LIVE WEBINAR

Dr. Evelyn Reinmuth

HOHENHEIM University

Overcoming Barriers in Digital Agroecology: Survey Insights and Key Takeaways from PATH2DEA's Local Workshops

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A multi-stakeholder perspective on the use of digital technologies in European organic and agroecological farming systems

Cynthia Giagnocavo [a,b,*], Mónica Duque-Acevedo [b], Eduardo Terán-Yépez [b,q], Joelle Herforth-Rahmé [c], Emeline Defossez [d], Stefano Carlesi [e], Stephanie Delalieux [f], Vasileios Gkisakis [g], Aliz Márton [h], Diana Molina-Delgado [i], José Carlos Moreno [j], Ana G. Ramirez-Santos [k], Evelyn Reinmuth [l], Gladys Sánchez [m], Iria Soto [n], Tom Van Nieuwenhove [o], Iride Volpi [p]

- Survey results based on 533 completed surveys
- Geographical distribution: Austria, Belgium, France, Germany, Greece, Hungary, Italy, Spain, Slovakia, Switzerland

Source: Path2Dea publication

Highlights

- Perceptions of digitalisation benefits and barriers vary among stakeholder types
- Main barriers for use of technologies are cost, complexity and lack of adaptation
- Lack of awareness of the technologies is the main reason why farmers do not use them
- Stakeholders have greater agreement on the drivers of digitalisation in agroecology
- Stakeholder networks and government support are main drivers of digitalisation

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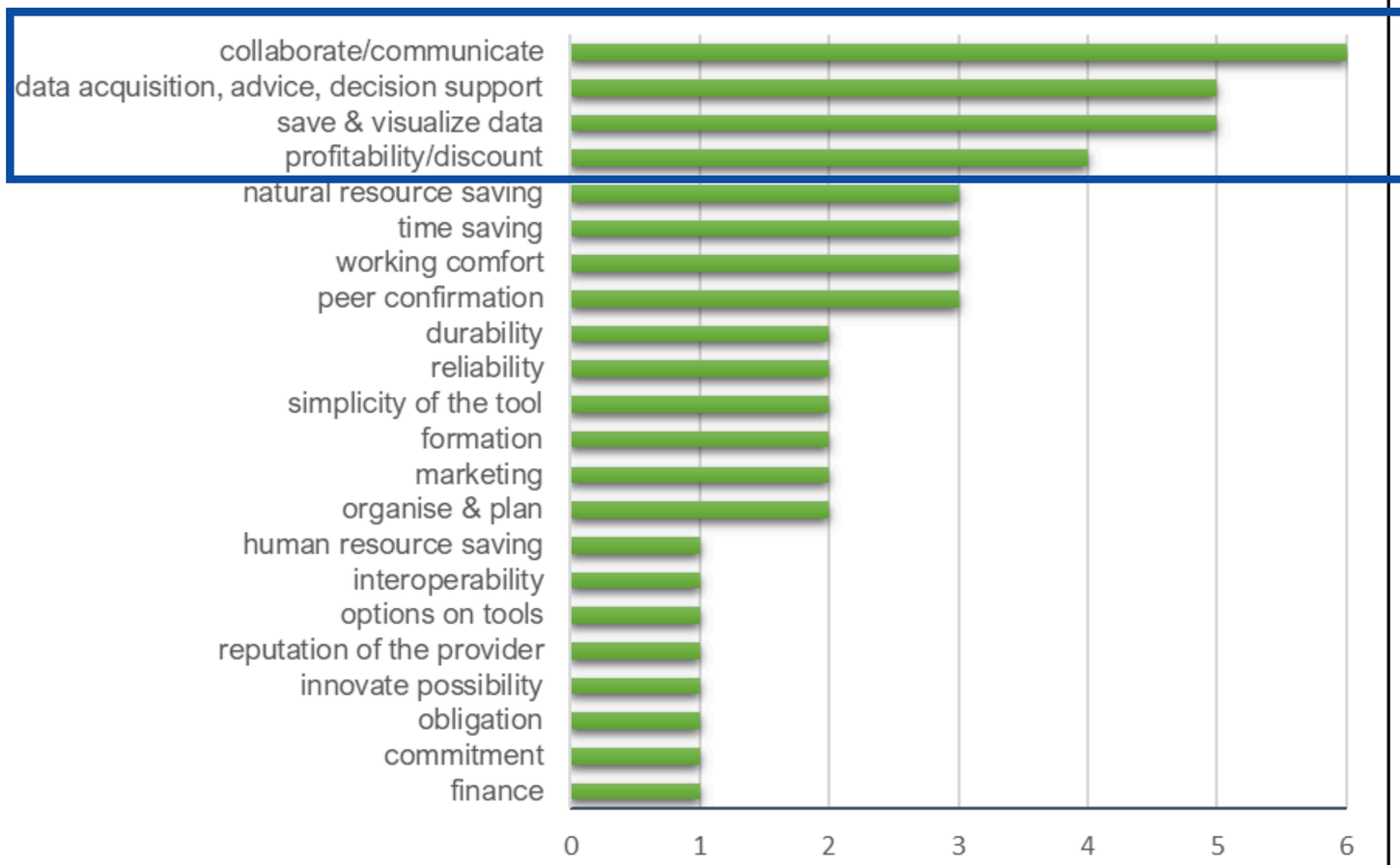
Drivers or reasons for a good usability of DTs according to the type of tools used in the 6 Path2Dea showcases



