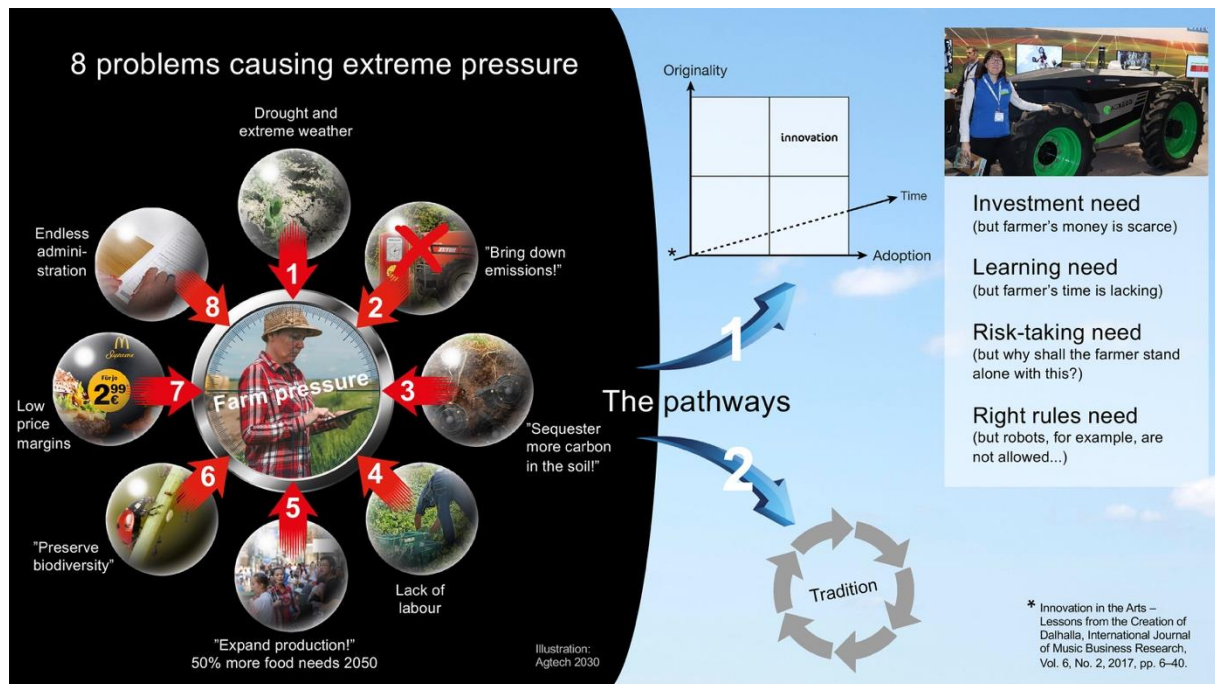


28 November 2023

## Core message from Per Frankelius

*The 2023 EU Agricultural Outlook Conference – Sowing the Future of EU Agriculture during the EU Agri-Food Days in Brussels Brussels, 6-7 December 2023  
Day 2, Session 7.2: 15.30 – 16.30*



Generally, the farmer of today's Europe is under pressure. This originates from many factors:

- 1) Drought and extreme weather
- 2) Bring down emissions
- 3) More carbon capturing
- 4) Lack of labour
- 5) 50% more food needs 2050
- 6) Preserve biodiversity
- 7) Low price margins
- 8) Endless administration

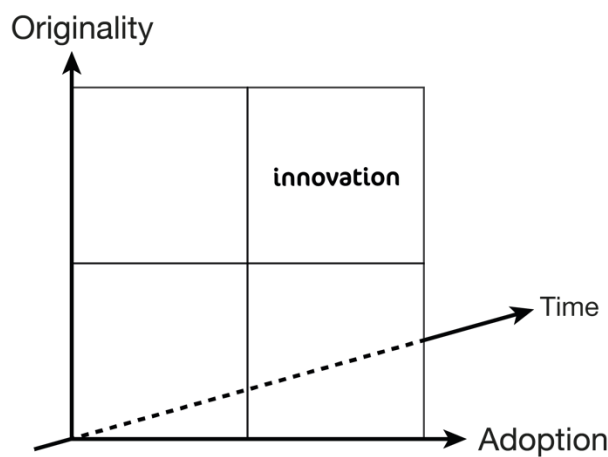
These are but examples of problems causing huge pressure. Some problems are of internal character, for example masculine norms, loneliness, isolation and lack of support. Others are crime and hard laws and regulations. High workload and a feeling that time is never enough are recurrent themes (Lundqvist et al 2022).

