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Co-construction of innovation processes :

What types of innovation networks do exist in digital agriculture ?

170th EAAE Seminar

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PRESENTATION PLAN

- Context and Objective
- Research question and theoretical framework
- Methodology
- Results
- Conclusion

CONTEXT AND OBJECTIVE



- Digital innovation in agriculture use of technologies likes GPS, sensors or drones
 - Optimization of agricultural practices
 - Increased productivity
 - Environmental protection
 - Improvement of farmers' working conditions, reduction of hardship



- Technological innovation is also a collective process involving a wide range of actors
 - New actors promoting the use of ICTs in agriculture
 - Traditional actors in agricultural innovation systems such as fundamental and applied research
 - Actors in the agricultural world who are the intermediate or end users of technologies



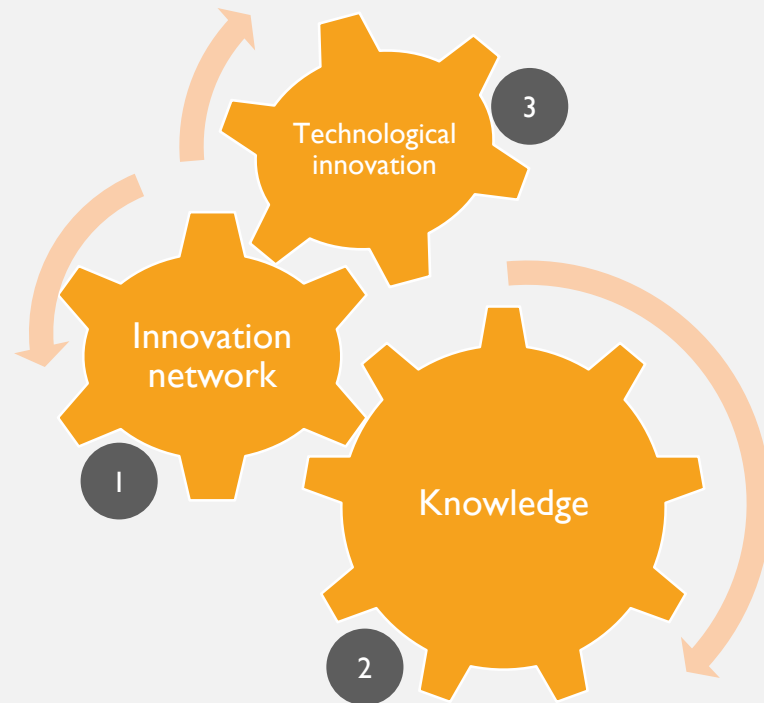
- Explore a typology of innovation networks in the digital agricultural innovation system, based on
- The technological innovation
 - The knowledge mobilized
 - **« The organizational forms of the actors involved in the innovation process »**

RESEARCH QUESTION AND THEORITICAL FRAMEWORK



Research question

What forms of organizations of innovation networks exist to promote the development of knowledge and technological innovation in digital agriculture ?



Theoretical framework

Based on the exploration of Sectoriel Innovation System (SIS)

- A sectoral innovation system refers to all the stakeholders, organizations, institutions and networks that promote the production of new knowledge and innovation in a sector (Breschi & Malerba, 1997 ; Malerba, 2002)

Three essential components

- « Technological » innovation : Object of interactions between actors and constitute a major constraint to the diversity of actors' behaviours, to the organization of companies, and to the potential forms of innovation networks
- Knowledge : Central object around which actors interact within innovation networks in order to generate innovative technologies
- **Innovation network** : Temporary set of partners composed of private or public laboratories, companies, customers, suppliers, financial institutions who actively participate in the development of new products

METHODOLOGY (1/2)



- **Data collected**

- Technological innovation : Specific uses, specific knowledge used and innovative companies in the sector
- Specific knowledge : Type of knowledge, actors involved in the production of this knowledge, Usefulness of knowledge in the innovation process
- **Innovation networks** : Types of relation between actors, network characteristics and functioning, roles in the innovation process

- **Semi-structured interviews**

- Seventeen (17) semi-structured interviews were conducted
- The people surveyed are part of the organizations involved in knowledge development activities or innovation projects
- Companies / Start-up, Research units, Agricultural education, Technical Agricultural Institute, Chambers of Agriculture, advisory agricultural services and agricultural cooperatives were also surveyed



