt med ramme på ~31 mill*
  - *3-årig prosjekt*
  - *start 1. januar 2021*
- *Støttet av Norges Forskningsråd gjennom Pilot-T programmet*
- *«Nye smarte mobilitetsløsninger raskere over i anvendelse»*
- *Proactima – prosjektansvarlig*

Dette jobber vi med

AP1 Kunnskap

AP2 Metodeutvikling

AP3 Digitale verktøy

APPLIED AUTONOMY

AP4 regulering og standarder

AP5 ansvar, eierskap, forsikring

proactima.com

Prepared.

Challenges for risk management in the century of complex systems

ESRA 2021

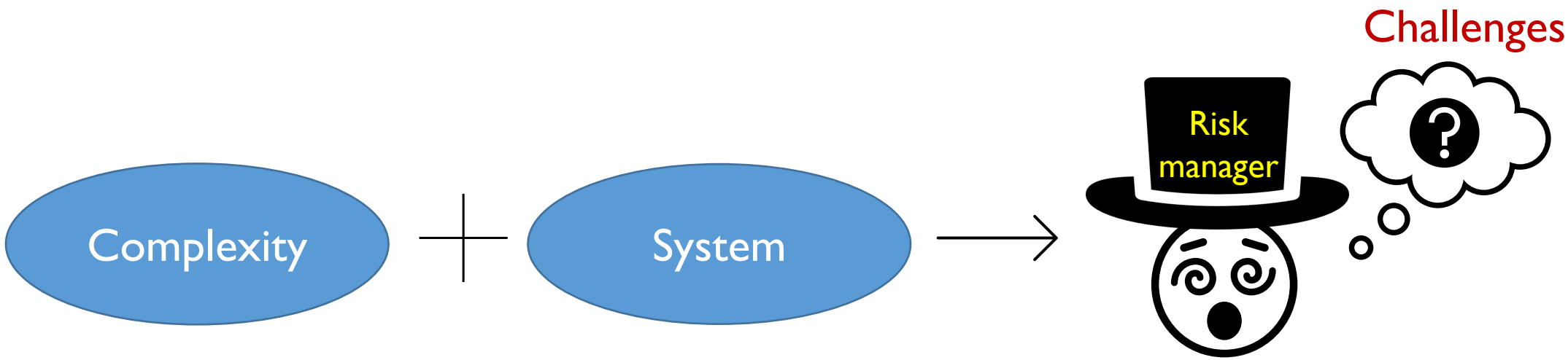
Dr. Surbhi Bansal

https://www.modernanalyst.com/Resources/BusinessAnalystHumor/tabid/218/ID/5885/A_Picture_is_Worth_A_Thousand_Words.aspx

Theme

'I think the next century will be the century of **complexity**'.

- Stephen Hawking (2000)



What is complexity ?

- Many perceptions but a single emerging theme about inability to predict its behavior or state

Many definitions to pick…

The complexity concept[1]

2.2. What Is Complexity? We define the complexity of a behavior as equal to the length of its description. The length of a description of a particular system's behavior depends on the number of possible behaviors that system could exhibit [8]. For example, a light bulb that has two possible

complex systems. To illustrate, Bar-Yam [3] defines a complex system as follows: "a complex system is a system formed out of many components, whose behavior is emergent, that is, the behavior of the system cannot be simply inferred from the behavior of its components". Simon

[31] says: "By a complex system I mean one made up of a large number of parts that interact in a non-simple way." Similar definitions can

A complex system[1]

