



A return to decision support: How can decision support tools be used at the science-policy interface?

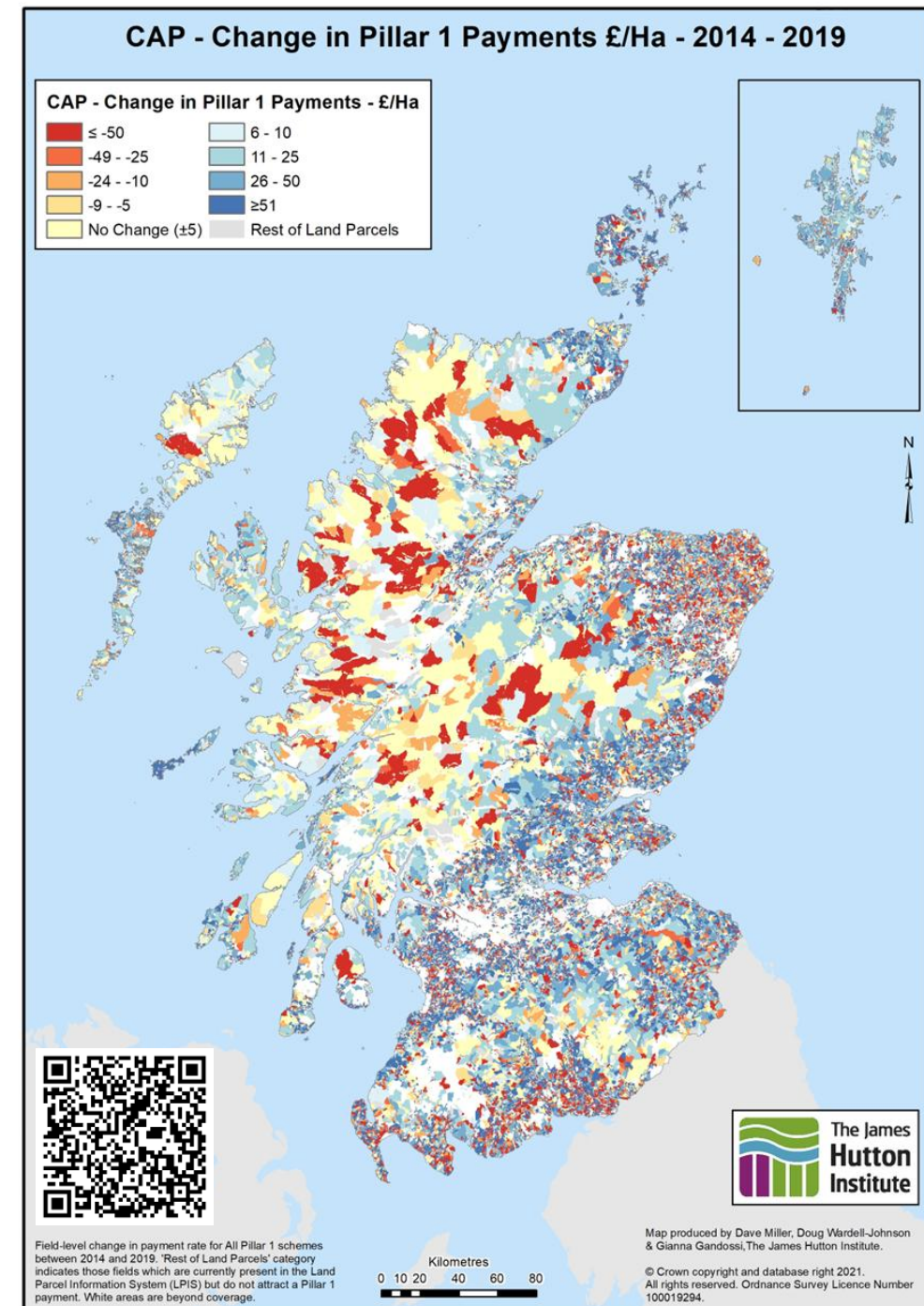
Keith Matthews, Doug Wardell-Johnson, Dave Miller, Mostafa Tavana, Jess Whitaker, Kirsty Blackstock.
Presentation at MODSIM 2025, Session F05, *Advancing decision support: Decision tools for building robust and resilient futures*, 30 November – 4 December 2025, Adelaide, Australia.