METHODOLOGY (2/2)



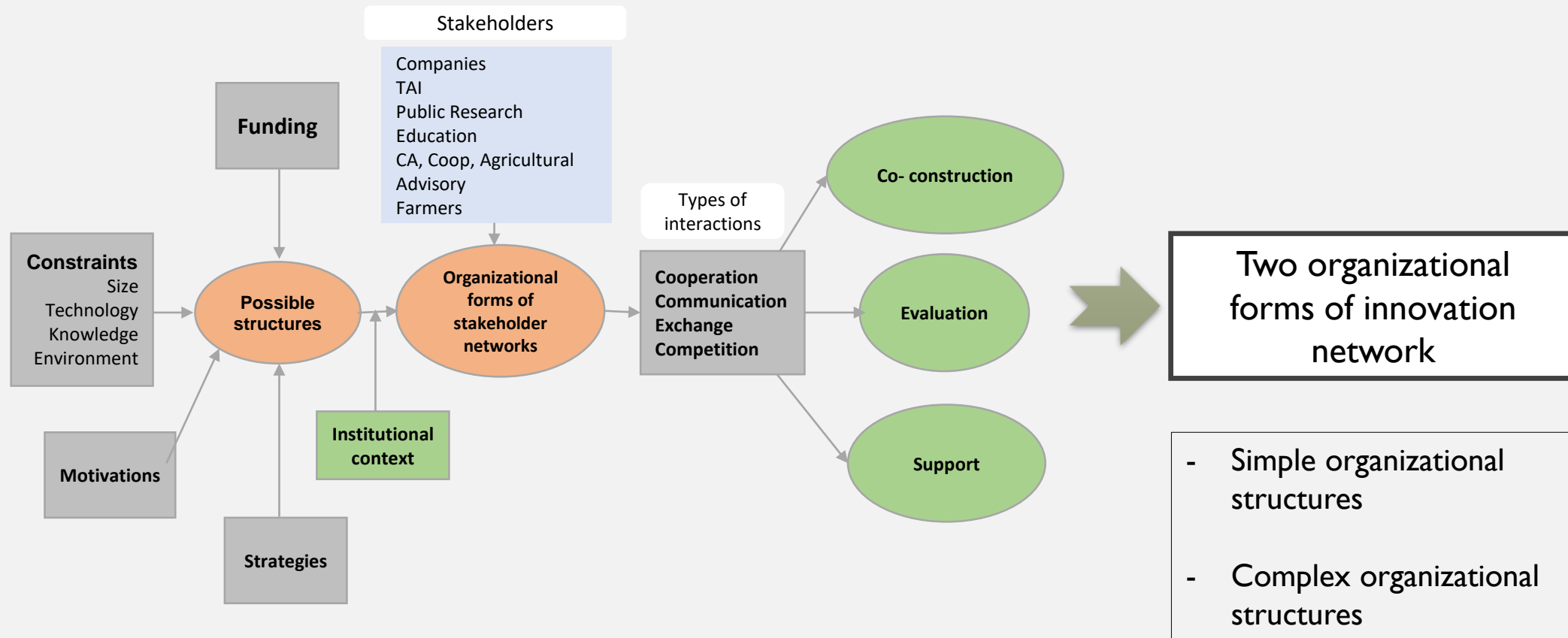
Categories	Companies/Start-up (SMEs)	Research units	Agricultural education	TAI (Technical Agricultural Institute)	Chambers of agriculture and advisory agricultural services	Agricultural cooperatives	Total
Organizations or structures	Smag	ITAP	AgroTIC Master	IFV	CA Haute Garonne	National Federation of CUMA	
	Agriscope					Arterris	
	Beapi					Sigma Master	Arvalis-Institut du Végétal
	Agrifind	CESBIO				Maisadour	
						Invivo	
Respondents surveyed	Directors and Heads of Innovation Division	Researcher	Educational managers	Project managers	Project Manager and Director	Innovation Directors and Project Managers	
Total	4	2	2	2	2	5	17

STRUCTURES OF INNOVATION NETWORKS



- **Main factors influencing the construction of stakeholder networks**

- The construction of the networks of actors in favour of innovation is determined by a number of factors that make interactions possible



Source: adapted from Menard (2004)



