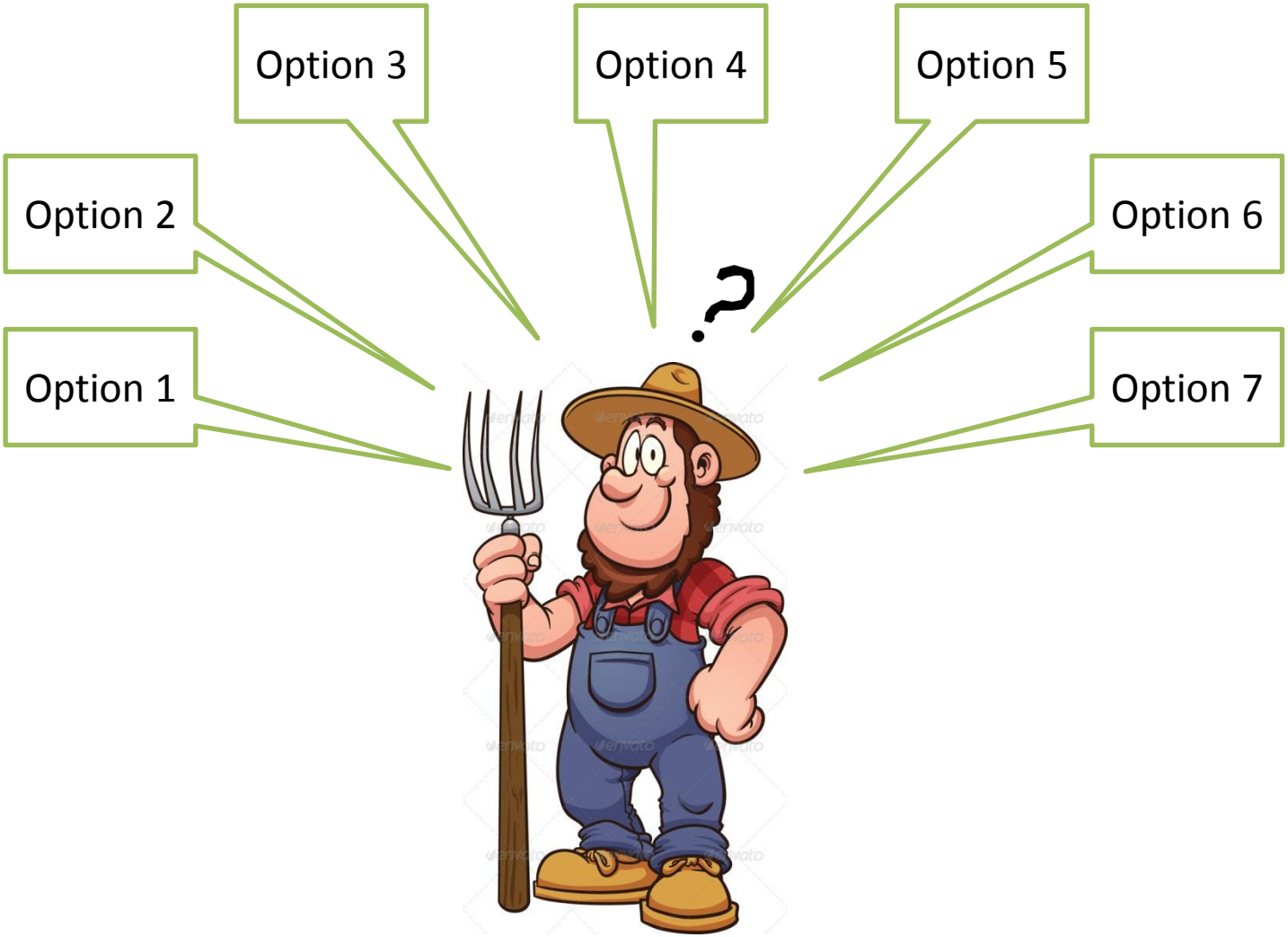
Participatory modelling for strategy design on dairy farms



