SUSTAINABLE RESILIENT EU FARMING SYSTEMS

Risk, risk management and resilience in European agriculture

Yann de Mey

Zurich, 5 July 2018

Presentation in the context of the Symposium Managing Risk in Agriculture. A Symposium focused on Innovations in Agricultural Insurance and Digitization

SURE Farm
SUSTAINABLE RESILIENT EU FARMING SYSTEMS

SUSTAINABLE RESILIENT EU FARMING SYSTEMS

Coordinated by:

WAGENINGEN UNIVERSITY & RESEARCH

Partners:

UNIVERSITY OF BERGEN

ccri countryside and community research institute

SLU

INSTITUTUL DE ECONOMIE AGRARĂ ACADEMIA ROMÂNĂ

1872 PRIFYSGOL ABERYSTWYTH UNIVERSITY

iamo Leibniz Institute of Agricultural Development in Transition Economies

ILVO Instituut voor Landbouw- en Visserijonderzoek

UNIVERSITY OF NATIONAL AND WORLD ECONOMY 1920 SOFIA

IRWIR PAN Polish Academy of Sciences Institute of Rural and Agricultural Development

KU LEUVEN

INRA

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

ETH zürich

UNIVERSITAS STUDIORUM TUSCIAE VITERBIUM MCMLXIX

UNIVERSIDAD POLITÉCNICA MADRID

POLITÉCNICA

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

SURE Farm

Mixed farms

Horticulture

Perennials

Crops

Livestock

France	Spain	Sweden	Belgium	Germany	Bulgaria	Netherlands	England	Italy	Poland	Romania
Extensive beef cattle systems	Extensive bovine and ovine farms	High-value egg and broiler farms	Intensifying dairy farming	Large-scale corporate farms	Large-scale corporate farms	Arable farming	Large-scale corporate farms	Small scale Hazelnut production	Private family fruit and vegetable farms	Small scale farms

Resilience

SURE-Farm defines resilience as:

Maintenance of the essential functions of farming systems in the face of increasingly complex and volatile economic, environmental, social and institutional challenges through capacities of robustness, adaptability and transformability (Bullock et al., 2017).

- Focusses on dynamics of a system
- Is an elusive concept that needs context
- Resilience is (unfortunately) the new sustainability

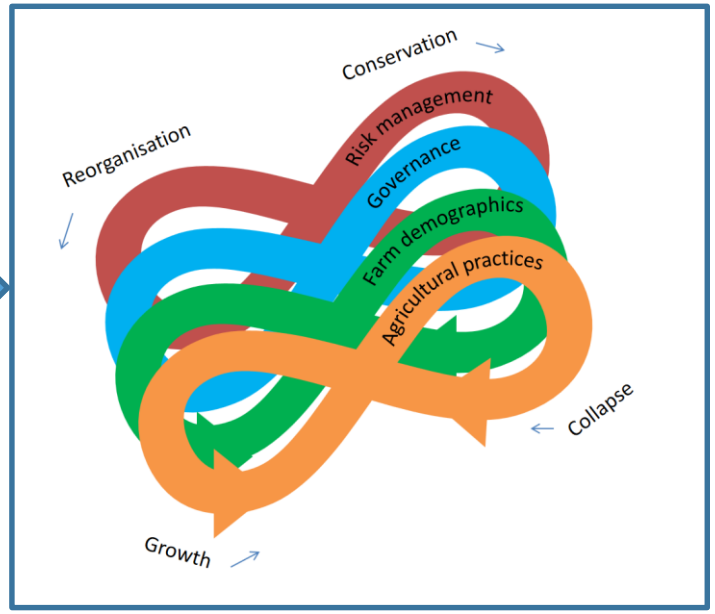
This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Bullock, J. M., Dhanjal-Adams, K. L., Milne, A., Oliver, T. H., Todman, L. C., Whitmore, A. P., & Pywell, R. F., (2017) Resilience and food security: rethinking an ecological concept. Journal of Ecology, 105(4), 880-884.

Resilience framework

Capacities of robustness, adaptability and transformability

Main Challenges
- Economic
- Environmental
- Social
- Institutional



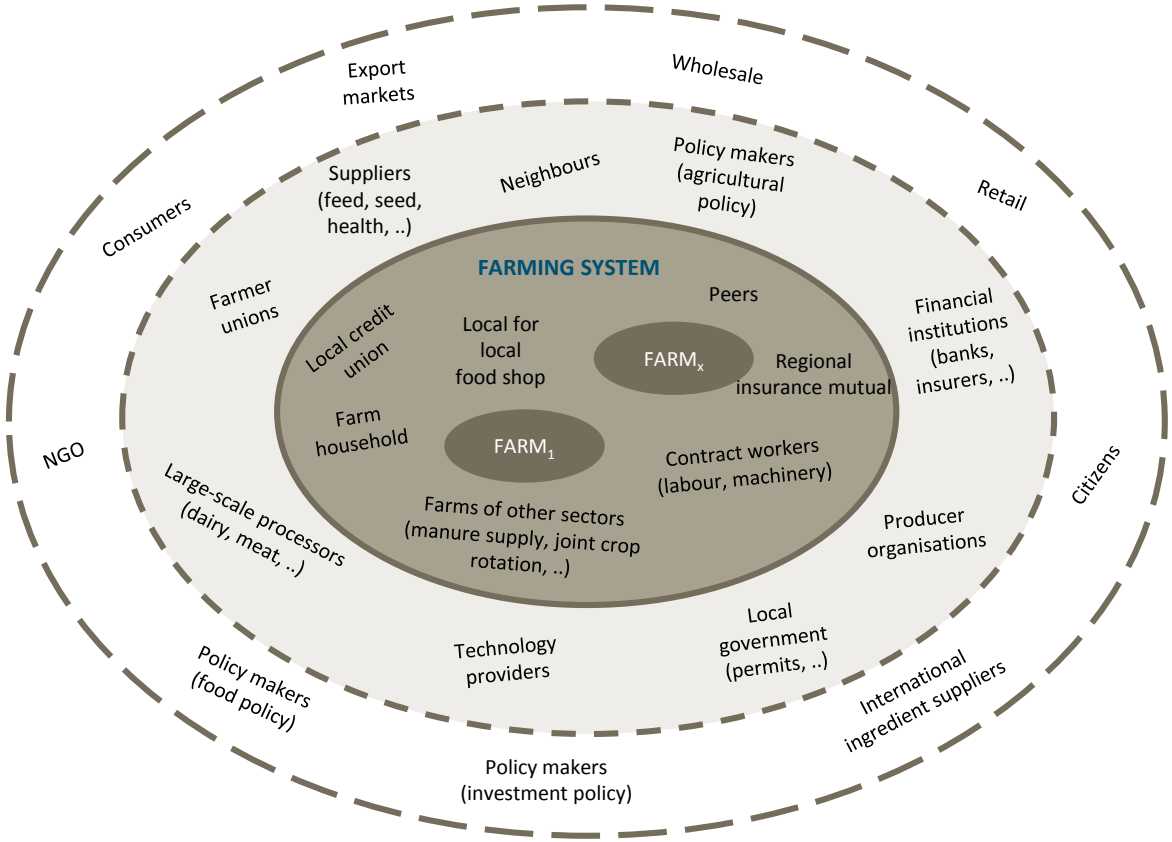
Main adaptive cycles and interwoven processes

