Quantitative story-telling for a more robust understanding of the nexus

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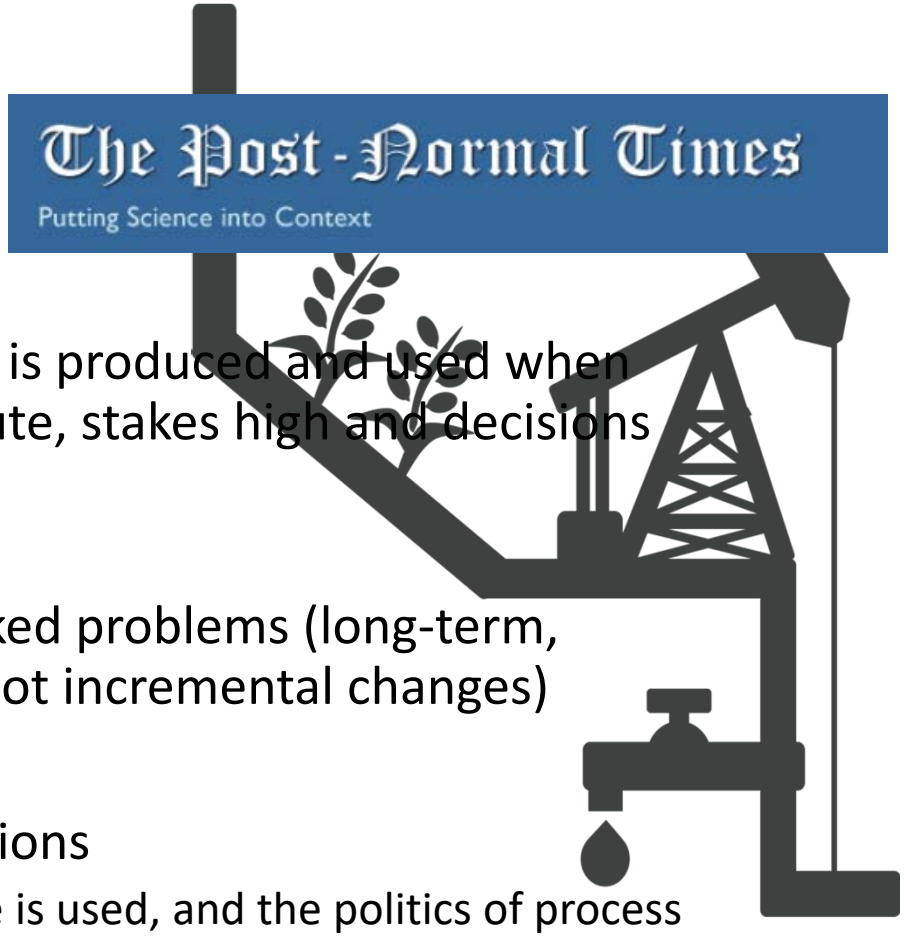
Take Home Messages

- How quantified evidence is selected and interpreted via story telling
- Foundation = MuSIASEM - Multi-scale Integrated Analysis of Societal and Ecosystem Metabolism
- Cross sector and cross scale accounting framework for multiple variables preserving the view of the whole system
- Applied to range of policies and innovations from EU28 to individual cities or social groups
- Insightful for complex coupled social-ecological systems but more demanding for interpretation

"Cleverclogs here has all the answers but never the right ones!"