Results from co-creation workshops with Path2Dea Showcases

P2,7,8

Decision support to increase profitability by means of technology

→ monitoring, visualizing data, exchange of knowledge amongst farmers + advisor support

Source: Path2Dea project results - empirical results based on a multi-stakeholder approach

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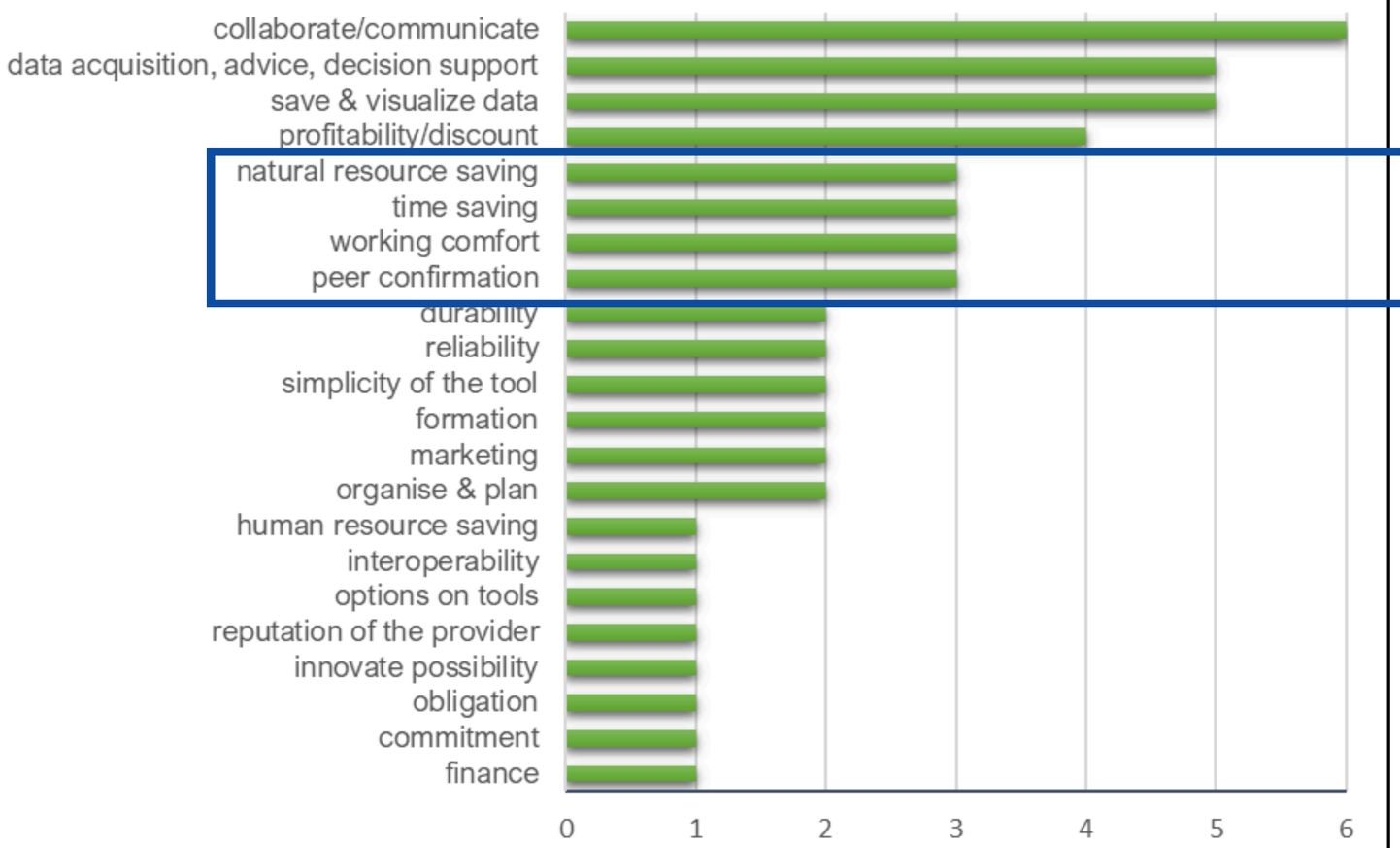

Results from co-creation workshops with Path2Dea Showcases

P7,8,10

- Resource efficiency through technology at all levels such as inputs or labor
- Social aspects such as better working conditions and peer validation

