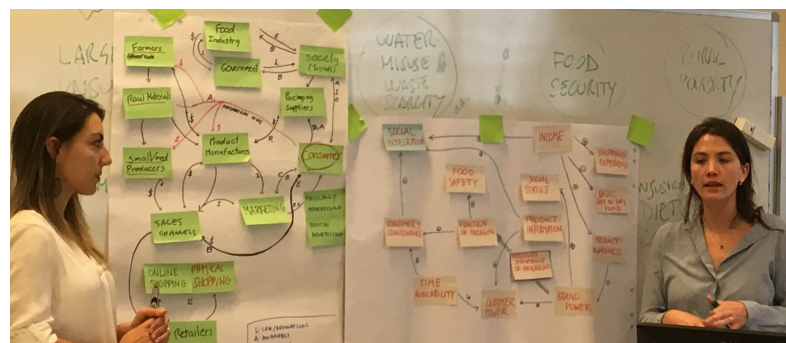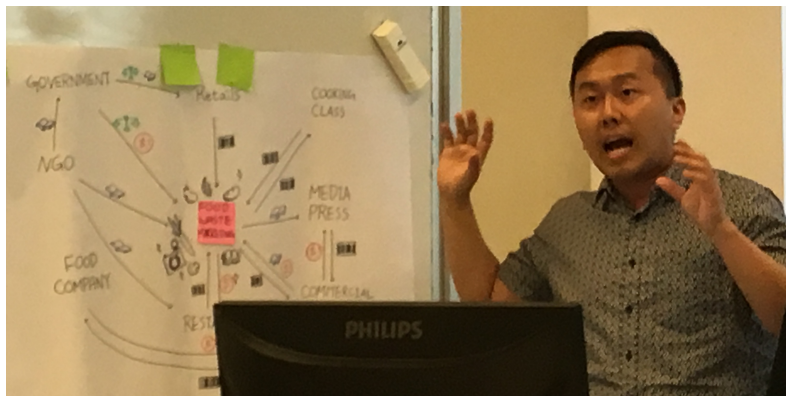# Systems thinking, mapping & change in food and agriculture

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Key question and definitions

How can we encourage actors in the agri-food sector to collectively understand their (past and present) problems and collectively envision a way to address them?

We use systems thinking... [a way of understanding reality and enacting change by considering the dynamic interactions among multiple interdependent social and ecological agents].

…to propose an approach of systems mapping… [the co-creation of visual depictions – for example, diagrams, maps, or sketched models – of a complex system]

…meant to support systems change [societal changes that, to seriously address current problems, are deep enough to challenge power structures and broad enough to cut across multiple sectors]