MAGIC NEXUS

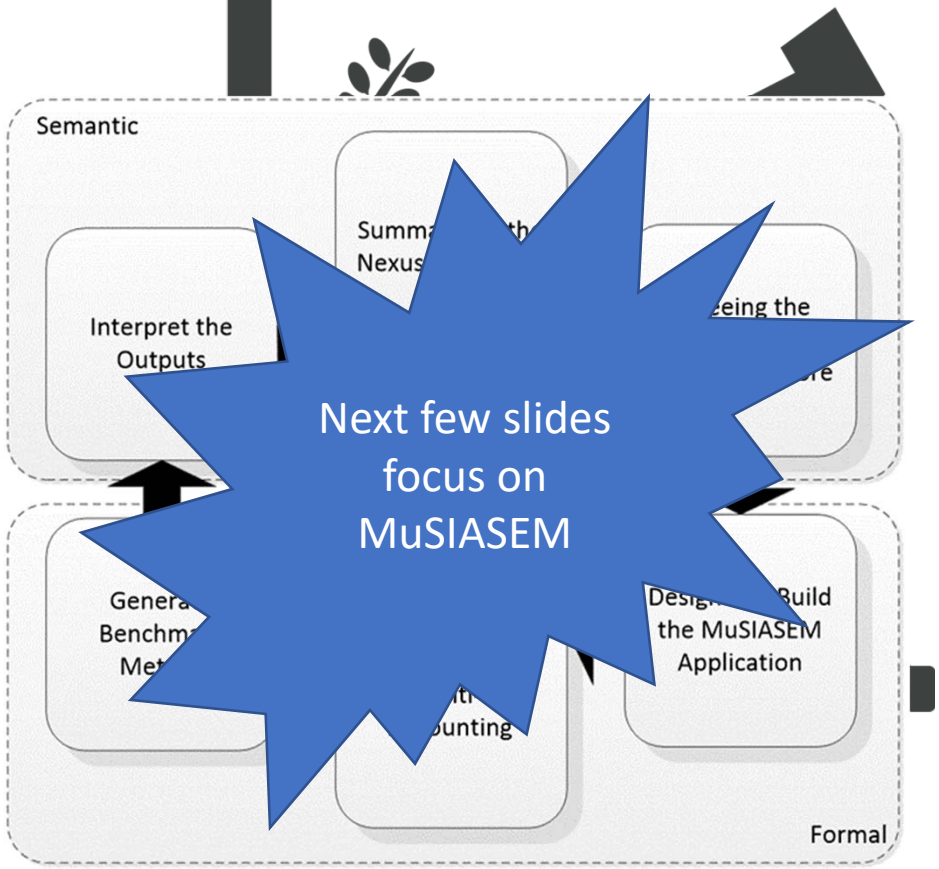
Post Normal Science



- Critical questions about how science is produced and used when "facts [are] uncertain, values in dispute, stakes high and decisions urgent"
- Sustainability and the Nexus are wicked problems (long-term, contested, requires transformation not incremental changes)
- Attention to science – policy interactions
  - How problem is framed, what evidence is used, and the politics of process
  - Multiple legitimate perspectives (even if contradictory)
  - Extended peer community – all 'experts' with different expertise
- Quantification serves, not drives, deliberation

Quantitative Story Telling – making metrics matter

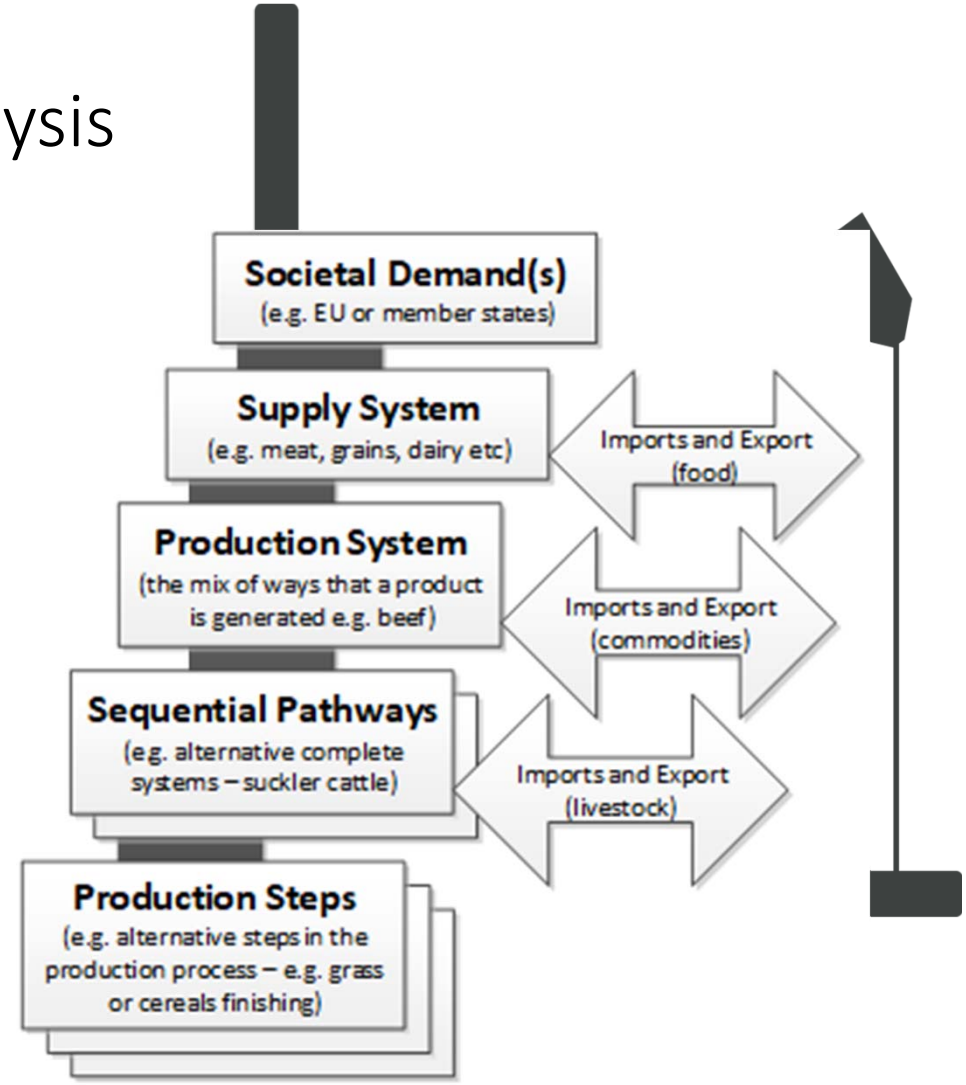
- Deliberative cycle for complex, contested, value dominated policy decisions
- Narratives shape analysis
- Dependencies of formal and semantic (impprediction)
- Attention to environment, economy and societal trade-offs
- Benchmarking – feasibility, viability and desirability