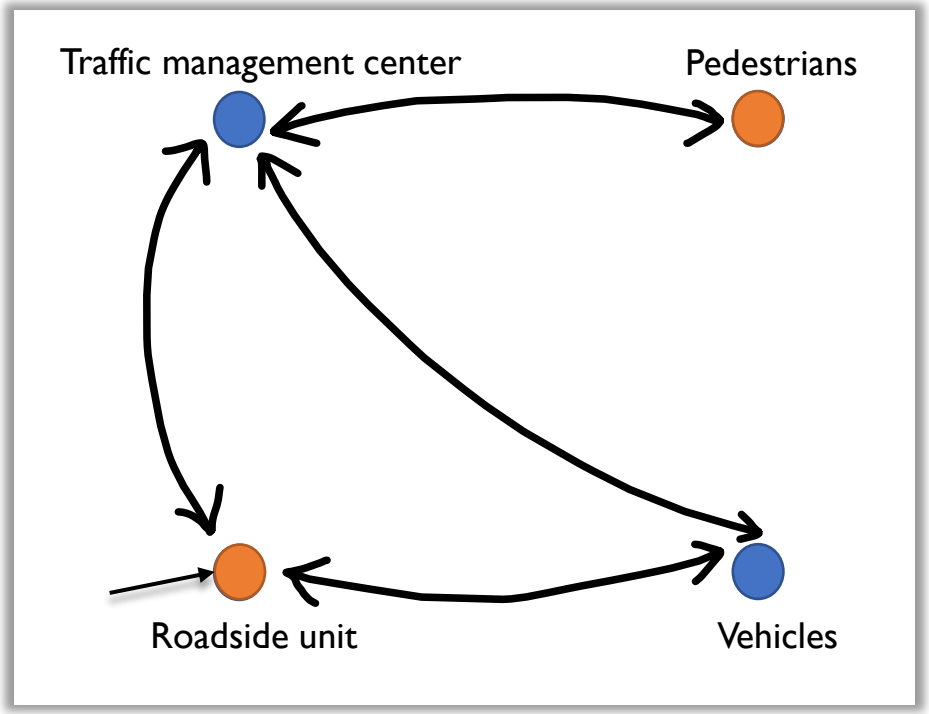
An activity is considered complex if we have poor knowledge about the consequences of the activity, even if we have strong knowledge about the consequences of its sub-activities.

A complex activity[2]

[1] Siegenfeld, Alexander F., and Yaneer Bar-Yam. 2020. An introduction to complex systems science and its applications." *Complexity* 2020
[2] Jensen, A., & Aven, T. (2018). A new definition of complexity in a risk analysis setting. Reliability Engineering & System Safety, 171, 169-173.

Complex system[1]

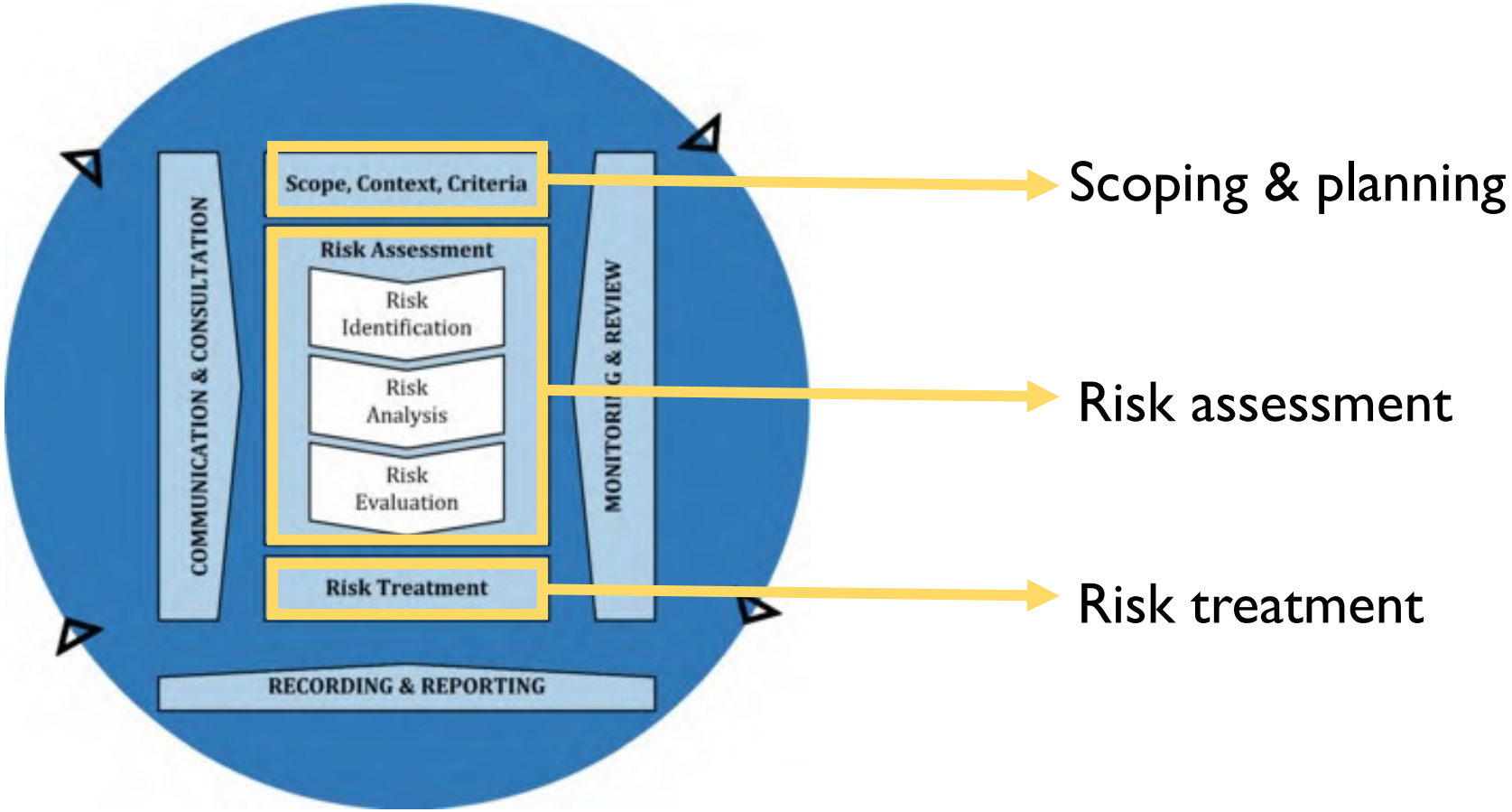
- Many dynamically interacting elements
- Non-linear interactions
- Feedback loops *(element of circularity)*[2]
- Open systems (*boundaries ??*)
- Evolving *(constantly adapting to achieve its purpose)*
- Often operates on the edge of chaos[3]
- …