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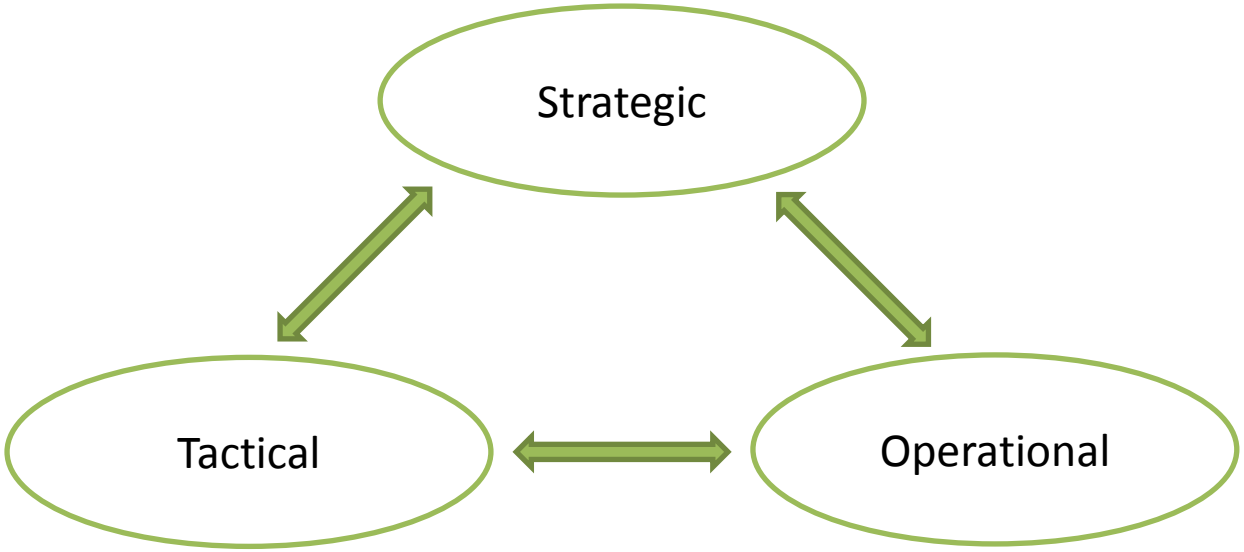
Decision levels



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Knowledge is necessary to take the best decision

Labour

Consumer

Cost price

Technical performances

Environment (oa CC)

Capital/land

Regulations

Technological progress

Prices

Ambition

Family

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PROBLEM context

- Why operational research (OR) methods can't help decision making at farm level?
- OR models (ex. LP) are mathematical formalisation of the economic decision problem;
- This is, optimizing something (a criterion) subject to constraints (production factors, other criteria, technological relationships)

PROBLEM analysis

- For some processes: OR optimisation = OK ex. ration optimisation
- For other applications, ex. culling decisions based on stochastic dynamic programming, OR use in practice is already more problematic
- Process versus organisational optimisation: farmer as decision maker has multiple objectives and constraints
- Strategy design versus operations management
- Not “the optimum”, but a range of plausible solutions is interesting
- But also attitude towards solutions “that come from a machine”
- Do we really need stand-alone one-fits-all quantitative tools?
- Or is it workable?

Learning by doing: 4 cases

- RQ: how to organize a proces and tool development to make it work
- Action research, mutual learning
- Close involvement of stakeholders, while we carefully watch not to confound the stakeholders stakes with our RQ
- Cases:
  - Scale enlargment in the post-quota era: AR with advisors
  - Communication between modellers at various levels with typical farms
  - Home-grown proteins in LI dairy farming
  - Soy bean breeding in moderate climate zones

Some lessons learnt

- It works! But difficult
- Very situation specific (farm, location, contexte, theme)
- Need for high involvement of those who are familiar with the situation
- Too early to come to conclusions, but, already a framework of four principles