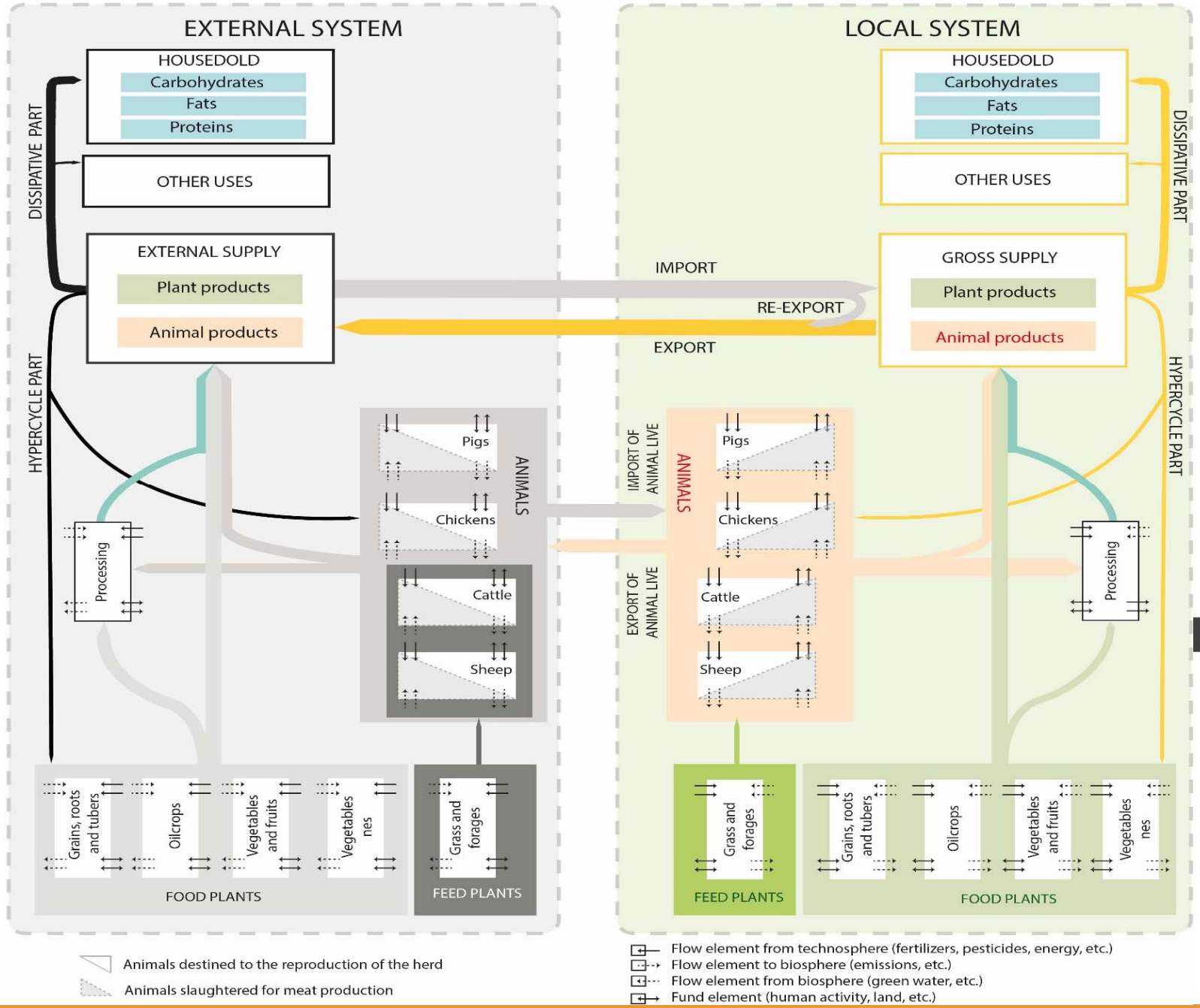
For more information, see https://youtu.be/b5LBlFAUtbM

Societal Metabolism Analysis

- Understand human-environment systems across space and time
- Focus on metabolic patterns – how are resources used to reproduce the system
- Magnitudes and Mixes of biosphere and technosphere
- Degree to which these are met locally (externalisation)
- Attention to multiple perspectives (geographical scale, hierarchy composition etc)



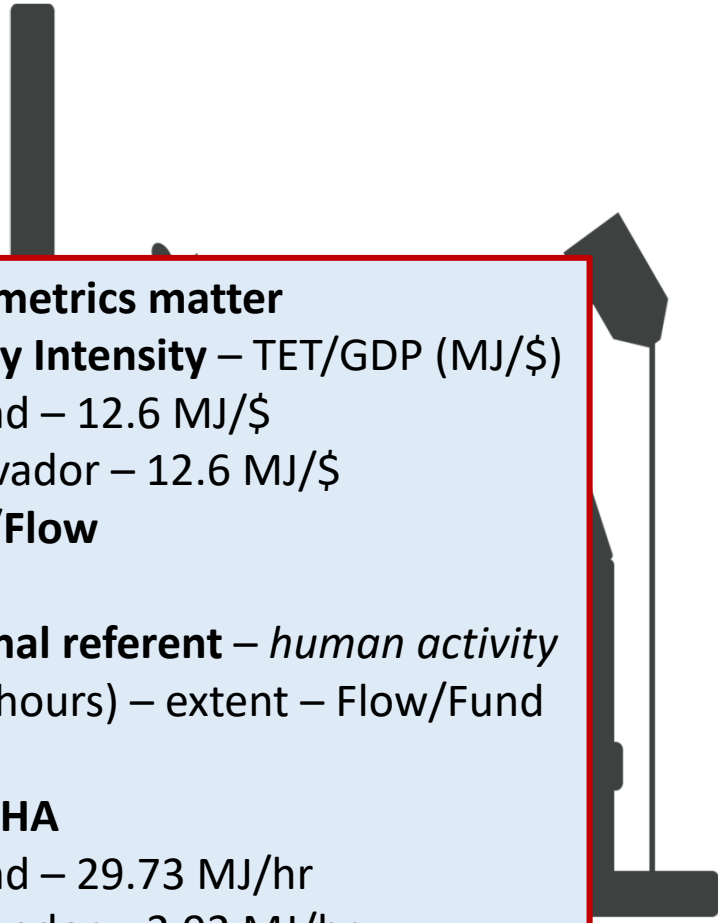
GRAMMAR
A set of expected relations over chosen categories of accounting



