Digital tools for better agricultural and agri-environmental policies in Estonia

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OECD
BETTER POLICIES FOR BETTER LIVES

Context: Estonia's agriculture

Economic performance

- Dualistic structure
- Net importer of agri-food products
- Productivity growth rates higher than in most comparable countries and the EU average over the last decade
- Milk yields in Estonia have achieved faster growth rates and started to catch up the yields in other countries

Environmental performance

- GHG emissions generally lower than other OECD countries, but rising
- Decline in farmland birds (biodiversity)
- Local environmental issues:
  - Water quality in some agricultural catchments
  - Management of peatlands (organic soils)

➢ Conclusion: Estonian agriculture has been growing reasonably well, but needs to ensure **sustainable growth**

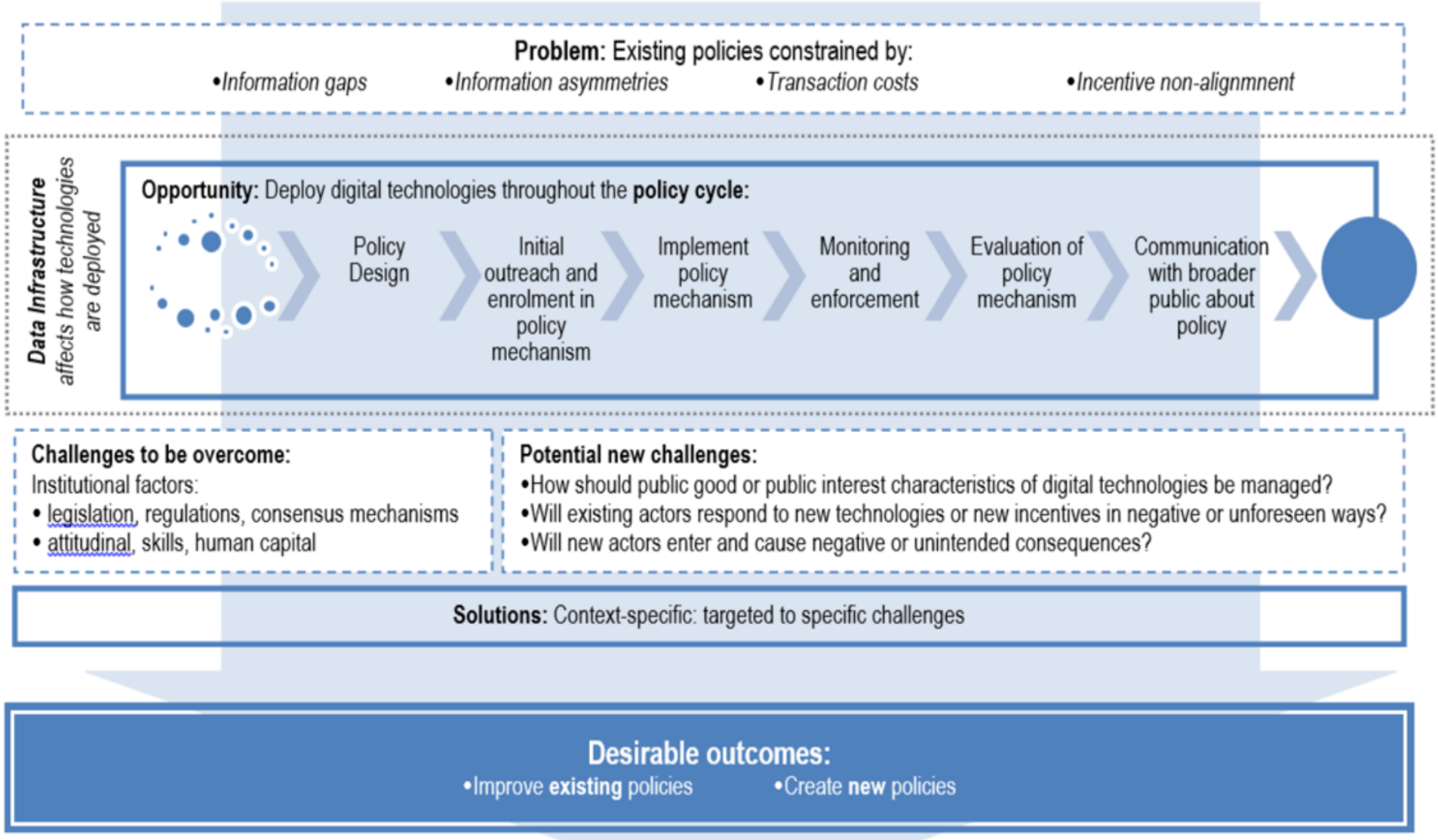
Context: the drive to deliver better policies for Estonian agriculture

- 2016 OECD Agriculture Ministers Declaration on Better Policies to Achieve a Productive, Sustainable and Resilient Global Food System
  - Political will to deliver “better” policies, but how?
- Planning for CAP 2020+ = a window of opportunity

- **Objective**: provide guidance to policy-makers on:
  - Opportunities: how can digital tools improve policy?
  - Challenges (impediments to adoption)
  - Risks (new issues adoption may create)

How can digital tools help deliver better policy? Conceptual framework

*Basis in transactions costs economics, information economics, institutional economics



What technologies are we talking about?