Essential functions
- Private goods
- Public goods

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Meuwissen, M. ... **de Mey, Y.** ... Finger, R., ... et al., (2018) Report on resilience framework for EU agriculture. Deliverable 1.1, SURE-Farm.

Resilience of what?



Selection criteria:

- Actors that influence farms and are influenced by farms
- Actors that influence the farming system but are marginally influenced by the system
- Actors that neither directly influence the farming system, nor are directly influenced by the system

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Resilience to what?

	Short-term shocks	Long-term challenges
Environmental	❖ Extreme weather events ❖ Epidemic disease outbreak ❖ Hail, frost	❖ Climate change
Social		❖ Changing societal concerns ❖ Increasing urbanisation
Economic	❖ Price drops ❖ Food or feed safety crisis ❖ Personal hazards (illness, death)	❖ Upstream and downstream market power along the value chain ❖ Increasing dependence on non-farm land owners

Both @ micro scale (idiosyncratic risks) and @ macro scale (systemic risks)

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

SURE Farm

Resilience to which purpose?

1 Healthy food

2 Biomass

3 Well kept resources (water, soil, air)

4 Ecosystem Services (biodiversity)

Goals for EU farming systems

For Sustainable Development

5 Attractive rural areas

6 Viable farms

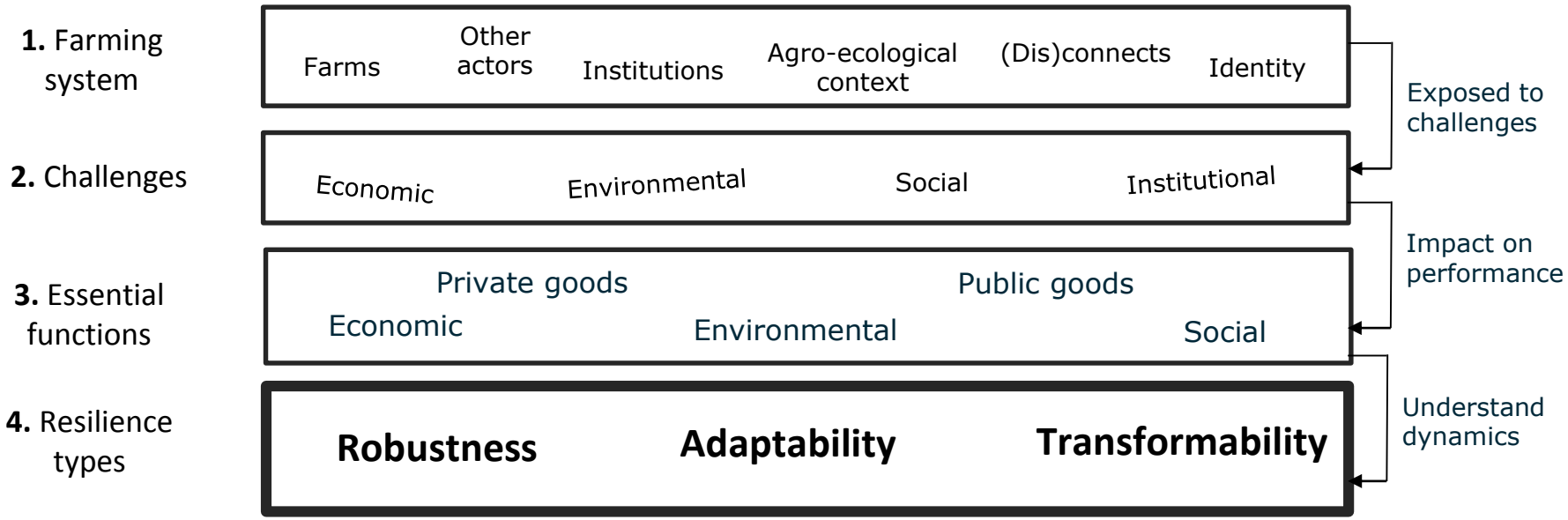
7 Employment & decent working conditions