Among the policy-related factors putting pressure on farmers are some difficult goal conflicts. How, for example, shall the farmer boost carbon sequestering when at the same time avoid chemicals? Conservation agriculture without glyphosate is shown to be difficult. And how, for example, shall the farmer expand food production at the same time reduce

negative emissions? According to Louise McHough (personal communication 27 November 2023) the main reason why farmers feel pressed, is that they don't are invited to take part in new policy formation. They might feel that "city people" make the rules and don't trust the farmers regarding for example to save and develop the soil. Besides farmers psycho-social pressure the problems mentioned affect society as a whole. in the short run production of enough food, fibres and fuels are under threat. In the longer run the security of society is on stake (Frankelius, 2019).

So, what are the pathways for European farmers in light of the 8 pressure forces? I see two main alternatives: Innovation or tradition. Tradition – to improve present way of doing things – is probably not enough. No, we need innovation.

According to my research (Frankelius, 2017) innovation is a matter of three dimensions: Originality, Adoption and Time. To fulfil innovation is needed high originality, effective adoption and to fulfil that at a specific point of time. See figure:



Innovation defined in three dimensions: Originality, adoption and time. Source: Frankelius, Per (2017). Innovation in the Arts – Lessons from the Creation of Dalhalla, *International Journal of Music Business Research*, Vol. 6, No. 2, pp. 6–40.

The farmer can have different roles in the innovation process. He or she can be originator of the idea, developer, early adopter or a combination. There are many interesting innovation areas in modern farming. Some examples:

*Some innovation areas in modern agriculture (derived from Frankelius (forthcoming): Agtech innovation: Urgent needs and possible pathways (Heidelberg: Springer Nature).*

<b>1. New crops</b>
Revival of forgotten crops
High-speed phenotyping breeding
CRISPR/Cas9 modified crops
<b>2. Alternative cultivation concepts</b>
Sensor and AI-aided precision
Novel no-chem weed management
Field vegetation combinations
Compaction reducing concepts

<b>3. Break-through of field robotics</b>
Small and big field robots
Robot swarm concepts
Robot mode functions
Master and servant concepts
Autonomous drone scouting
<b>4. Smart connected systems</b>
Data standards and platforms
Rural communication infrastructure
Predictive maintenance
Remote support
Connected farm systems
Traceability customer value
<b>5. Intelligent water management</b>
Autonomous water vehicles
Subsurface drip irrigation
Fresh-water concepts
<b>6. Climate-smart energy and products</b>
Carbon-free farm energy concepts
Carbon-free necessities
Crop-based biofuel production
Fossil-free substitutes production
<b>7. Animal welfare technology systems</b>
AI-aided animal monitoring 24/7
Prevention of antibiotic usage
Proactive prevention of animal pain
Sensor-aided breeding on new targets

Regardless role the farmer needs to make investments. But farmer's money is scarce and that is a problem. The farmer also has learning need. But farmer's time is lacking and lack of time is not good for learning. Moreover, the farmer has to take risks when involved in innovation. He or she has a risk-taking need, but at the same time, why shall the farmer stand alone with this when farming innovation is needed for us all in society? Last but not least, farming innovation needs the right rules. But robots, for example, are not allowed. Drones are not allowed in beyond sight mode.

To conclude: Society needs farming innovation but that is not easy to fulfil if not society helps the farmers. One way to boost innovation is innovation platforms such as Agtech 2030 in Sweden. Agtech 2030 is an innovation initiative comprising 100 partners and coordinated by Linköping University. The main financiers are Vinnova, Region Östergötland and Linköping University. See more here: [www.agtech2030.com](http://www.agtech2030.com).