"Digital technologies" are: *ICTs [information communication technologies], including the **Internet**, mobile technologies and devices, as well as **data analytics** used to improve the generation, collection, exchange, aggregation, combination, analysis, access, searchability and presentation of digital content, including for the development of services and apps.*

Source: OECD (2014)

Note: doesn't include other technological innovations such as genome editing, vertical farming, lab-grown animal products…

What technologies are we talking about?

Purpose	Technology category
Data collection	Remote sensing
	In situ (proximal & ground) sensing
	Crowdsourcing data collection
	Online surveys / censuses (voluntary or mandatory)
	Financial / market data collection
Data analysis	GIS-based and sensor-based analytical tools
	Crowdsourcing data analysis
	Deep learning / AI
Data storage	Secure and Accessible Data Storage
Data management	Data management technologies (Distributed Legers, data portals, interoperability protocols, APIs)
Data transfer and sharing	Digital communication technologies (social media, NLG)
	Data visualization software
	Online platforms - property rights, payments, services and markets

What technologies are we talking about?

Key recent developments:

- **Remote sensing** (satellite, UAVs): up to 1-2 day re-visit, <1m resolution
- **In situ / proximal sensing**: could ag nonpoint sources become point sources?
- **Encryption** and **confidential data sharing** techniques
- Web-based **platforms**
  - Sharing economy, online payments & purchases, collaborative planning, “layering” of multi-source data
- **Machine learning / AI**
  - Automated diagnoses, early warning / early compliance systems, natural language generation (NLG)
- **Social media**
  - Multi-way communication, peer-to-peer learning
- **Precision agriculture**: data source for farmers, services and policy + a means of implementing policy?

OECD report: Methods for analysis

- Literature review
- Expert consultations
- 2018 OECD Global Forum on Agriculture
- **Questionnaire** on policy administrators' current use of and experience with digital tools
  - **46 responses** covering **67 institutions** from **16 OECD countries**, plus DG-AGRI
  - **4 Estonian agencies**
- 10 in-depth **case studies**

In-depth case studies

Country	Case study
AUS	Remote sensing for gully erosion monitoring
AUS	Digital tools and data sharing institutions for enhancing access to agricultural micro data for research and policy
EST	**X-road digital platform & digital identity system for public services and agricultural policy administration**
EU	RECAP digital platform for EU CAP administration
NLD	*Akkerweb* digital platform for farm data and agricultural services
NLD	SCAN-ICT system for Dutch Agricultural Collectives Agri-Environmental Schemes
NZD	Digital tools for *Our Land and Water* National Science Challenge
USA	Digital tools for innovative compliance with CWA (US EPA)
USA	Data transparency requirements and California water quality collectives
USA	US National Soil Moisture Network

Improving current policies with digital tools

- More **holistic models** allow setting of realistic, measurable goals
  - Refine existing objectives to better account for spatial heterogeneity
  - Better understanding of farmers' incomes and activities
  - Better targeting to specific beneficiaries and goals
- **Digitally-delivered outreach and farm advisory services** for voluntary programmes (AES)
- **Automation** of compliance, controls and payments
- **Connect administrative data with farm performance data** to better evaluate current policies and plan for future ones
- Use monitoring to target audits (controls) and reduce costs

New digitally-enabled policy tools

- **Information rich policy paradigms**
- **Co-innovation approach:** farmers & communities "have a stake" in policy
- **Data transparency requirements** → reputation driver of compliance and value
- Compliance risk **early warning systems** & **self-evaluation** (FaST Nutrient tool?)
- **100% monitoring** instead of audit (control) approach
- **Hybrid payment systems** which incentivise farmers to monitor performance
- **New penalty structures**: Digital tools in "enforceable undertakings"
- New ways to **reconnect consumers with agriculture**: "digital windows"
- Digital communication tools to provide useful **feedback to farmers** from publicly-held data
- **AI/Virtual farm advisory services**
- **Digitally-delivered training**
- **Policies which support digitalisation in agriculture to attract young farmers**
- **(Near-)real-time data and advice** → temporally adaptable policies
- **Spatially-targeted and results-based AES**
- **Digital repository for CAP NSP documents** → transparency and robustness

Challenges

- **Path dependencies**
  - What limitations are embedded in current IT systems?
    - Limits on accessibility?
    - Are datasets geo-located?
    - Do IT systems cater for co-operative planning?
    - Do organisations have e-payment systems? Can these be adapted to do more than just make payments?
  - Do policy administrators have the right skills? Can they retrain or partner with private sector?
  - Attitudinal impediments: Are organisations willing to change?