Transport system

[1] Cilliers, P. 1998. Complexity and postmodernism. Understanding complex systems. London & New York: Routledge.
[2] Le Coze, J-C. 2005. Are organizations too complex to be integrated in technical risk assessment and current safety auditing? Safety Science 43: 613-638.
[3] Reiman, T., Rollenhagen, C., Pietikäinen, E., Heikkilä, J. 2015. Principles of adaptive management in complex safety critical organizations. Safety Science 71: 80–92.

Risk management process

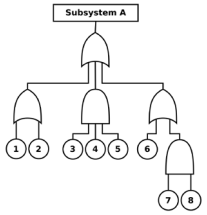


Source: ISO 31000:2018 *Risk management - Guidelines*

The traditional risk management approach…

Scope, context, criteria

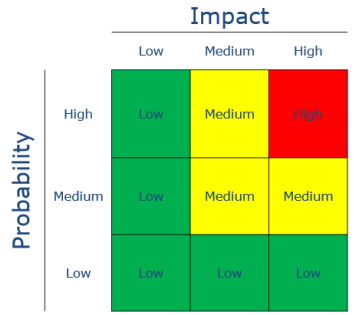
Understand system
(separability)



(HAZID, FTA, ETA, …)

Risk assessment

Identification, analysis, evaluation



Risk treatment

TADAA…
Result!

Suggest measures!

Challenges for RM (1)

1. Scope, context, criteria

How to identify…

Relevant stakeholders? Conflicting values & goals?

Elements, functions, boundaries, interactions, feedback loops, … ??

1 ≤ Decision criteria? How to chose?

Challenges for RM (II)

II. Risk assessment

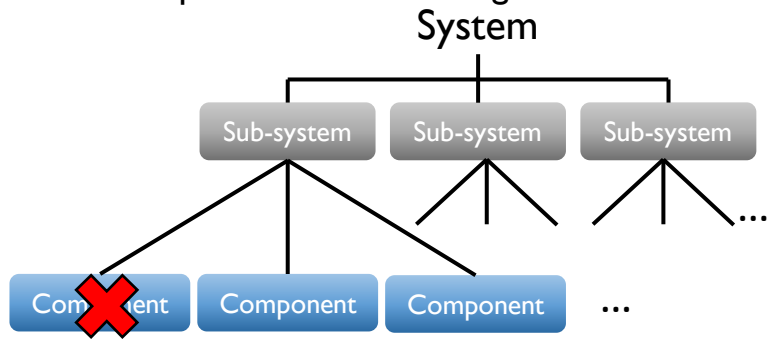
Which method? Which perspective to look at from?

Unexpected outcomes?