8 Animal welfare

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

SURE Farm

Resilience analysis in four steps



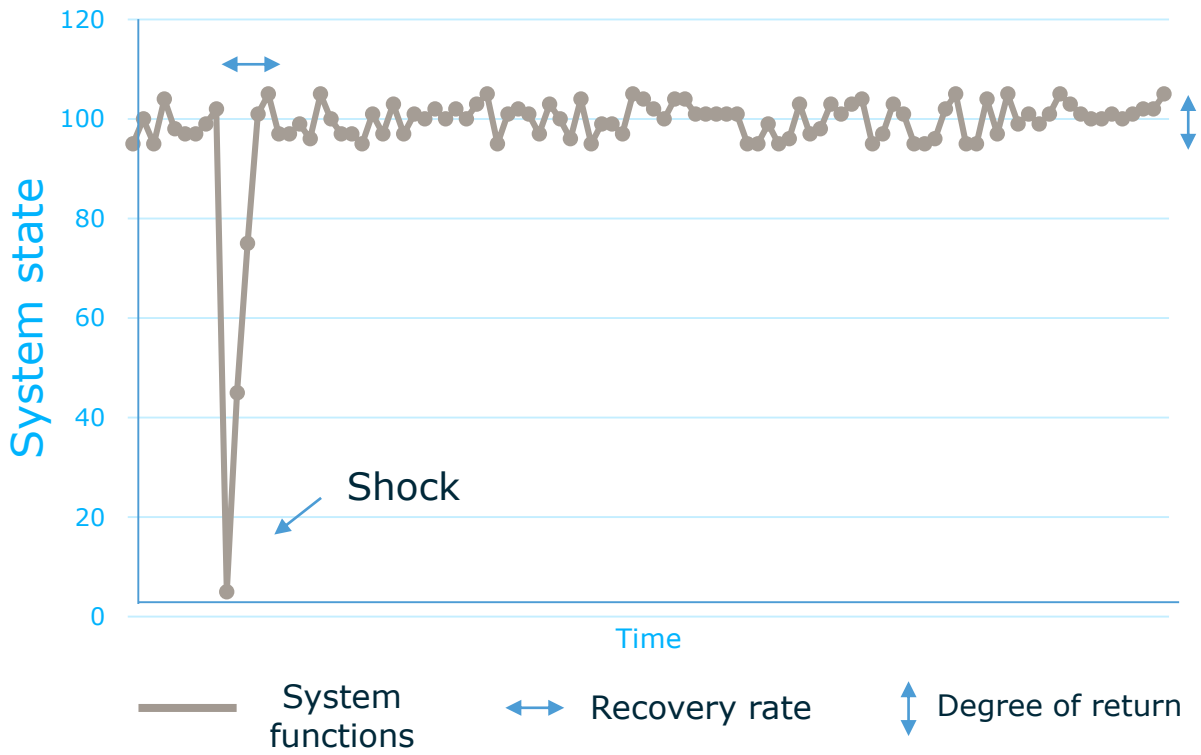
This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Understanding robustness

How well can shocks be absorbed and how fast is recovery?

Examples:

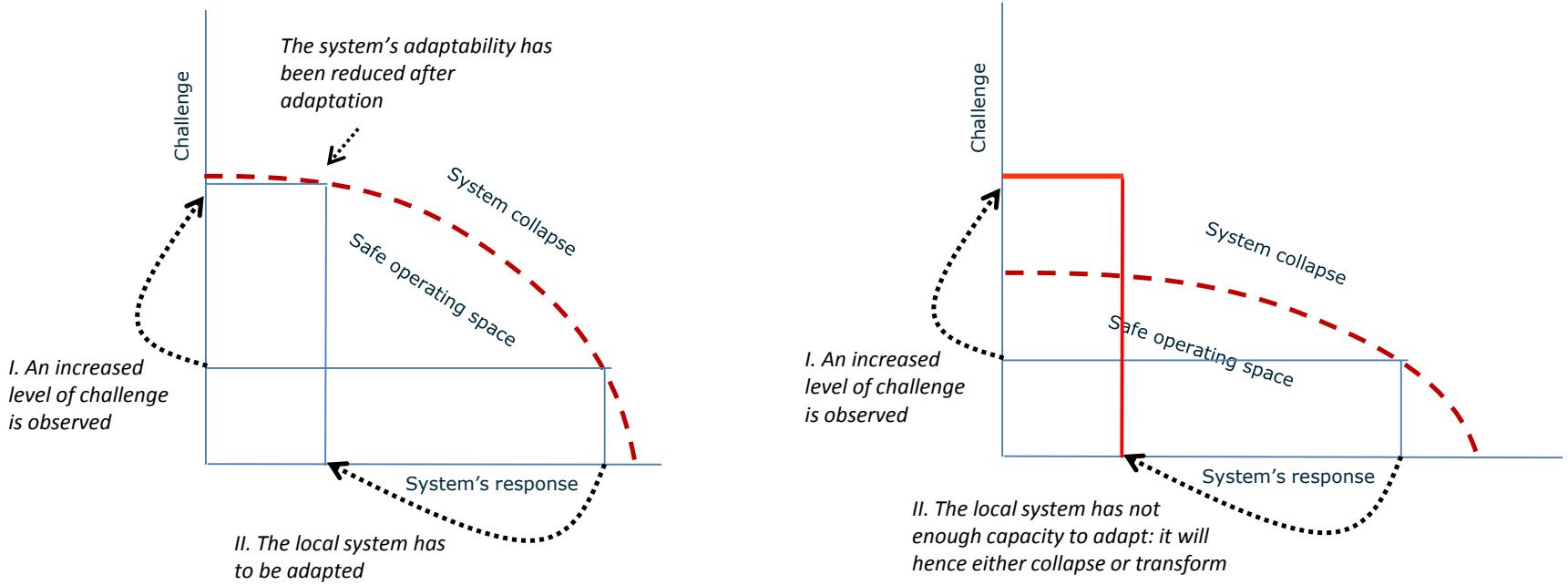
- ✓ Sector income
- ✓ Aggregate production
- ✓ Consumer trust



This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Understanding adaptability

How easy is it to adjust or change, while still maintaining essential functions?