- **Changing how we work with data**
  - Can we effectively integrate data of varying quality, temporal and spatial scales? What does this mean for statistical analyses?
  - Moving towards explorative research, rather than always hypothesis driven
  - Recognising inherent bias in data and how this affects algorithmic decision-making

- **Regulatory constraints:**
  - Privacy / confidentiality requirements are a key impediment to accessing and combining datasets, but are needed for several reasons
  - Existing regulation may pre-empt using digital tools and related data

Risks

- Data breaches
- 'Social licence' to collect agricultural data may be jeopardised if government is too intrusive or confidentiality is not maintained
- Transparency of decision-making and access to new knowledge: potential to create a new digital divide
- Liability when devolving analysis and decisions to algorithms
- Algorithmic advice as a standard for human decisions?
- Creating new dependencies– e.g. over-reliance on models
- Data-driven conflict (e.g. animal welfare, env. impact)

Key policy recommendations

- **Governments** can make use of digital technologies to **improve existing policies** and **create new, better policies** for the agriculture sector
  - Governments should allow room for genuinely new approaches, supported by technology
  - Technology can help governments take a co-innovation approach where farmers and others are directly involved in research, policy design and implementation
  - Governments may need new skills and new administrative processes

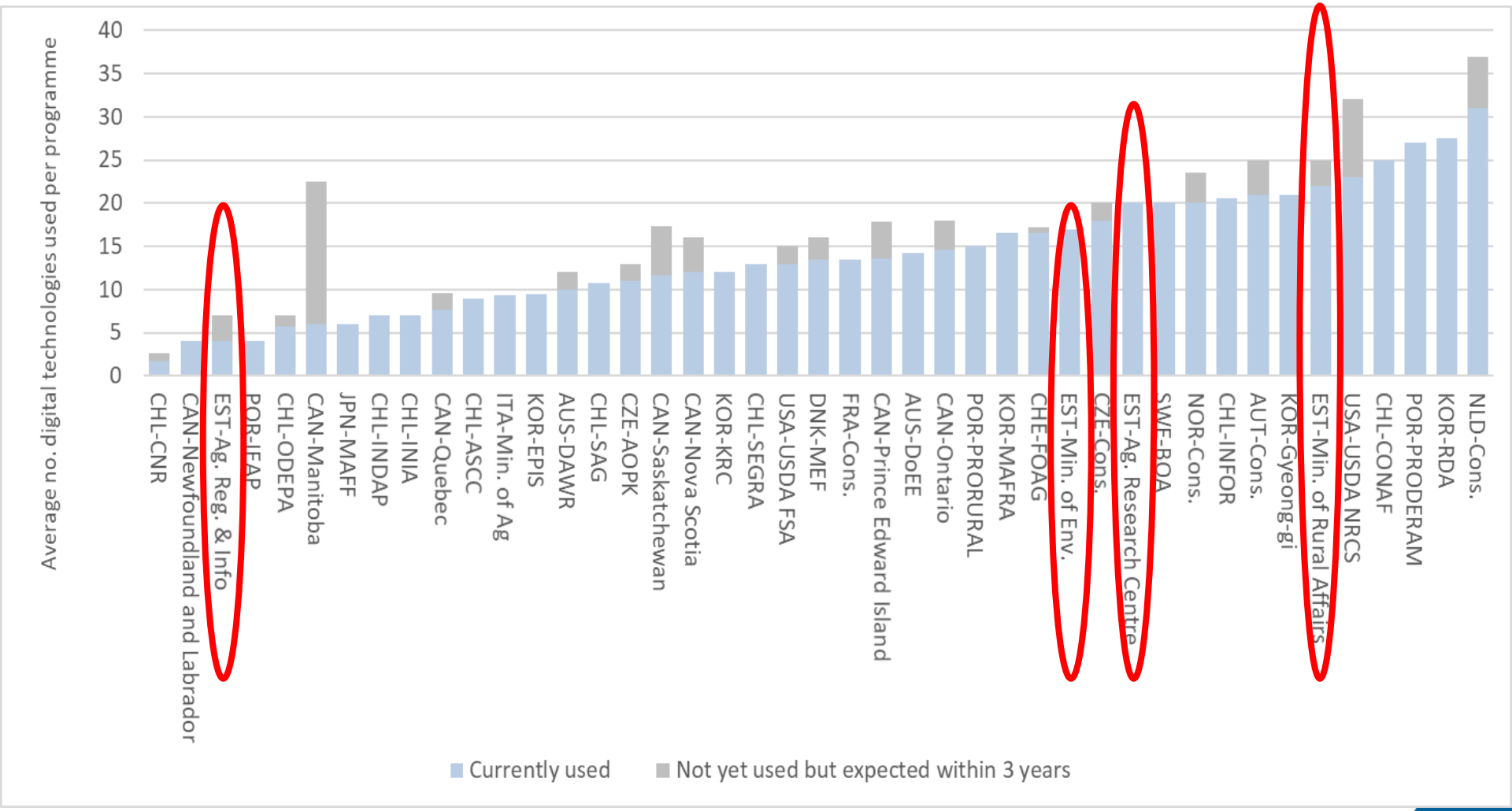
- **Governments should champion efforts to improve access to agricultural data** for policy, research, and services to farmers
  - Take a risk-based approach to provide access to publicly-held data
  - Develop data services to increase accessibility and the usefulness of government data collection
  - Government investment in accessing privately-held data for public good (e.g. retail scanner data)