Building Blocks: Funds and Flows

Definitions

1. "Funds"
   - Remain within the system (define its identity, need to be maintained, overhead (e.g. physiological)
   - Stay the same (within the defined time frame)
   - Land, people, power capacity
2. "Flows"
   - Enter or leave the system
   - Materials, energy carriers, wealth
3. Flow-Fund ratios → metrics



Why metrics matter

Energy Intensity – TET/GDP (MJ/$)

Finland – 12.6 MJ/$

El Salvador – 12.6 MJ/$

Flow/Flow

External referent – *human activity*

THA (hours) – extent – Flow/Fund

TET/THA

Finland – 29.73 MJ/hr

El Salvador – 2.92 MJ/hr

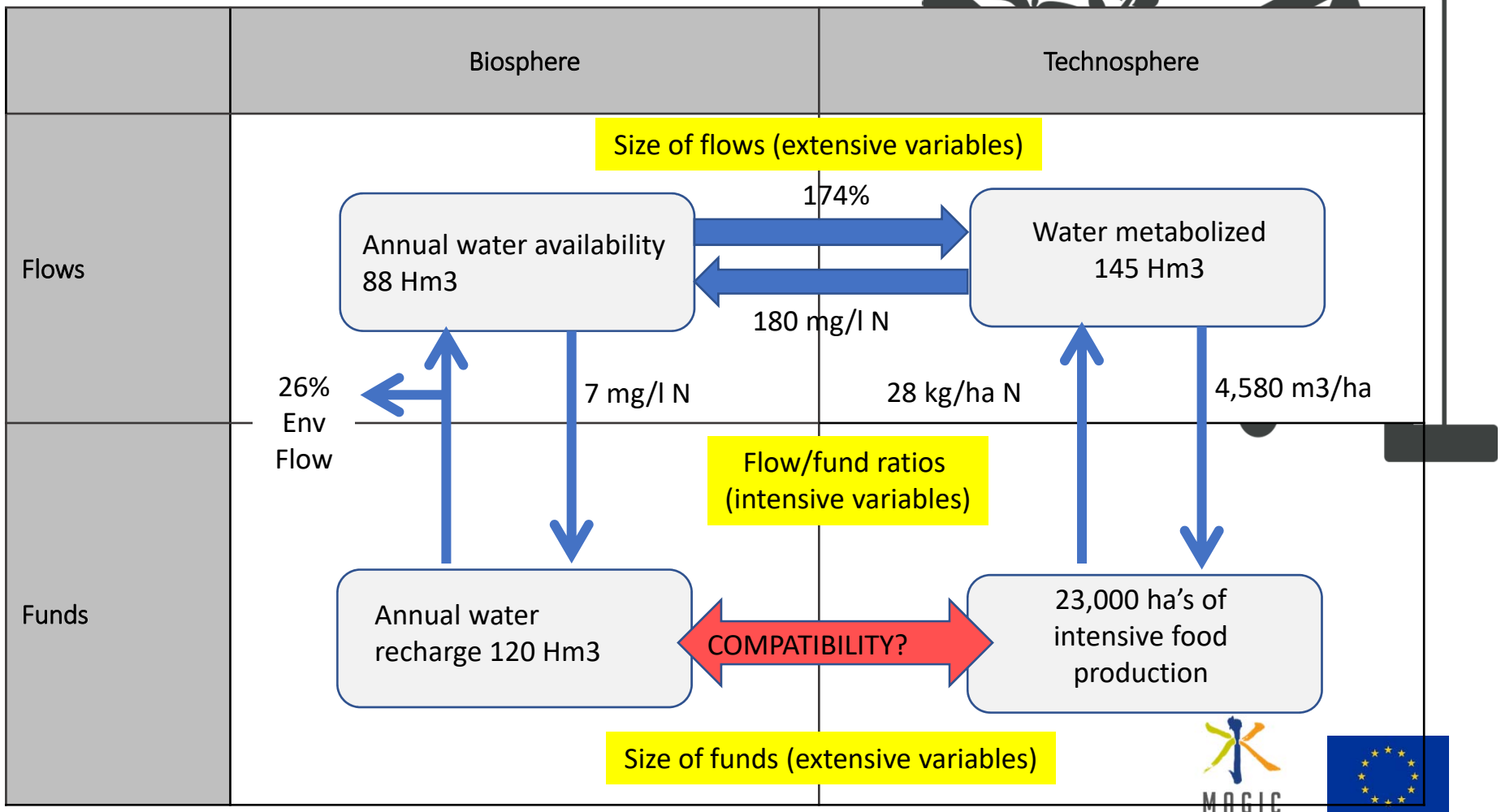
GDP/THA

Finland – 20,600 $/yr p.c.

El Salvador – 2,020 $/yr p.c.

