



INITIATIVE ON
Agroecology



“Fail to Scale”:

The Persistent Problem of Technology Transfer and Possible
Solutions Based on Key Agroecological Principles

20th International Scientific Day of INRGREF

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ICARDA
11-Oct-2023

icarda.org

International Center for Agricultural Research in the Dry Areas

cgiar.org

A CGIAR Research Center



The problem – lack of inclusive innovations

- Des facteurs externes (marché et changement climatique) et internes (taille réduite des exploitations, manque de technologies, etc.) qui font que **l'agriculture conventionnelle devient peu productive et protectrice** des ressources naturelles et de l'environnement.
- Besoin de modèles (et pratiques) agricoles alternatives, chose qui reste difficile à identifier et promouvoir chez les communautés d'agriculteurs.
- Car le **cycle d'innovations** dans les pays en développement est parfois **peu inclusif** (l'innovation elle-même est promu par des agents externes),
- Besoin donc d'innovation inclusive: « développée par les pauvres pour bénéficier les pauvres »

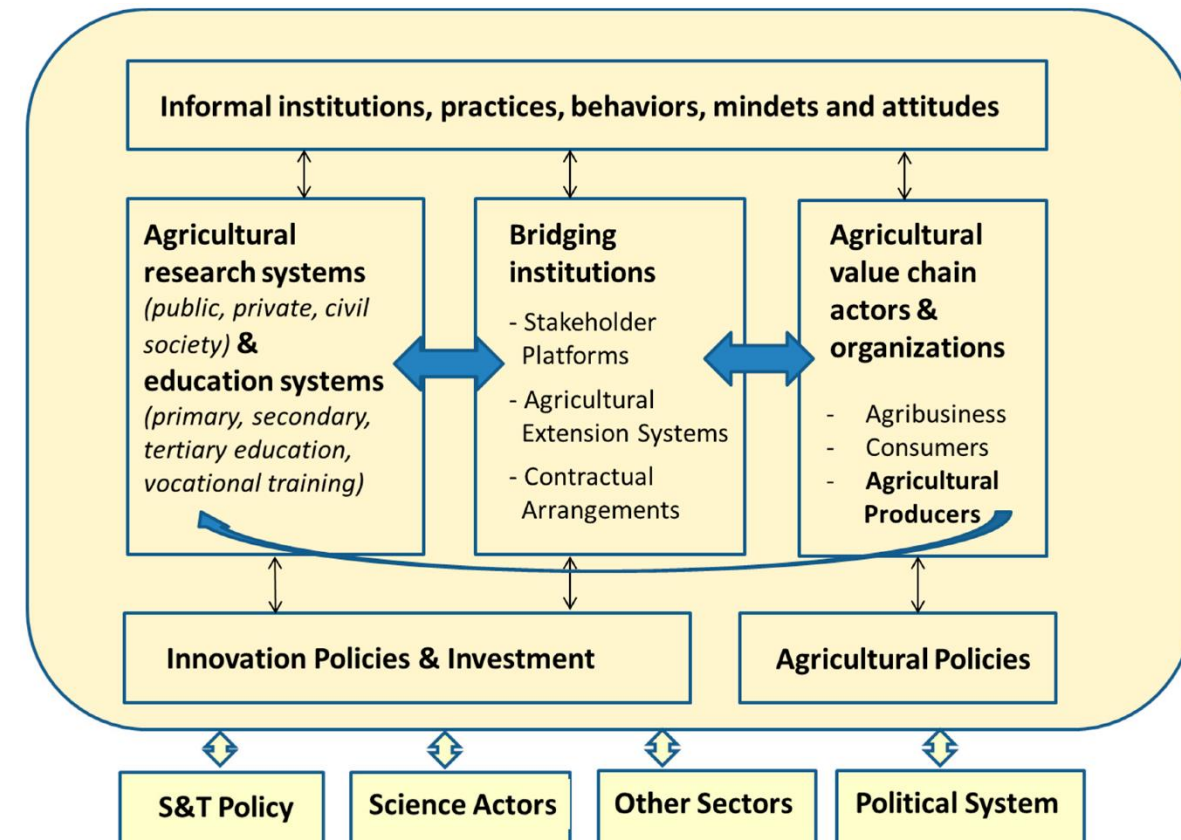


The problem – little awareness about bridge Institutions

Quels dispositifs pour promouvoir les innovations inclusives?

- **Modèles linéaires** de Transfer de technologie sont à leur fin.
- **L'innovation** est maintenant définie dans la littérature comme étant le **résultat des interactions** des acteurs locaux au tour d'un problème donné
- Le plus on a des interactions locales au tour des problèmes techniques et sociaux, mieux serait le contexte local de l'innovation.
- On commence actuellement à parler du « **Systèmes d'Innovation Agricoles** »,
- Mais, quelle formes concrète ces SIA doivent avoir: Des **nouveaux concepts** comme les Living Labs, Plateformes d'innovations, etc. commencent alors à émerger.

Les systèmes d'innovation Agricoles (AIS)



The problem – lack of public investments

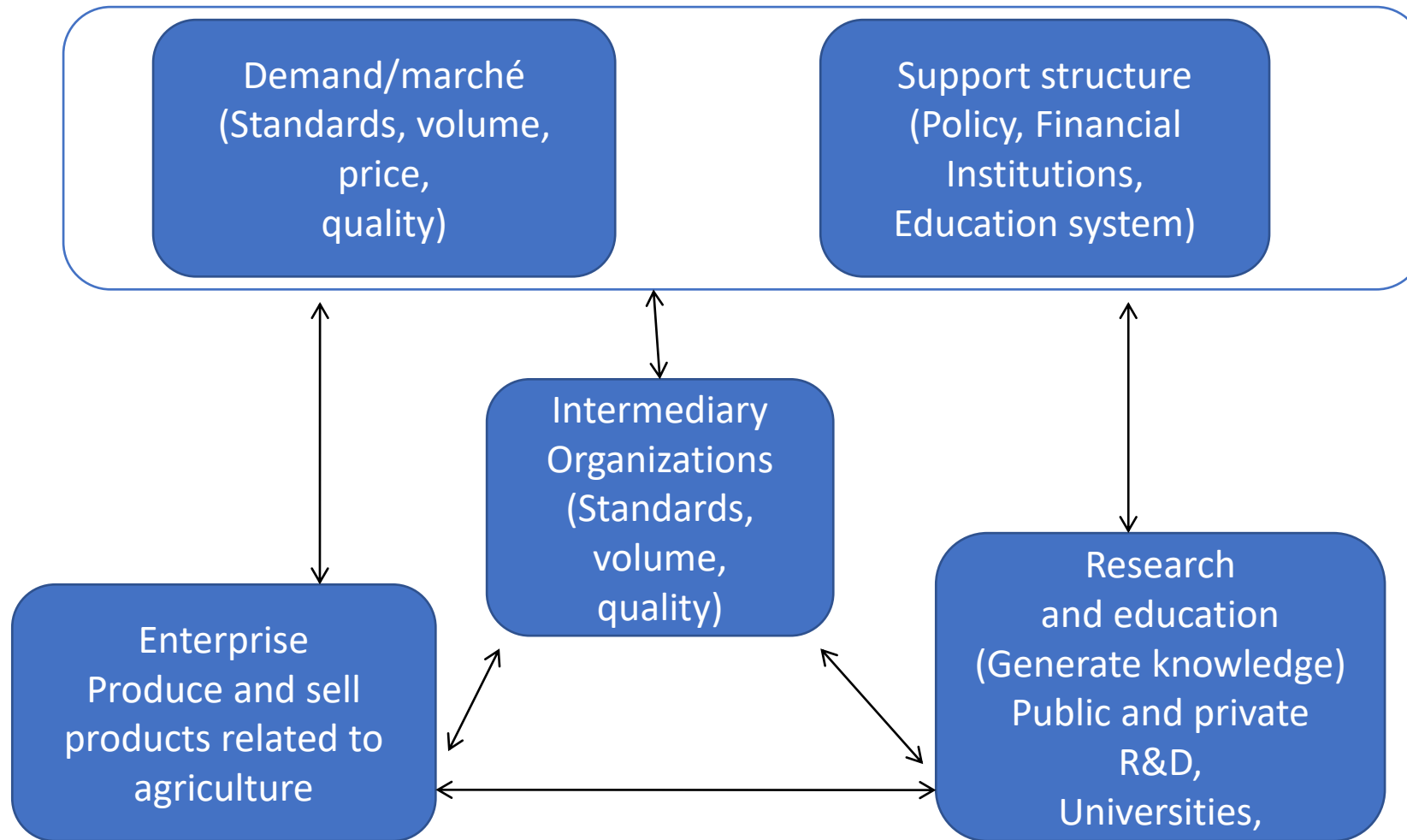
- Problématique typique, due à des failles systémiques et conceptuelle des deux domaines.
- Besoin de financements publics pour financer les deux domaines, mais aussi le lien entre les deux.
- L'allocation et la priorisation de ces investissement est assez claires pour la recherche et pour le développement,
- Mais beaucoup plus complexe lorsqu'il s'agit de R4D - système d'innovation (organe de nature complexe).
- comprendre ce « système d'innovation » pour mieux cibler nos investissements dedans.

icarda.org



Source: schuts, M. 2020.

Diversity of innovation actors



Diversified actors, rarely considered as a whole, by developers and researchers!

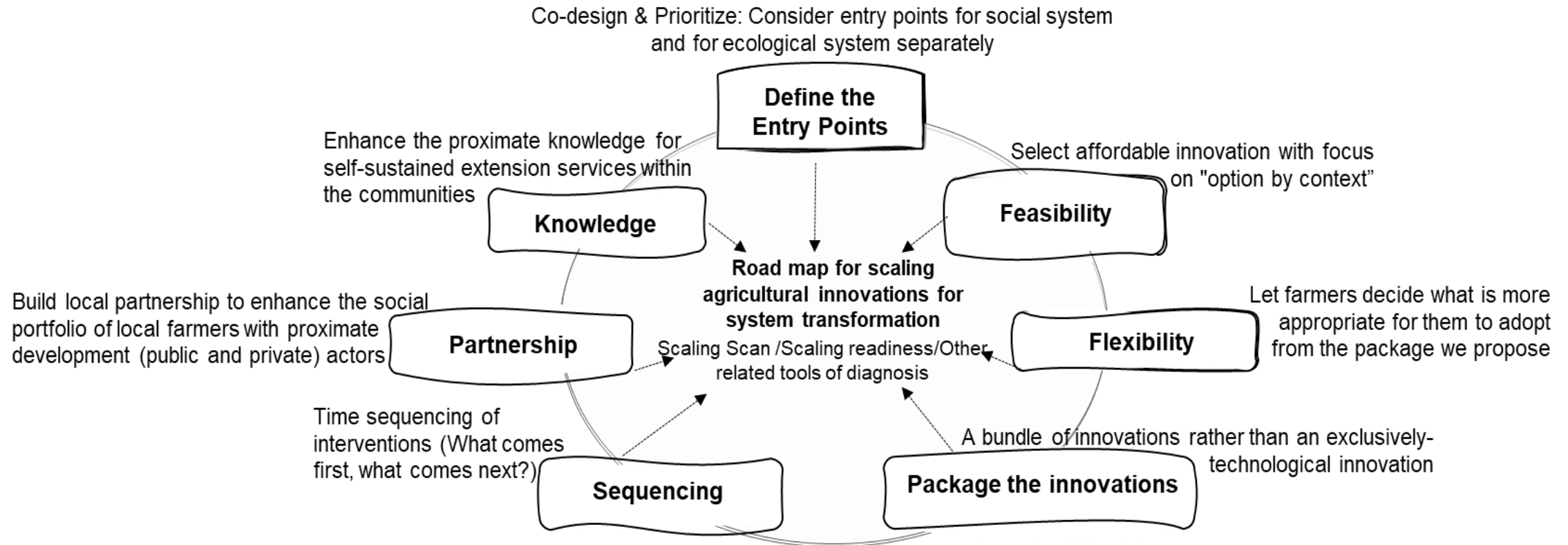
Possible actors in the agricultural innovation system. Adapted from CABI/CTA/KIT/VRLIE/WUR (2006), Rajalahti et al.(2008, 4), Arnold and Bell (2001, 279).

