How to support digital innovation in agriculture?

Guy Faure, CIRAD, UMR Innovation
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Outline

- What is an innovation?
- How to support innovation?
- How research can support innovation?
Some useful definitions

Innovation : an idea put in action (EU)

Several dimensions of innovation

◦ Hardware : new technical device, new practice
◦ Orgware: new organizations, institutions, relationships
◦ Software : new knowledge, vision, value, discourse
Characteristics of innovation in digital agriculture

- **Hardware**: technical dimension (sensor, data, software, etc.)
- **Orgware**: new service providers, new rules to manage the property rights or share the value
- **Software**: new thinking regarding agriculture development, farm management, business model
Which development pathway?

- Depending on the knowledge embedded in digital tools, the way to provide this knowledge, and the business model to provide services, digital agriculture may:
  - support intensive agriculture vs agroecological agriculture
  - increase the autonomy of farmers with new tools to support decision making vs transform farmers in subordinates without access to their own data
  - support individual entrepreneurial behavior (precision agriculture) vs collaborative mechanisms (digital platforms)
  - be inclusive with low-cost/frugal innovation or be exclusive with high-cost/high tech innovation
A key issue: which participation?

- To address ethical issue: Which agriculture and which farmers do the society (we) wants? Which technology is better suited to support this vision? How research can participate?
- To address the real demands and needs of actors (especially farmers): How to co-design digital innovation useful for actors farmers with new and sustainable business models?
- Two ways to see innovation with different degree of participation
linear model of transfer of knowledge

- The innovation is mainly technical and top-down (research, extension/service provider, farmer)
  - still dominant,
  - efficient to address simple problem (e.g.: determine date and dose for irrigation)
  - but fails to address complex problems (e.g. promote a new cropping system)

- Key role of research and scientific knowledge (technology, method, model, etc.) and less participation
The innovation system approach

- The innovation is multiform, distributed among actors, not easy to plan
- Key role of formal and informal networks of public and private actors to co-construct knowledge, to build capacities, and mobilize resources
- The multistakeholder approach is relevant to address complex problems involving several types of actors, not easy to implement (e.g. EIP in EU, innovation platform in Africa)
- Research contributes to innovation by interacting with other actors

AIS: Agricultural Innovation System
How to support digital innovation?

Space for new ideas, exchange, support to informal networks, incentives ($, grant).

Dissemination of K, advisory service, training, support to institutional networks.

Space to experiment. Incubator (start-up), support to formal network, access to key resources (K, $).
4 models for research to support innovation

- Participatory transfer of technology
- Co-design of innovation
- Open innovation
- Support to innovation
Participatory transfer of technology

<table>
<thead>
<tr>
<th>Research added value</th>
<th>Research approach</th>
<th>Role of other actors</th>
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<tbody>
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<td>Scientific knowledge is important</td>
<td>Clear vision on how to achieve outcomes</td>
<td>Participation +/- important to adapt the research outputs and to achieve outcomes</td>
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<tr>
<td>High control of technology design and implementation</td>
<td>Key role of research to define priorities and to implement actions</td>
<td>Limited number of actors in the first phases</td>
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Scientific knowledge is important for the clarity of the vision on how to achieve outcomes. It also plays a key role in defining priorities and implementing actions. Participation is +/important to adapt the research outputs and achieve outcomes. In the first phases, the number of actors is limited.
Co-conception de systèmes innovants

### Research added value
- Scientific knowledge is important
- Control of technology design and implementation is shared among actors

### Research approach
- Clear vision regarding outcomes but not regarding the way to achieve outcomes
- Co-construction and mutual learning

### Role of other actors
- Recognized role for co-construction
- High number of actors to valorize the diversity of knowledge and share resources

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**Research**

1. **Invention**
2. **Conception, trials, R&D**
3. **Adoption, new use of technology, new organisations**
4. **Scaling out/up**

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**INNOVATION**
### Open Innovation

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<td>Scientific knowledge is important</td>
<td>Outcomes are not planned in advance</td>
<td>Innovation process driven by actors</td>
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<tr>
<td>High control of technology design</td>
<td>Key role of research to design the technologies and to open these technologies to other actors for new development</td>
<td>Undetermined number of actors</td>
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**Research**

**Farmers and FO**

**Private firms and NGO**

**Public services**
## Support to innovation

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<td>Scientific knowledge is more or less important</td>
<td>Outputs and outcomes are planned with other actors</td>
<td>Innovation process driven by actors</td>
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<td>No control of technology design and implementation</td>
<td>Supporting and not driving (research = one actor among others)</td>
<td>High number of actors</td>
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- **Recherche**
- **Agriculteurs OP**
- **Pouvoirs publics**
- **Entreprises**
Conclusion

- Innovation is more than technology
- Innovation is not neutral
- Research may reflect how to support innovation for a sustainable and inclusive development what ever the agricultural model
Thank you
How innovation can change the agricultural sector?