Building Blocks: Metrics

Derived from a set of relations that define a coupled SES



Example from El Egido (Almeria, Spain)

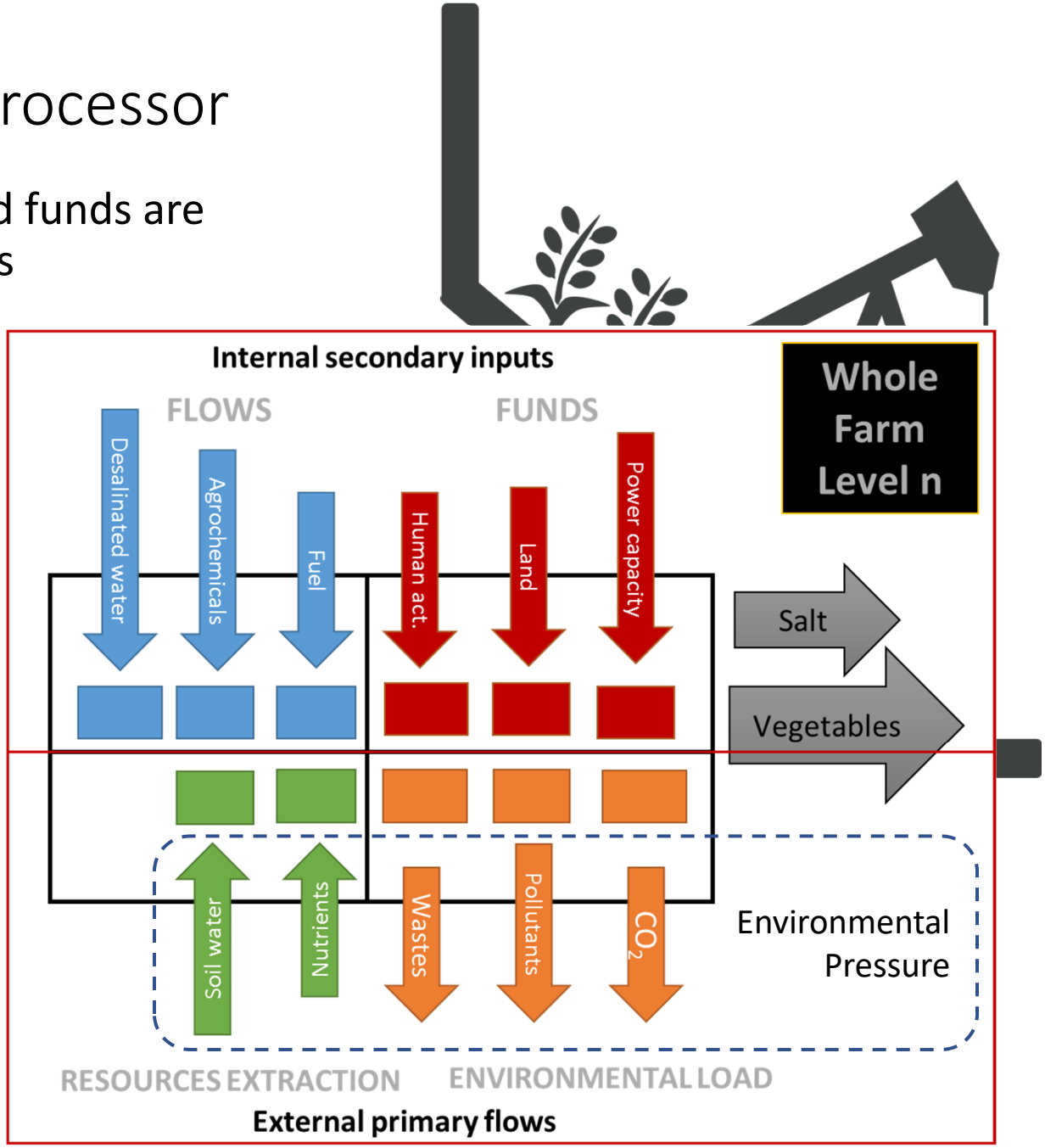
Building blocks: Processor

- In MuSIASEM flows and funds are organised as Processors

- Excel databases
- Core and satellites

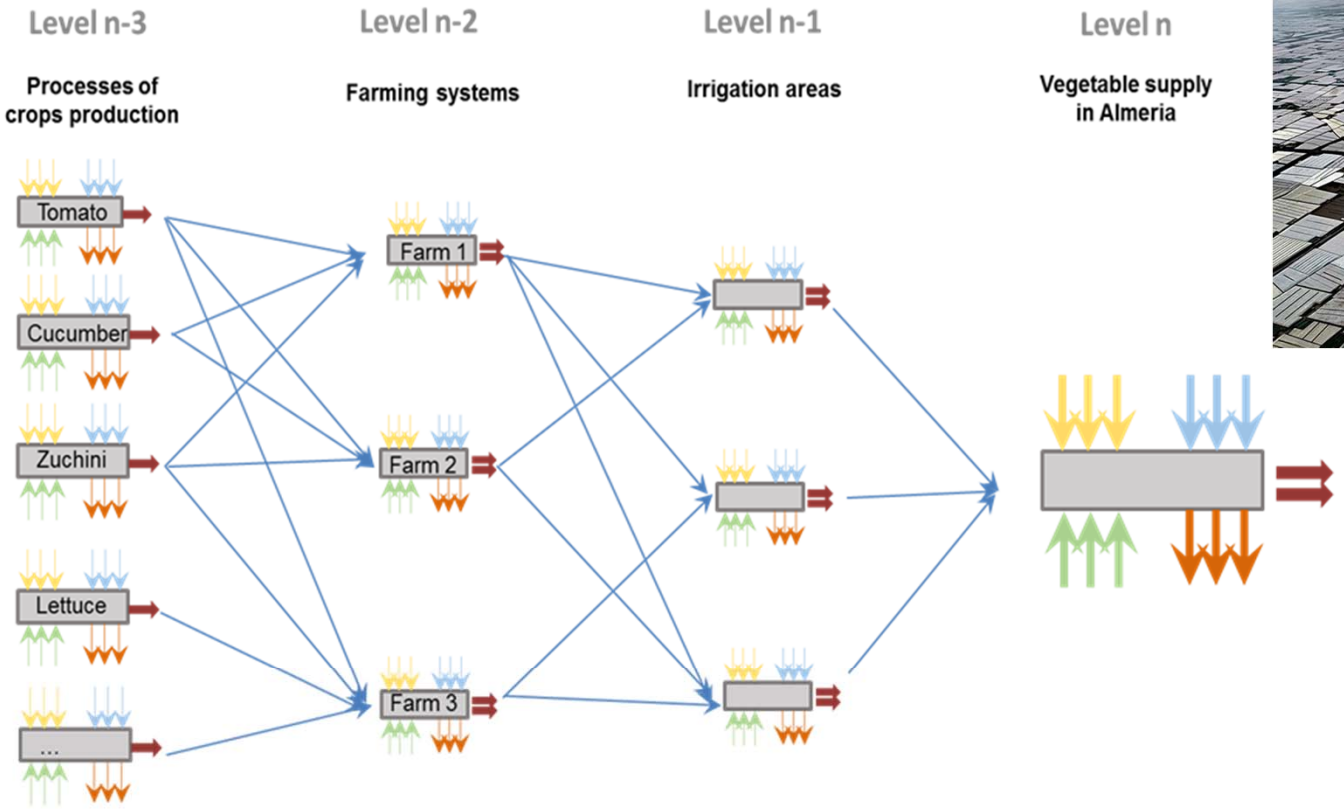
- Scalable
  - Aggregate
  - Disaggregate
  - Inputs to macro-processes
  - Societal consumption patterns