Our intellectual roots are:
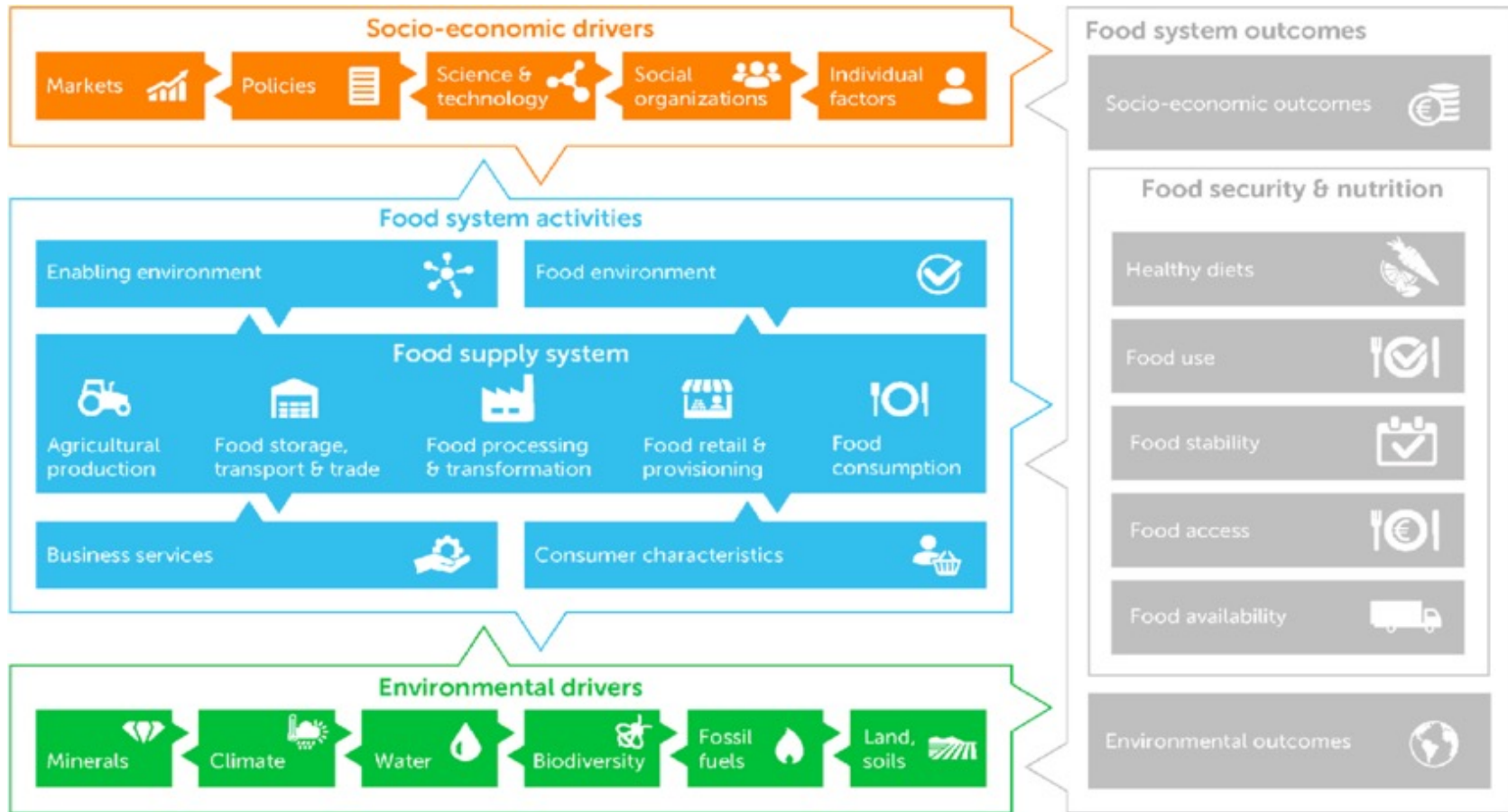
Engineering
(Forrester, Sterman)

Socio-Ecological Studies
(Holling; Ostrom; Meadows)

Social Sciences
(Van Bertalanffy; Cilliers)

Current 'food systems approaches'

Socio-economic drivers
- Markets
- Policies
- Science & technology
- Social organizations
- Individual factors

Food system activities
- Enabling environment
- Food environment

Food supply system
- Agricultural production
- Food storage, transport & trade
- Food processing & transformation
- Food retail & provisioning
- Food consumption
- Business services
- Consumer characteristics

Environmental drivers
- Minerals
- Climate
- Water
- Biodiversity
- Fossil fuels
- Land, soils

Food system outcomes
- Socio-economic outcomes

Food security & nutrition
- Healthy diets
- Food use
- Food stability
- Food access
- Food availability

- Environmental outcomes

Van Berkum et al. (2018); Borman et al. (2022)

Our constructive criticisms:

How can actors express and debate their problems in this representation of a system?
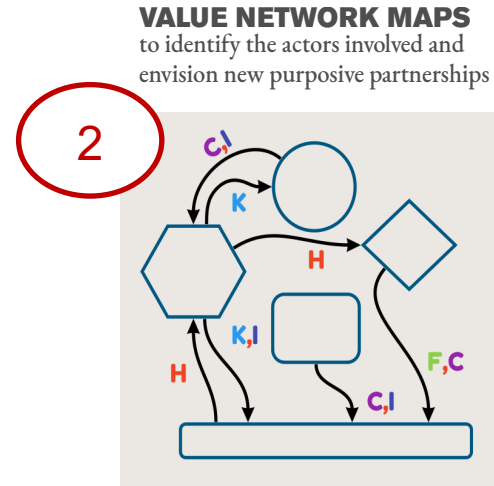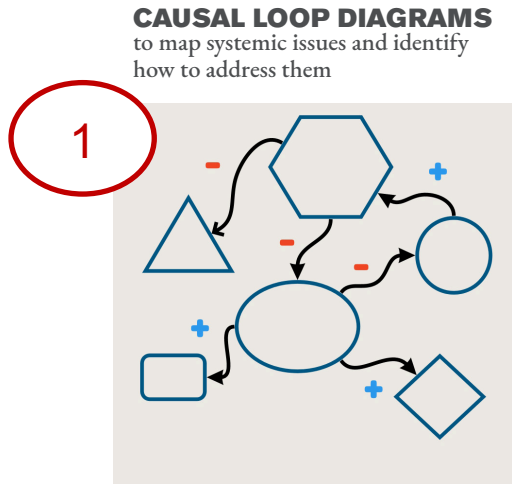
How do these problems, as lived by actors, affect the whole agri-food system?