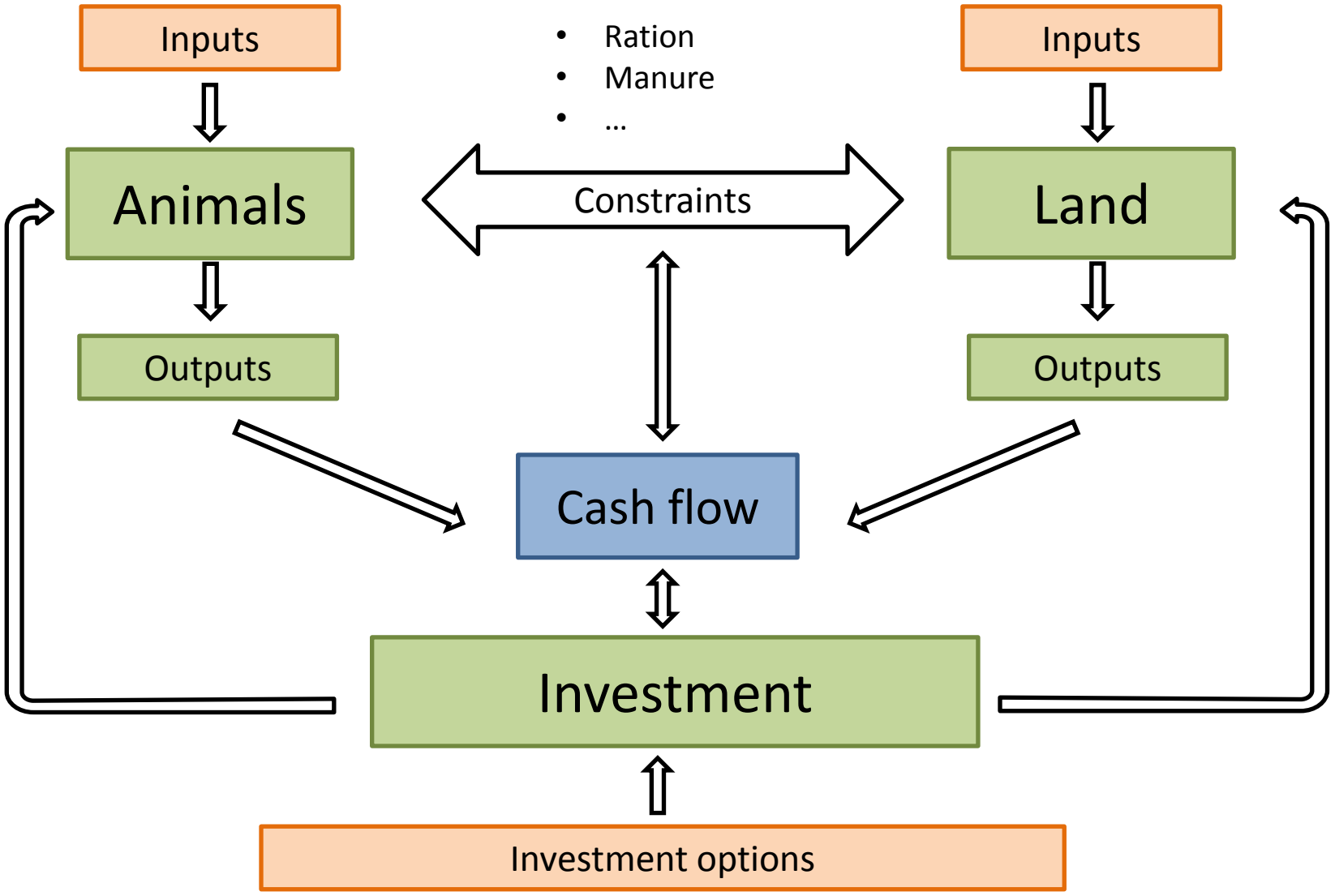
4 attention fields – principles – actions - paradoxes

- Whole-farm modeling, integrative, holistic approach to link all relevant processes and links. Paradoxe complexity -simplicity
- Decision support systeem, normative, need to integrate strategic and operational levels.
- Stakeholder involvement, participatory, need to compile knowledge for inspiration. Paradoxe generality- specificity
- Typical farms, communicative, reflect own decision context to benchmarks

Whole-farm modelling

- For **academic** reasons: model the system as comprehensive as possible to gain extra insights
- For **practical** reasons: we cannot experiment (that much) with the system, so simulation to cope with it
- For **decision support**
  - E.g. grazing strategies, crop mix- feed ration, culling decisions
  - Policy level : trade and food security
  - Farm: continuum from operational to strategic decisions
- Paradoxe: comprehensiveness versus simplicity