Validity of assessment? *(evolving)*

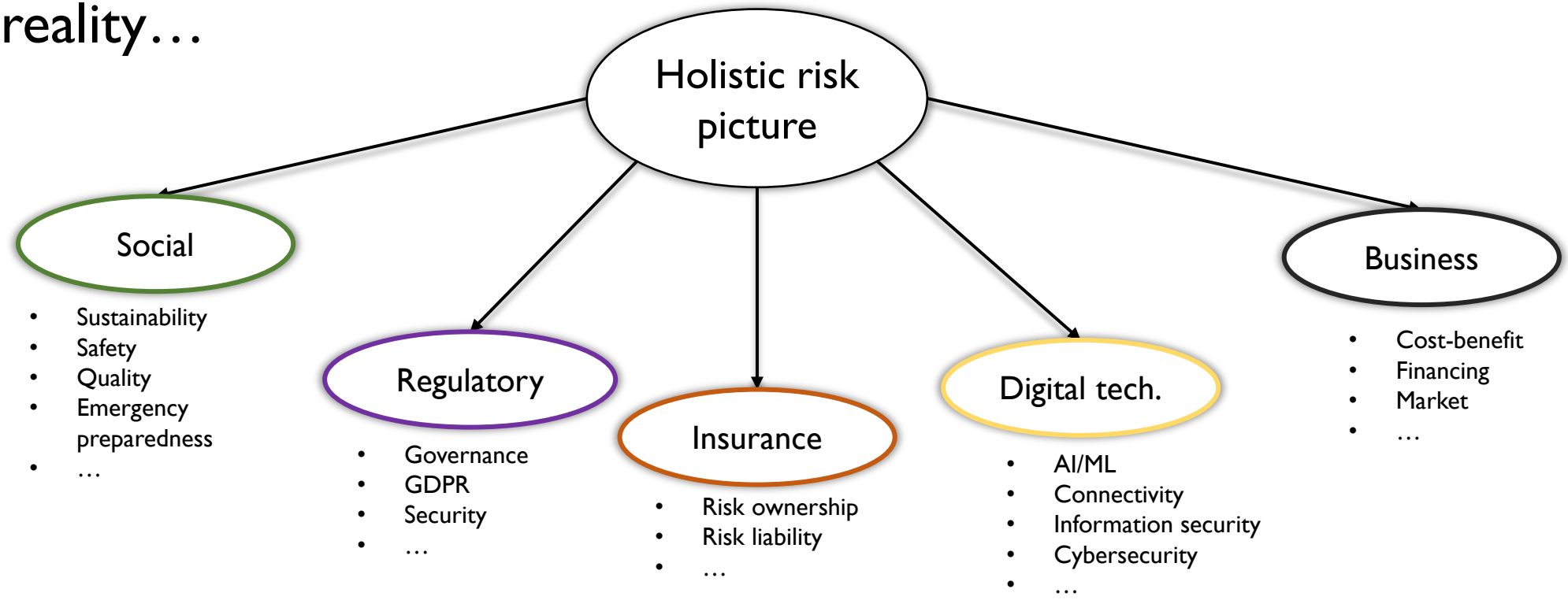
Uncertainties of results?

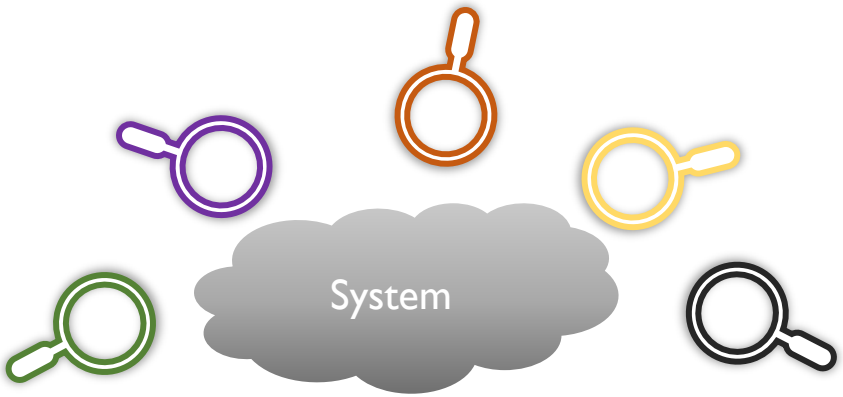
'Cause- consequence' linear thinking does not suffice