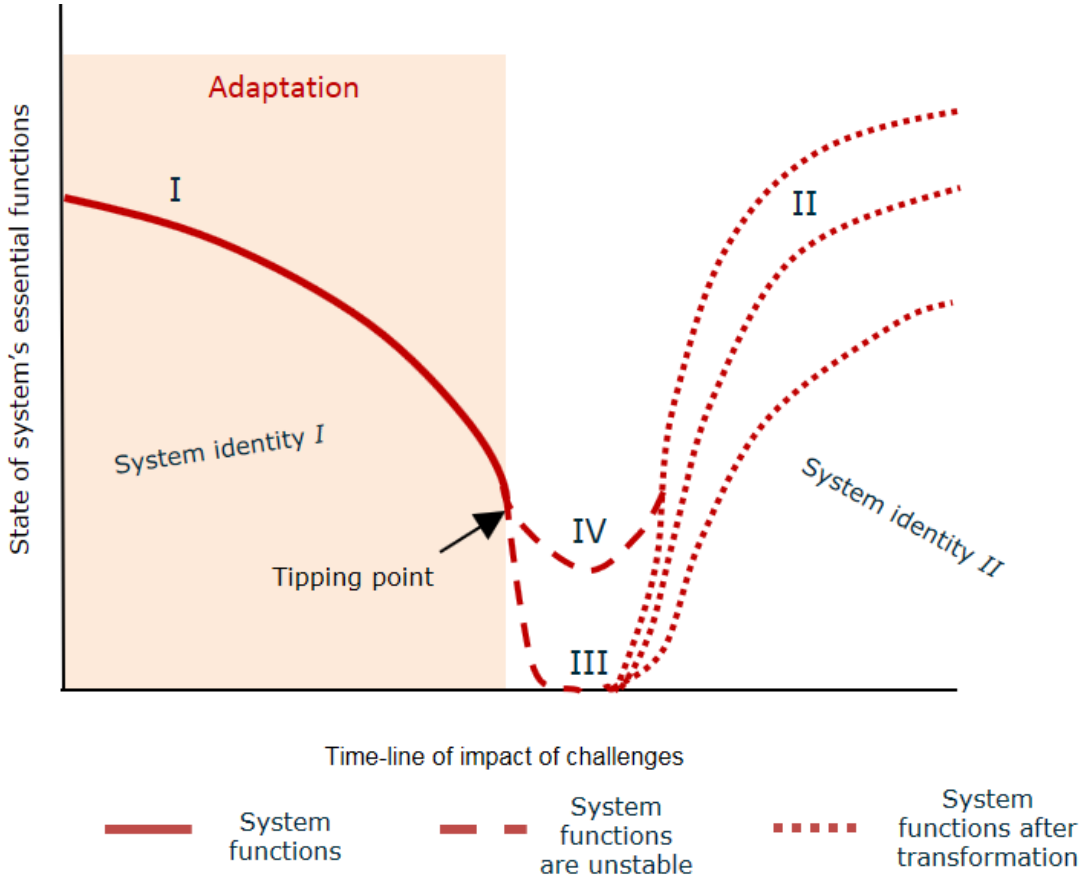


Continuing important system functions

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Understand transformability

How easy is a radical transformation or reorganisation?



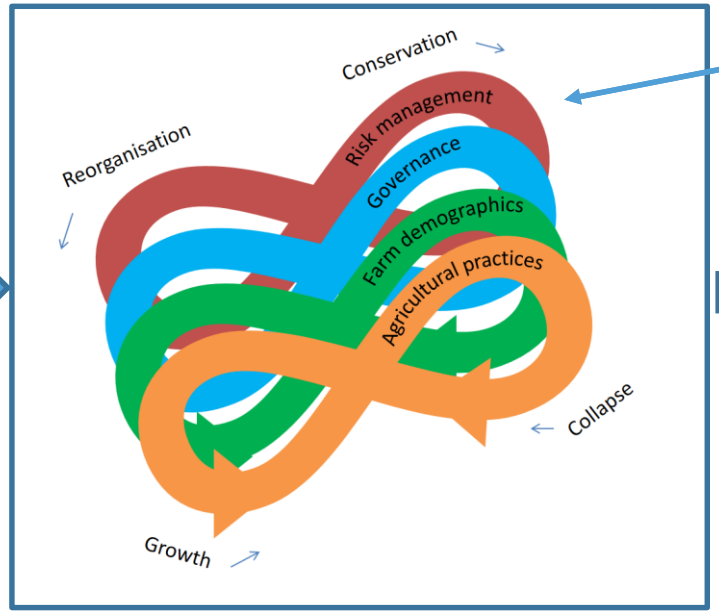
This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Resilience framework

Capacities of robustness, adaptability and transformability

Risk management
as essential process

Main Challenges
- Economic
- Environmental
- Social
- Institutional



Essential functions
- Private goods
- Public goods

Risk as the underlying disruption to the system

Main adaptive cycles and interwoven processes

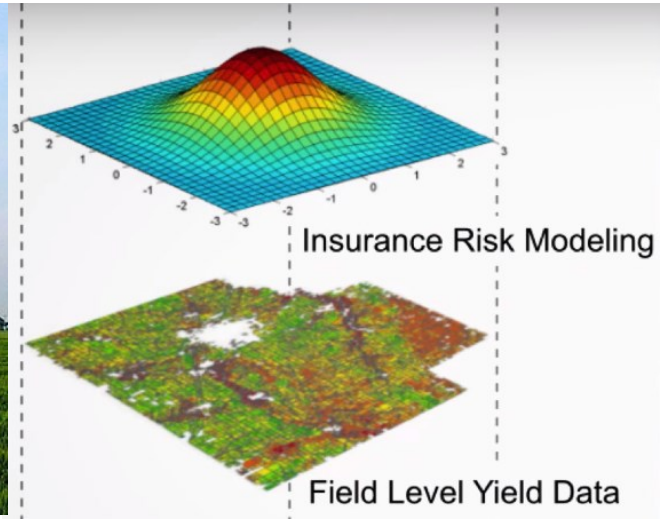
This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Meuwissen, M. ... **de Mey, Y.** ... Finger, R., ... et al., (2018) Report on resilience framework for EU agriculture. Deliverable 1.1, SURE-Farm.