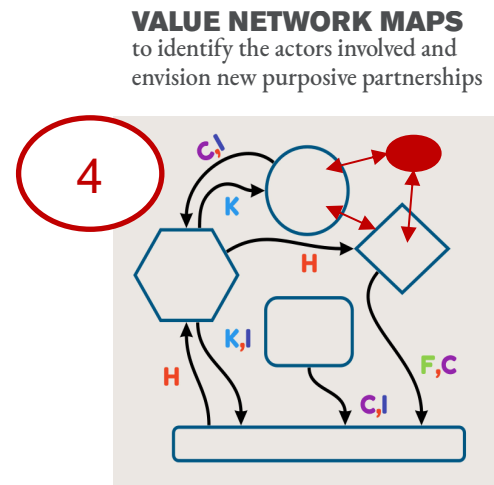How can actors re-organize to address the problems in this representation of a system?
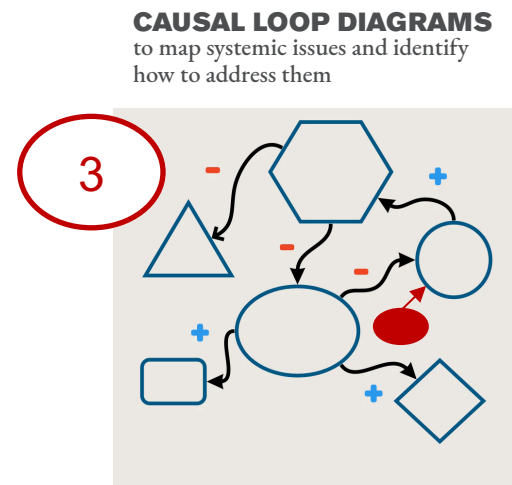
Our systems mapping approach in 4 phases

Configurations of problems and **configurations of actors** are two sides of the same coin
(Senge et al. 2007)

SENSEMAKING
(i.e. understanding problems)

ENVISIONING
(i.e. addressing problems)

CAUSAL LOOP DIAGRAMS
to map systemic issues and identify
how to address them

1

VALUE NETWORK MAPS
to identify the actors involved and
envision new purposive partnerships

2

CAUSAL LOOP DIAGRAMS
to map systemic issues and identify
how to address them

3

VALUE NETWORK MAPS
to identify the actors involved and
envision new purposive partnerships

4

We need to deeply comprehend problems
to seriously attempt to addressing them (Cilliers 1989)

Our empirical grounds (2015-2022)