Source: Path2Dea project results - empirical results based on a multi-stakeholder approach

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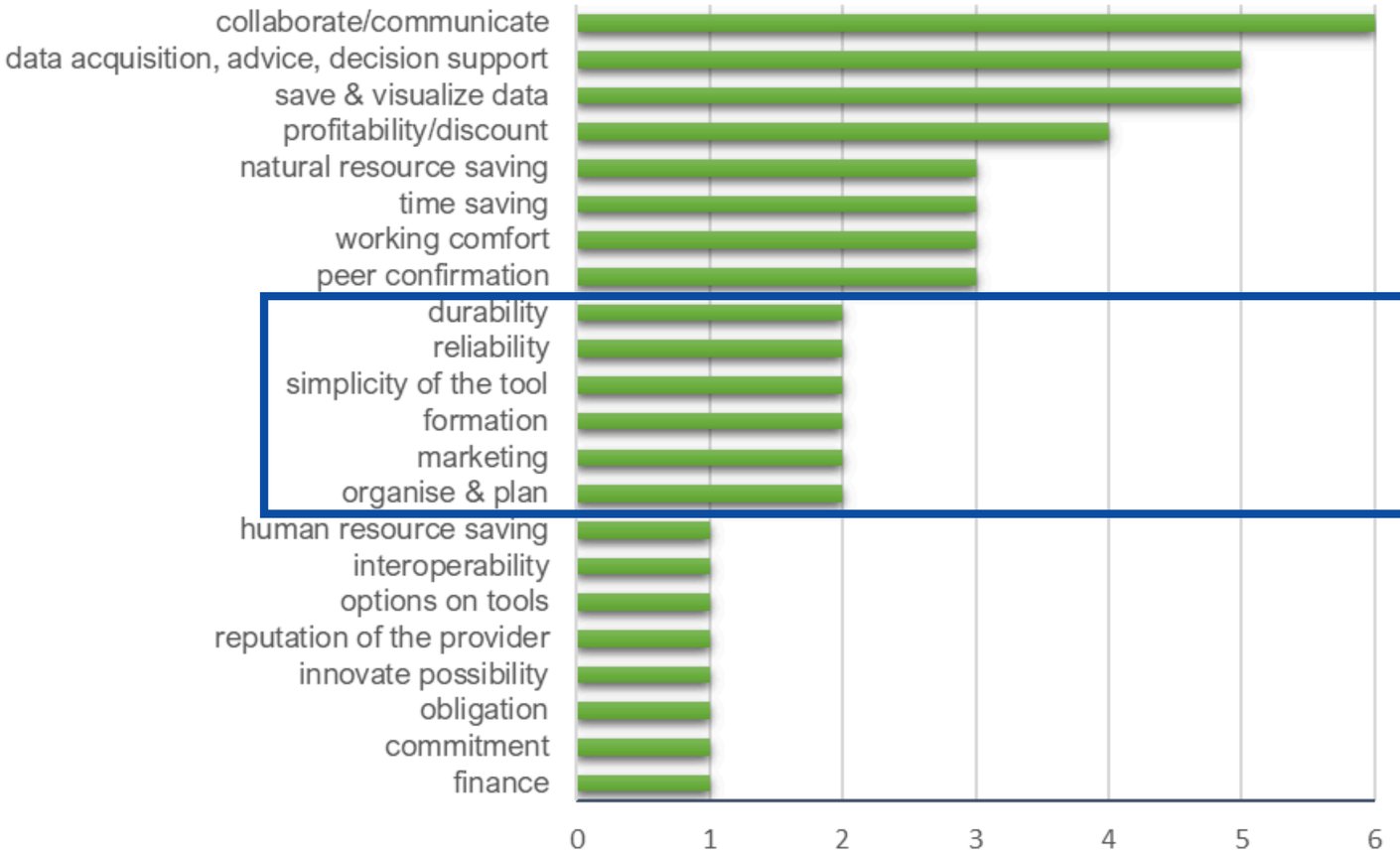

Source: Path2Dea project results - empirical results based on a multi-stakeholder approach

Results from co-creation workshops with Path2Dea Showcases

The preferred characteristics of the tools relate to performance aspects such as durability and reliability, but also to the simplicity of the tools.

P7,11,13

But also tools to improve farm planning and marketing of products.