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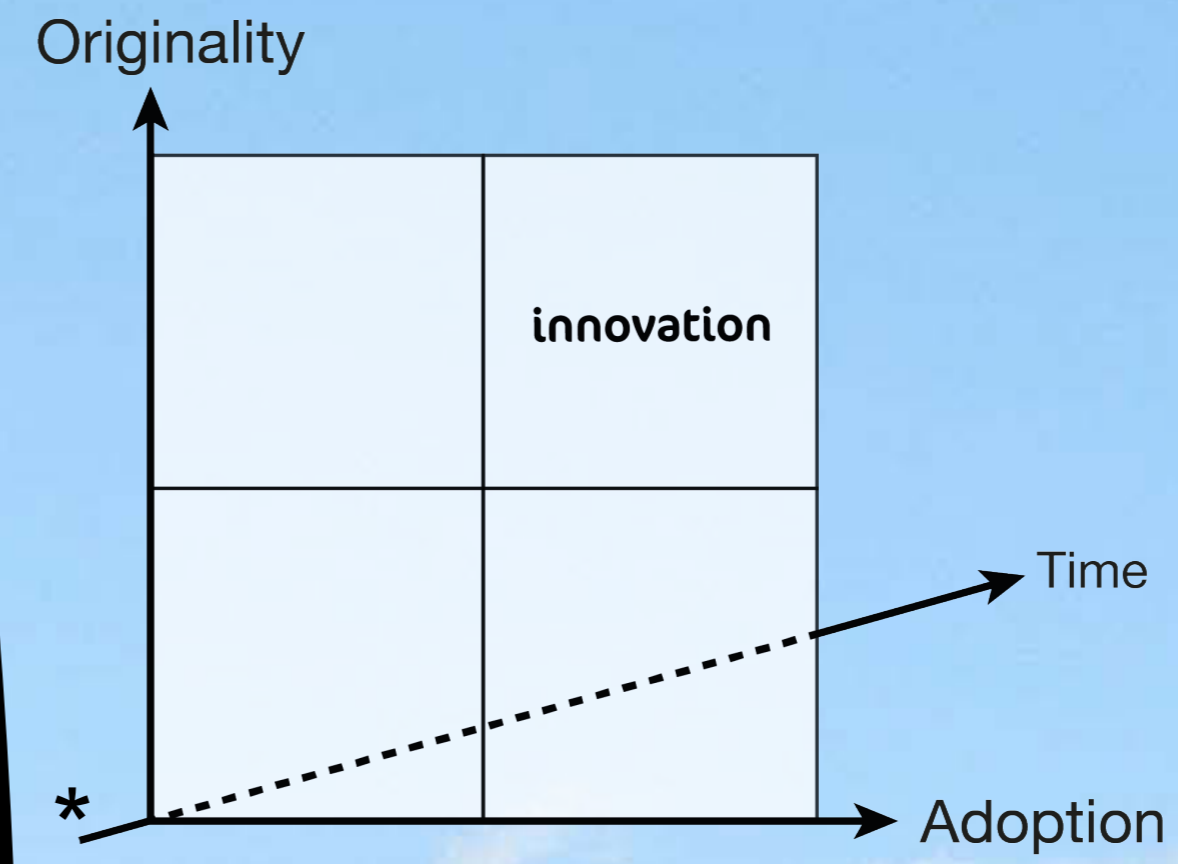
## About Per Frankelius

Per Frankelius, PhD, is Associate Professor at Linköping University and Chief Initiative Officer Innovation at the Agtech 2030 initiative focusing on agricultural innovations. Most of his ca. 500 publications (including articles in journals like *Journal of High Technology Management Research*, *the Lancet*, and *Agronomy Journal*) treats the subject area innovation in connection with agriculture. He holds 3 agtech patents (a precision harrow, a robot concept and a soil compaction system) and is involved in many innovation projects together with companies and other organizations.