Linear extension vs Innovation systems

	Technology Transfer (TT)	Farming Systems Analysis (FSR)	Agricultural Knowledge and Information Systems (AKIS)	Agricultural Innovation Systems (AIS)
Roles of farmers	Adopters of technologies	- Adopters of knowledge and technologies - Source of information	- Experimenters - Experts	- Partners - Entrepreneurs - Part of innovation network
Roles of research and researchers	Developers of knowledge and technologies	Experts	- Capacity builders - Facilitators of learning	- Enhance innovation capacity in the system - Members innovation network

À noter le changement du rôle et statut du chercheur.

Key principles and ingredients for scaling



Refinement and Scaling of Agricultural Technologies and Practices
Frija A., & Idoudi Z., 2022

Need for contextualized approaches

Clustering Crop-Livestock Integration (CLI) Options Based on the Scale of Implementation (On-Farm, Landscape) and Resource-Orientations.

CLCA Options

No-till on Residues + Forage Diversification+ Livestock Management Interventions

Minimum Tillage+ Forage Diversification+ Alternative Feed Options + Livestock Management Interventions

Conventional Till + Forage Diversification+ Forage Crops Seed Production + Small-Scale Mechanization of feed production

Minimum Tillage + Forage Diversification+ Alternative Feed Options

Cereal-Food Legumes Rotation + No-till on residues + Stubble Grazing Management

Phase-I: Adaptative Research & Options under Piloting

Phase-II: Scaling-Up Full CLCA Packages

Knowledge
Hubs

Forage Diversification to Address Feeding Gap
Minimizing Soil Disturbance

Forage Diversification to Address Feeding Gap
Minimizing soil Disturbance and Improving Herd Management

Conventional forage cropping for biomass and seeds and community-based mechanization for feed production

Forage Diversification to Address Feeding Gap
Minimizing Soil Disturbance

CA in Cereal-Legume Based Systems

CLCA Package/Context



Scaling

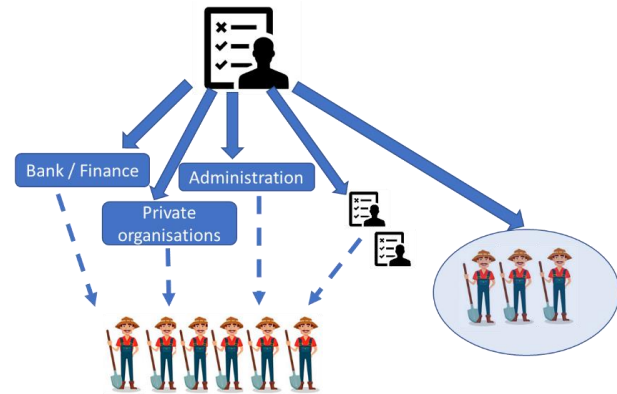
How can we define it?

Scaling defined

- Scaling is the **process of expanding beneficial technologies and practices over geographies**, and across **institutions** and **levels**-to impact **large numbers of people**.
- Key words for scaling:
 - **Impact** for **many** people,
 - **Sustainability**
 - **System Change**
 - **Responsible scaling**

Scaling need a change of mindset!

Collaborate with those
who share the same
vision for change
Target?
Direct vs indirect
beneficiaries?



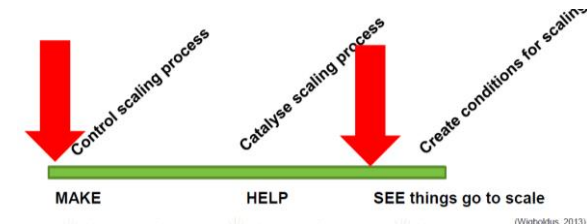
Scaling is not about
money (more money can
“buy me” more
beneficiaries and
maintain a controlled
environment)



Scaling is a BIGGER
Pilot... doing **more of the
same** with **more money**



Individual projects are **building
blocks** to achieve **mid/long term
impact** (it takes **time** to scale)



Enough theories - let's be practical!



Details = which actions and how to structure them?

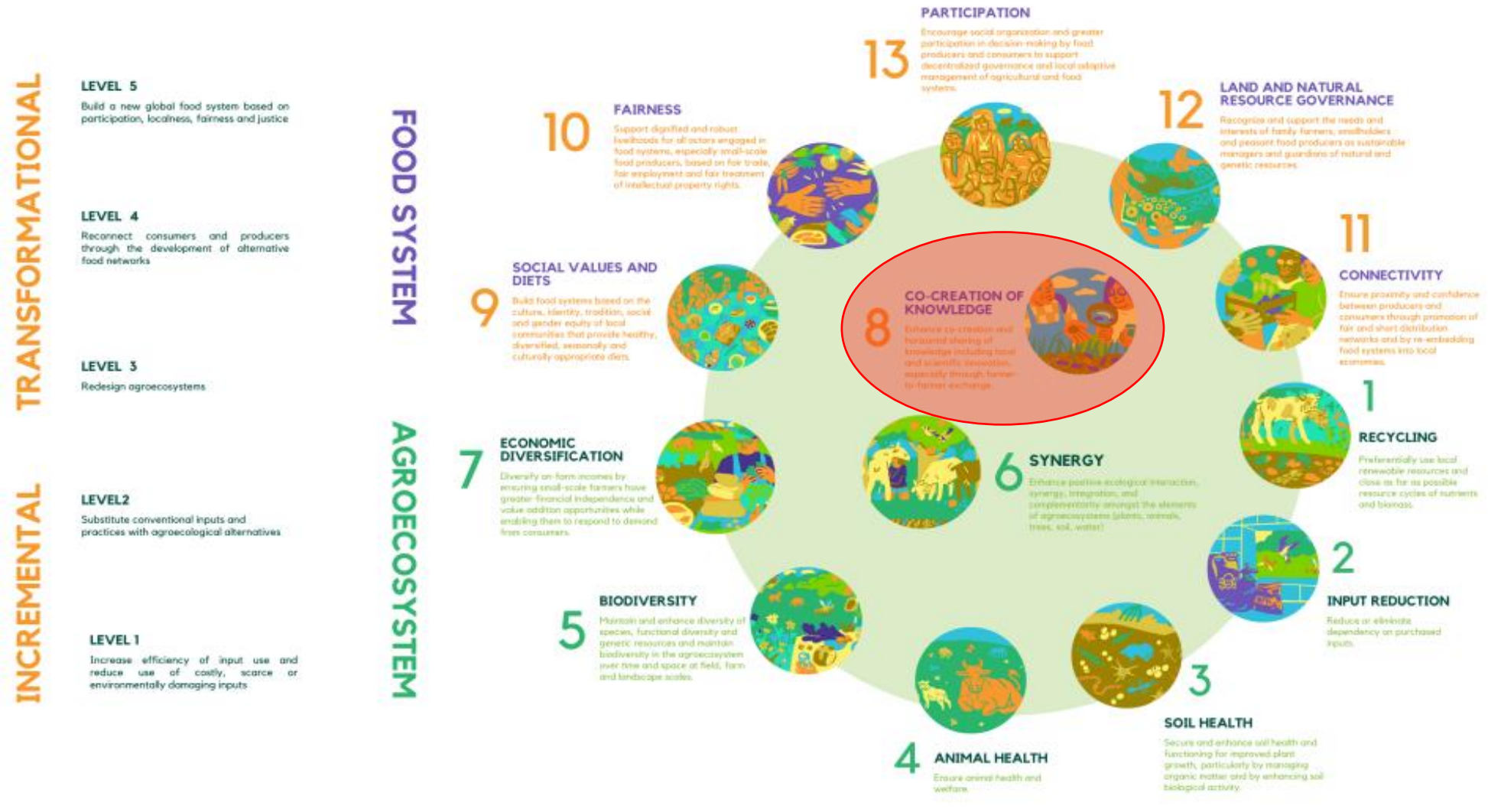
Details = how to contextualize?



Knowledge management

An illustration through the concept of knowledge hubs

Which inspiration we can get from agroecology principles?