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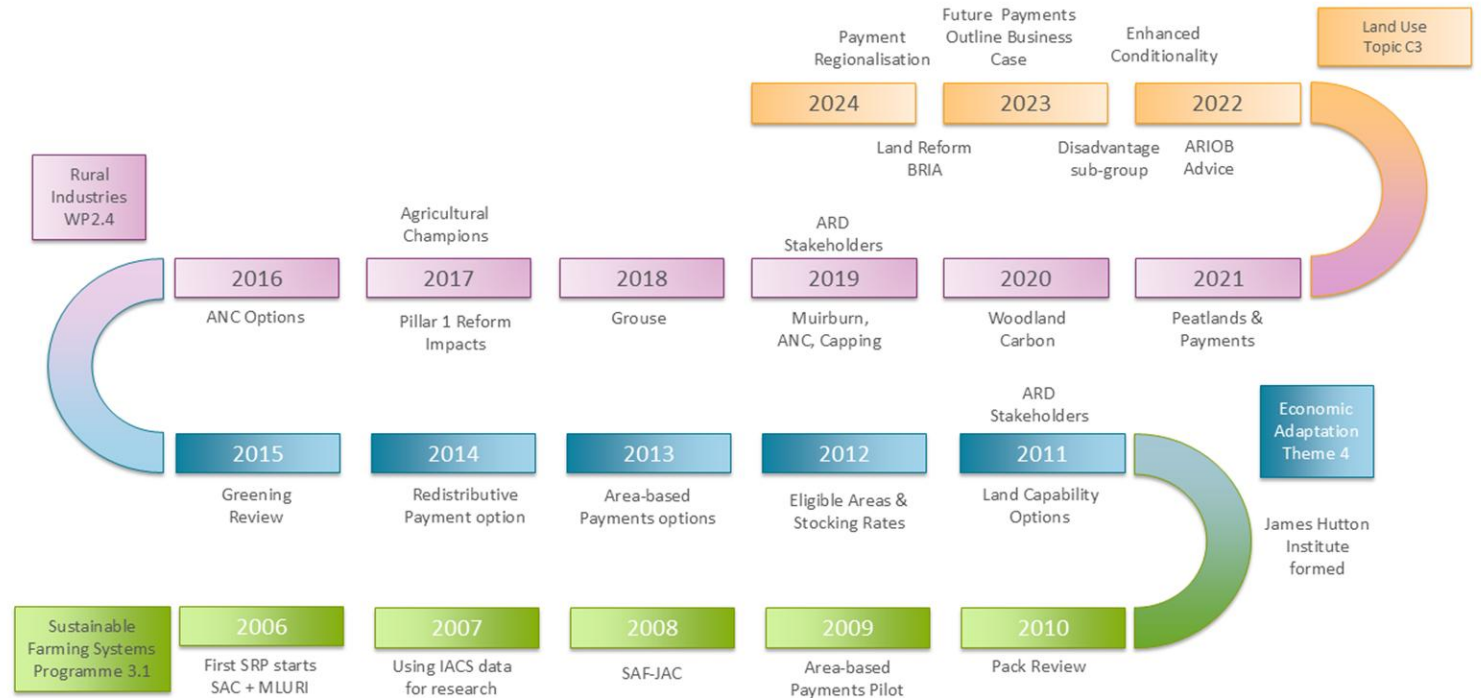
Problem and motivation

- **Problem statement:** How to design regional payment schemes that better deliver Net Zero and environmental objectives while managing distributional effects on land managers.
- **Why it matters:** payments' geographic and sectoral distribution shapes environmental and socio-economic outcomes.
- **Project aim:** Use Quantitative Story Telling (QST) – a second phase to co-develop and test farm payment regionalisation scenarios with Scottish Government analysts ➡