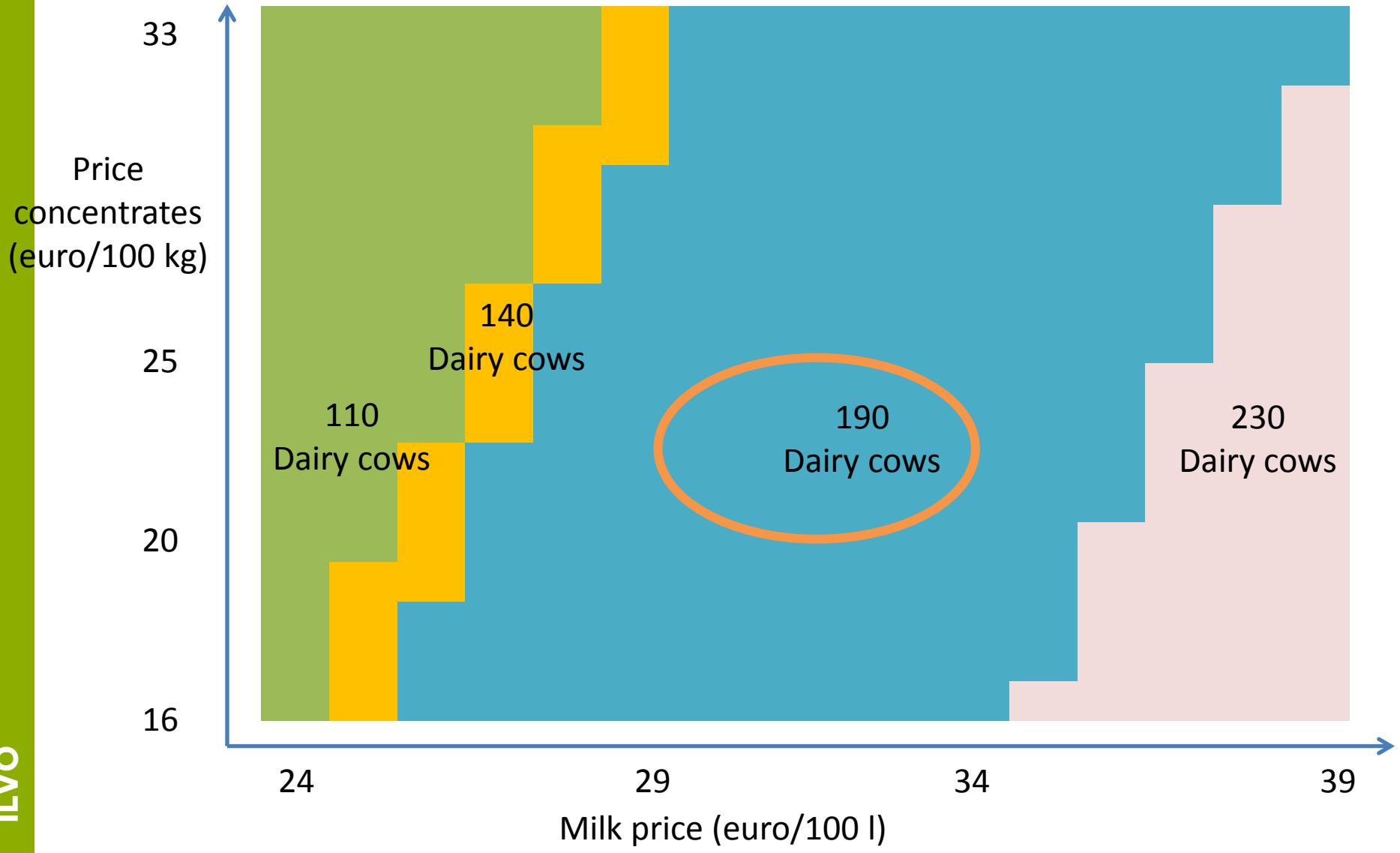
A farm model for dairy farms



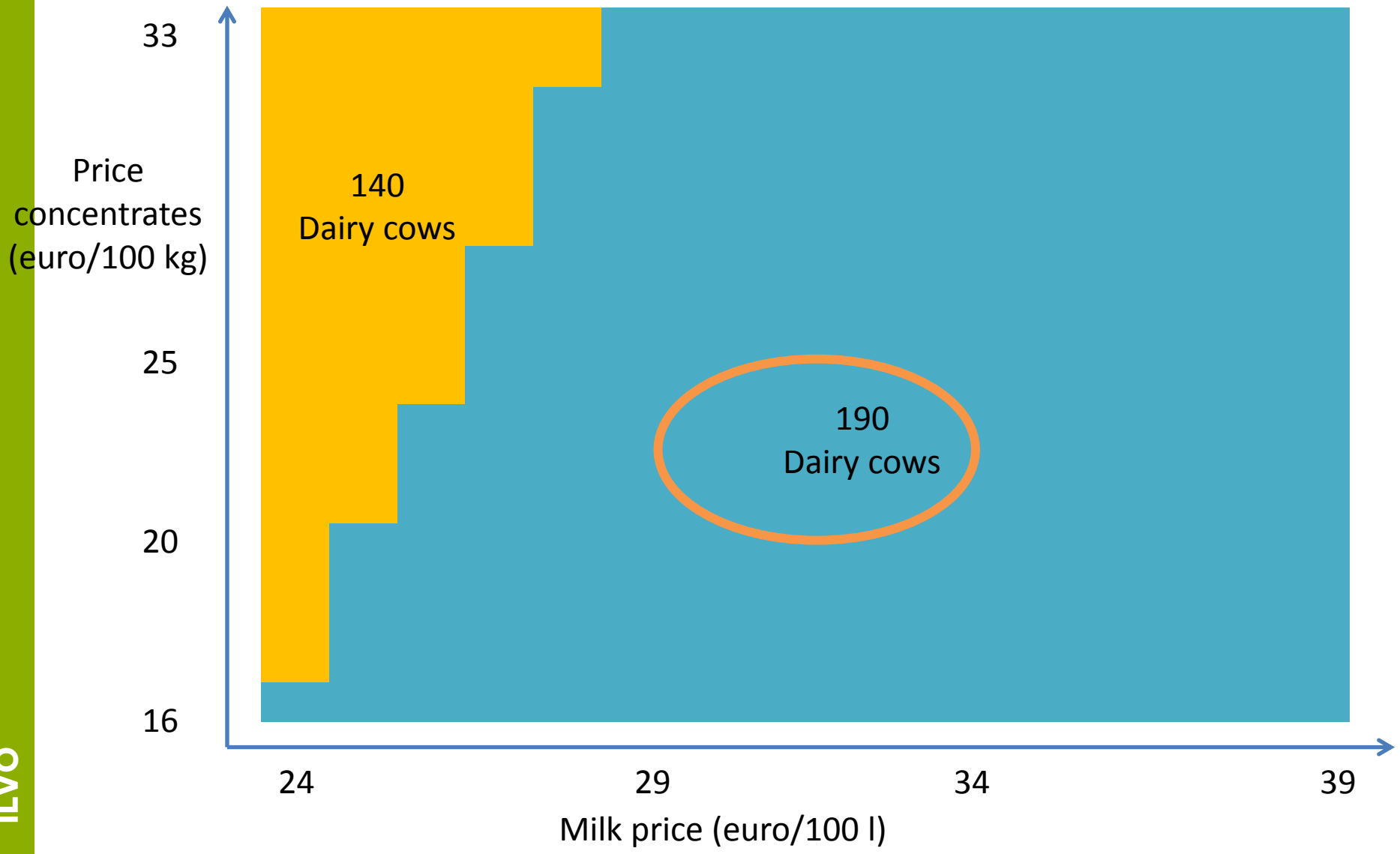
Decision-support systeem

- The strategic – operational challenge
- DSS= system of models
- Decision support tool linked to OR: sensitivity analysis, shadow price analysis
- Paradoxe: normative teachery versus normative explorative = > dual solution more important than the primal one