Analyse risk

Digitization of agriculture has tremendous opportunity to characterize risk

- Various sources of risk and their interdependency
- Regional level > Farm level > Plot (herd) level > m^2 (animal) level
- Historical data to real-time data



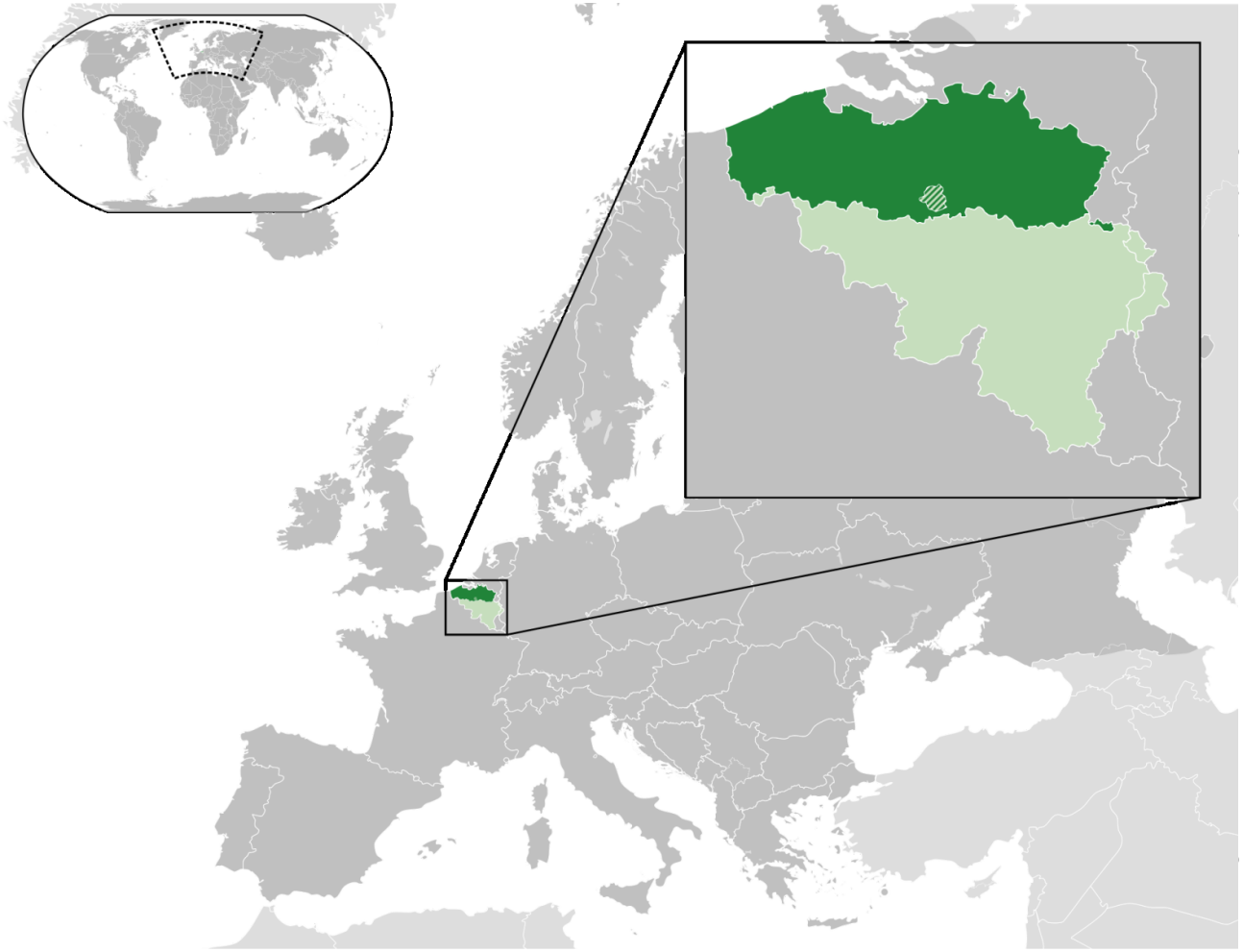
This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Pciture credit: http://english.gov.cn/news/photos; EIP-Agri Brochure and ag-analytics.org

Understand risk behavior

Farme

All farms
Typology
Arable fa
Greenho
Horticul
Fruit and
Dairy far
Beef farn
Mixed ca
Pig farm:
Mixed cr
Size class
Small
Medium
Large



This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Wauters, E., Van Winsen, F., **de Mey, Y.**, & Lauwers, L. (2014). Risk perception, attitudes towards risk and risk management: evidence and implications. *Agricultural Economics–Czech*, *60*(9), 389-405.