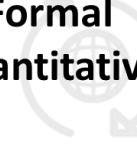
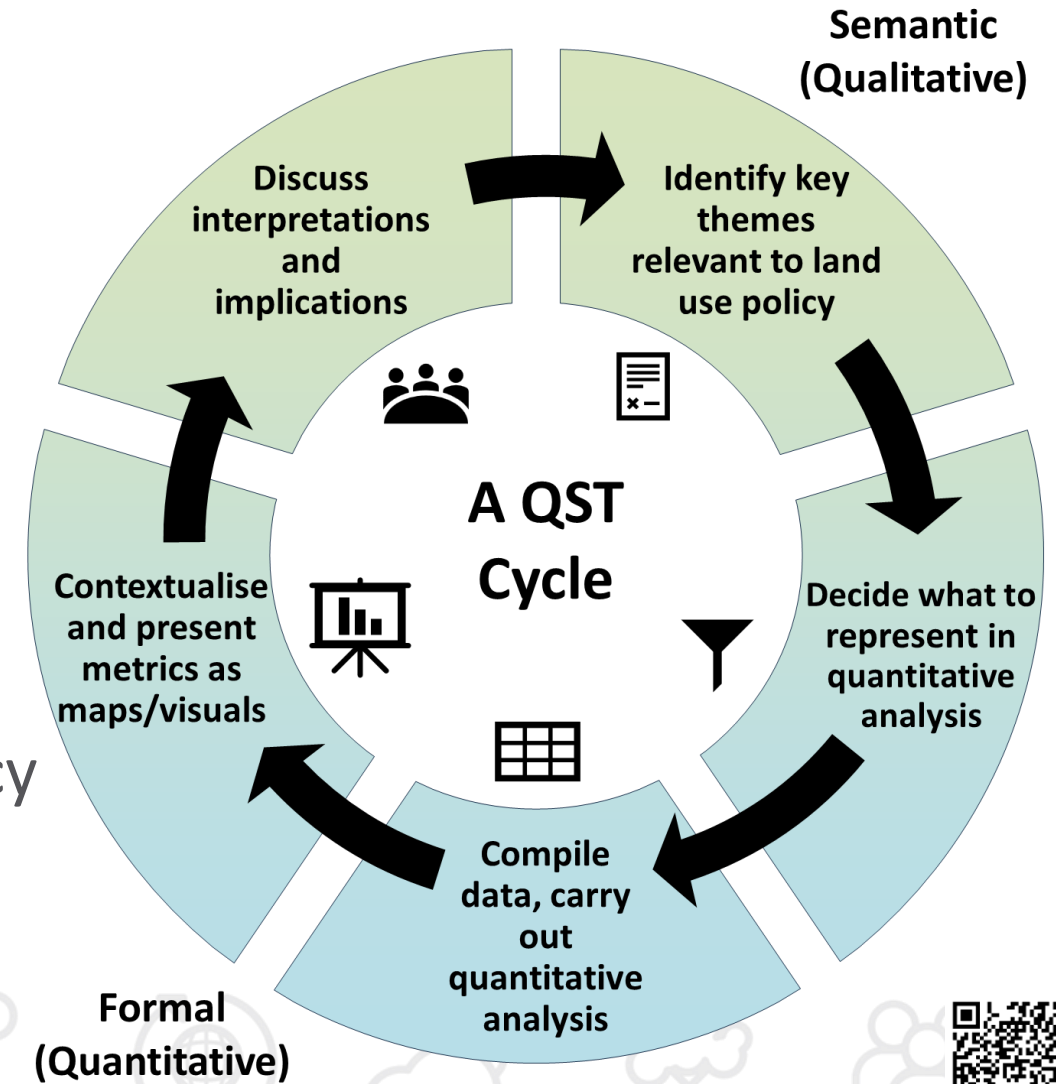
Background to the research

- **Policy context:** Scottish Government reform (Vision for Agriculture after EU-exit).
- **Historical basis:** builds on two decades of policy led and DST experience ➡
- **Motivation:** test how regionalisation interacts with Net Zero and other environmental outcomes