Dr. Evelyn Reinmuth, University of Hohenheim on behalf of the Path2Dea project team |

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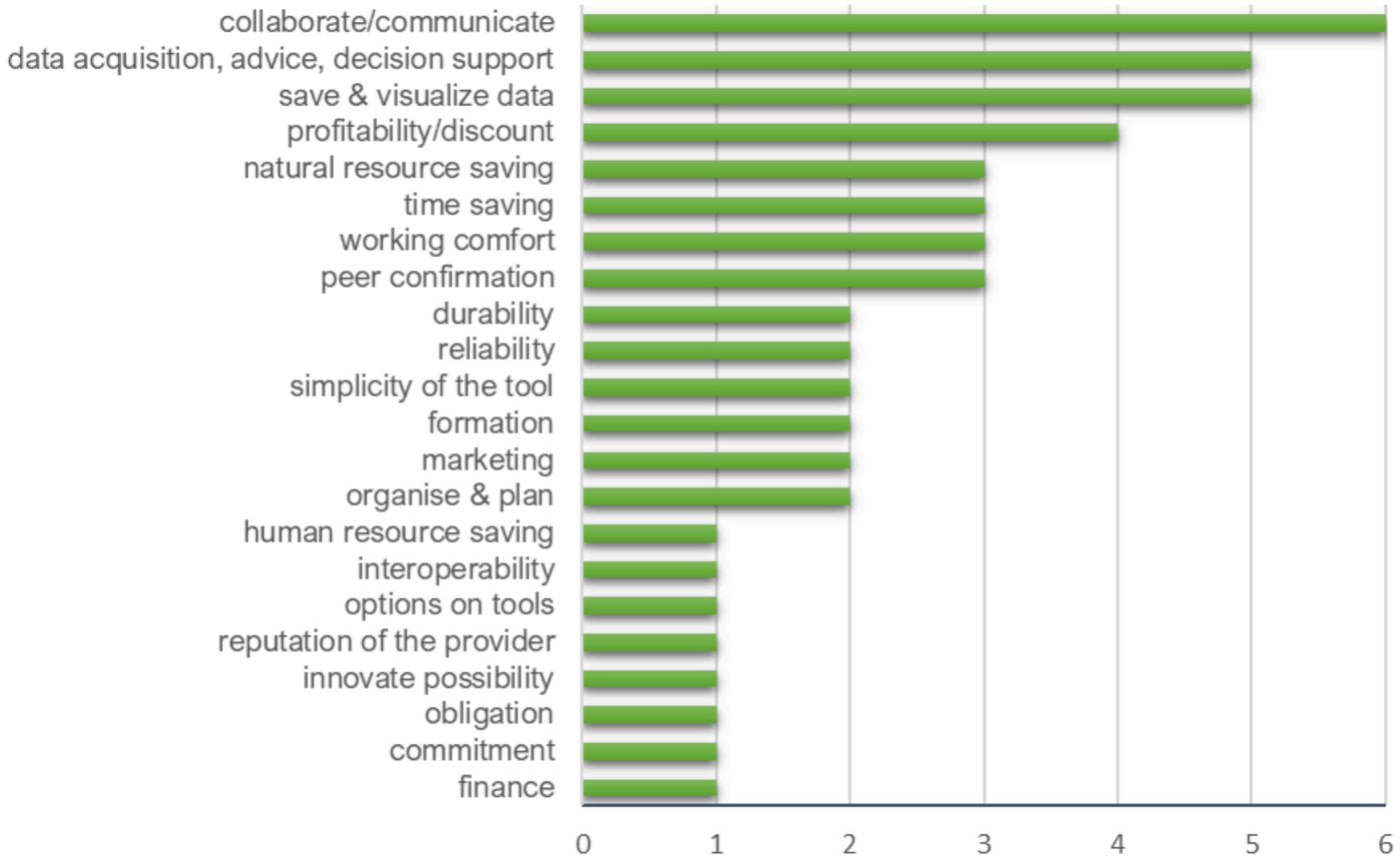
Drivers or reasons for a good usability of DTs according to the type of tools used in the 6 Path2Dea showcases



Source: Path2Dea project results - empirical results based on a multi-stakeholder approach

Results from co-creation workshops with Path2Dea Showcases

The reasons why aspects such as interoperability and tool options are given lower priority, although they are promoted throughout the whole thematic area of digitising agriculture, can be found in the **barriers**...

NEXT

Dr. Evelyn Reinmuth, University of Hohenheim on behalf of the Path2Dea project team |