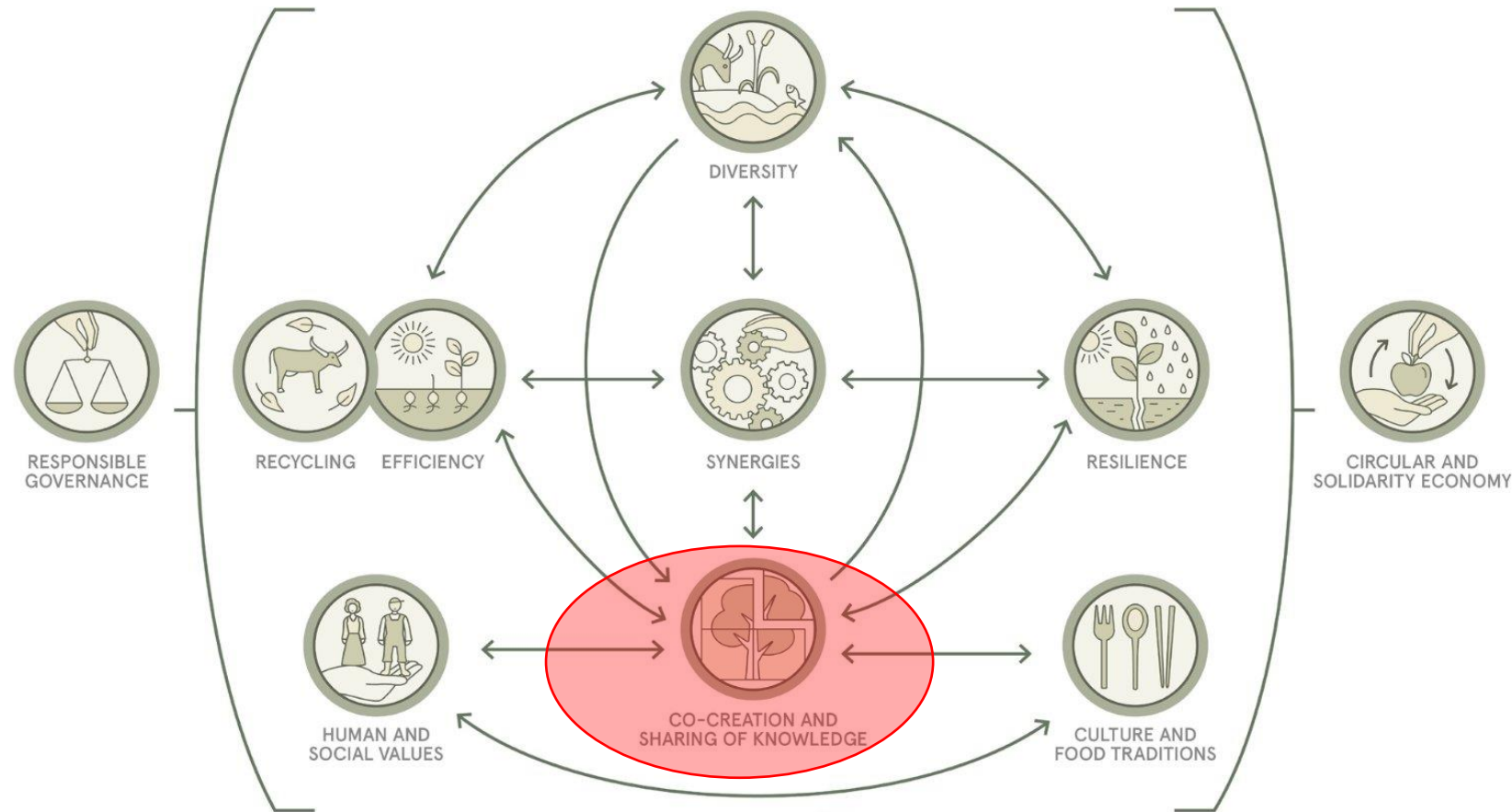


ILLUSTRATIONS: DOROTTYA POOR

THE FIVE LEVELS OF TRANSITION TOWARDS SUSTAINABLE FOOD SYSTEMS AND THE RELATED 13 PRINCIPLES OF AGROECOLOGY

SOURCE: GLIESSMAN (2007) AND HLPE (2019)

Which inspiration we can get from agroecology principles?



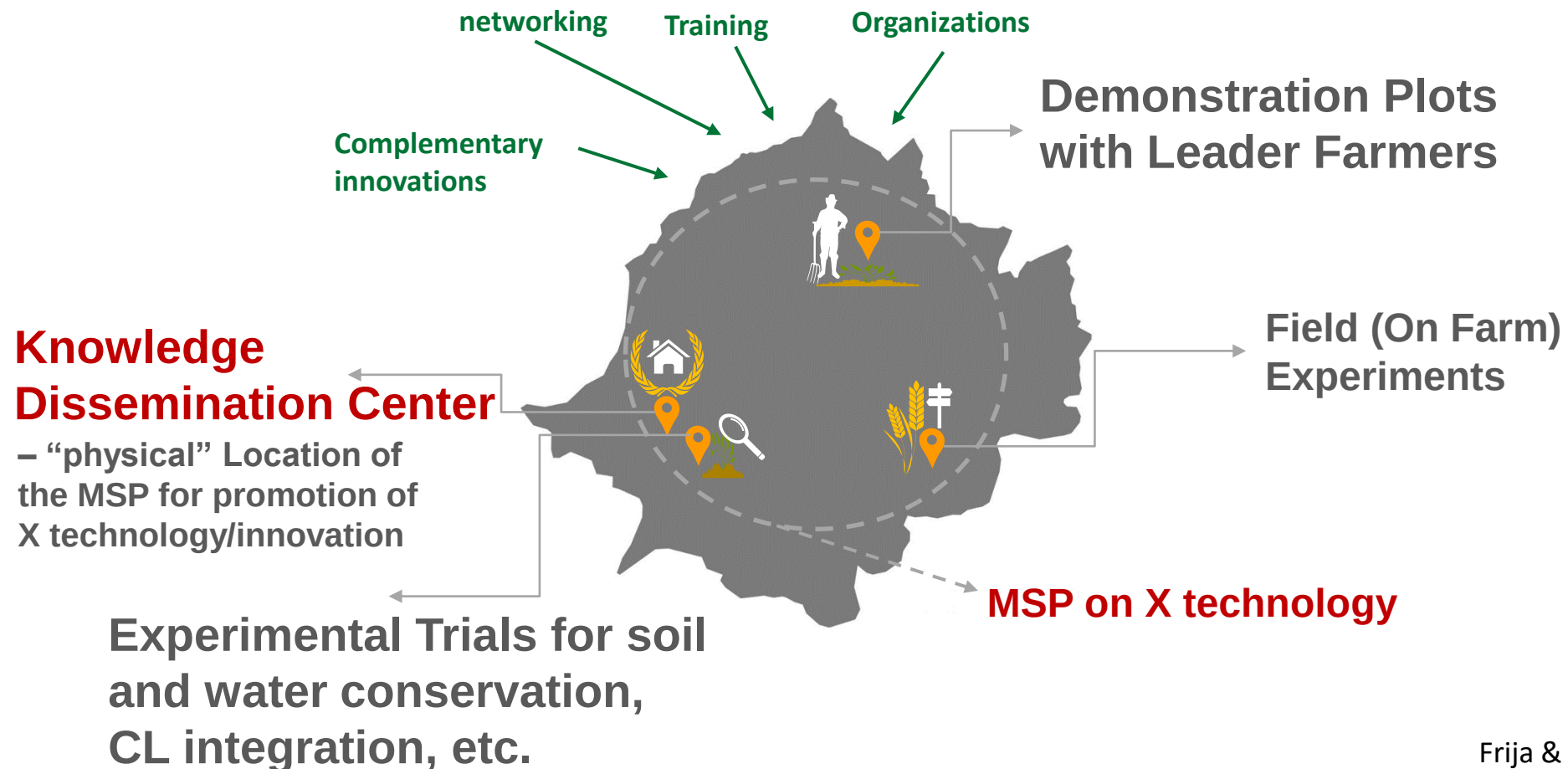
How can we decline such a theoretical illustration in practice?

The key 10 principles of agroecology

Source: FAO

Knowledge management and Multi-stakeholder platforms?

Illustration of the set of integrated interventions for the creation of self-sustained MSPs



Frija & Idoudi, 2021.

<https://repo.mel.cgiar.org/handle/20.500.11766/12248>

A knowledge management approach based on 4 pillars

1

Co-design de quelques expérimentations sur l'érosion et la fertilité des sols (générer des évidences)

2

Multitudes de parcelles et activités de démonstration (sur les bonnes pratiques et bonnes rotations)

3

Priorisation et ciblage des activités de développement des capacités (agriculteurs leaders, agents de proximité)

4

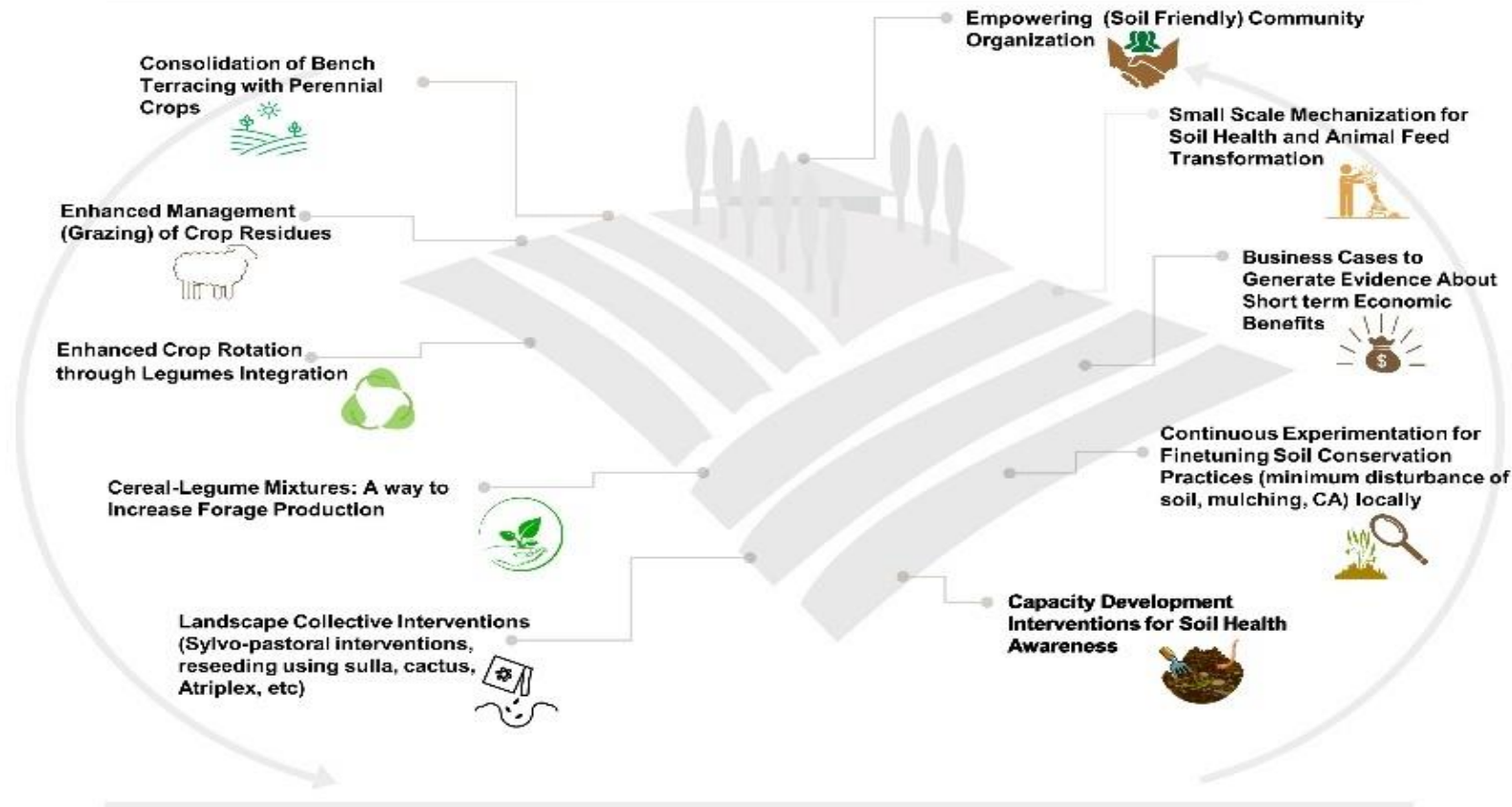
Activités de réseautage de l'association (réseau social est un élément de résilience)



Photo credit: ICARDA, 2021

Combined with a packaging of technologies

Integrated Soil-Friendly Sociotechnical Package



- Des innovations techniques complémentaires
- Des innovations sociales, et organisationnelles

1- EXPERIMENTATION 2- DEMONSTRATION 3- DEVELOPPEMENT DES CAPACITES 4- RESEAUTAGE





knowledge management is not
helpful if not combined with
« PARTNERSHIP »