Source: Reuters

In reality…





Multiple Stakeholders
↓
Different perspectives

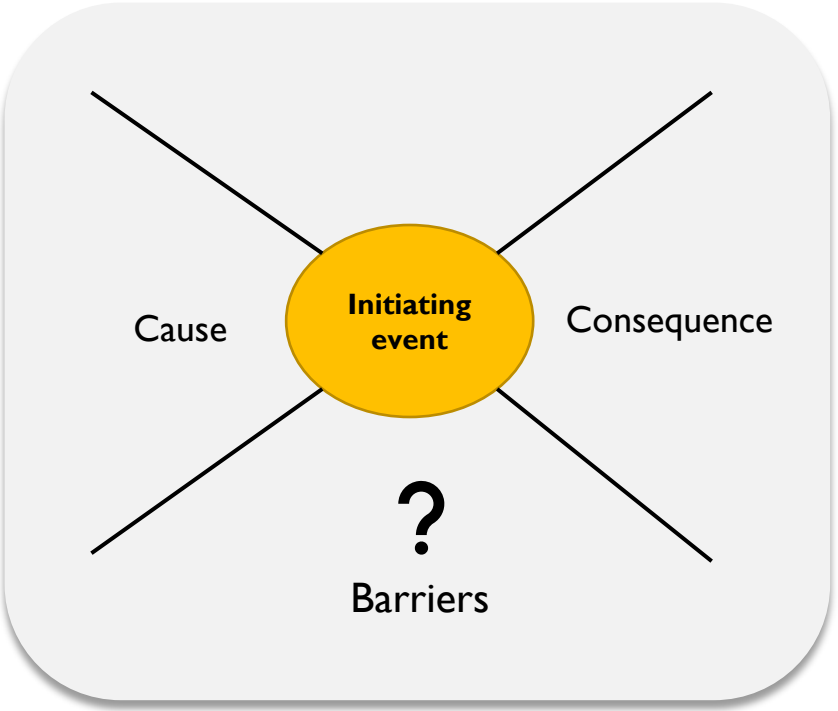
Challenges for RM (III)

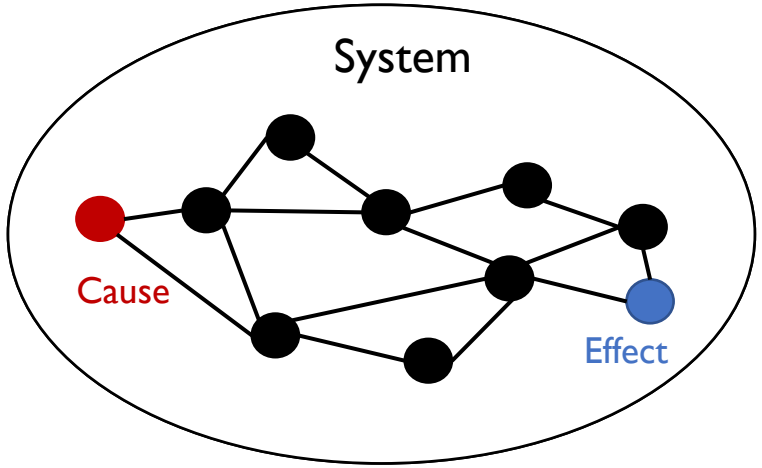
III. Risk treatment

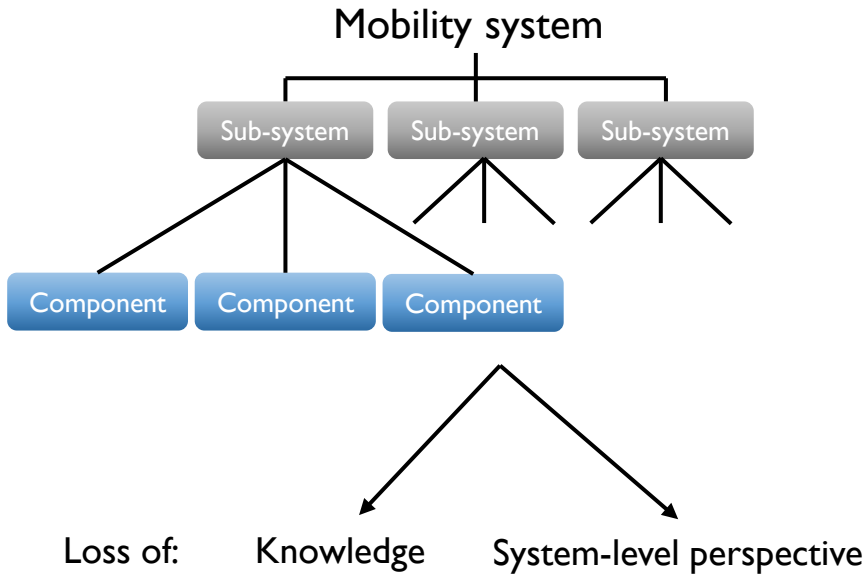
Which risk treatment strategy to choose?

Where to place barriers for maximum impact?

Can barriers introduce new risks?







Poor ability to make deeper impact!

Challenges for RM (IV)

- Not experts
- Different system understanding
- Limited knowledge

Risk communciation

?