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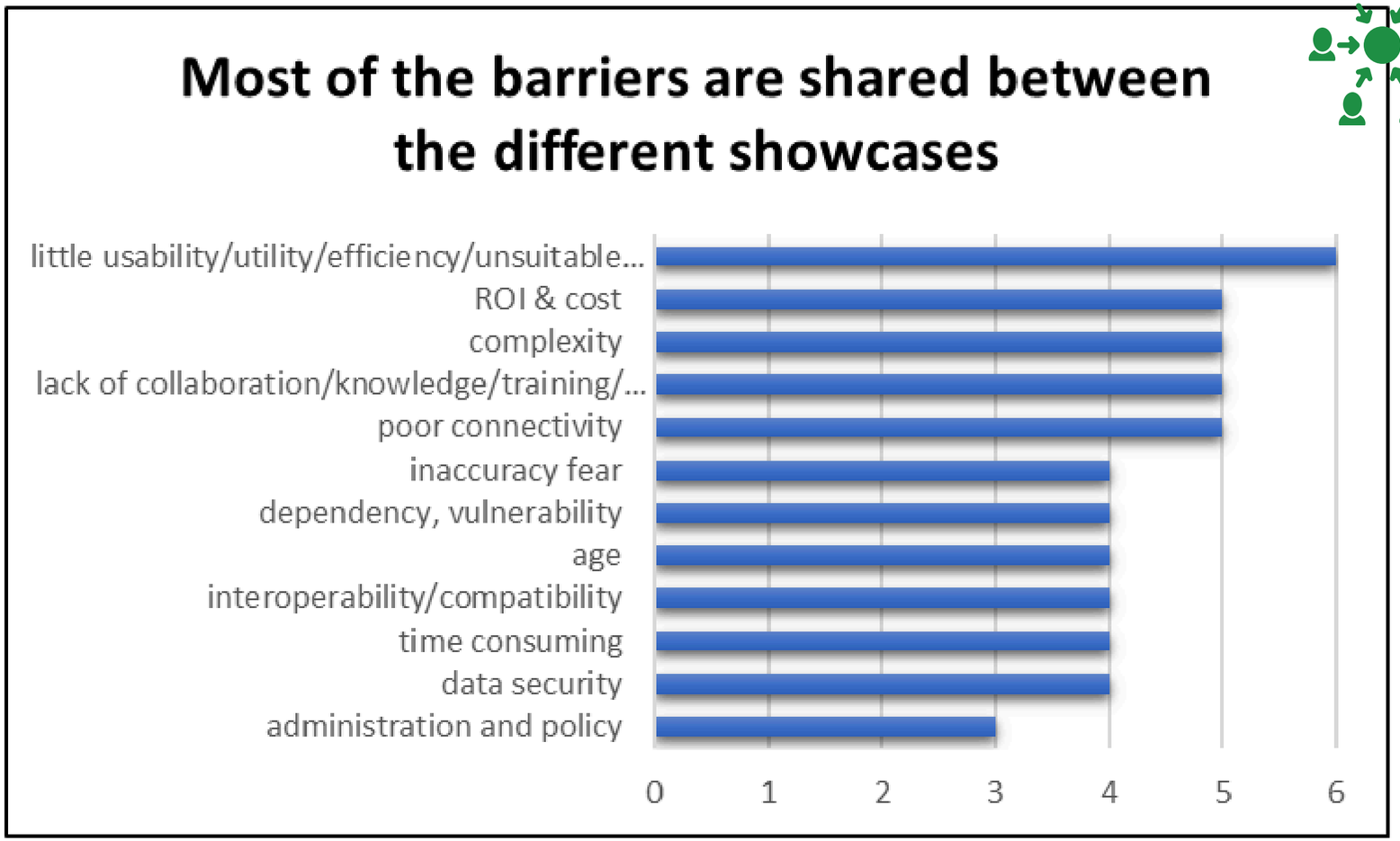
Results from co-creation workshops with Path2Dea Showcases



Source: Path2Dea project results - empirical results based on a multi-stakeholder approach

Background:

While drivers are very case-specific, barriers are more clear and seem to be more agreed on...

Status quo:

Most tools are not suitable and do not provide enough added value (**inaccuracy, complexity**) combined with a lack of infrastructure (**Internet access, compatibility and data security concerns**). As a result, tools do not necessarily work together or are used based on their capabilities. Data is collected for individual farm solutions and manual analysis.

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Path2Dea
Showcases

Agroforestry plot of INAGRO, with sensors: walnut trees and in between the leeks. Under the trees, a perennial flower mixture saw sown

Covides - vineyards in hot and dry area in Spain

Olive plot with slope, in Italy

Terrena - crop and livestock farming in the Northwest of France

Coexphal - vegetable production under greenhouse with beneficial insects & solar energy

Beef cattle farming in Hungary, extensive and with necklaces on cows

Dr. Evelyn Reinmuth, University of Hohenheim on behalf of the Path2Dea project team |

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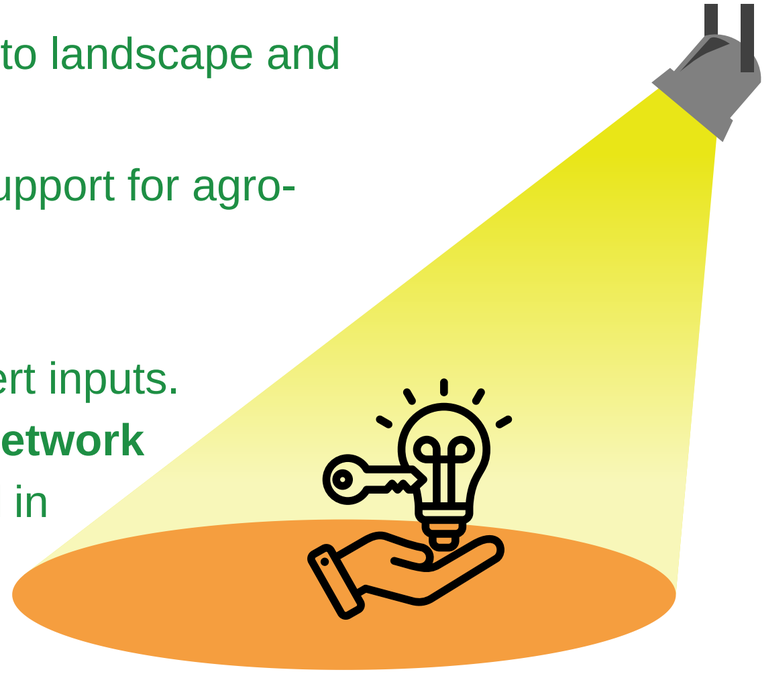
Understanding the needs of agroecological farming operations