Our recent experience in testing and adapting systems mapping approaches

| Title (and year)	Participants	Session length	Country (institutions)
Global Center for Food Systems Innovation (2013-2018)	80 policy-makers, development agency officers and researchers	4 hours (causal loop diagrams + value network maps)	Malawi, Southern and Eastern Africa, United States (USAID)
Putting Big Ideas into Practice: Developing Soft Skills for Large Systems Change (2015)	60 junior scholars across life and social sciences	30 hours across five days (causal loop diagrams + value network maps)	Poland, The Netherlands (Pro-Akademia, European Regional Funds)
Nudge Global Impact Challenge on Global Peace, SDGs and Circular Economy (2016-2021)	90 social entrepreneurs, managers, Master students and activists below 30 years old	2-3 hours (causal loop diagrams + value network maps)	The Netherlands (Nudge B-Corporation and Wageningen University)
Entrepreneurship and Innovation in Emerging Economies (2017-2020)	75 Master students in 3 years	30 hours across 10 workshops (causal loop diagrams + value network maps)	Global, The Netherlands (Wageningen University and EU's Comenius program)
Organizing business models for SMAllholder REsilience (OSMARE) project (2017-2020)	120 dairy farmers, seed growers, value chain actors, policy-makers, and researchers.	5 workshops ranging between 2-4 hours (causal loop diagrams + value network maps)	Malawi, Zimbabwe (NWO/WOTRO and CGIAR/CCAFS)
Beyond Fair Trade: Transnational entrepreneurship and partnerships with African Diaspora (2019)	15 researchers, entrepreneurs in the cacao sector, civil society organizations and Master students.	2 hours (causal loop diagrams + value network maps)	Ghana, The Netherlands (Science Shop, Wageningen University)
Food Design and Innovation (2018-2022)	80 Master students	4 hours (causal loop diagrams + value network maps)	Global, Italy (Polytechnic School of Design)
Changing Socio-Ecological Systems at the Theory-Practice Nexus (2021)	75 management researchers, junior scholars, and management practitioners	3 hours of preparation (causal loop diagrams + value network maps) + 1,5 hours of pitch and reflection	Academy of Management (AoM), Organization & Natural Environment (ONE) and Social Issues in Management (SIM) Divisions
Capacity Development for Agricultural Innovation Systems (CDAIS) (2019)	70 life scientists, research managers, facilitators, consultants, value chain actors and entrepreneurs in the fish sector	16 hours across 2 workshops (causal loop diagrams + value network maps)	Ethiopia with the Feed the Future (FtF) Livestock Innovation Lab, Nigeria with the FtF Fish Innovation Lab (USAID)
Entrepreneurship for systems change (2021-) and Organizational behavior and systems change (2021-)	300 Master students (Program Grandes Écoles, PGE + Master of Science) in 1 year	18 hours across 6 workshops (causal loop diagrams + value network maps)	Global, France (Montpellier Business School)
Comprendre et confronter problèmes socio-écologiques complexes (2022-)	25 company managers, entrepreneurs and Master students	6 hours (causal loop diagrams + value network maps)	Global, France (Montpellier Business School in collaboration with Veolia France)
ENcouraging Farmers towards sustainable agri-food SYStems (ENFASYS) project (2022-2026)	25 applied researchers, research managers, consultants, civil society organizations and junior scholars	1,5 hours (causal loop diagrams + value network maps)	Europe, Belgium (European Commission's Horizon 2020 and Farm to Fork Strategy)

…plus five new settings in 2023 across Europe, Africa and Latin America.

Examples of systems mapping (process)

Examples of systems mapping (process)

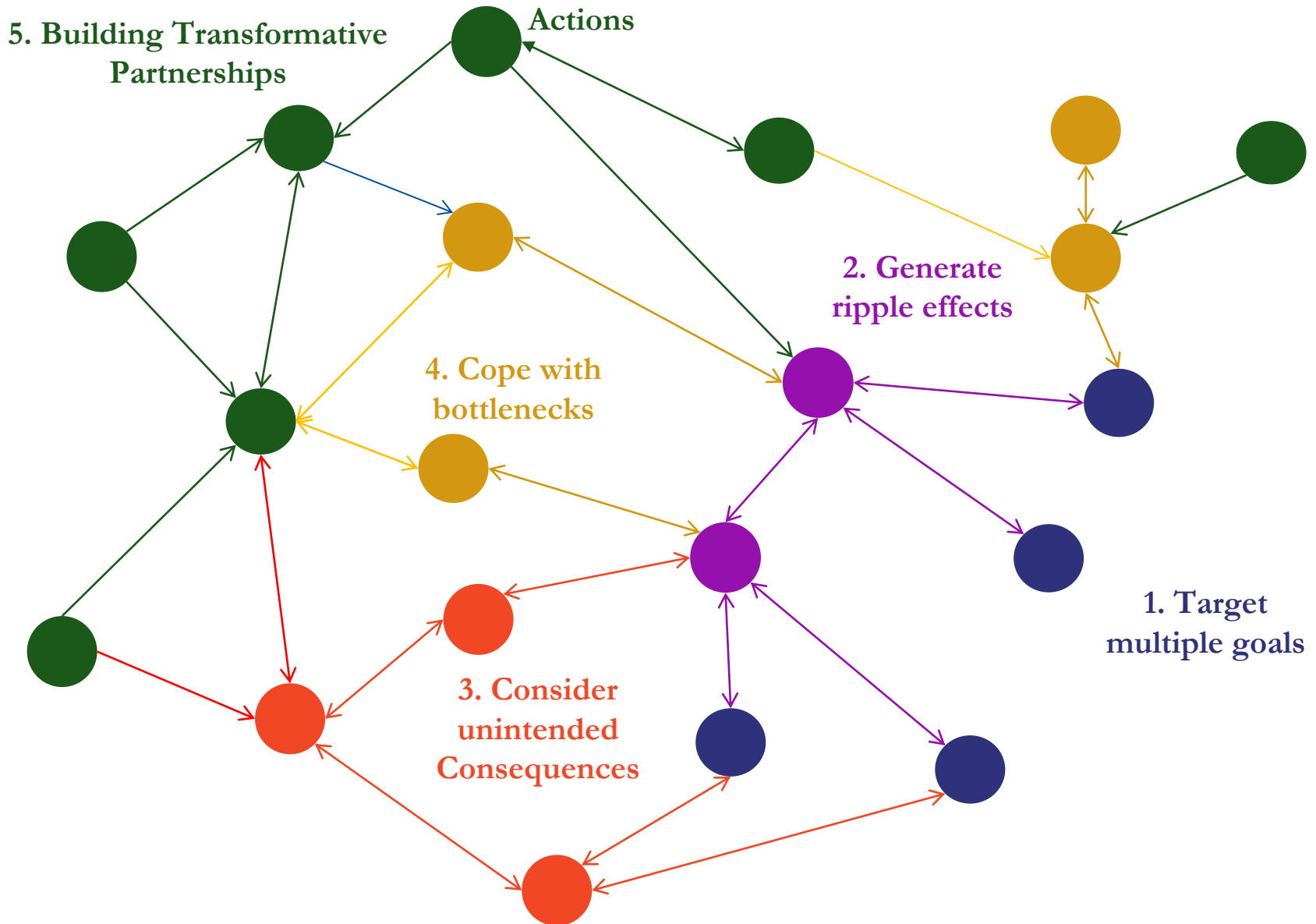# Examples of systems mapping (outcome)