Understand risk behavior

Farmers' subjective impact when shocks occur

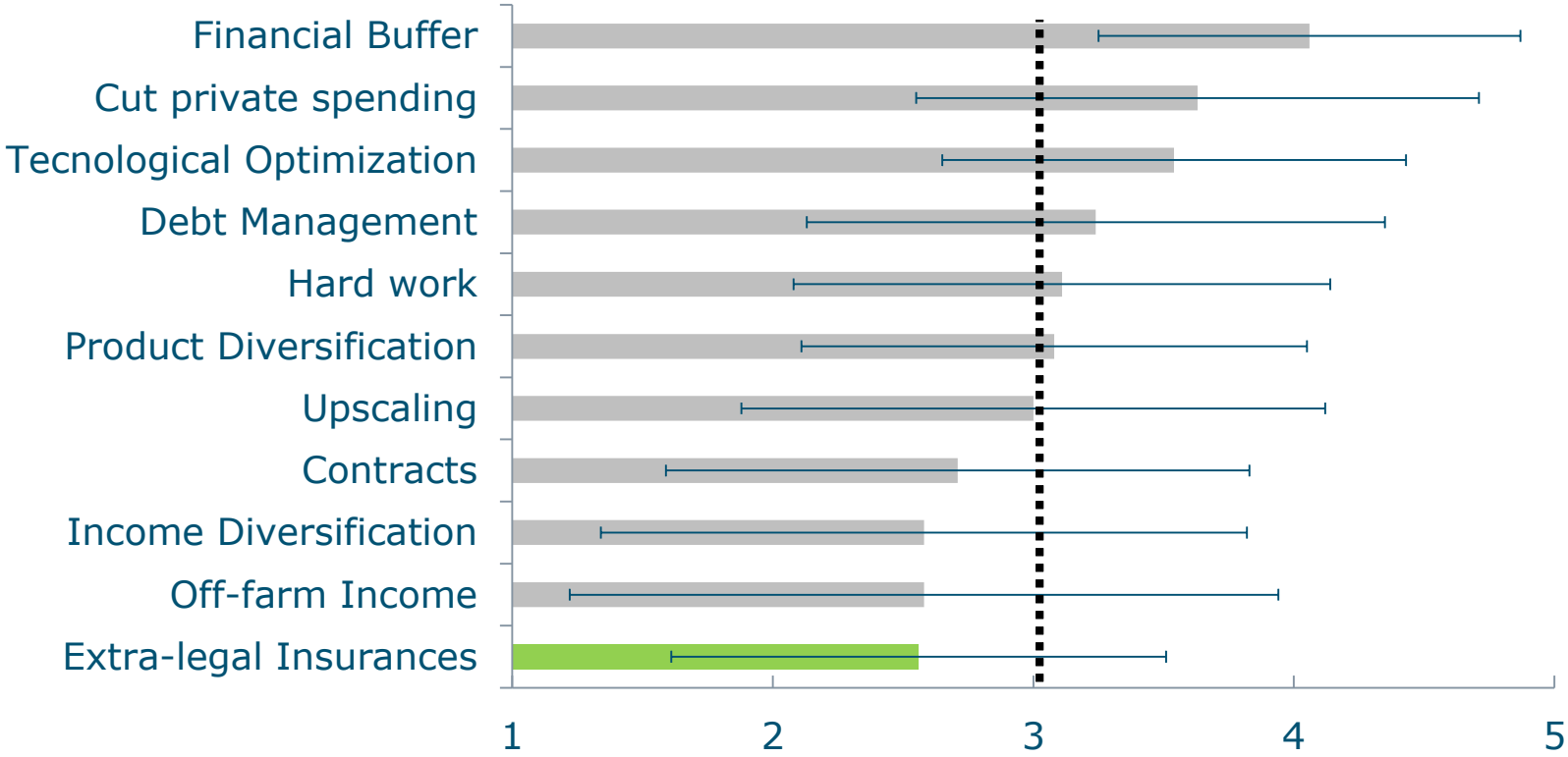
	Type of shock								
	weather	pests	prices	costs	margin	policy	land	personal	subsidy
All farms	3.56	3.63	4.15	4.05	4.08	3.83	3.77	3.69	3.59
Typology									
Arable farms	3.79	3.51	4.02	4.05	4.00	3.86	4.07	3.74	3.95
Greenhouse growers	3.58	3.75	4.29	3.88	4.04	3.67	3.18	3.47	3.04
Horticulture	3.78	3.47	4.13	3.84	3.94	3.55	3.41	3.69	2.78
Fruit and orchards	4.31	3.25	4.27	3.88	3.96	3.58	3.37	3.54	2.73
Dairy farms	3.60	3.67	4.08	4.00	4.01	3.76	4.06	3.68	4.00
Beef farms	3.47	3.90	4.13	4.10	4.23	3.92	4.06	3.92	4.22
Mixed cattle	3.43	3.75	4.03	4.17	4.19	3.97	4.06	3.64	4.42
Pig farms	3.04	3.74	4.36	4.39	4.22	3.89	3.88	3.80	3.30
Mixed crop-livestock farms	3.66	3.59	4.11	3.98	4.11	4.03	3.89	3.78	4.05
Size class									
Small	3.52	3.56	4.07	3.95	4.01	3.84	3.71	3.78	3.72
Medium	3.71	3.68	4.19	4.13	4.12	3.84	3.82	3.70	3.68
Large	3.44	3.62	4.18	4.06	4.09	3.84	3.75	3.63	3.41

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Wauters, E., Van Winsen, F., **de Mey, Y.**, & Lauwers, L. (2014). Risk perception, attitudes towards risk and risk management: evidence and implications. *Agricultural Economics–Czech*, *60*(9), 389-405.

Understand risk behavior

Farmers typically select a portfolio of risk management techniques



Likert scale items, black lines indicate standard errors

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Wauters, E., Van Winsen, F., **de Mey, Y.**, & Lauwers, L. (2014). Risk perception, attitudes towards risk and risk management: evidence and implications. *Agricultural Economics–Czech*, *60*(9), 389-405.