Background of our showcases:

- Small farms in rural areas with limited infrastructure and very specific farming conditions
- Often cooperation of small farms under the umbrella of large cooperatives
- Low level of standardisation
- Many farmers over 50 years old with low digital literacy
- Place-based decision-making required due to farm characteristics, from size to landscape and climatic conditions
- Data collection based on own expertise in terms of relevance and decision support for agro-ecological farming practice



Status quo Path2Dea Showcases

A set of tools not adapted to agroecology, manually integrating site-adapted expert inputs.

- Decision support based on a **combination of** (self-developed) **tools** and a **network of experts** (advisors + peers) for a specific farming focus, (partly) embedded in **challenging landscapes or climatic conditions** (challenging in terms of standardisation).

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Path2Dea Showcase

ÖMKi

Planning / farm management

- Predor, Geofolia Easy Track, JDLink, Allflex livestock, JOTForm
- Digital farm diary
- HR optimisation
- Digital maps

Data acquisition

Drone
Weather station (iMeteo)
On-field : Land surveying equipment
Household equipment: Camera

Mobility, transport

Navigation systems (GPS)

- Contact
- Promotion
- Education
- Contact building

communication

Renewable energy

Solar panel

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Path2Dea Showcase

AEDIT SRL

- Excel for calculations and scheduling-storing & elaborating data,
- web platform for data sharing,
- search for information with computer or smartphone,
- Cloud storage

- weather forecast apps,
- app for monitoring pest and diseases,
- phytosanitary bulletins (agroambiente.info),
- Poderi : DSS in app with notifications,
- crop operation register
- Global Navigation Satellite System (GNSS)

Planning / farm management → Data acquisition / management → Product processing

weather station

- Excel for managing orders, management software (invoices, paying agencies etc.), managing customer
- accounting administration, farm management software

Developing packaging, database of products, recipe book

SMS, WhatsApp, Telegram, e-mail, PowerPoint for presentations

Communication

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Path2Dea Showcase

- Farm Management Information Systems (FMIs)
- DSS : RAWDATA

Planning / farm management

- RAWDATA
- Commercial forecast apps
- SENCROP app
- GPS
- satellite image
- drones

Data acquisition and management

Sensors

- Humidity sensors (OrGeVine project)
- connected weather station (SENCROP)

satellite image, remote sensing

Production

- auto guidance
- dose modulation

- RAWDATA as a way for advisors to communicate with farmers
- WhatsApp, second-hand webpages, YouTube, e-mail

Communication

Resource-related technologies

water use efficiency

Renewable Energy

Dr. Evelyn Reinmuth, University of Hohenheim on behalf of the Path2Dea project team |

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Path2Dea Showcase

inagro

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INAGRO

GPS
Outlook & Google agenda
Geofolia
My Johndeere app
Job maps
Task maps
QGIS
Excel
Crop registration
Intranet reo (auction)

Planning / farm management

Watchitgrow
Weather apps (Buienradar, Weather.com...)
Digital fertilizer registry
Fytoweb (information site on crop protection products)
Crop protection app from Inagro
Automatic advice/notification from soil sampling

Apps

Data acquisition / management

Sensors

Soil moisture sensors (Irrometer)
Weather stations (signum)

Production

Geofolia
Track&Trace
Trimble
Isagri
Yield charts

Communication

e-mail
WhatsApp
Internal networks form Reo

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Path2Dea Showcase

COEXPHAL

- Climate and irrigation management
- Collecting and storing crop data
- Visualizing and managing multi-sensor data
- Monitoring, data/resource acquisition and integration systems (SCADA - IVEG)

Programmable logic controller (PLC) - process control and task automation

- Agricultural prices management
- Farm Notebook

Planning / farm management

Data acquisition / management

Production

- Soil temperature, humidity and conductivity monitoring
- Nematode control
- Irrigation & ferti control

Sensors

Remote activator management (e.g. greenhouse aeration sidebands)

Renewable Energy

solar panels

Communication

WhatsApp/Facebook

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Path2Dea Showcase

TERRENA
LA NOUVELLE AGRICULTURE

- apps to register practices (synapse, conselio, terciel, GRC)
- banking & treasury management apps
- market prices tracking (agritel, euronext)
- apps for sales contracts managing
- Agricultural machinery : rental, managing, booking (Karnott, MyCuma)