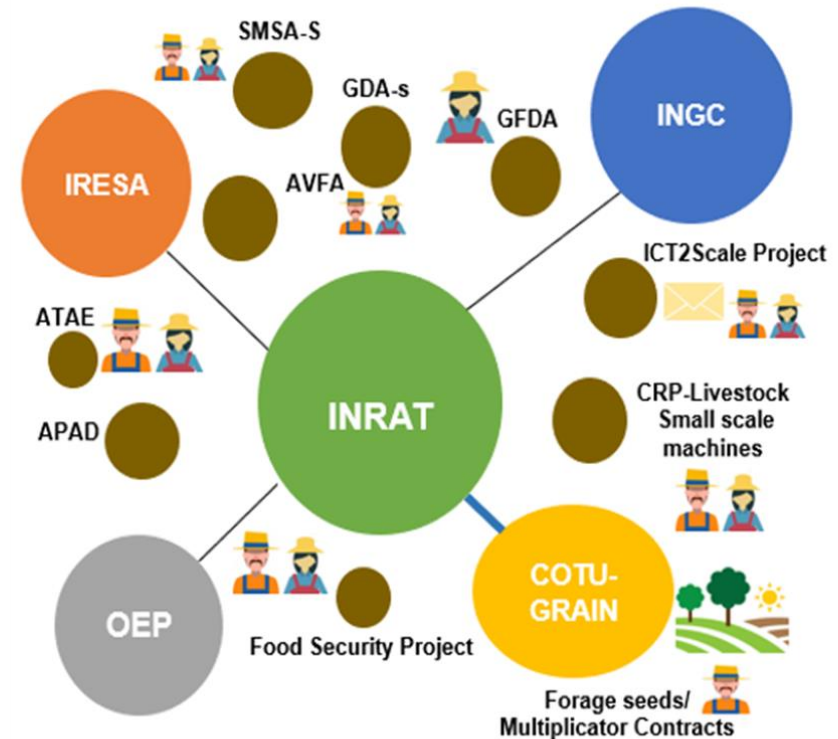
Partnership for scaling – the 4-wheels approach

Wide Range of Research and Development Partnership

The Project initially aimed to be inclusive and focus on “Partnership for Scaling”

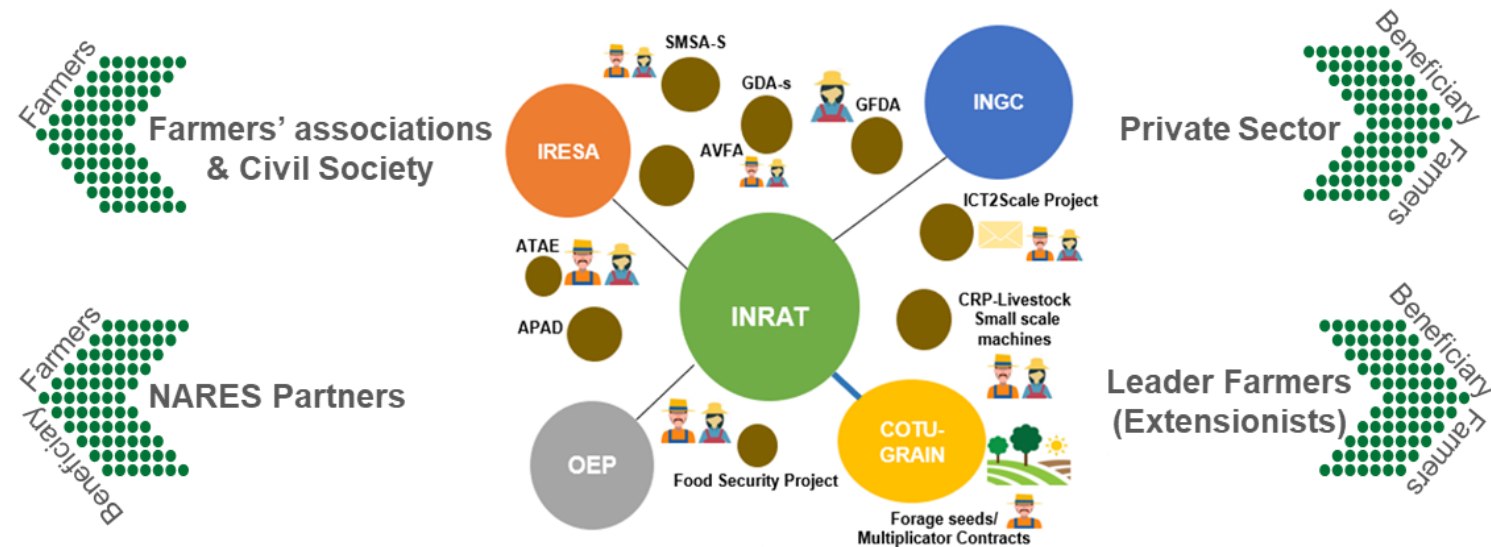
This has led to a large network of actors and partners from different research and development backgrounds, involved in the project at different levels and activities

We then had to structure this network according to an appropriate typology of actors involved, so that our knowledge management, communication, and monitoring became more effective.



Wide Disaggregate Partnerships to be more Effective!

Typology of scaling actors according to “4-Wheels approach” for partnership

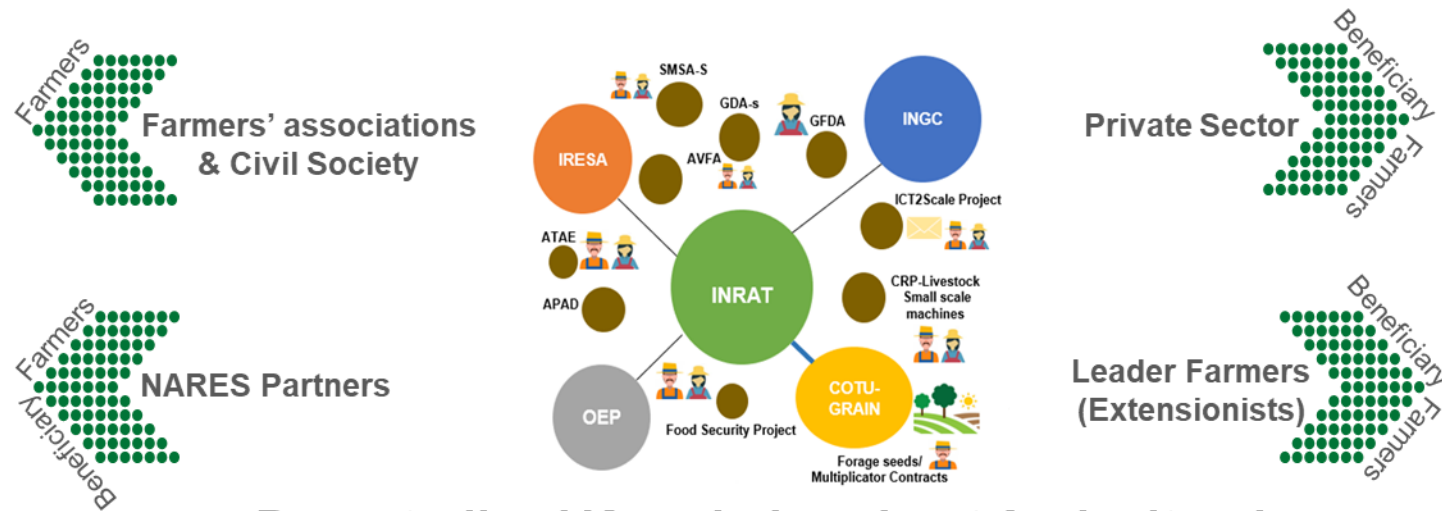


The R4D Project team continue to capitalize knowledge about CLCA systems:

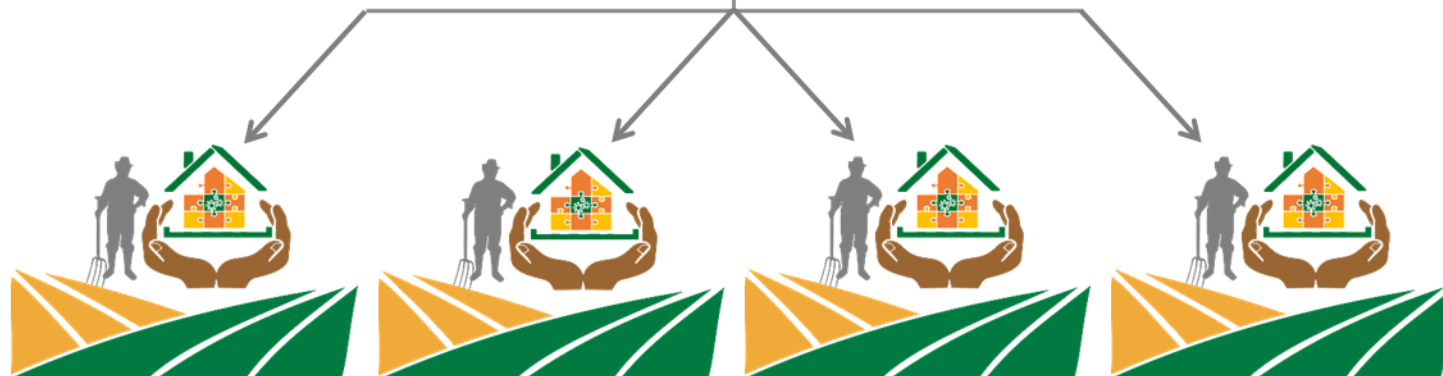


Need for a more Decentralized Knowledge Management Approach

Wide Range of Research and Development Partnership

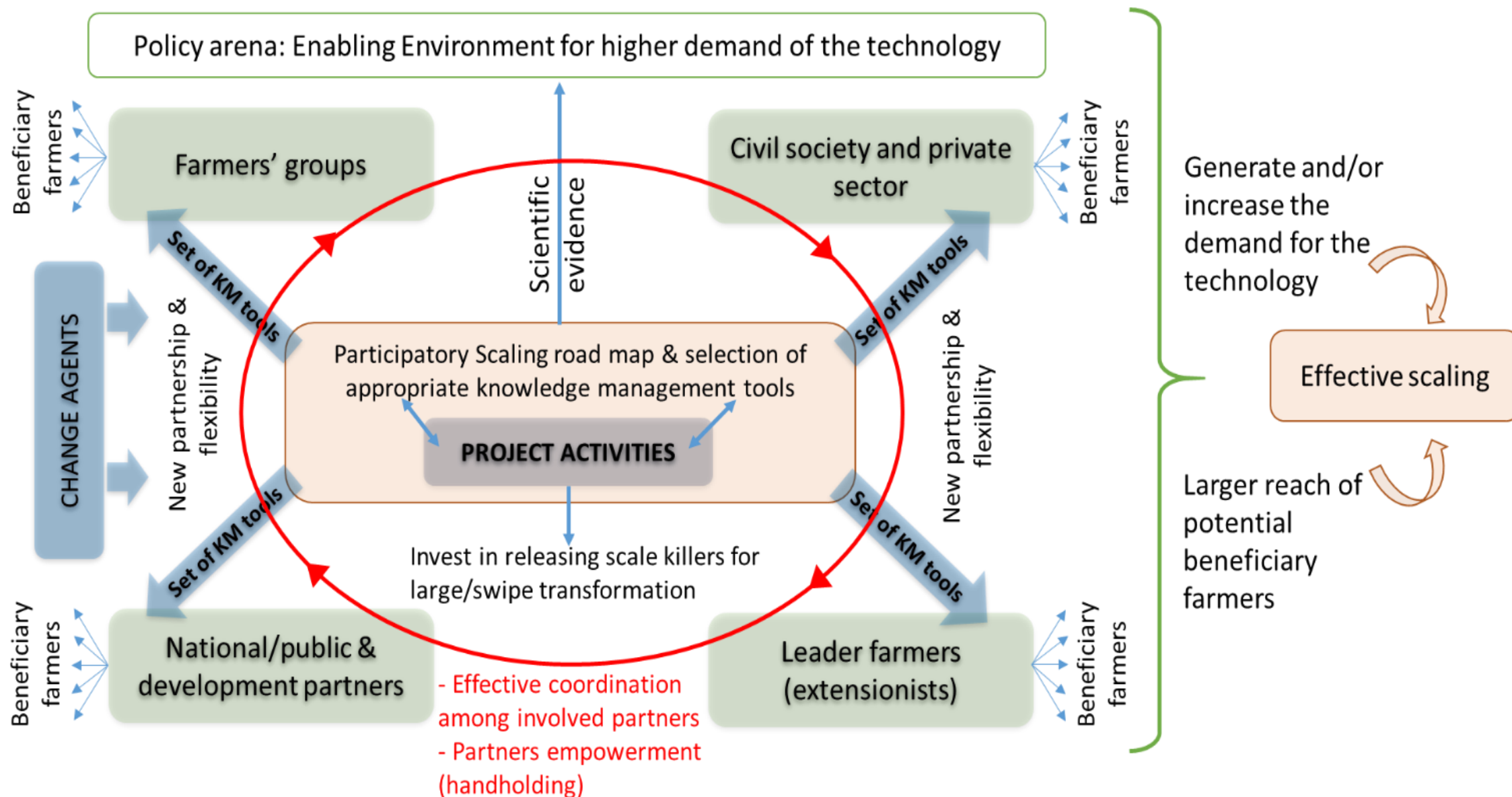


Decentralized Knowledge about Agricultural Systems and practices

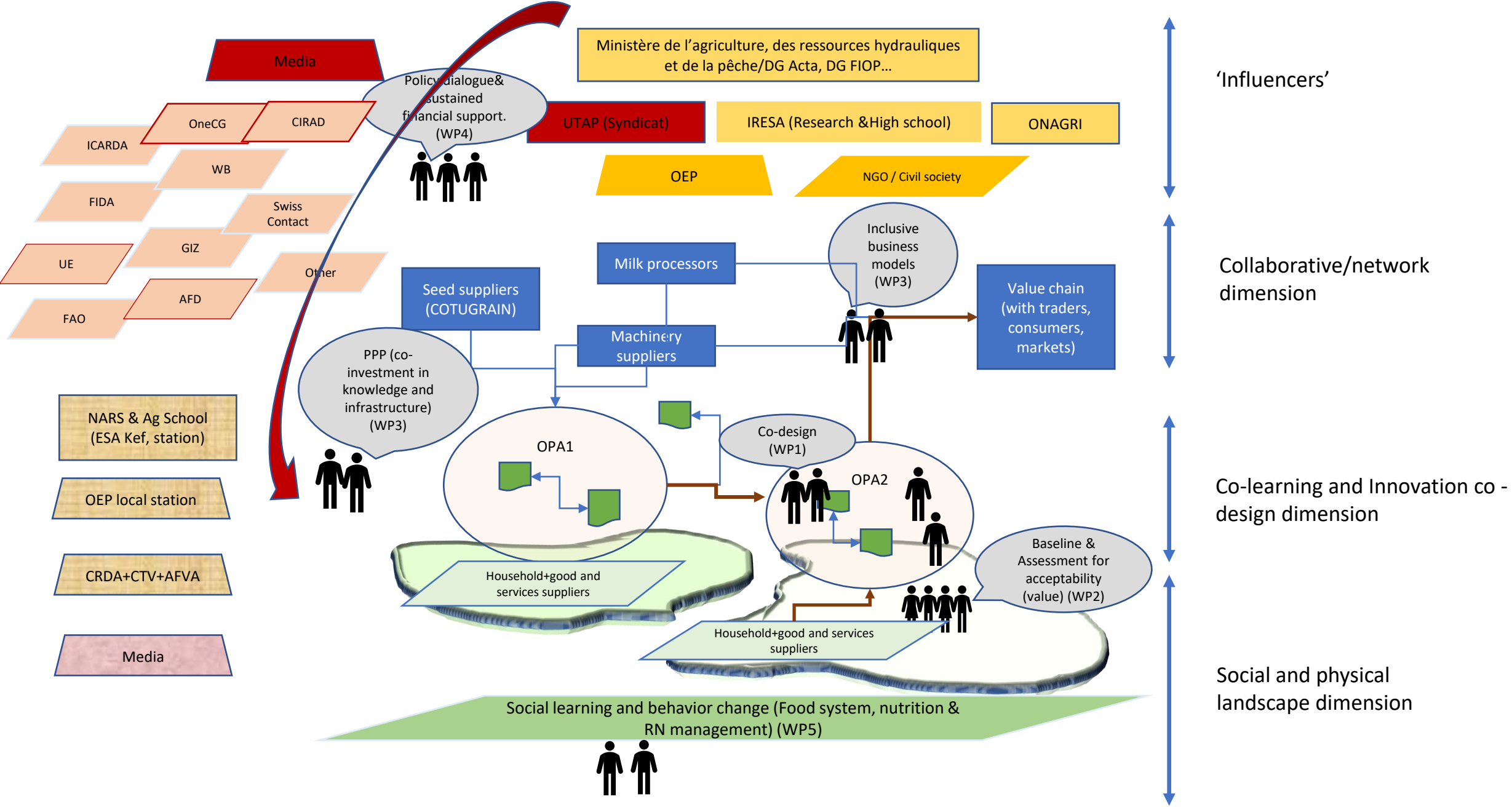


Create Knowledge Hubs on Different CLCA Thematic

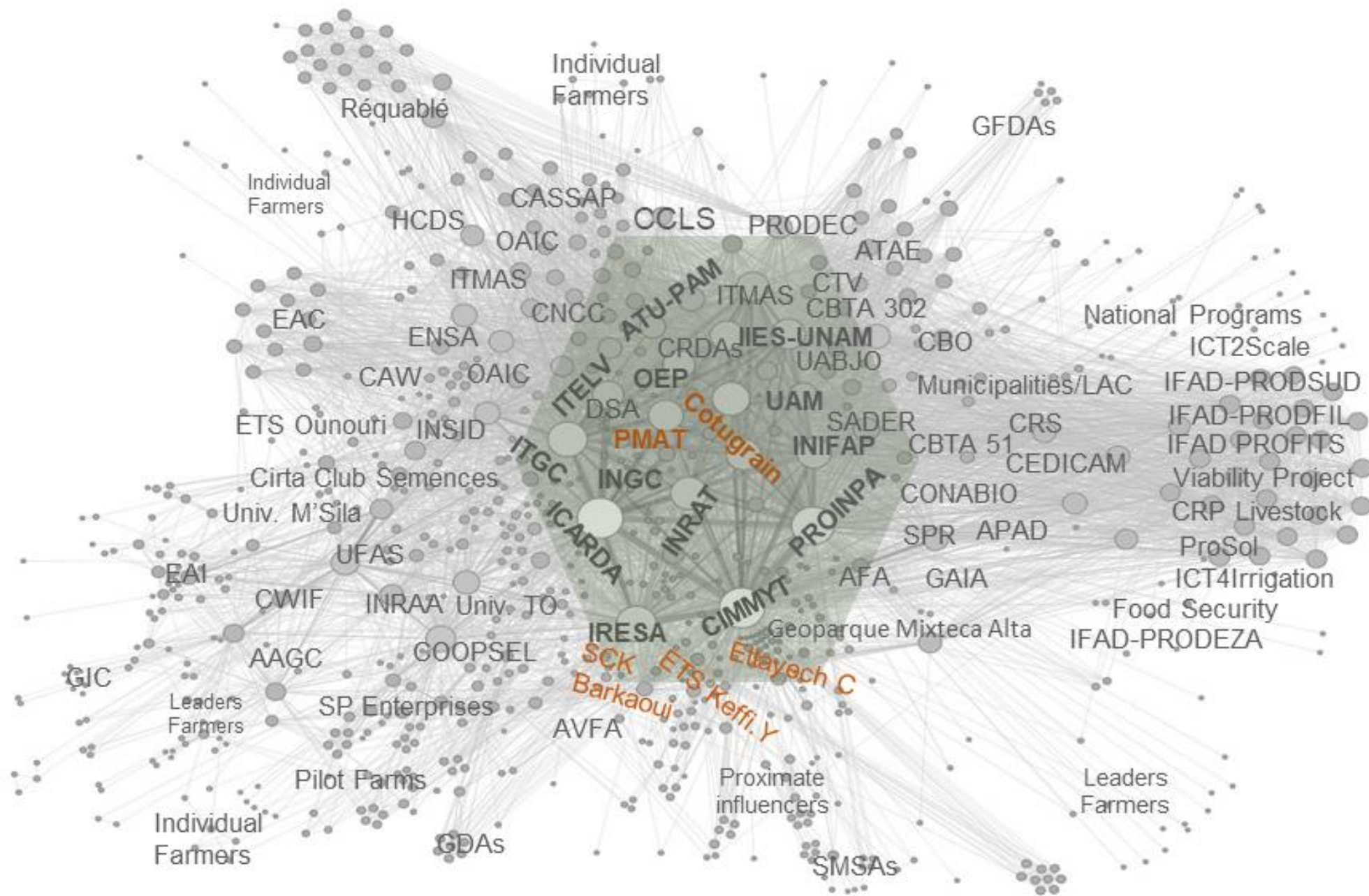
4-wheels approach of partnership for scaling



Build on an existing institutional landscape (relevant institutions for AE-i)



Engage Effective Partnership & Deliver at Scale



Engage Effective Partnership & Deliver at Scale

A project of
2 Mio USD
budget



1,200

5,600

Gender Based-Interventions for Innovative Solutions in NA reaching out 1200 women farmers

Dissemination of the Integrated Improved Crop-Livestock Management Packages to 5,600 Mixed, Smallholder Farmers in NA and LAC Countries

20,000

Farmers are indirectly reached through broader CLCA initiatives

6,000

Hectares were Implemented under CLCA Farming Systems in NA and LAC Countries

125\$

A cost per beneficiary ratio of US\$125 compared to the average of US\$246 in IFAD's 2016-2018 portfolio.