Understand risk behavior

Farmers typically select a portfolio of correlated risk management techniques

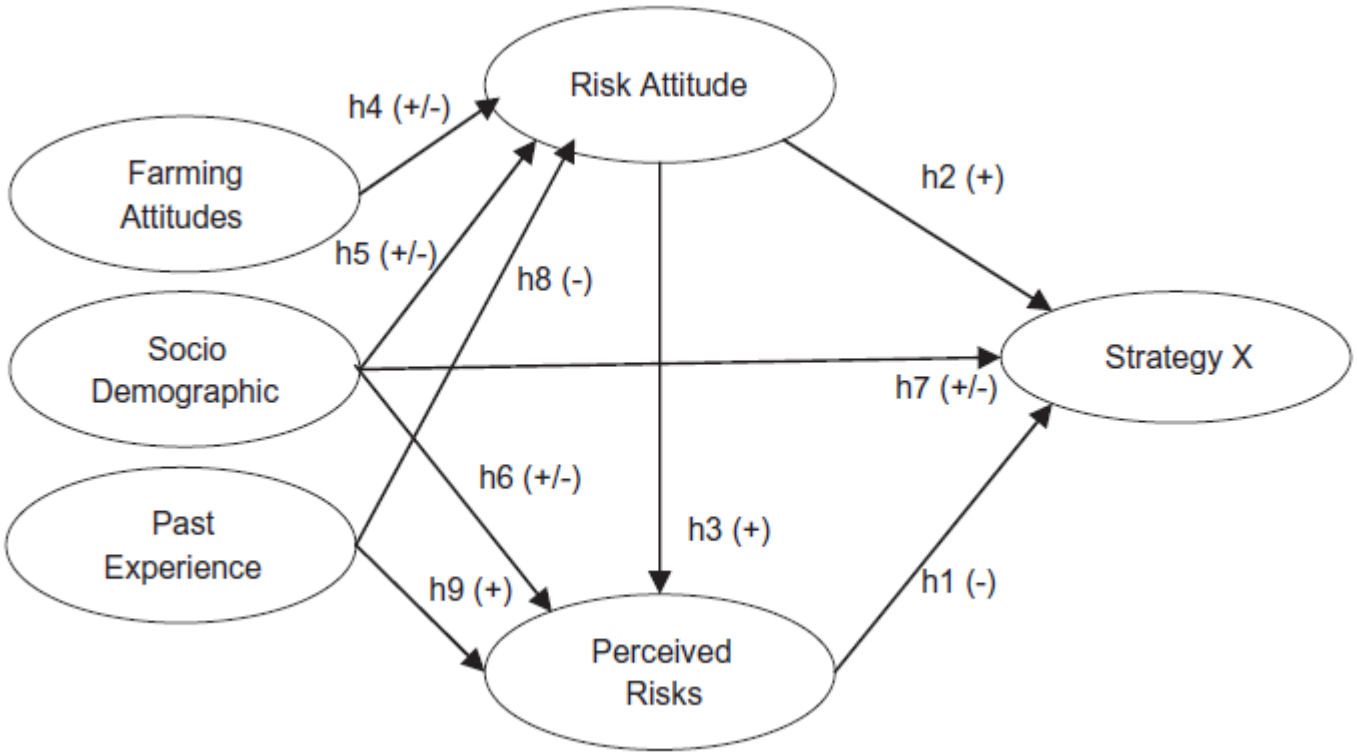
	Buffer	Avoid	Cutting	Hard work	Prod. Div.	Contract	Insur.	Optim.	Enlarge	Income Div.	Off-farm
Buffer	1.00										
Avoid loans	**0.13**	1.00									
Saving on private	**0.10**	**0.21**	1.00								
Hard work	0.04	**0.08**	**0.38**	1.00							
Prod. Div.	0.06	**0.10**	**0.07**	**0.07**	1.00						
Contracts	-0.02	0.02	0.02	**0.07**	**0.11**	1.00					
Insurances	**-0.09**	-0.01	**0.17**	**0.12**	0.06	**0.16**	1.00				
Invest. Techn.	**0.09**	-0.05	**0.11**	**0.18**	**0.23**	**0.10**	**0.12**	1.00			
Enlarge	0.04	**-0.17**	0.04	**0.20**	**0.19**	**0.10**	**0.16**	**0.46**	1.00		
Income Div.	**-0.07**	0.02	0.00	0.01	**0.38**	**0.12**	**0.16**	0.04	0.03	1.00	
Off-farm	-0.07	**0.20**	**0.10**	0.06	0.02	**0.11**	**0.13**	**-0.07**	-0.05	**0.22**	1.00

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

van Winsen, F., **de Mey, Y.**, Van Passel, S., Vancauteren, M., & Wauters, E. (2017). Insure or endure? Exploring the determinants of risk management strategy diversity.

Understand risk behavior

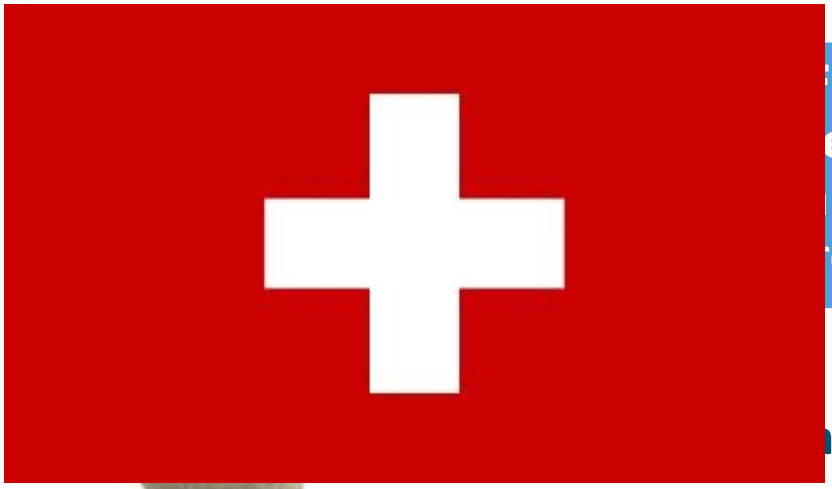
But, understanding how these insights shape risk perceptions and lead to farm decision making under risk is crucial as well



This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

van Winsen, F., **de Mey, Y.**, Lauwers, L., Van Passel, S., Vancauteren, M., & Wauters, E. (2016). Determinants of risk behaviour: effects of perceived risks and risk attitude on farmer's adoption of risk management strategies. *Journal of Risk Research*, 19(1), 56-78.

Understand risk behavior



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Volkswirtschafts-
departement EVD
Forschungsanstalt
Agroscope Reckenholz-Tänikon ART

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

de Mey, Y., Wauters, E., Schmid, D., Lips, M., Vancauteren, M., & Van Passel, S. (2016). Farm household risk balancing: empirical evidence from Switzerland. *European Review of Agricultural Economics*, *43*(4), 637-662.