- Linkable



Simultaneous analysis over scales

Non-equivalent perspectives
Checking coherence and illustrating gaps in knowledge



Bottom-up: Determined by lower level characteristics (per unit of land or output)

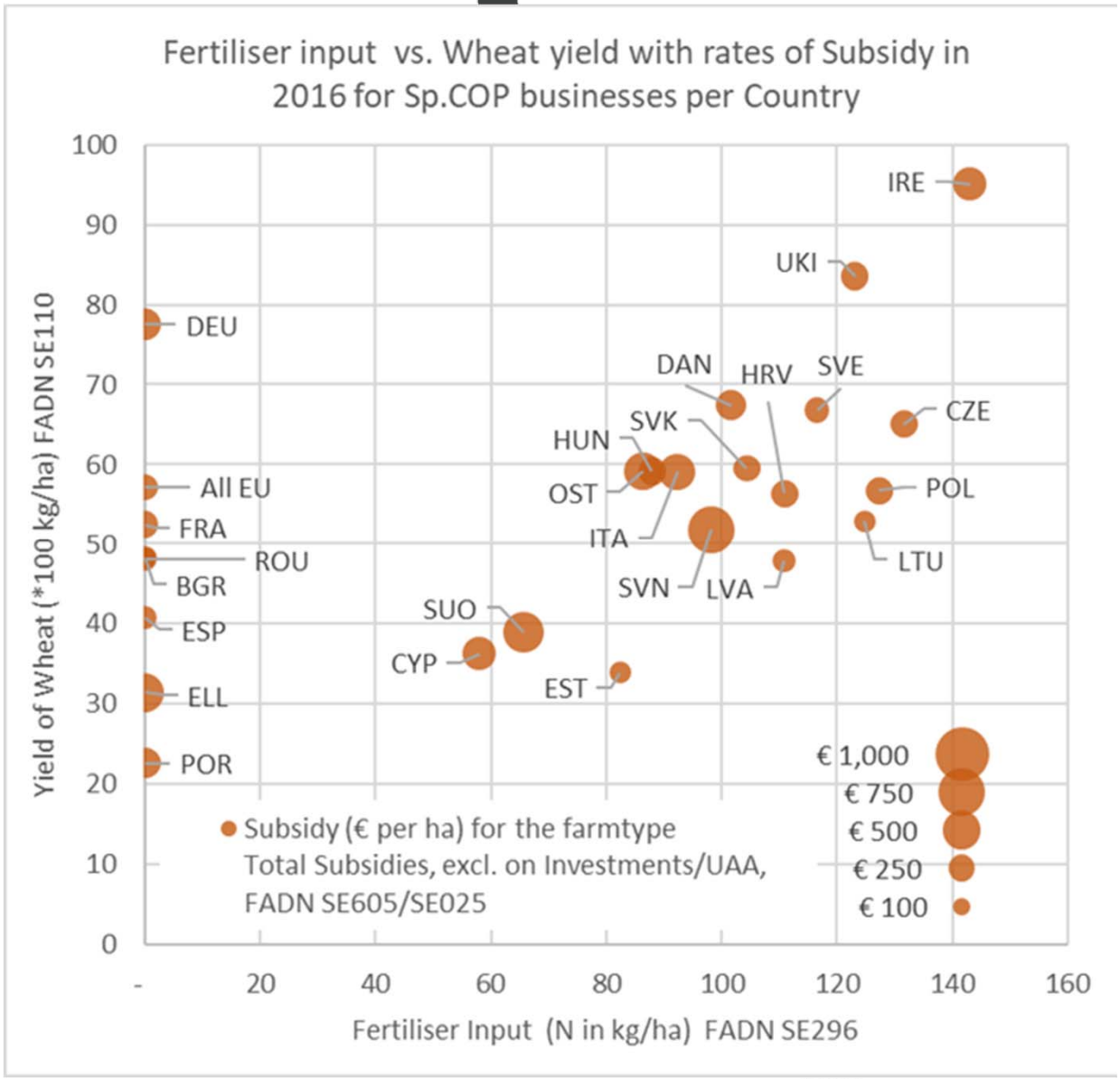
Top-down: Determined by the compatibility between bottom-up scaling of farming typologies and boundary conditions provided by the socio-economic (viability) and the environmental contexts (feasibility)