5,000

knowledge Provision & Capacity Lifting to more than 5,000 Farmers, National and Local Extension Agents, Students, Young Scientists, and Policy Makers – in NA and LAC Countries

02

Private Public Partnerships

05

Knowledge Hubs for Leveraging the democratization of knowledge and Communities Empowerment of Contextualized CLCA Systems (CA, Forage, Livestock) in Algeria and Tunisia

- ITGC – PMAT-CLCA in Algeria to Locally Produce Zero-till Seeders and Expand areas Under CA
- INRAT-Cotugrain-CLCA to scale forage crops and forage mixtures in Tunisia

Step	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Step 1 – Selection of hosting organization/platform of the KH												
Task 1.1. Selection of promising technologies (relevant for the projects, regions, and context). This can happen through concertation between the project teams, and their national and local partners												
Task 1.2. Identify potential public and private partners who might be members (or clients) of the KH. This includes an assessment of the actual demand for the technology in the dominating farming systems												
Step 2 – capacity assessment of the selected hubs and investments in appropriate knowledge products												
Task 2.1. Preliminary assessment of local partners engagement (can be straightforward or based on questionnaire, Manifestation of interest, existing partnership, etc.). The rationale is to select a platform holder/ manager who will ensure the maintenance and sustainability of the knowledge products and materials which will be invested												
Task 2.2. Assessment of technical and infrastructure capacities within the hub												
Step 3 – Handholding activities to build the knowledge dissemination capacity of the established KH												
Task 3.1. Handholding of the KH managers and personnel (these are not necessarily the personnel of the KH, as they can be leader farmers, NGO, etc.)												
Task 3.2. Minimum co-investments in appropriate infrastructure which will allow the hub to be functional as a knowledge dissemination center												
Task 3.3. Investments in demonstration plots, and other experimental fields to further generate context-specific knowledge and evidences of the technology benefits												
Task 3.4. Investment in generating knowledge products useful for technology dissemination												
Step 4 – Connecting the KH with wider local and regional, research and development stakeholders – First step to operationalize a “Scaling Hub”												
Task 4.1. A large workshop event where all relevant stakeholders will be invited to present the established network and discuss potential joint scaling activities												
Step 5 – Co-design of scaling activities led by the established of the KH (institutional arrangements, clients, beneficiaries, and funding activities)												
Task 5.1. Refine the co-designed scaling activities with different 4-W partners												
Task 5.2. Develop joint sub-agreements (including activities and budgets) with different 4-W partners for the implementation of the defined scaling activities												
Step 6 – “Social learning” and adaptation												
Task 6.1. Measuring social learning and progress on social capital within and beyond the hub based on a set of knowledge and social network indicators which can constantly be collected to monitor the progress and sustainability of the created hubs												

Exemple du “Pole
du Savoir sur les
rotations des
cultures dans les
systèmes mixtes
céréales-petits
ruminants”

Rhahla, Siliana



Selection of the Hosting Organizational Platform



Selection of Promising Technologies (relevant for the projects, regions, and context)



Identify Potential Public and Private Partners who Might be Members

Photo of the Rhahla Landscape at the beginning of our work: 2020



Intervention Landscape at El Rhahla Site, Gaafour – Siliana (Photo Credit: Zied Idoudi, ICARDA)

Selection of the Hosting Organizational Platform



Selection of Promising Technologies (relevant for the projects, regions, and context)



Identify Potential Public and Private Partners who Might be Members



The launch of field activities in Rhahla, Siliana, where all regional and national stakeholders relevant for all technical and organizational matters of our intervention were present

Capacity Assessment of the Selected Hubs and Investments in Appropriate Knowledge Products

Assessment of Technical and Infrastructure Capacities within the Hub



Production System

Semi-Arid North & Central West Tunisia

- ❖ Cereal – Livestock belt (Wheat, Barley, Fallow, Sheep);
- ❖ Mixed small to medium-scale holders;
- ❖ Rainfall 200 - 450 mm, very irregular;
- ❖ Poor soils, extremely low soil organic matter;
- ❖ Very high erosion risks;
- ❖ Extended practice of fallow;
- ❖ Low integration of forages;
- ❖ Supplementary irrigation (in some cases)

Handholding Activities to Build the Knowledge Dissemination Capacity

- Minimum Investment in Infrastructure and equipment



Supporting with key machinery which can be used at collective basis for soil-related matters (enhancement):

- Forage seeds cleaning
- Pelleting for legume forage conservation
- Grinding for better legume forage use and storage

Handholding Activities to Build the Knowledge Dissemination Capacity

- Minimum Investment in Infrastructure and equipment



Mécanisation à Petite Echelle Pour l'Amélioration de la Fertilité des Sols et la Transformation des Aliments de Bétail

Without forgetting gender empowerment in these handholding activities

Handholding Activities to Build the Knowledge Dissemination Capacity (Cont'd)

Facilitation and Creation of a farmer association with key orientation of soil conservation



Public invitation to participate in the election of the executive board members of SMSA "Ankoud El Kaier"



Building community leadership through farmers trainings

Handholding Activities to Build the Knowledge Dissemination Capacity (Cont'd)

Investment in Demonstration Plots



Mise en Place des Parcelles d'Expérimentation, de Démonstration et de Multiplication des TCES

Les détails peuvent être trouvés dans le rapport annuel

Section de Mise à l'Echelle - Suite

80 Parcelles de démonstration et de multiplication ont été directement implémentés par le projet pour près de **42** agriculteurs dans différentes zones d'intervention

Site	Total Superficie au niveau Plot	Total Superficie au niveau Exploitation	Superficie exposée à la technologie au niveau du Paysage
El Rhahla, Siliana	47,5 ha	150	2,000 ha
El Khol, Kairouan (+ 10 ha à Sud El Gorri)	35 ha	70	800 ha
Total Superficie	82,5 ha	220	2,800 ha

Développement d'un outil ODK – Intelligent, pour suivre l'évolution de toutes les parcelles de démonstration, les surveiller, et analyser les échecs et les succès au niveau des parcelles



Handholding Activities to Build the Knowledge Dissemination Capacity (Cont'd)

Investment in Demonstration Plots

Aperçu Général sur l'Avancement: Décembre 2020 – Avril 2022

Section de Mise à l'Echelle - Suite

Les parcelles de démonstration ont été établies comme un Centre d'Apprentissage/de diffusion des connaissances où les agriculteurs peuvent évaluer la technologie du semis à la récolte et seront utilisées comme support de formation pour les différentes journées de terrain et les formations sur l'exploitation



L'accent a également été mis sur l'engagement du secteur privé, principalement pour la production de semences fourragères)



Handholding Activities to Build the Knowledge Dissemination Capacity (Cont'd)

Investment in experimental Plots for contextualized knowledge generation and adaptation



Installation of the Wischmeier protocol (and soil pedology profile) for soil erosion measurement



Sowing of durum wheat in the experimental plot using conventional and no till seeders

Handholding Activities to Build the Knowledge Dissemination Capacity (Cont'd)

- Investment in experimental Plots for contextualized knowledge generation and adaptation



Completed with Lab analysis for accurate contextualized knowledge to be simplified and transferred to farmers



Handholding Activities to Build the Knowledge Dissemination Capacity (Cont'd)

Investment in experimental Plots for contextualized knowledge generation and adaptation

Promoting Sulla for soil consolidation and fertility



Handholding Activities to Build the Knowledge Dissemination Capacity

- Cap Dev (in on a participatory way)



Community consultation on innovations and technologies, priorities, capDev needs, organizational aspects

Handholding Activities to Build the Knowledge Dissemination Capacity (Cont'd)

Technical capacities

Series of technical trainings in collaboration with AVFA, INRAT, INRGREF for enhancing overall farmers technical capacities.

Main causes of soil degradation	Problem Level	Problems of the production systems
Slope, frequent tillage, poor soil cover	Soil	P1: Erosion
No crop rotation, Lack of knowledge		P2: Fertility
Poor pastoral resources, Lack of knowledge, high feed prices	Production system	P3: Livestock feeding
Lack of knowledge, no herd monitoring		P4: Livestock management
Pests, poor soil organic matter, irrigation problems, crop rotation		P5: Annual crop productivity
Lack of knowledge, poor soil organic matter		P6: Trees productivity

Handholding Activities to Build the Knowledge Dissemination Capacity

- Cap Dev (participatory way) of proximity agents and leader farmers/extensionists

Développement des Modules d'Apprentissage en ligne (E-Learning) sur les TCES et Lancement des Sessions de Formation physique

Trois modules d'apprentissage en ligne sur les TCES (en français) ont été développés en collaboration avec des partenaires de recherche, l'INRAT et l'INRGREF, et mis à disposition sur la plateforme d'apprentissage en ligne de l'ICARDA. <https://elearning.icarda.org/> :



Agriculture de Conservation



Agroécologie



Santé des Sols

Partage et gestion des connaissances centré sur les bénéficiaires (st. Communautés d'agriculteurs)



Partage & Gestion de
Connaissances



- ✓ Co-générer (avec les agriculteurs et les parties prenantes locales) de nouvelles connaissances locales à partir d'expériences et de démonstrations établies localement.
- ✓ Des outils de gestion des connaissances et des produits de connaissances appropriés seront spécifiquement développés et adaptés aux agriculteurs et aux communautés afin de mieux les sensibiliser et de renforcer leurs compétences techniques pour une mise en œuvre "douce" des TCES



Connecting the KH with
Wider Local and Regional,
Research And Development
Stakeholders