Optimal scale under changing milk and concentrate prices



Optimal scale under changing milk and concentrate prices



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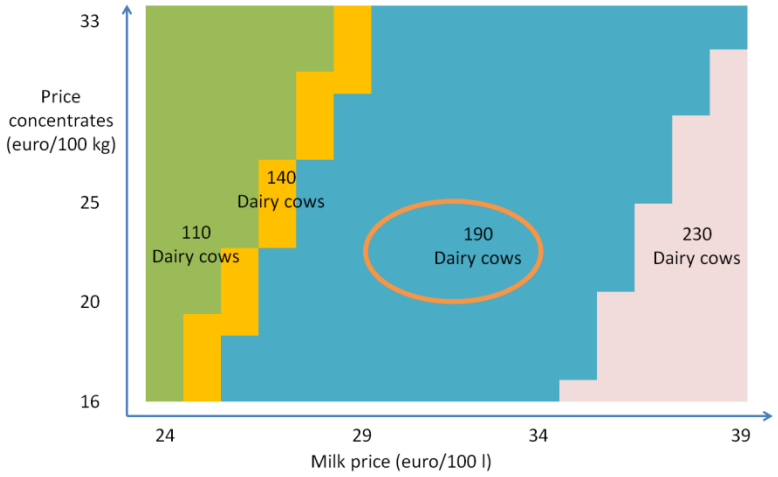
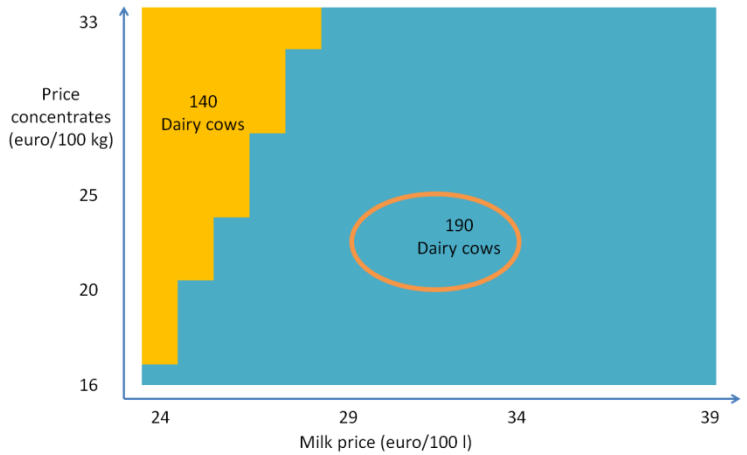
Possible output

Why does the model make a certain investment choice?

Example: within which limits of the milk price and the concentrate price stays the optimal investment choice optimal?





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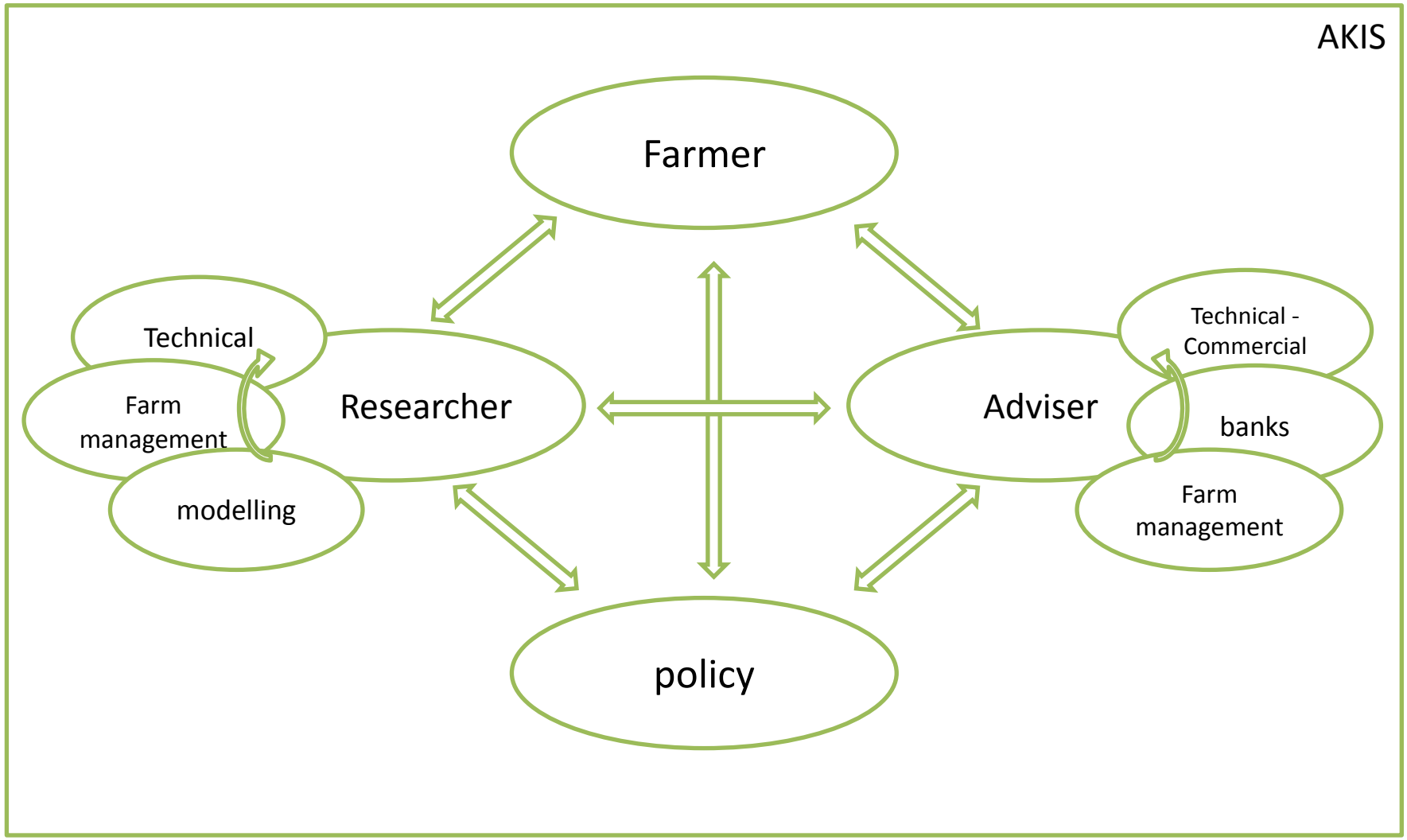
Stakeholder involvement