QST in action – CAP example

DIAGNOSTIC MODE

Allowed us to debate

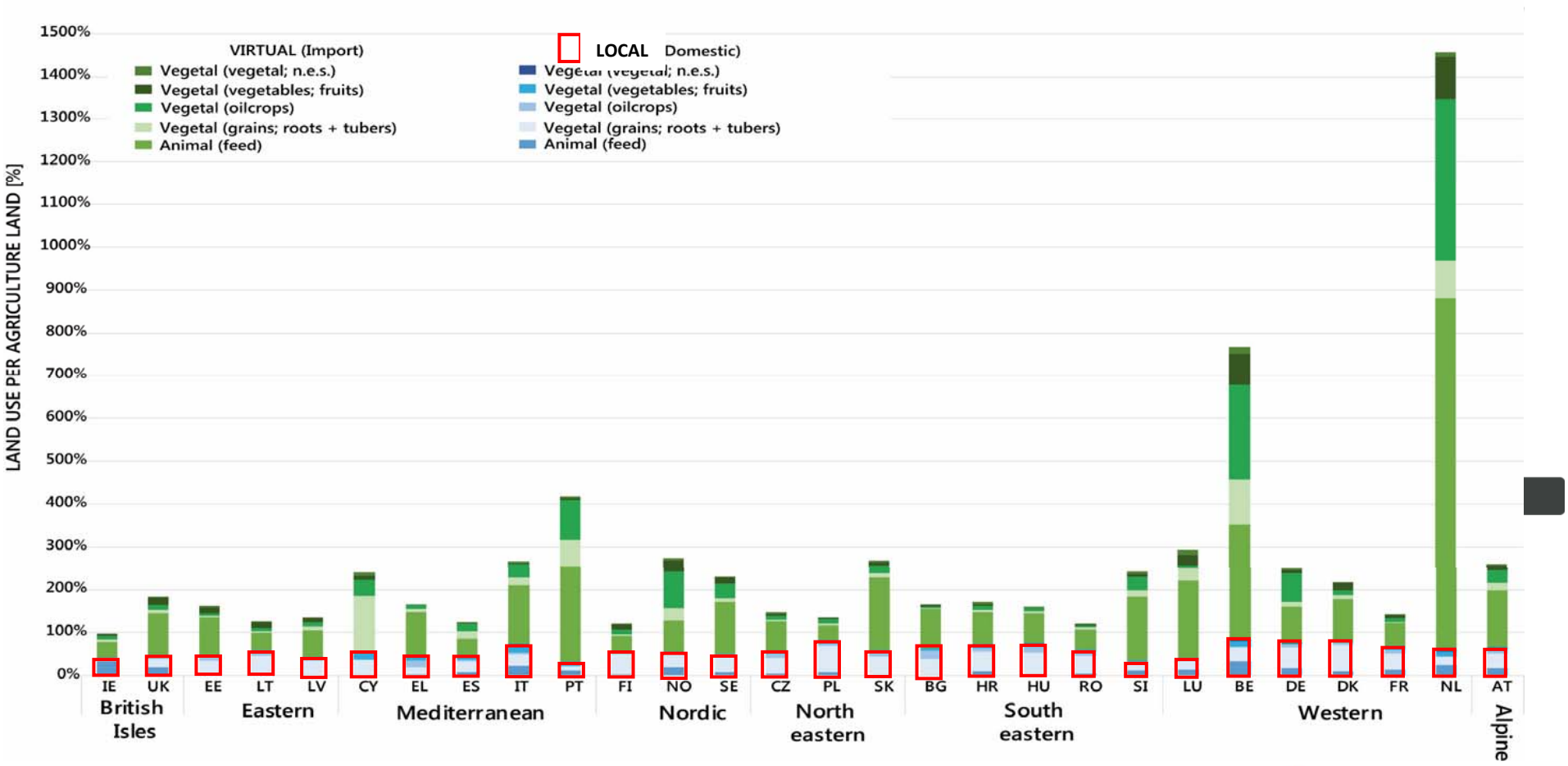
- Biophysically feasible, in long-term?
- Technologically and economic viable, in long-term?
- Desirable? If not, what needs to change?



What if the EU had to produce all its own food?