Agroecology

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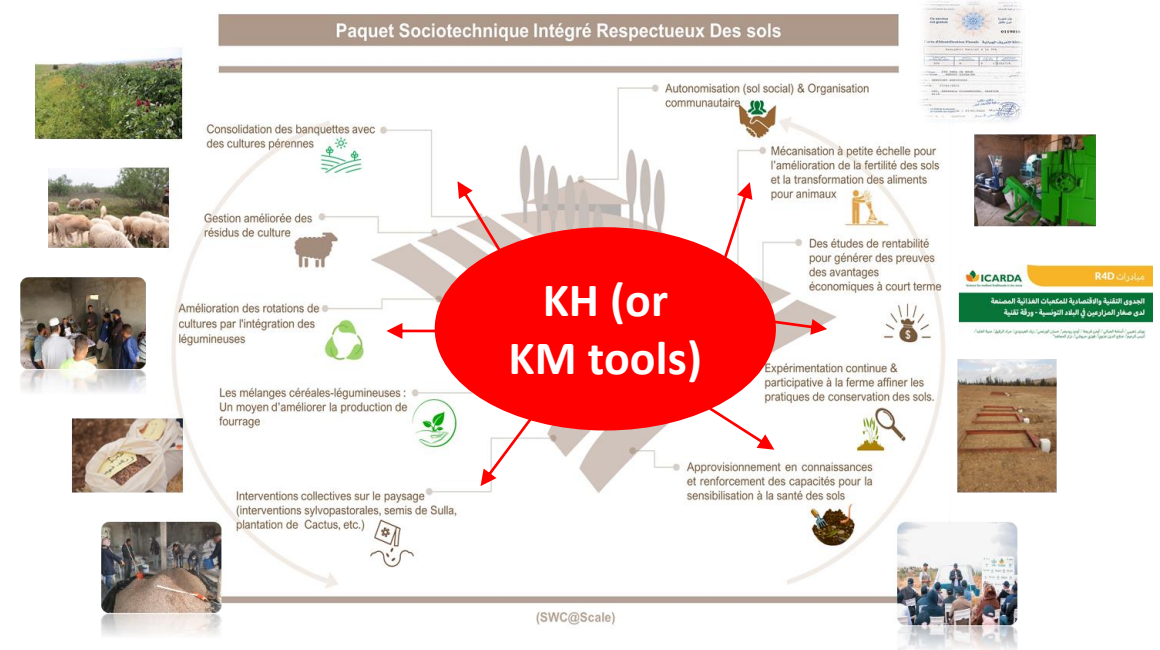
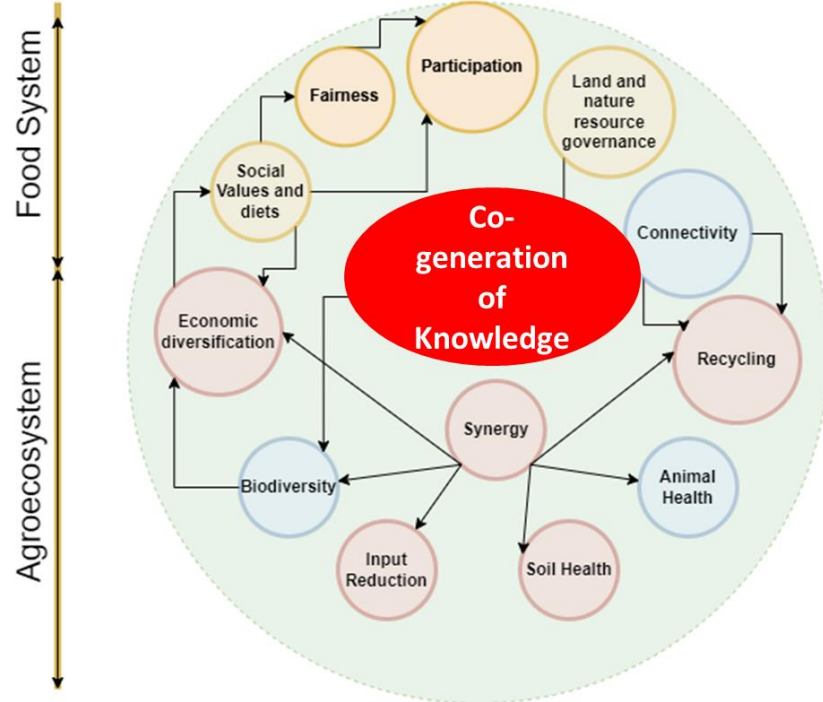
KM

+

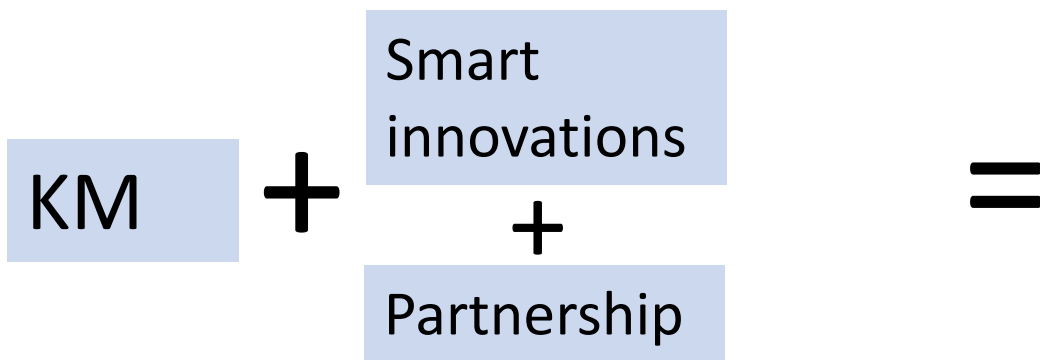
Smart innovations

+

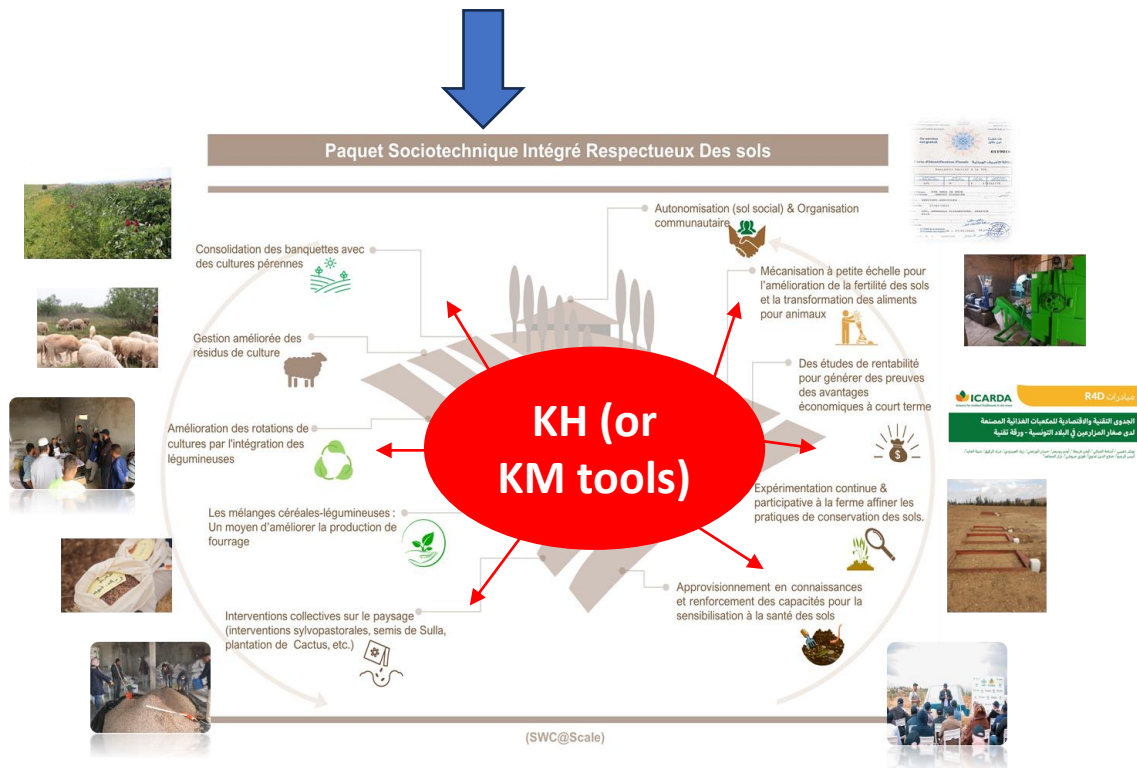
Partnership



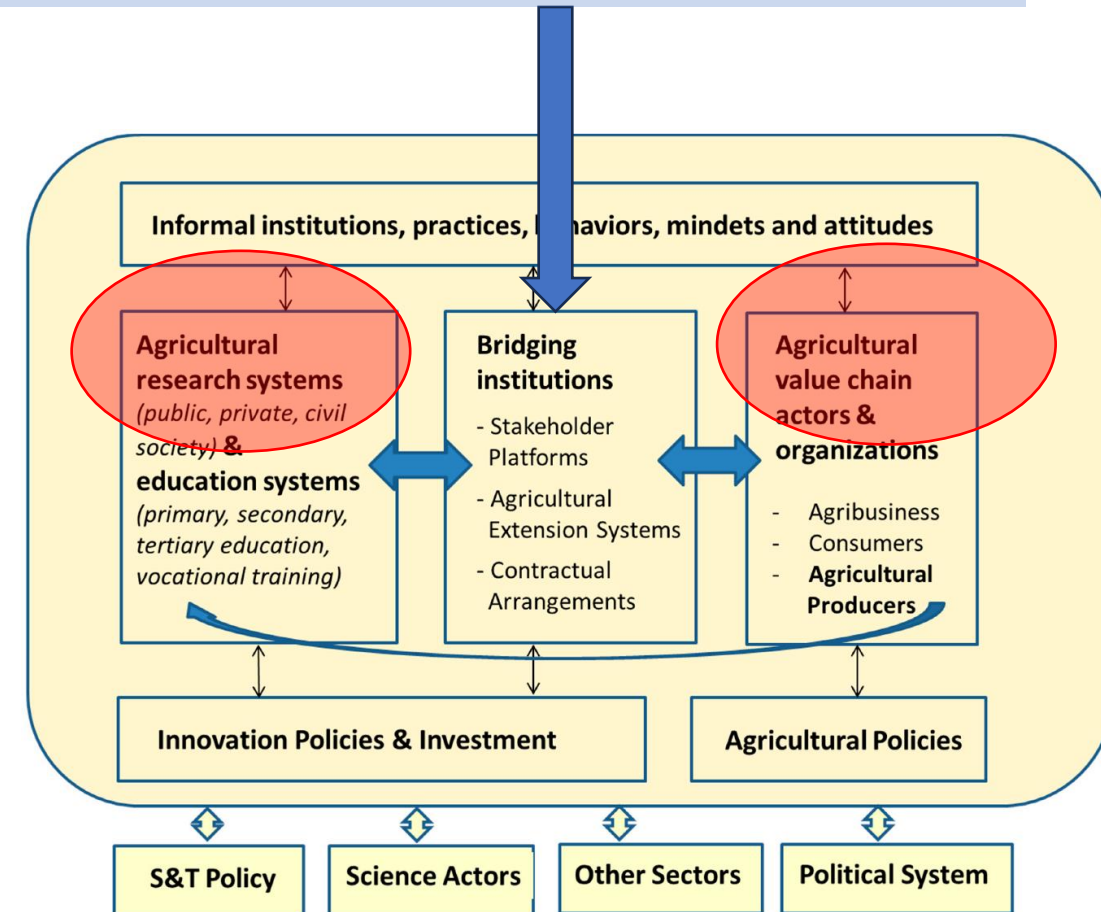
Ps: this illustration is (of course) still conceptual and need more evaluation and validation



As materialized in a KH



A « bridge micro-institution » of the innovation system



Ps: this illustration is (of course) still conceptual and need more evaluation and validation

Early changes and transformations of the system

Only 18 months of work

(unfortunately followed by a drought)

Development of contract farming between farmers and their associations



After **18 months** of
implementation!

Increased trend towards commercial activities (sheep and beef fattening), due to the increase of forage availability.



After **18 months** of
implementation!

Increased awareness about environmental and soil health through confirmed adoption of (forage) legume rotations (Self production and storage of forage seeds increased)



After **18 months** of
implementation!