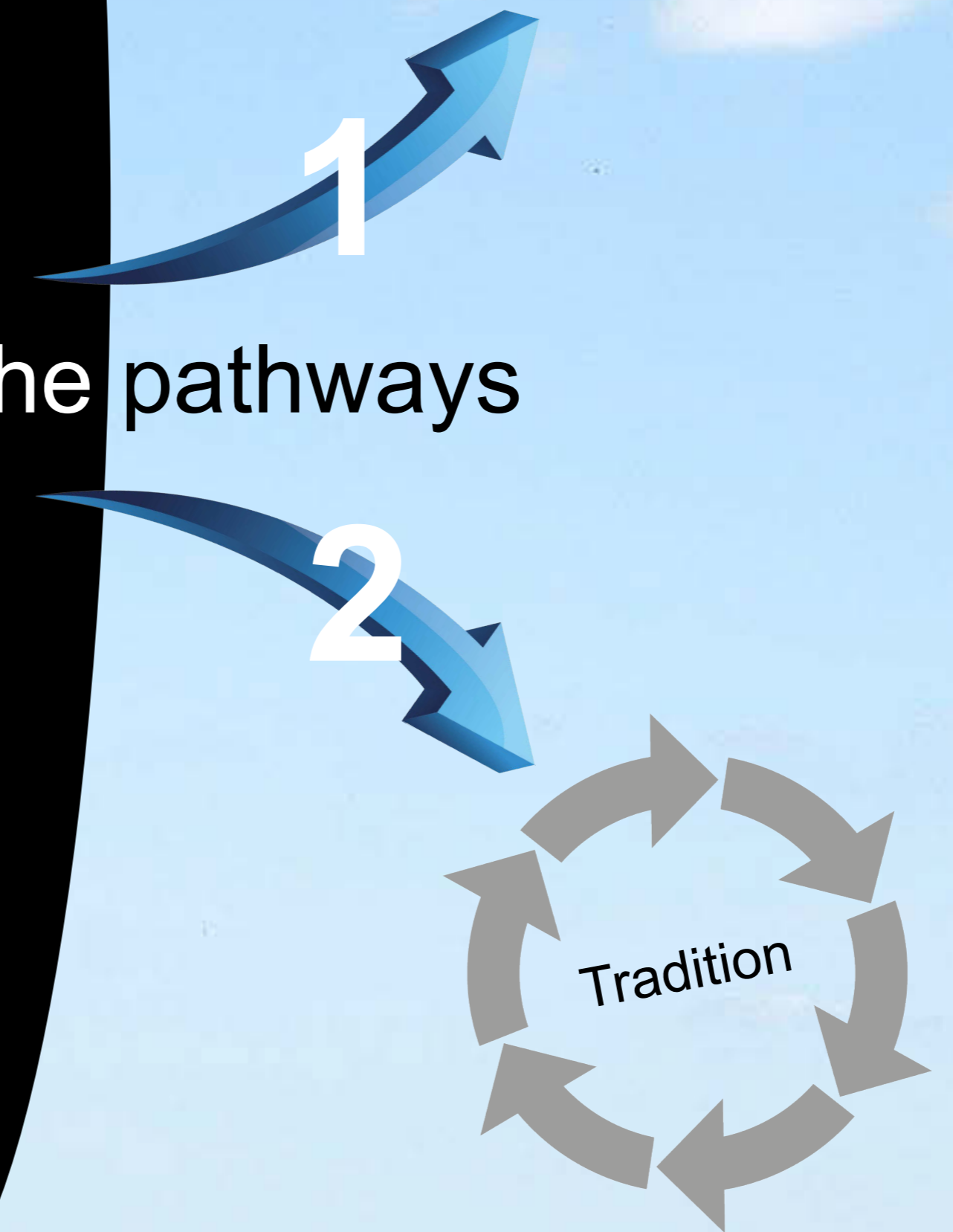
# 8 problems causing extreme pressure



Illustration:  
Agtech 2030



## The pathways



**Investment need**  
(but farmer's money is scarce)

**Learning need**  
(but farmer's time is lacking)

**Risk-taking need**  
(but why shall the farmer stand alone with this?)

**Right rules need**  
(but robots, for example, are not allowed...)

\* Innovation in the Arts –  
Lessons from the Creation of  
Dalhalla, International Journal  
of Music Business Research,  
Vol. 6, No. 2, 2017, pp. 6–40.