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A possible pathway towards sustainable food systems in Europe, and beyond



8/2/2024, Hugo de Vries, Ph.D., INRAE, France, Coordinator of the HorizonEurope Project FOODPaths

Sustainable food systems (SFS) are considered food systems that are **capable of providing food for all future generations anywhere, anytime**¹. A **musician** would say 'These are like musical waves that never die out, allowing our grand...children to hear music as well'. A mathematician expresses this as endlessly evolving **sinusoidal** waves in two dimensions, or **helical patterns** in three dimensions², instead of endless growth or decline patterns³. It is not amazing that sinusoidal and helical patterns are omnipresent in natural evolution like for predator-prey relations or the structure of DNA.

Such sinusoidal waves – or helical patterns – can only evolve between limits. This implies that for **each sustainability indicator, there is both a lower and upper limit**. *The first option is to translate European sustainability objectives (like the Farm-to-Fork ones, or even the Sustainable Development Goals) into sustainability indicators with upper and lower limits, serving a future EU legislative framework for SFS.*

The fact that each sustainability indicator has an upper and lower limit provides another advantage. Instead of confronting food system actors, like farmers, with one strict objective – and being punished by surpassing it – upper and lower limits **allow for creating a playing field for actors** in which they have the freedom to operate and make their choices while respecting the boundaries.

The notion of a playing field provides the opportunity to **describe different food systems (FS)⁴ in a similarly structured way, using the building blocks of a game**. All food systems can be characterized by a context (playing field), FS actors (players), resources (pieces), FS activities like production (moves), incentives and legislation (rules), duration of activities (time), and the (un-)sustainable outcomes (win/lose)⁵. This allows for exchanging best practices, avoiding already made mistakes, and jointly striving for better outcomes. *Here, the second option is to study different Food System Cases using the structure of a game and exchanging best practices⁶.*

The next question is: '**How can FS actors collectively play to reach sinusoidal outcomes?**' Again, a musician can help us. **The output of an orchestra is only harmonic if all musicians individually play harmonically**. If one musician plays falls, the overall outcome is falls. This holds for orchestras of all sizes, 'scales' or consisting of sub-groups of musicians'. Since each musician likes to have some freedom to play (like in jazz music), still the 'ensemble' needs to be synchronized and fine-tuned. This is in the hands of an orchestrator.

A similar reasoning holds for European or global food systems. **Sustainable outcomes are reached if each food sub-system operates harmonically, thanks to an orchestrator**. This holds for any scale at which a (sub-)food system is considered. Is this always realistic? A simplified example is the following. Suppose that seafood is strongly recommended for sustainably produced, healthy diets. Then, mountain regions depend on coastal regions. Inversely, coastal regions depend on mountain regions for freshwater supply. **Hence, even if two (or more) sub-systems are not entirely sustainable, one or**

¹ With reference to the definitions provided by the Brundtland Commission (WCED, 1987) and the FAO (2019).

² Doi: 10.1007/s10806-021-09850-7 (de Vries et al., 2021)

³ Systems that reveal endless growth (or decline) patterns, end up in chaos (or frozen states); (Prigogine & Stengers, 1985).

⁴ Doi: 10.1016/j.gloenvcha.2007.09.002 (Ericksen, 2008)

⁵ Doi: 10.1016/j.tifs.2022.03.027 (de Vries et al., 2022)

⁶ It should be noted that we are here dealing with serious games, since the viability of our planet is at stake.

more complementary exchange mechanisms allow both to become sustainable. Here, **transparency** is required to reach overall sustainable outcomes.

A subsequent question is whether countries or regions can become sustainable food systems. **Nations are political and not SFS-oriented constructs** (except at the beginning of agricultural production, starting 12000 years ago⁷). This yields a *third option: 'Mobilize socio-cultural and natural sciences to re-design and categorize food systems in Europe, at different scales, which all have the potential to act sustainably ('harmonically'), either individually or via some exchange mechanisms.* Again, the structure of the game can be here used to coherently describe the different FS and their boundaries. It is suggested to include groups of citizens – in their **various** professional, personal, and consumer roles – to understand their preferences, acceptances, and needs. **Inclusivity** is crucial to hear all their voices.

In games, it is not only the structure that counts, but also **the way players (public, private, academic, civil society, philanthropic,...) behave, act, and interact.** The structure of a game, like 'football' or 'chess', permits playing an endless number of plays. The behavior and moves of the players define which plays are being played, how moves are interpreted by others, which new conventions are set, etc. In a game, we can **distinguish four interactions:** (i) collective ways to reach an objective ('point of gravitation'), (ii) cooperation versus competition between multiple players ('attractive and repulsive forces'), (iii) the capacity of a single player to adapt ('adaptive, weak force') and its capacity to be resilient by strengthening its core competencies (strong force)⁵; this set of four interactions interestingly resembles the *unification theory in physics* or actions of clusters in management sciences. This leads to *a fourth option: understanding the complexity of FS and the capacity of interacting actors to adapt to external stressors such that sustainable outcomes are always reached. Hereto, a (virtual) EU center on complex food systems is interesting coupled with an inclusive Partnership on SFS.*

Why is this crucial NOW? Numerous indicators provide 'alarming signals', especially the FS-related ones, like climate change, biodiversity loss, fresh and safe water supplies, hunger, overweight and obesity, and over-exploitation of planetary resources (on average 1.7 planets are currently used for our daily needs)⁸. Hence, interventions are urgently needed, touching upon the most appropriate leverage points⁹ to change the current pathways. **Insights into the complexity of FS help to understand which leverage points to choose, what (radical) innovations** are to be supported, and which potential **trade-offs and co-benefits** are to be considered and monitored.

In the search for leverage points, the **REFRAME methodology**¹⁰ plays a crucial role, because it **mobilizes collective intelligence** by working as teams with mutual respect, trust, ethical guidelines, complementary competencies, and jointly elaborated narratives. A fifth option is to further explore the REFRAME methodology for FS cases. To provide overall directionality toward sustainable outcomes, the REFRAME methodology is proposed to link with the **INCAS Approach**¹¹. The latter starts with designing scenarios, used to prioritize pathways for different FS, then executing innovative activities, monitoring their progress towards the scenarios, and adapting their pathways if necessary; hence an INtelligent Complex Adaptive Systems (INCAS) approach to reach Sustainable Food Systems.

A final option is to set up **an orchestrating group** for this pathway taking action immediately to accelerate the transition towards SFS and safeguard our cultural food heritage.

⁷ <https://education.nationalgeographic.org/resource/development-agriculture/>

⁸ https://scar-europe.org/images/FOOD/Main_actions/SFS_Partnership_SRIA_31012023.pdf & www.footprintnetwork.org/ & <https://scientificadvice.eu/advice/a-sustainable-food-system-for-the-european-union/> & www.foodpaths.eu etc.

⁹ E.g. ISBN 0876631650 (Meadows et al., 1972); ISBN 978-92-76-08794-6 (Kauffman, 1995); (Halberg & Westhoek, 2019)

¹⁰ ISBN-978-2-9602872-6-4 (REIMAGE Europe report)

¹¹ ISBN 978-3-319-58373-0 & <https://doi.org/10.1016/j.ifset.2018.04.004> (de Vries et al., 2017, 2018)