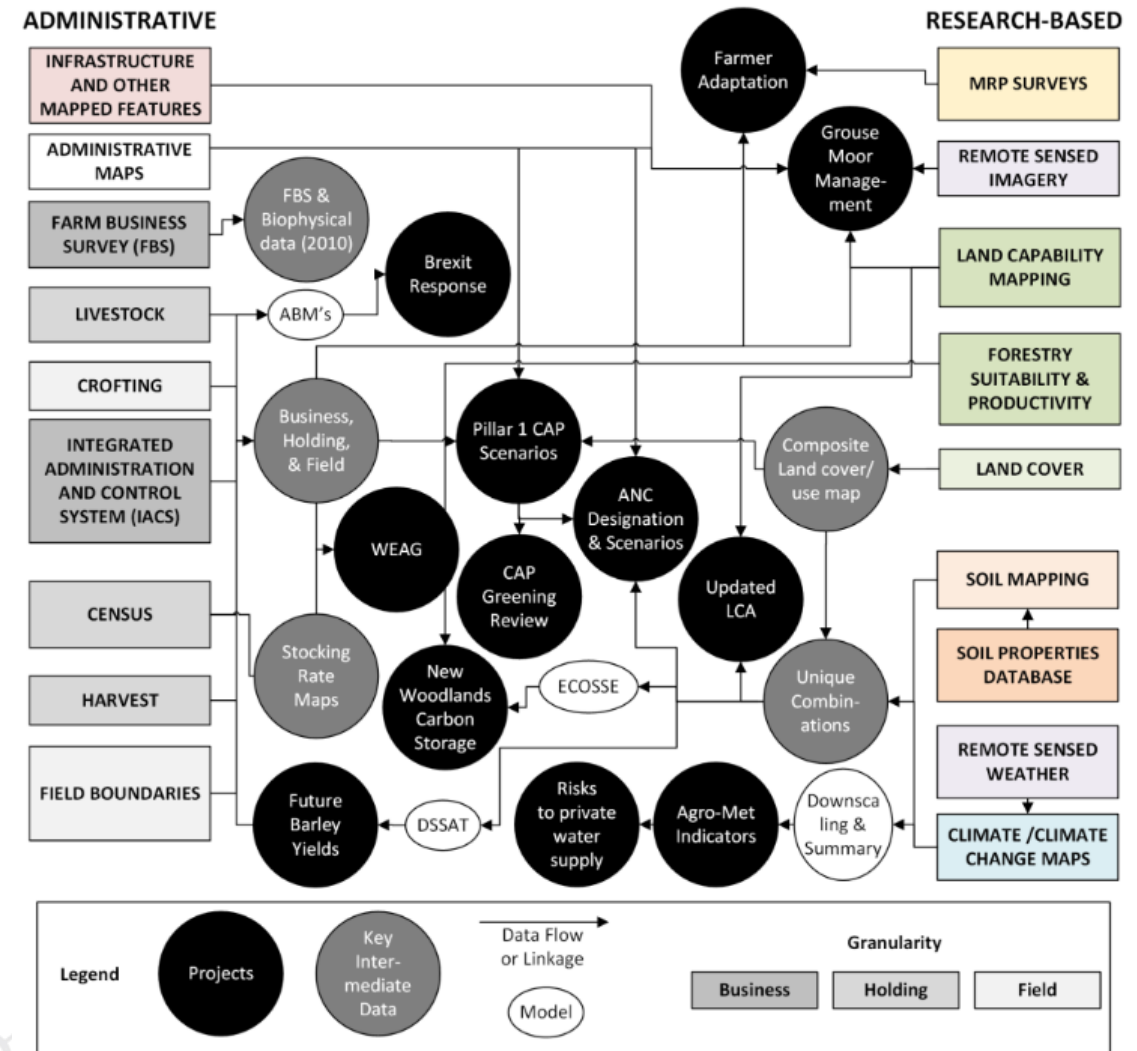
QST process and analytical scope

- **QST process:** iterative cycle combining semantic (stakeholder framing and interpretation) and formal (quantitative) phases →
- **Five Project Phases:**
 - 1) Baseline characterisation;
 - 2) Region based payments;
 - 3) Disadvantage payments;
 - 4) Livestock payments;
 - 5) Synthesis and engagement.
- **Engagement:** Co-development with policy and analysis staff
 - short quantification window (<16 weeks)
 - longer translation (>32 weeks).