- **Government has a role in supporting connectivity and development of a data collection infrastructure**
  - Directly invest in data collection technologies where there is a public good or public interest rationale to do so

- **Recognise the risk of creating a "digital divide"** when adopting and designing tools and mitigate it
  - Don't create new information asymmetries or high entry costs when developing digital tools and new knowledge

OECD questionnaire: results for Estonia

Note: Different organisations have different functions, so greater use of technologies doesn't necessarily mean "better" performance.



OECD questionnaire: results for Estonia

Estonian agricultural policy organisations are using some digital tools for administering agri-environmental policies:

- ✓Remote sensing data
- ✓GIS-based analytical tools
- ✓Social media
- ✓In situ (proximal & ground) sensors
- ✓Online surveys

… but also did not report using others:

- ✖ Data management tools
- ✖ Data from precision agriculture
- ✖ Deep learning / AI
- ✖ Data visualisation tools

→ Based on this data, there is potential to make greater use of digital tools

BUT: remember digital tools are just a **means to an end**

→ Opportunity to consider whether there is “untapped potential”

Summing up: Digital tools for Estonian agriculture and policy

- Estonia's strengths:
  - ✓ Already has some advanced digital infrastructure (X-road, e-ID, e-payments)
  - ✓ Already has relatively good uptake of digital tools for agriculture and for agricultural policy
  - ✓ Already has a digital strategy for agriculture
  - ✓ Already doing relatively well on environment, and productivity is improving: could Estonia leap-frog "over-extraction phase" and move straight into "sustainable agriculture"?
- Ideas for the future:
  - ➢ Digital tools to help ensure Estonian agriculture grows sustainably
    - ➢ Targeted support, public funds for public goods approach
  - ➢ Relatively urban population → opportunity to use digital tools to improve connections between farmers and consumers, urban and rural
  - ➢ In OECD survey, Estonian institutions reported quite different use of digital tools → opportunity to learn from each-other
  - ➢ No Estonian institutions reported using precision agriculture data, data visualisation tools or machine learning / AI for policy → potential opportunity but need to understand risks and challenges

Thank you!
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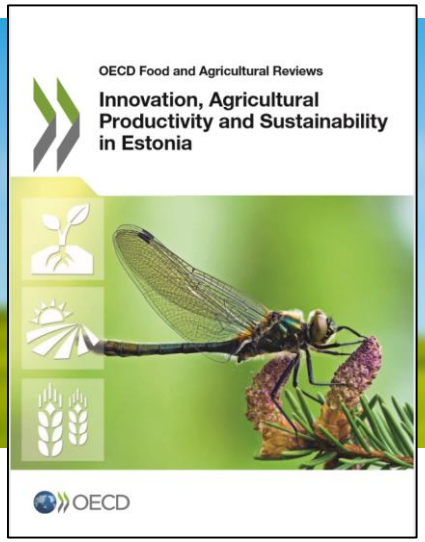
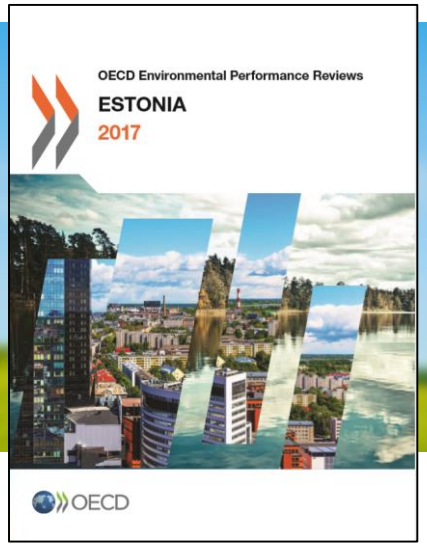
We look forward to hearing from you!





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