



# Integrating Traditional and Digital Soil Monitoring: Experiences from an EIP-AGRI Operational Group in Hungary

*“The future of EIP-AGRI Operational Groups: challenges, opportunities and existing support services”*

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Development of a cost-optimized novel soil sampling methodology for precision agriculture

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# Drawing from broad experience with Operational Groups

- Discovery Center is coordinator or member of 15+ Operational Groups across Hungary
- Diverse roles: research partner, advisory service (soil health, sustainable farming practices, precision technologies)
- Today's case study: precision soil monitoring OG in Somogy County
- Insights on collaboration, implementation and knowledge transfer drawn from our complete OG portfolio



# Context & Problem

- In Hungary, many farmers want to adopt precision agriculture but struggle with selecting appropriate technologies.
- Our OG was formed in response to a clear need: farmers were overwhelmed by competing technology providers, each promising fast soil mapping results but offering little clarity on which solutions truly delivered value.
- As one farmer partner explained: *"When I became CEO of a farming company with 700 hectares in Somogy county, I tried to implement precision technologies but couldn't tell which soil mapping approaches were actually reliable and worth the investment."*
- Confusion was preventing widespread adaptation of beneficial practices



# Our solution:

## precision soil sampling & targeted application

- As coordinators, Discovery Center established a multi-stakeholder framework to develop an integrated approach combining traditional soil knowledge with digital tools:
  - Precision soil sampling based on management zones rather than grid sampling (proved more cost effective)
  - Geospatial analysis using Digital Elevation Models (field topography, water movement)
  - GPS-enabled application equipment for targeted nutrient delivery
- This approach directly addressed the "bridging science and practice" challenge by creating practical implementation paths for farmers.



# Key benefits observed

- Economic benefits that answered the critical farmer question "*Is there money in it?*":
  - 15-20% reduction in fertilizer use without yield loss (immediate cost savings)
  - Long-term cost savings from more efficient resource use
  - Improved crop resilience during drought conditions, reducing irrigation needs
- Environmental benefits:
  - More precise nutrient application reducing runoff
  - Better soil health with 25-30% improved root systems
- Increased biodiversity observed on trial sites

These tangible benefits are crucial for adoption, farmers need to see both economic and environmental value to justify the transition.



# Implementation journey

- Our implementation revealed important insights about the OG process (beyond the specific technology):
  - Adoption was significantly boosted by local demonstrations where farmers could see results firsthand (vs technical explanation or published materials)
  - Knowledge-sharing among farmers proved more effective than top-down technical instruction (peer learning → trust, adoption rate ↑)
  - Technical support during initial implementation was absolutely critical for success (hands-on guidance)
- As we have heard in other discussions, "*It is a slow transition*" - most farms needed about three years to see full benefits (important implication for structuring and supporting OG projects)



# Overcoming barriers

- We directly addressed common challenges identified by farmers:
  - High initial costs were mitigated by helping secure subsidies and developing cost-sharing approaches
  - Knowledge gaps were addressed through simple, visual step-by-step implementation guides focusing on practical actions rather than technical theory
  - Technical complexity were tackled by providing advisory support to ensure that farmers could get theoretical and hands-on support
  - Variability in results were addressed by developing tailored solutions based on site-specific conditions (vs 'one-size-fits-all')



# Future vision for OGs

- Based on our experience across multiple OGs, successful OGs of the future will need to:
  - Focus on creating practical tools farmers can immediately implement (moving beyond knowledge sharing to action enablement)
  - Balance innovation with proven practices (integrate new technologies with traditional knowledge farmers already trust)
  - Provide economic pathways that make adoption feasible ('what' and 'how' of implementation financing)
  - Create ongoing support systems, not just one-time knowledge transfers (implementation is a 'journey', not an event)
- As one farmer noted: *"The plant-soil ecosystem is very complex - expertise is crucial when collecting and interpreting data."* (ongoing support is essential to successful innovation adaptation)





# Conclusion

- Our OG demonstrated that technology adoption isn't just about the innovation itself, but about creating the right support ecosystem around the innovation.
- The future of OGs depends on our ability to make scientific advancements accessible, economically viable and practically implementable.
- Achieving this balance ensures that OGs can truly fulfill their potential as catalyst for sustainable agricultural transformation.

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<https://discoverycenter.eu/portfolio-items/cost-optimized-soil-sampling>

<https://soilxchange.eu/>

# Thank you!