- Who cares? Many!
- Farmer, advisors, partners, family, veterinarians, technology providers, agronomists, farm economists, modellers, …
- Who helps in knowledge compilation and inspiration? Same!
- Paradoxes: specificity versus generality

Different actors have knowledge at different levels and in different disciplines



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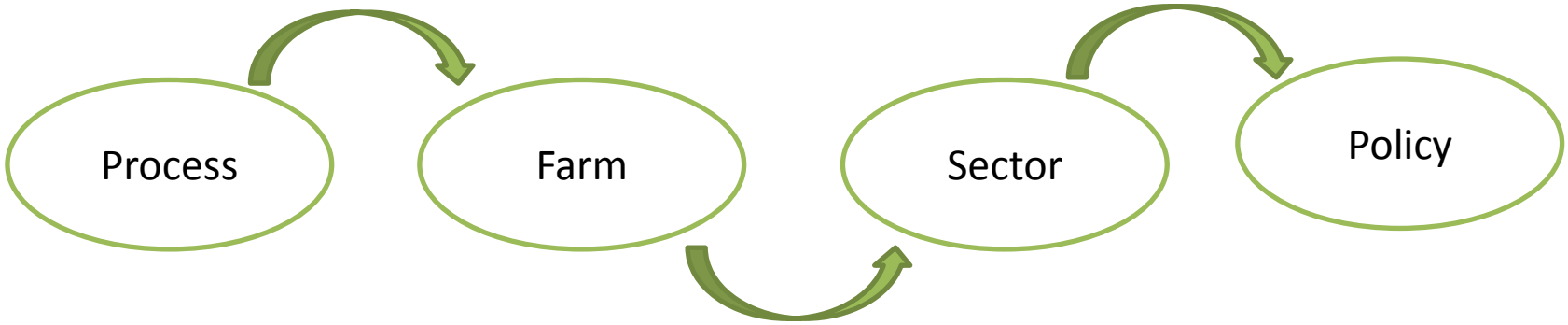
Typical farms

- Typical farm:
  - not necessarily a peer or a benchmark, but similarity helps
  - recognizable characteristics from a group of farmers (or individual farm, BUT confidentiality)
- Aim:
  - making ideas and inspiration tangible
  - to show mechanism of optimisation, importance of processess and links
  - Communicatio between modellers
- Paradoxes: recognizable pocket size example versus similarity to specific complexity