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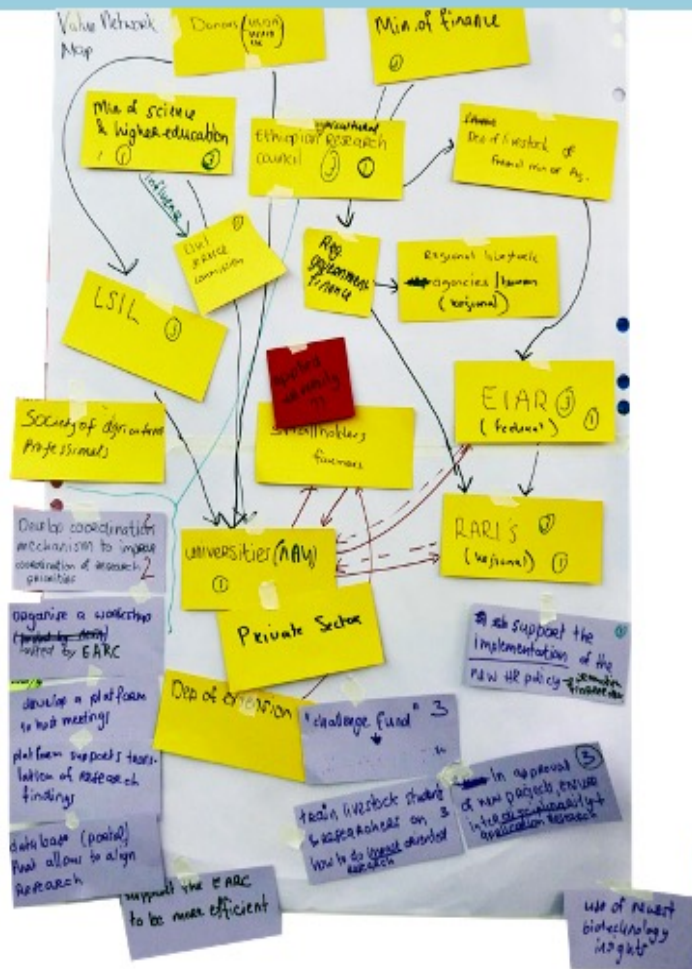
Implications for systems change

Final message

How can we encourage actors in agri-food systems to collectively understand their (past and present) problems and collectively envision a way forward?

1. We cannot understand and address problems in agri-food systems without deeply considering the interconnected dynamics with other sub-systems.

2. To address these problems, we need tools to map them and to discuss how to deeply re-organize their network and resources to address them.

3. We have participatory and visual tools (= systems mapping tools) available to rapidly (but deeply) consider and act upon the problems in agri-food systems:

> → In this paper, we propose to combine tools (causal loop diagrams and value network maps) across two iterative phases (sensemaking & envisioning) to collective understand and envisions ways to address complex problems affecting agri-food systems.

Thank you!
Please reach out with comments, suggestions, ideas.

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