ANTICIPATION MODE

LAND – local vs virtual



MAGIC NEXUS

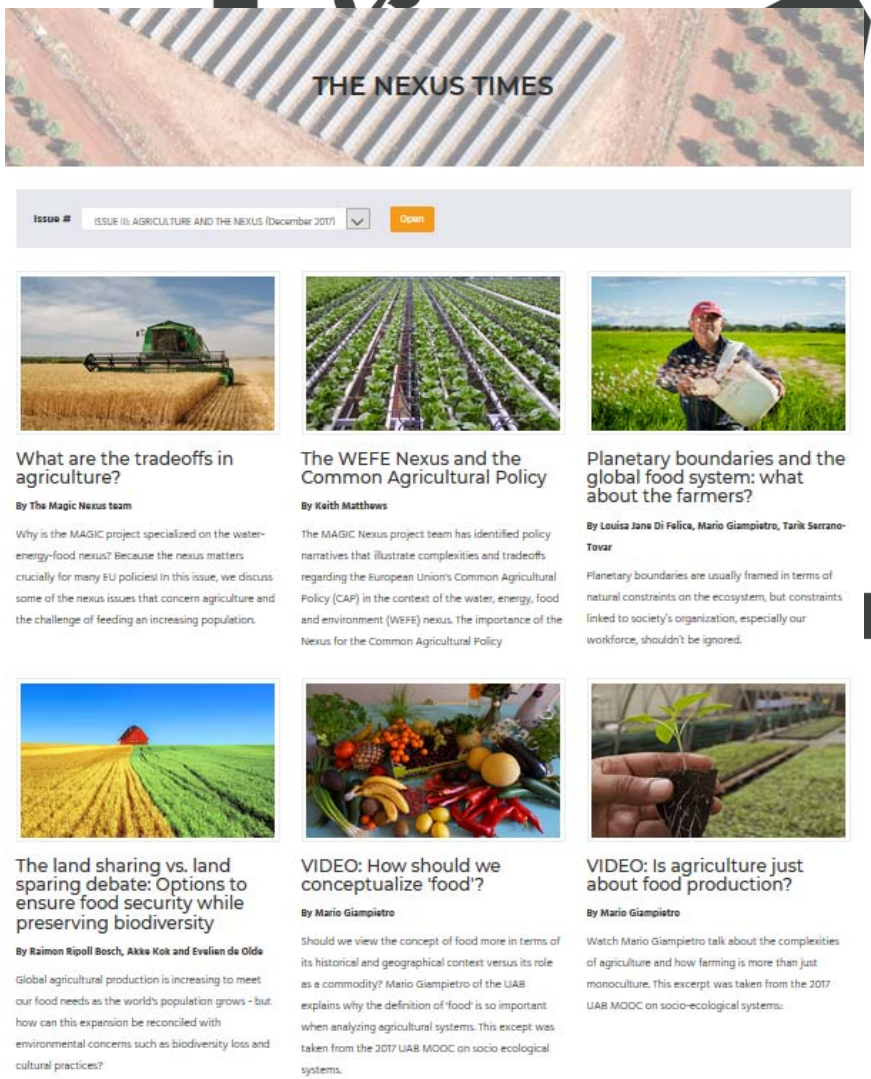
MuSIASEM as Post-Normal Science

- WEFE nexus “security” highlights strong sustainability as urgent and intractable

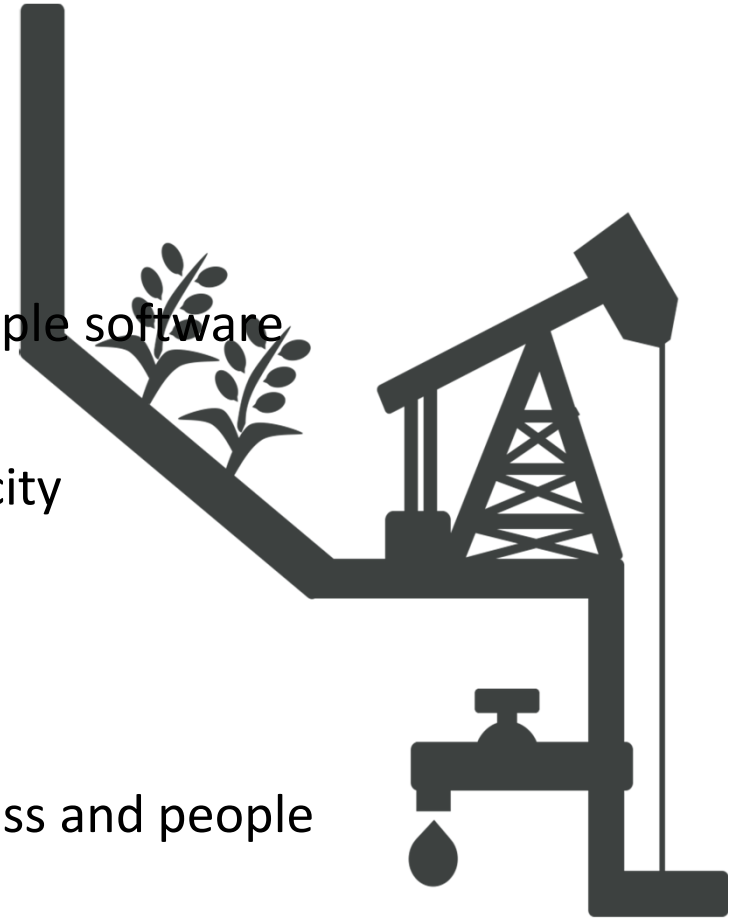
- Scientific practice and products can be political
- Need to fully consider how the SDGs deliver benefits, to whom and where

- All analysis is partial – trying to be as holistic as possible
- Conveying complexity and trade-offs to enable, not disable, policy making

http://www.magic-nexus.eu/nexus-times



The magic of Magic



- Not a tool – no user friendly interface or simple software
- Requires immersion, commitment and tenacity
- Challenging to use and to explain
- An approach that focusses on context, process and people
- A flexible accounting framework that works across scales and with non-equivalent variables
- Identifies ‘known unknowns’ in evidence-based policy

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The present work reflects only the author's view and t Funding Agency can not be held responsible for an use that may be made of t nformatio it contains.

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Video Series on Uncomfortable Knowledge:
https://www.youtube.com/playlist?list=PLIZrkdjNiMaWa0Gq3RT2NRQHpTkrARVmH

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