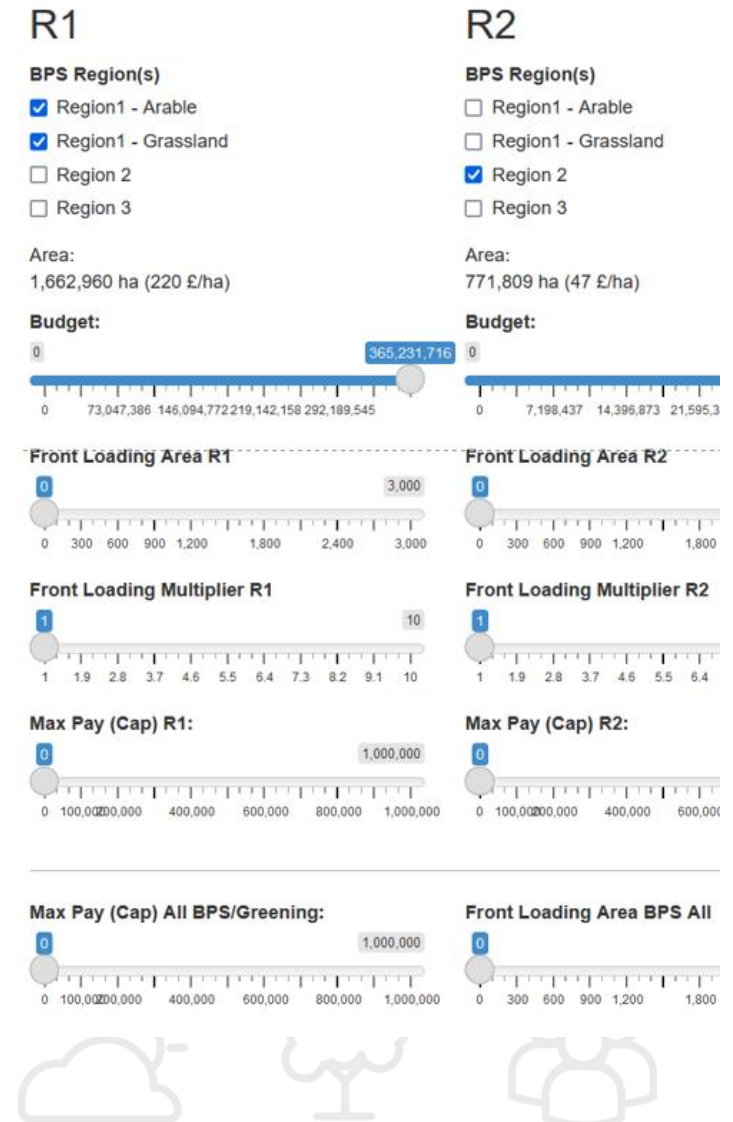
Data and decision support tools

- **Key datasets:** farm structures and payments (administrative) – climate, soil, capability (research based) ➔
- **Tools:** PowerBI dashboards for interactive visualisation then Scenario Builder (R Shiny) scenario generation & mapping.
- **Scenario Builder:** define payment budgets/rates/areas, compute per-business payments; change vs baseline; charts by region/farm type/size; maps; save scenarios.
- **Opened the tools for use by SG analysts – return to decision support.**