Identifying typical farms

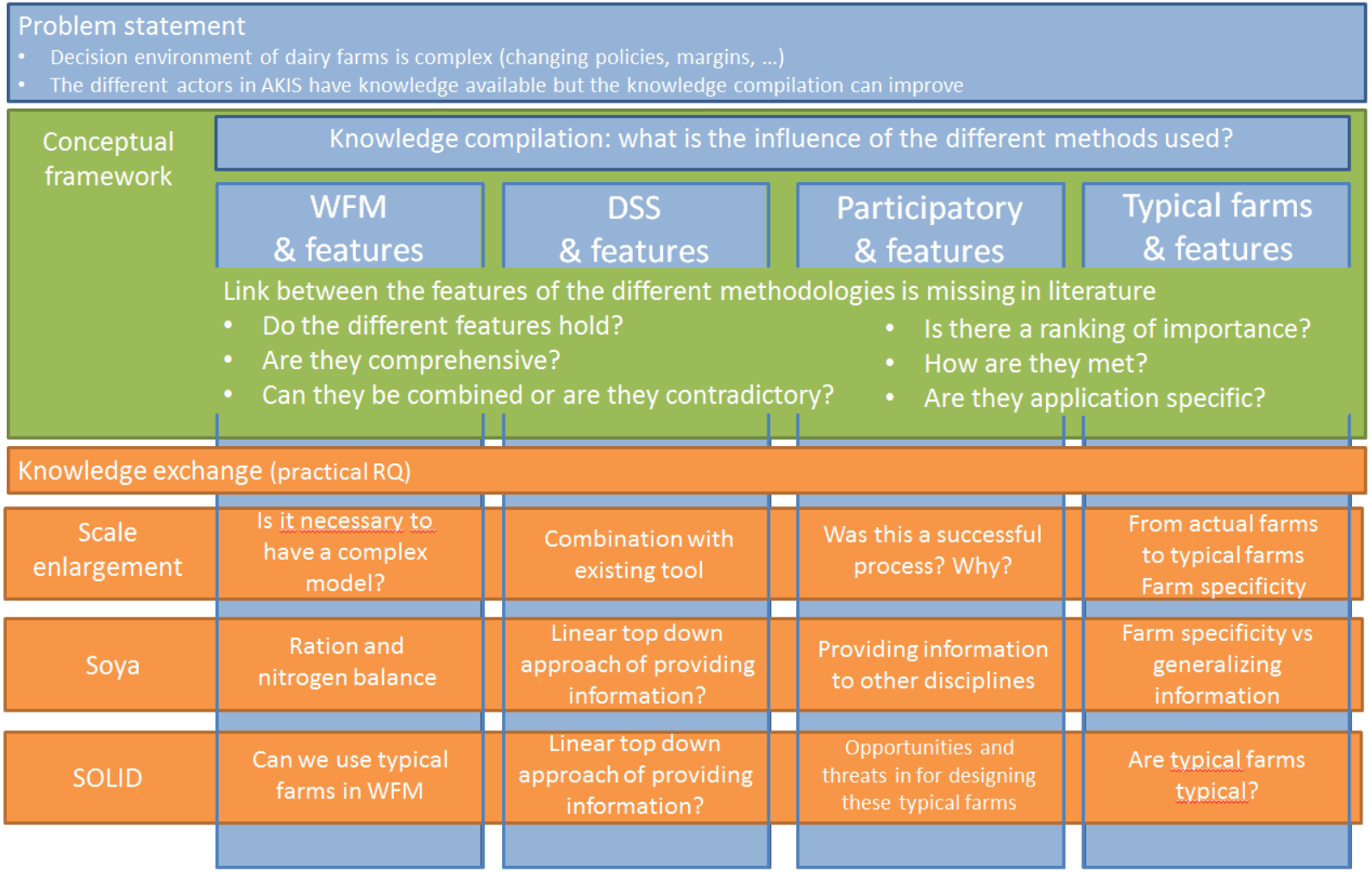
Facilitator for constant information flow between different modelling levels in the project



- Models are not aligned
- Have a different data need

Can we link the results of the different modelling levels using typical farms?

Researcher's inspiration: 4 principles drives RQ in the cases



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