Example:Vulnerabilities for self-driving cars

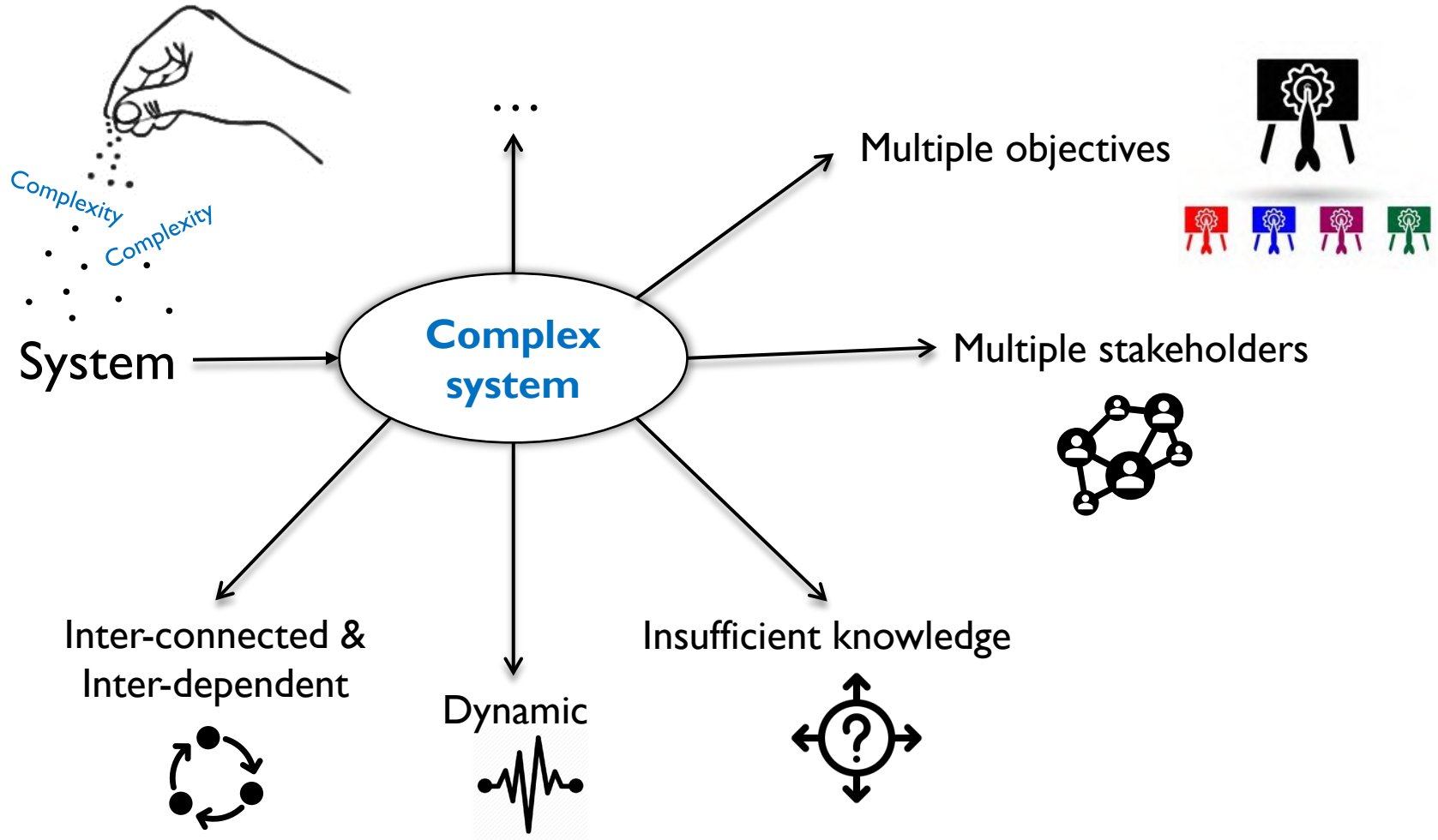
Public & users

Authorities

Operators

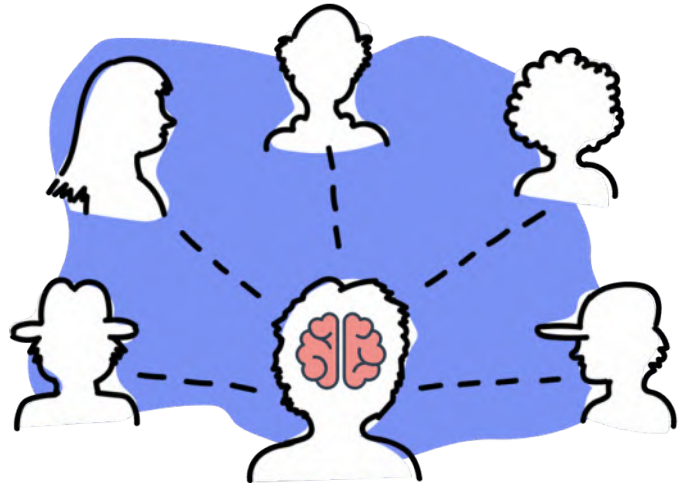
Suppliers

Challenges of complex systems



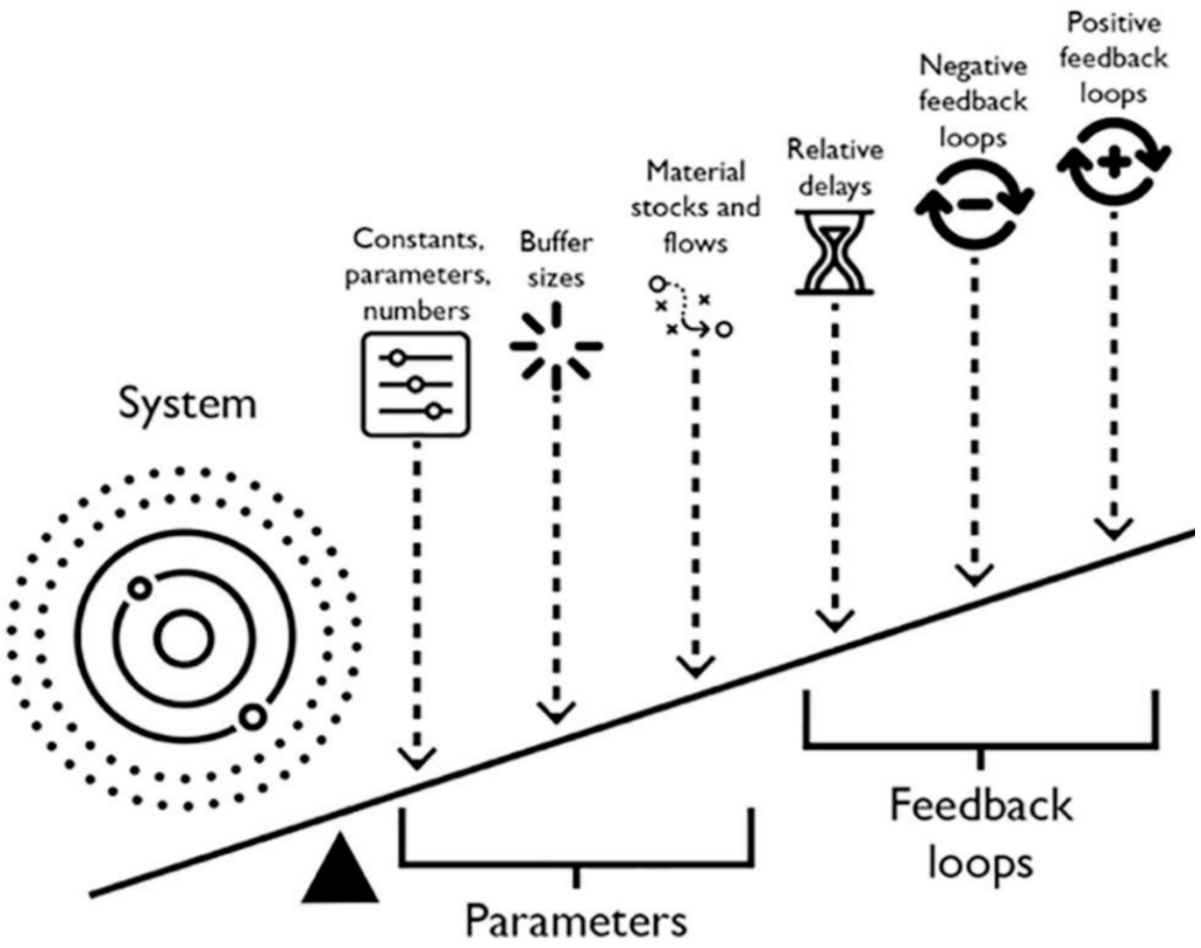
New challenges for risk management (Aven & Renn, 2010)

- Find ways to characterize uncertainties in complex systems.
- Focus on synergistic effects between different threats
- Integrate social perceptions and scientific risk picture
- Expand knowledge about consequences of emerging risks and human actions.