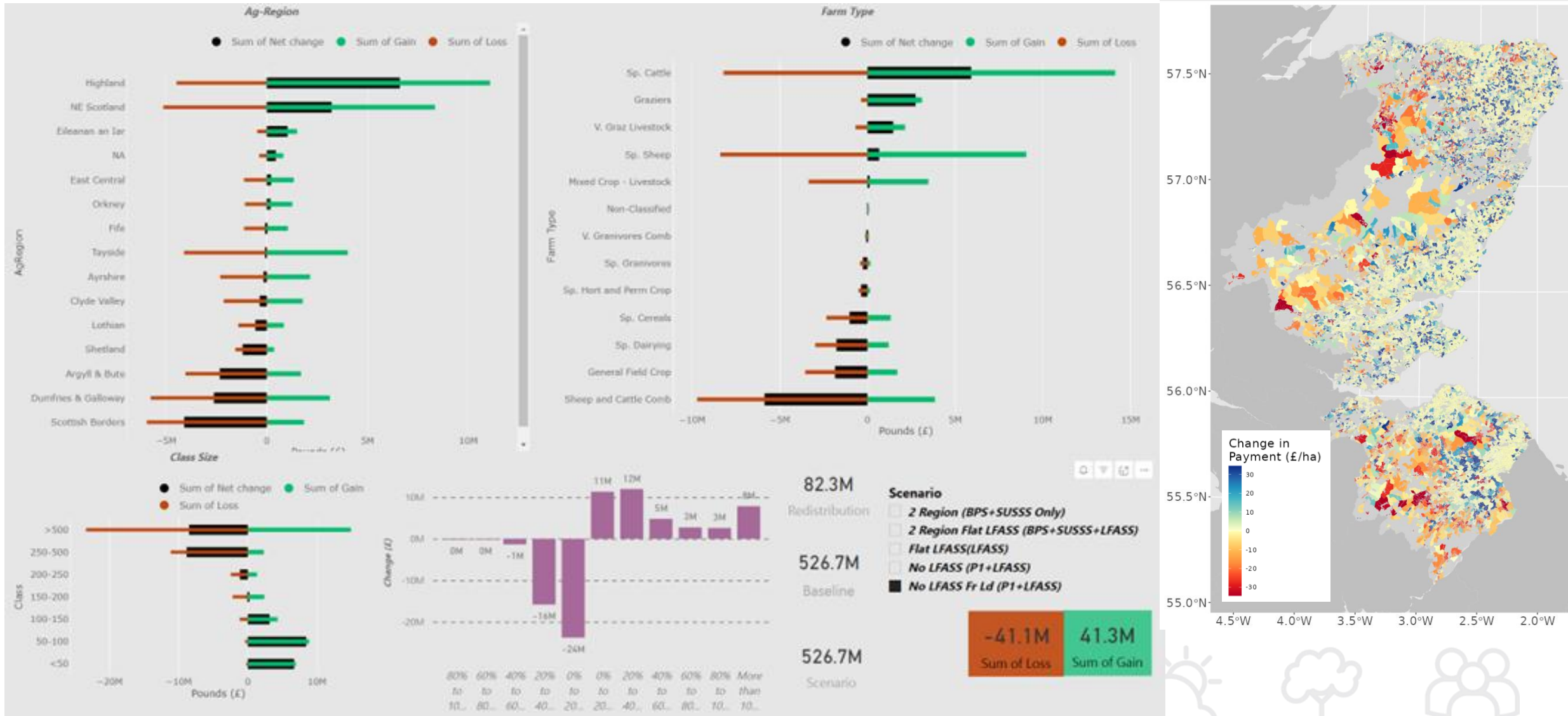


Scenario design - components

- **Number of regions**
 - Up to four future regions, any combination of BPS regions
- **Area per region**
 - Determined by the assigned BPS regions
- **Money per region**
 - Constrained to stay within the maximum budget but otherwise free to be assigned between regions to best meet scenario goals
 - Non region schemes may be converted to area-based payments (flattened)
- **Disadvantage** – a scheme specifically tied to area with lower productivity.
- **Voluntary Coupled Support** – schemes where payments are linked to production systems – typically particular types of livestock seen as foundational for wider systems (paid per animal).
- **Capping** – sets a maximum payment per region, for all regions or per scheme, typically used to limit payments for the very largest businesses.
- **Frontloading** – a progressive payment that favours smaller businesses. Pays more (a multiplier of the rate for the region) for the first x hectares of a business (which may be a mix of region types). Can also apply to the first x animals in a VCS scheme.