Planning / farm management

- herd management apps (pilotelevage)
- milking robot data visualization
- weather forecast checking websites (meteogo, meteociel)
- DSS for fertilizer & phyto use (fongi pro, Fertilio sat, Fertilio ERM)

Data acquisition

- trigger irrigation and fault detection
- warning fuel level

Production

- auto guidance (Trimble) dose modulation (Vicon, JD)

Sensors : environment

- connected weather station (Sencrop, Weenat)
- capacitive electrode
- temperature sensor

Sensors : Herd/animal remote controlling

- calving sensing
- camera connected to smartphone for real-time monitoring

milking robot monitoring (DELAVAL, LELY)

- X, WhatsApp, Teams, e-mails
- apps to share data with advisor and communicate (Conselio)

communication

Renewable Energy

solar panels production monitoring (I solar Cloud)

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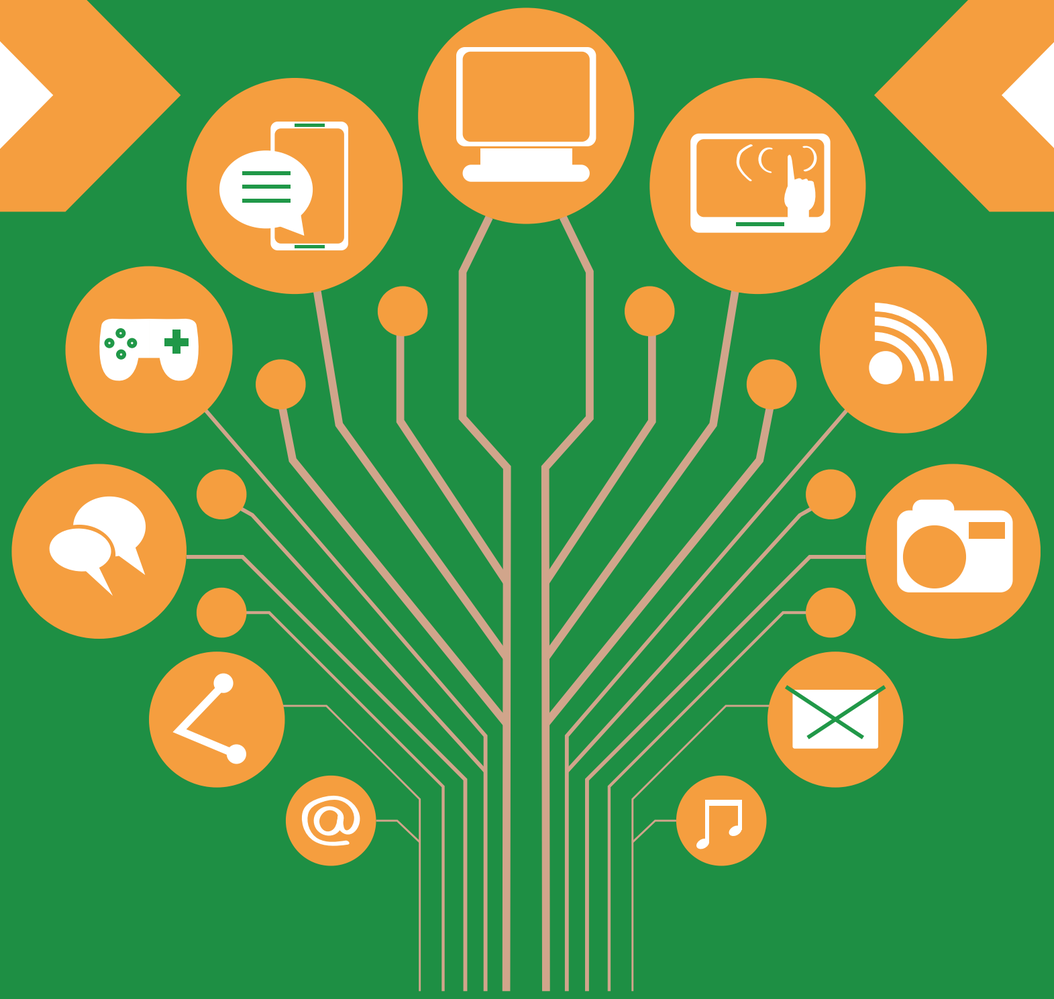
Critical components of designing and developing digital tools

Functional requirements

Define what the system should do in relation to a specific farming activity (irrigation, fertilisation, pest control, herd management, etc.), such as measure, monitor, control, etc.



Non-functional requirements

Define how the system should perform, e.g. it should be easy to use, easy to maintain, provide a good user experience, scalability, etc.