Aven, T., & Renn, O. (2010). Risk Management and Governance : Concepts, Guidelines and Applications (1st ed. 2010., Vol. 16). Springer Berlin Heidelberg : Imprint: Springer.

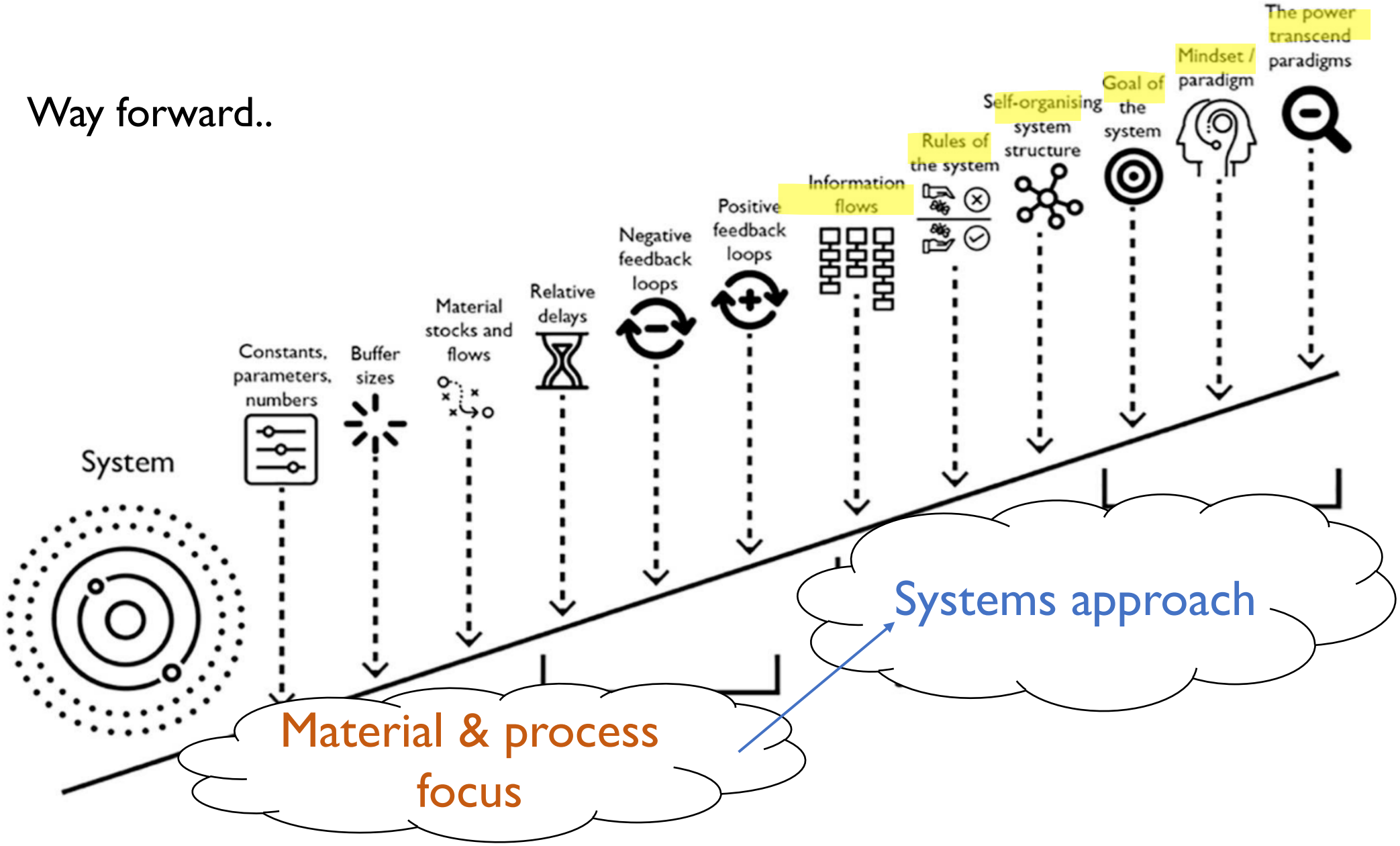
Way forward.. ?



https://medium.com/the-shape-of-things-to-come/ipcc-a-site-for-innovation-in-its-own-right-4a321e5b6d22

Meadows, D. (1997). Places to Intervene in a System. *Whole Earth*, *91*(1), 78-84.

Way forward..



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Thank you!

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