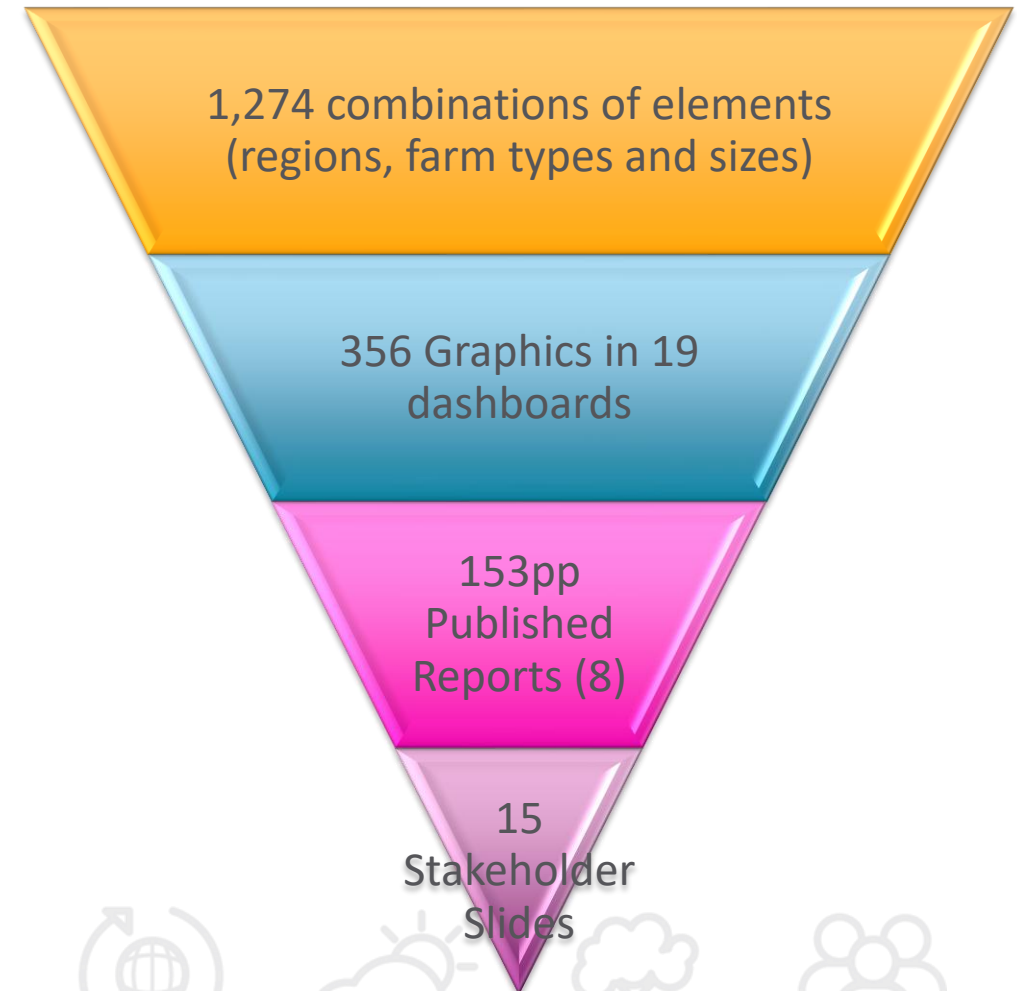


Dashboard example – key metrics



Quantifying complexity: outputs produced

- **Scale of outputs:** 19 dashboards across 4 topics, 2-6 charts each, 2 views + maps, 5 scenarios = 356 graphics.
- **Interactive detail:** Up to ~1,274 element combinations across regions, farm types and size classes (typical questions of detail).
- **Publication “funnel”:** 153 published pages reduced to 15 PowerPoint slides for stakeholder and ministerial workshop.
- **Access to the DSTs to help with the interpretation of analysis and open the deliberation (on policy options)**



Roles for decision support systems (DSS)

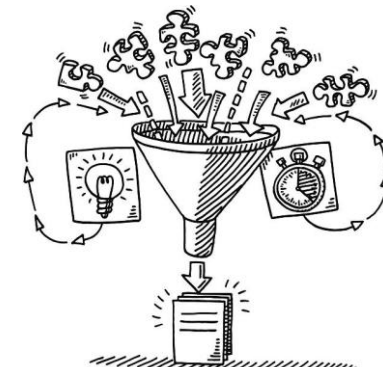
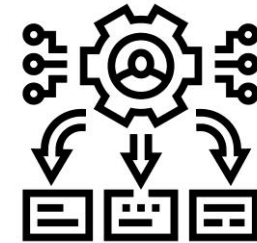
Guided by roles from McCown (2002) and Carberry (2002)

- **Calculator:** Fast, repeatable structured calculations; useful for routine per-business computations and sensitivity checks.
- **Record keeper:** Organises data, saves scenarios, supports audit and comparison across time.
- **Flexible simulator:** Exploratory “what if” analysis; requires developer support for setup and interpretation.
- **Systems analysis & learning environment:** Boundary object for deliberation, supporting reframing and social learning.
- Trade-offs: Flexibility \rightleftharpoons Complexity; developer support, transparency and documentation needed.