Increased exchange of information across communities and with locally empowered extension actors led to increased demand on agricultural innovation,



417

ha implémentées par les agriculteurs en se basant sur les différentes interventions du projet et en adoptant différentes bonnes pratiques promues (confirmés-impactés)



108

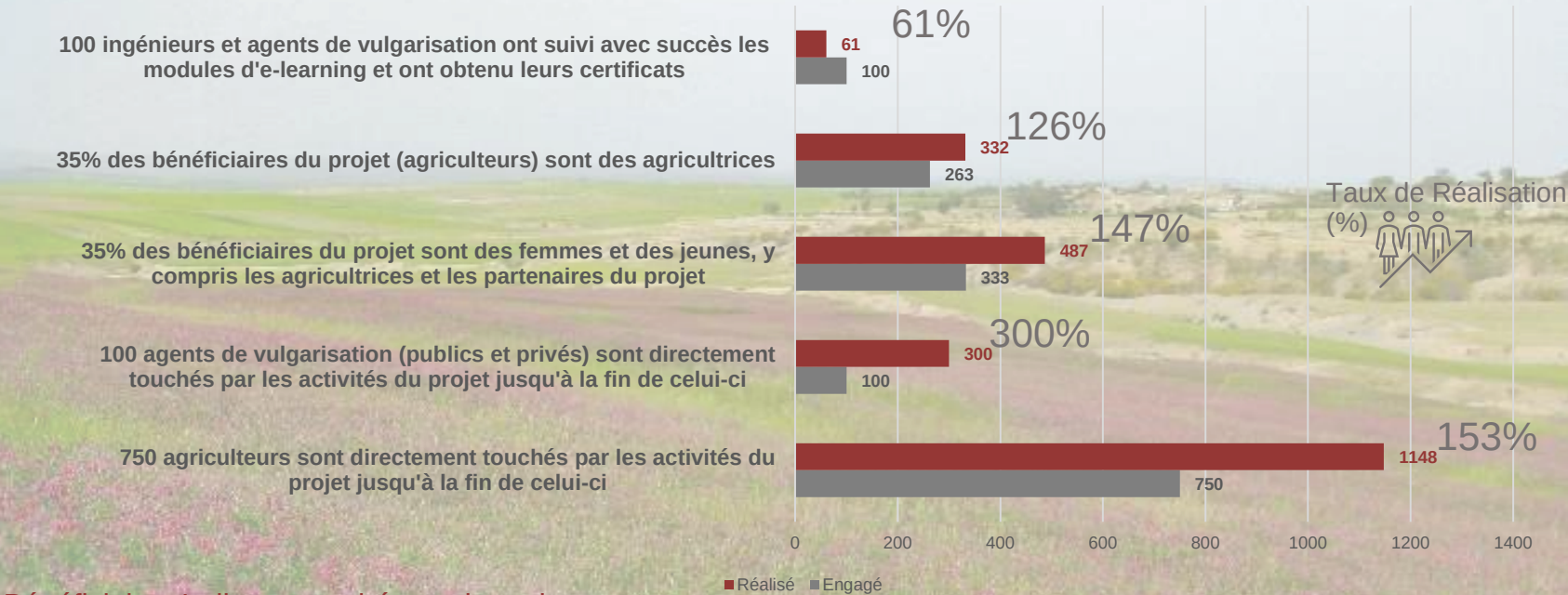
Parcelles de démonstration et de multiplication sont installées directement par le projet au profit des agriculteurs sur une superficie totale de (ha):

103

**After 18 months of
implementation!**

Raised interest for restoration of collective grazing areas (with Cactus, Sula, Atriplex, Carob trees, etc.)

Performance: Réalisation du Projet Vs Engagement



Bénéficiaires Indirects touchés par le projet

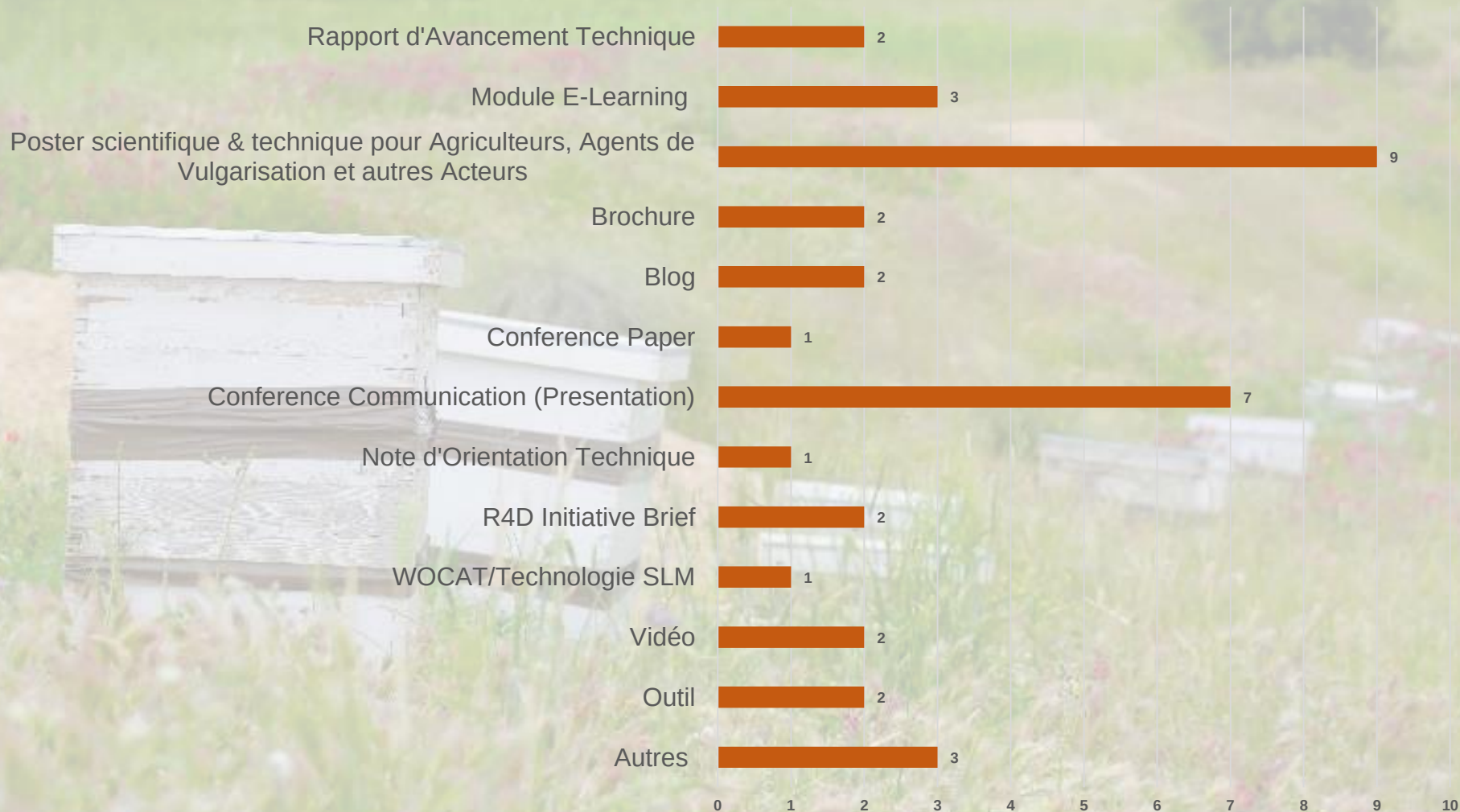
4,548 

Evénements de Renforcement des Capacités et des Technicités Locales

61 

After 18 months of implementation!

Nombre de Produits de Connaissances (PC) & d'outils (par type de PC)



After **18 months** of
implementation!

Increase of women engagement and leadership into the farmers associations (transformation of social norms)



After 18 months of
implementation!

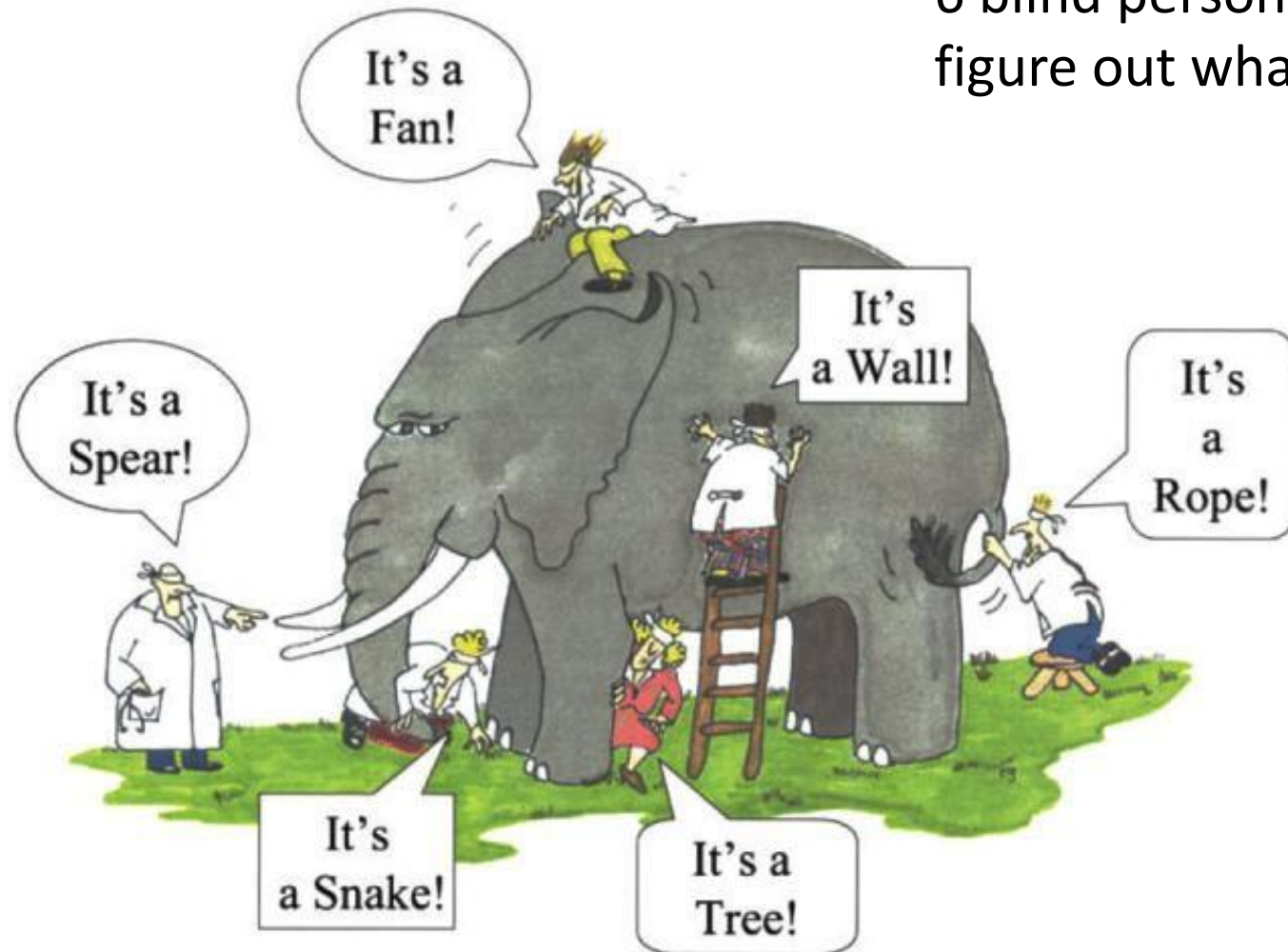
Increase of collective investments (due to farmers organisation into associations)



After **18 months** of
implementation!

Conclusion

6 blind persons trying to figure out what is this?



Source: Google photos (n.i)

Scaling must be examined as a whole rather than small parts of separate entities isolated from the whole.