SIMPLE ORGANIZATIONAL STRUCTURES (1/2)

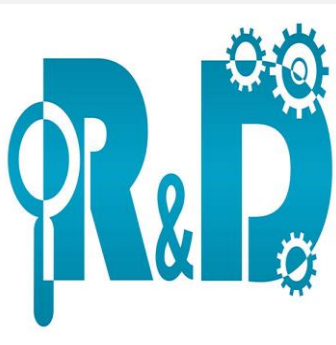
- These are forms of networks composed of two (2) categories of actors

- **Business to Business (customers-suppliers)**

- It is a partnership between a client company and a supplier company that does not involve transaction-specific assets
- These "contractual" relationships are associated with technological constraints and the size of companies that do not necessarily integrate all skills
- BeApi, subcontracts the "computer system" part to Smag and a "satellite image processing" part of its technological offer to the Isagri group, which has expertise in remote sensing and satellite image analysis.

- **Company – Research**

- These are specialized research units that work either on applied research or on the evaluation of existing technologies
- Many companies mobilize direct interactions with a research actor (INRA or IRSTEA) for developing communication and cooperation relationships around the construction and evaluation of innovative technologies,
- This is linked to the outsourcing of R&D within companies for example for technological benchmark, or the mobilisation of skills and research work in order to produce a new service,



SIMPLE ORGANIZATIONAL STRUCTURES (2/2)

- **Company - Intermediary in the agricultural world (CA, Coop)**

- This form of collaboration allows companies to assess the expectations of end-users of the technology (farmers), but also to test innovative solutions in real conditions with farmers.
- Many companies are developing a network involving agricultural organizations in order to have a local presence and privileged interlocutors for the dissemination of the technologies produced.

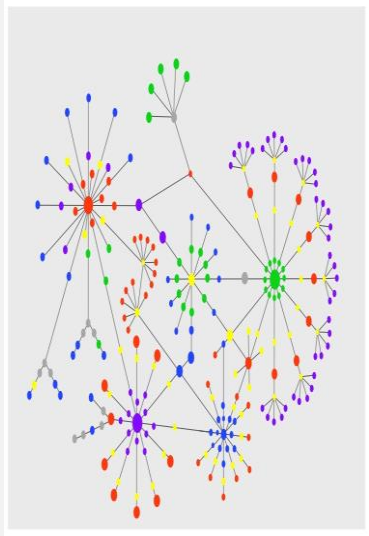


COMPLEX ORGANIZATIONAL STRUCTURES (1/2)



- These organizational forms bring together more than two (2) actors and are mainly structured around relationships of cooperation, communication and exchange between the various stakeholders
- These interactions result from the willingness of the various actors to grasp all aspects related to innovation in this sector, both upstream, and downstream of innovation process
- The specificity of these stakeholder ecosystems lies in the specific knowledge and skills of the members, but also in the purpose of these interactions
- These networks have a diversity of interacting purposes, including reducing the dependence of farms on plant protection products, using remote sensing in agriculture to improve yields, the well-being of farmers and various other innovative themes in agriculture

COMPLEX ORGANIZATIONAL STRUCTURES (2/2)