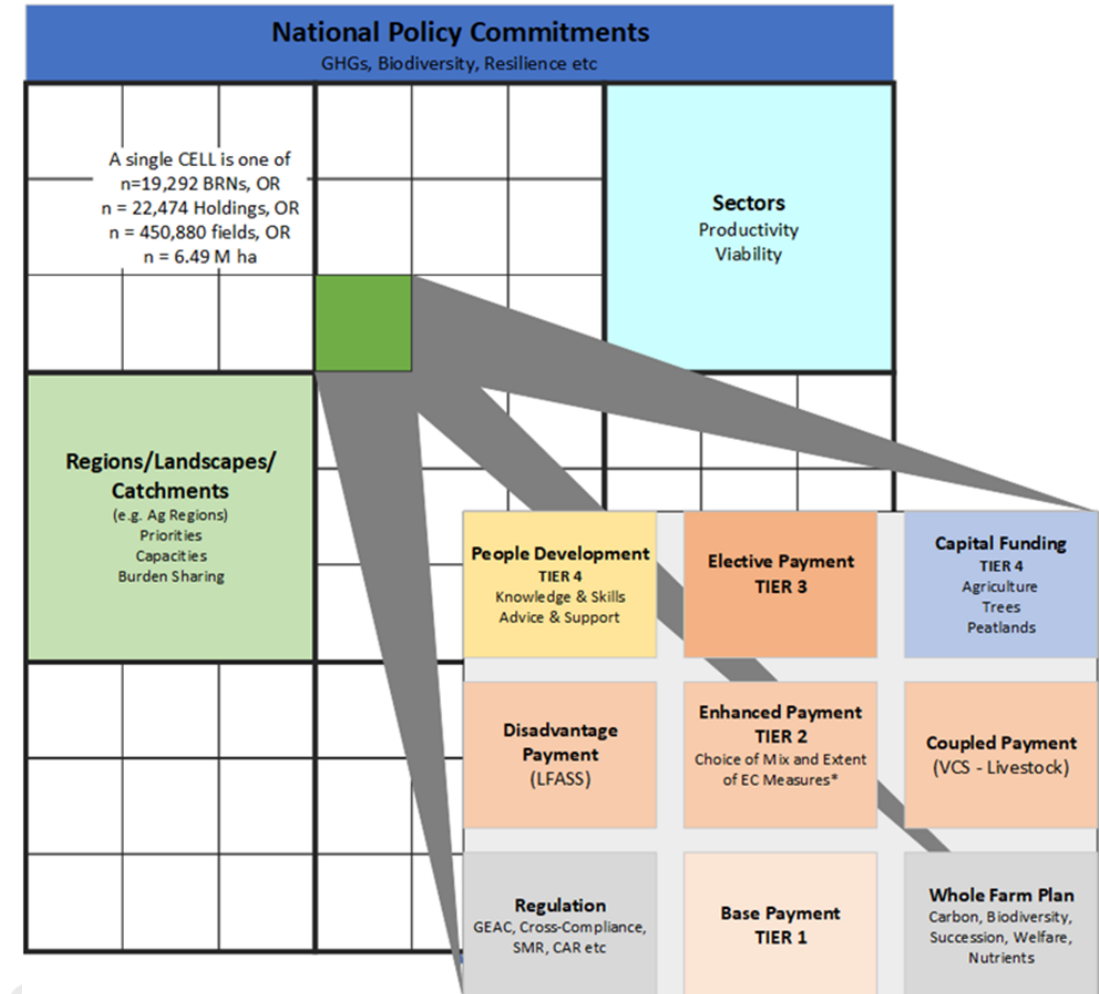
Reflections on DST roles and impact

- Impact ladder: Awareness → Enduring networks → Capacity building → Conceptual change → Instrumental change.
- Where DSTs add most: **capacity building** - repeatable options appraisal for analysis teams.
- Limits for policy uptake of DSTs: expertise needs, institutional fit, and the “funnel” narrowing and media what reaches ministers.



Lessons learned and recommendations

- **Practical lessons:**
 - QST works as a **process** for co-creation;
 - DST add to the **capacity for quantifications** and within limits flexibility for **ad hoc enquiries**;
 - **QST interpretation stage (5) the rate limiting step** - easy to overwhelm with evidence;
- **Strategic recommendations:**
 - Invest in **DST literacy** and analyst capacity inside government;
 - Use **DST as boundary objects** in deliberative forums – changing the way evidence is packaged.
- **Caveat: DST *use by* still seems a high hurdle – rather than *use with* – yet the next research programme proposals stress the former.**



Conclusions and next steps

■ Takeaway:

- DSTs and QST can generate rich, policy-relevant evidence, but institutional bottlenecks and translation challenges limit direct policy impact;
- Strength of relationships between researchers and policy makers more crucial than technical sophistication;
- Targeted capacity building and sustained collaboration increase usefulness.

■ Immediate next steps:

- Complete the monitoring and evaluation of the QSTs processes ➡

“I’ve never worked quite this closely in such an integrated way with an academic team. ... there’s something really interesting and exciting about the idea and the way of doing it.”

(QST2 evaluation interview with ScotGov, August 2024).

QST Policy Brief



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Previous related analyses are also available from the Hutton Land Systems Research Team website -
<https://ics.hutton.ac.uk/research/land-systems-research-team/>

The sets of slides and maps generated by the CAP 2014-19 analysis is available from -
<https://ics.hutton.ac.uk/research/land-systems-research-team/cap-analysis/>

For woodland expansion analysis see - [online mapping](#) and [paper](#).

Further research in the RESAS Strategic Research Programme 2022-27, in the [Land Use Transformations](#) (C3-JHI-1) and [Land Reform](#) (E3-JHI-1) projects in the SRP.

The James Hutton Institute is supported by the Scottish Government's Rural and Environment Science and Analytical Services Division (RESAS)