Dr. Evelyn Reinmuth, University of Hohenheim on behalf of the Path2Dea project team |

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Critical components of designing and developing digital tools

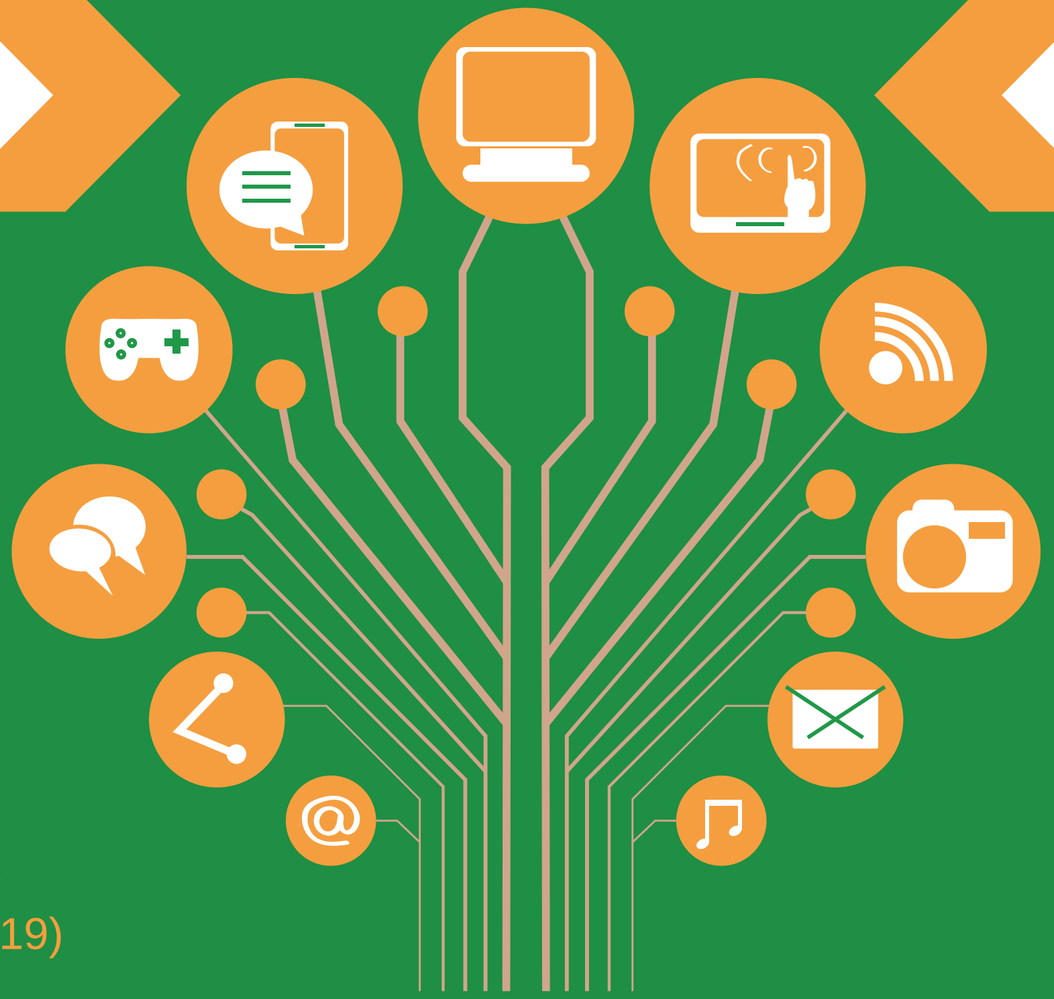
Functional requirements

Define what the system should do in relation to a specific farming activity, such as measure, monitor, control, etc.

Focus on features and functionalities

P1,2,3,4, 5,6,7

Improve resource efficiency + strengthen resilience (HPLE, 2019)



Non-functional requirements

Define how the system should perform, e.g. it should be easy to use, easy to maintain, provide a good user experience, etc.

Focus on quality attributes

P8,9,10,11, 12,13

Secure social equity/responsibility (HPLE, 2019)

Dr. Evelyn Reinmuth, University of Hohenheim on behalf of the Path2Dea project team |
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The way forward

Functional requirements

Non-functional requirements

Focus on features and functionalities

Adapt to specific production systems, e.g. by using EU networks: Use frameworks such as the European Network of Agroecology Living Labs to standardise metrics and share best practices.

AgroEcoLLNet

https://zenodo.org/communities/all-ready;
https://zenodo.org/records/8146954

Overcomming barriers for tool developers

Provide more opportunities for innovative companies, especially start-ups, to test their solutions, especially in the early stages of development. Building farmers' confidence in digital tools provided by start-up companies.

Focus on quality attributes

Co-create the tools with the farmers, split the tools into the robust operational units and the complex background expert systems, improve the maintainability, interoperability follows suitability.

Collaboration with statistical services of the EU to establish open repository for AgroEcol data for calibration of tools.

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Question to the audience

When introducing new technologies/tools to agricultural users, what challenges do you face?

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