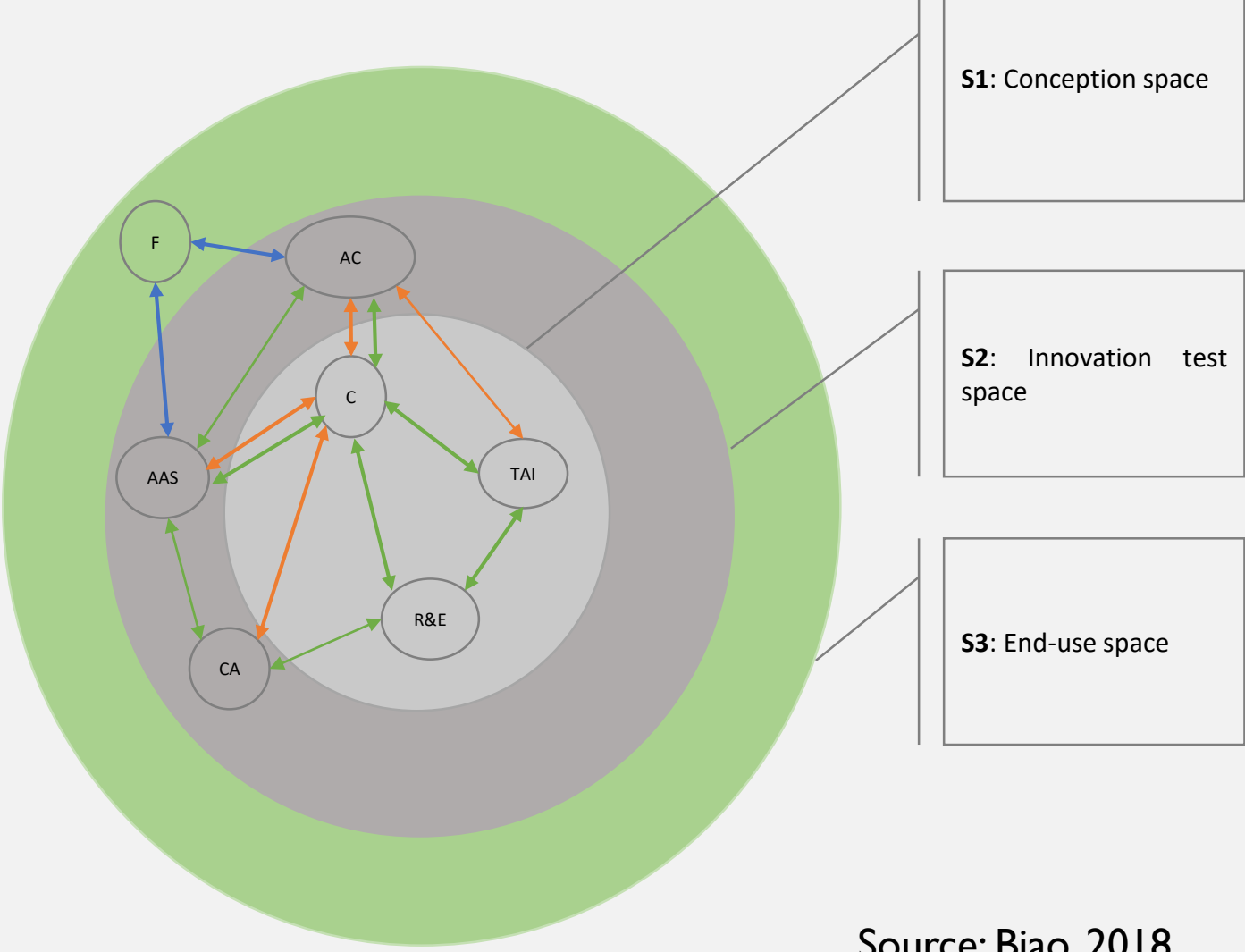
Forms of innovation networks	Benefits for innovation	Examples	Some of the organizations involved
Mixt Technological Unit	Fostering closer links between public research and professional technical organizations	Ecotech-viti	INRA, IRSTEA, IFV
Mixt Technological Network	Fostering closer links between public research and business	Modelia	Arvalis, INRA, CIRAD, IRSTEA, ITK, Agrosolutions
Other forms	Co-construct and evaluate digital innovation with companies	Digifermes	Arvalis, IDELE, ITB, Terre Inovia

REPRESENTATION OF SOME INNOVATION NETWORKS

Caption

S: Space
 C: Companies
 TAI: Technical Agricultural Institute
 R&E: Research and Education
 CA: Chambers of Agriculture
 AC: Agricultural Cooperative
 AAS: Agricultural Advisory Services
 F: Farmers

↔ Relationship for product development
↔ Relationship for launch
↔ Relationship for distribution of innovations



Source: Biao, 2018

CONCLUSION

- This paper highlights the plurality of organizational forms that co-exist throughout the innovation chain and process to form an innovation "community"
- The interactions between the different actors within these networks contribute to building a new innovation system, which leads to a change in the technological regime of agriculture.
- Highlighting of the relatively low involvement of agricultural organizations in innovation network who are customers or end users of the technology
- These results contribute to discussions on inbound open innovation in companies and these implications in terms of management of external knowledge and collaborations with innovation intermediaries and end users
- Extending research to large companies in the sector (e.g. Airbus, Geosys, Orange) could be a complementary approach to understanding the innovation sectors and networks of this emerging sector



**Thank you
for your
attention**