SURE Farm

Designing/promoting optimal risk management tools

- The European Commission relies on four groups of instrument to increase the resilience of European agriculture:
  1. Direct payments
  2. Rural development programs
  3. Risk transfer instruments (e.g. crop insurance, mutual funds, IST)
  4. Market management measures
- Difficult task for farmers/policy-makers to strike the right balance between risk management instruments that enable robustness, adaptability and transformability
- Devoting too much attention/resources to robustness may reduce possibilities for adaptation and change, while exclusive attention to long-term transformation may neglect functionalities of well-performing systems

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

SURE-Farm consortium (2018) Policy brief on resilience framework, scenarios and farm typology.

Designing/promoting optimal risk management tools

Robustness

- It can build on individual or collective resources, capacities and flexibility
- Access to information, novel insurance schemes, savings schemes, IST

Adaptability

- While adaptation can occur very quickly, building up adaptive capacities requires a medium-term strategy
- Well-functioning innovation system (training, research and technology)
- Precision agriculture, (climate)smart farming

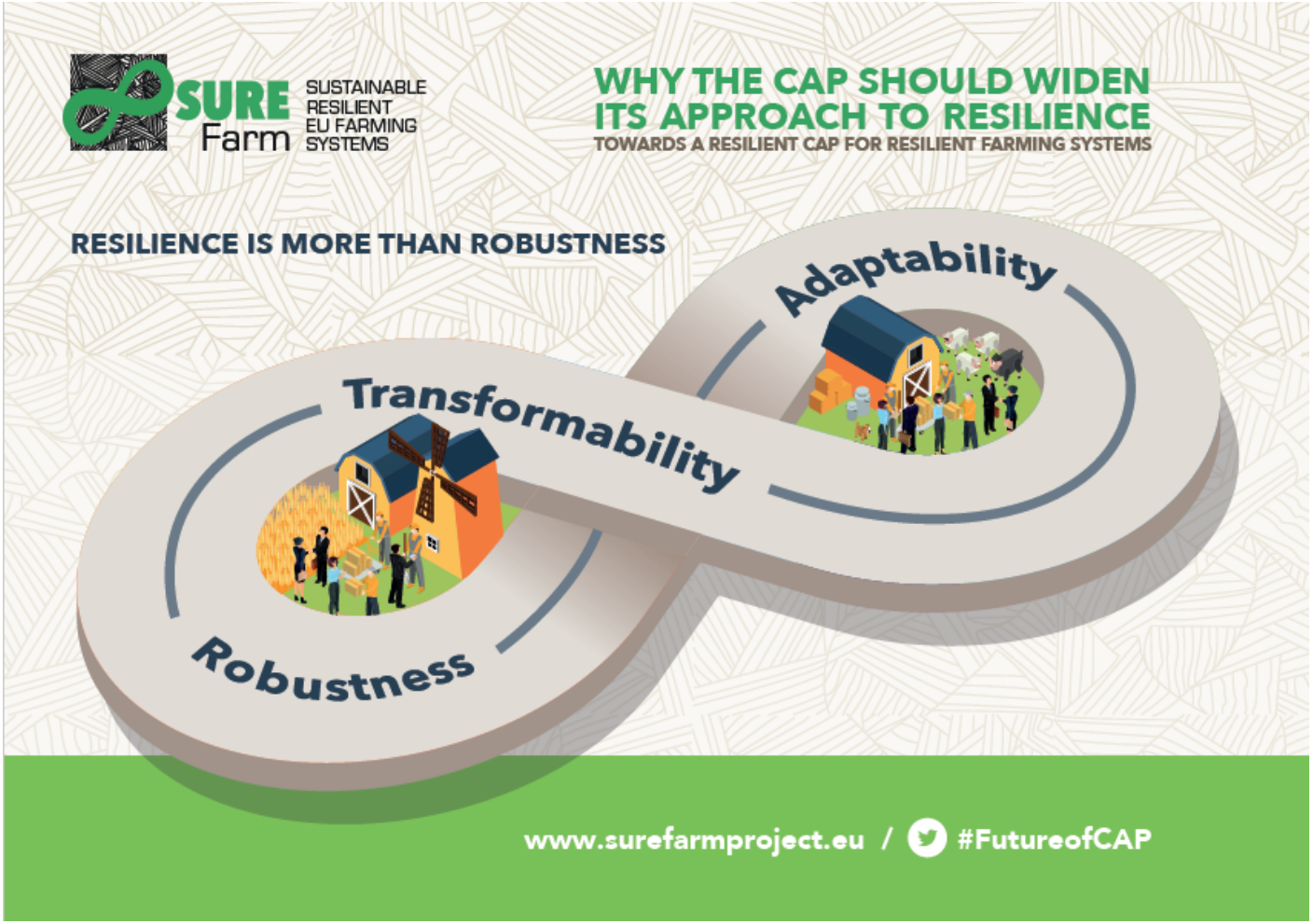
Transformability

- Transformations imply new business models and a fundamental change in the way goods and services are produced, financed or marketed.
- Requires long-term strategies and substantial structural changes
- Vertical farming, highly diverse and pluriactive farm

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

SURE-Farm consortium (2018) Policy brief on resilience framework, scenarios and farm typology.

Designing/promoting optimal risk management tools



This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

SURE-Farm consortium (2018) Policy brief on resilience framework, scenarios and farm typology.

Conclusion / Key messages

- Resilience = Robustness, Adaptability and Transformability
- Various sources of risk are the underlying challenges
- Risk management is a key process in fostering resilience
- Risk management tools should enable not just robustness, but also adaptability and transformability
- Digitization and innovation in agriculture has a tremendous opportunity to support risk analysis and designing optimal risk management portfolios
- A good understanding of farm risk behaviour is a crucial component

This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

SUSTAINABLE RESILIENT EU FARMING SYSTEMS

Thank you!

yann.demey@wur.nl

surefarmproject.eu

Presentation in the context of the Symposium Managing Risk in Agriculture. A Symposium focused on Innovations in Agricultural Insurance and Digitization