Enabel

Context analysis introducing the call for proposals on

Climate-Smart Agriculture

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1 General context

The effects of climate change become increasingly tangible. The latest IPCC report released in 2018, indicates that human activities have caused approximately 1°C[1] of global warming in the last 30 years and we are heading towards 1.5°C global warming by 2030 if we continue with business as usual. Many ecosystems and the services they provide have already changed because of the effects of global warming, including heat stress, droughts, heavy precipitation and floods.

Agriculture and climate change are closely linked. The IPCC estimated that activities in agriculture, deforestation and other land use changes are responsible for a quarter of all anthropogenic GHG emissions, representing just over 10 $GtCO_2$ eq/yr in 2010 (IPCC, 2014) (figure 1). Around half of these emissions are directly linked to agricultural production, mainly due to emissions from enteric fermentation (40% of agricultural emissions), manure left on pasture (15%), synthetic fertilizers (13%), rice cultivation (10%), manure management (7%) and burning of savanna (5%) (figure 2).

While agriculture is a major cause of global warming, it is the sector most vulnerable to climate change. Yield estimates of crops as maize, rice and wheat are projected to be declining, particularly in Sub-Saharan Africa, Southeast Asia and Central and South America (IPCC, 2018) as cause of climate change. The effects of global warming may also increase weed pressure, the proliferation of (new) pests and diseases, and the reduction of the nutritional quality of crops like rice and wheat. The increased risk of droughts and floods increase the chance of harvest losses and lower productivity on the long run. Increased pressure on water sources, spread of diseases and changes in feed quality may in turn adversely affect livestock production. Moreover, price and yield volatility are expected to rise as extreme weather continues.

Figure 1: GHG emissions by economic sector (2010)

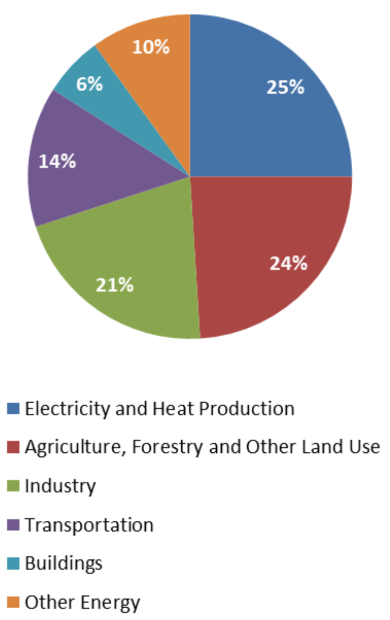
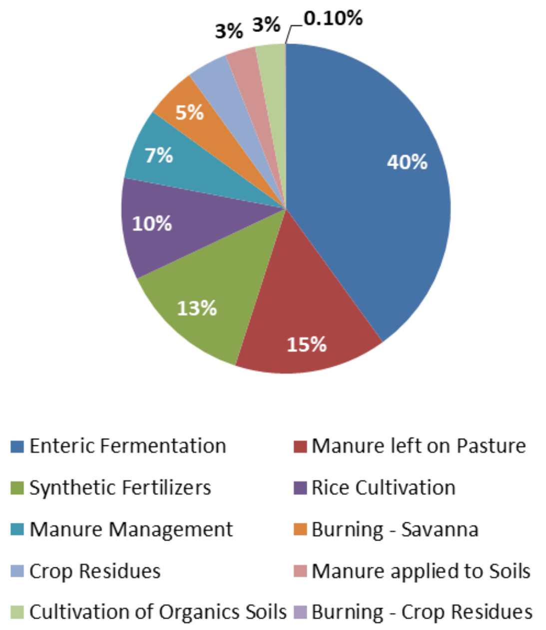


Figure 2: GHG emission from agriculture, by sub-sector (2001-2011)



[1] IPCC Special Report (2018), Global warming of 1.5°C.

2 Climate-Smart Agriculture

Agricultural systems worldwide are facing a triple challenge: how to sustainably increase productivity, while reducing the impact of agriculture on climate change and increasing resilience of agriculture and food value chains?

2.1 Productivity, adaptation and mitigation

Various projections suggest that food production must increase by 70-100 percent by 2050 to meet the demands of a world with more than 9 billion people and changing diets (Godfray et al. 2010). At the same time, urbanization and rising incomes in developing countries are driving increases in the consumption of animal products (FAO, 2009a). The concentration of global population growth in the poorest countries presents a considerable challenge to governments in implementing the 2030 Agenda for Sustainable Development, which seeks to end poverty and hunger, expand and update health and education systems, achieve gender equality and women's empowerment, reduce inequality and ensure that no one is left behind. Agricultural development is one of the most powerful tools to feed a growing population, end extreme poverty and boost economic development (Christiaensen et al. 2010).

Nevertheless, the consequences of climate change, such as droughts, floods, violent weather patterns and the rise of the sea level imply increasing challenges to agricultural development, especially in developing countries. Because of their vulnerability to disasters and their dependence from natural resources people in developing countries are most at risk, both from an environmental and from a social and economic perspective, even though they have contributed little to greenhouse gas emissions.

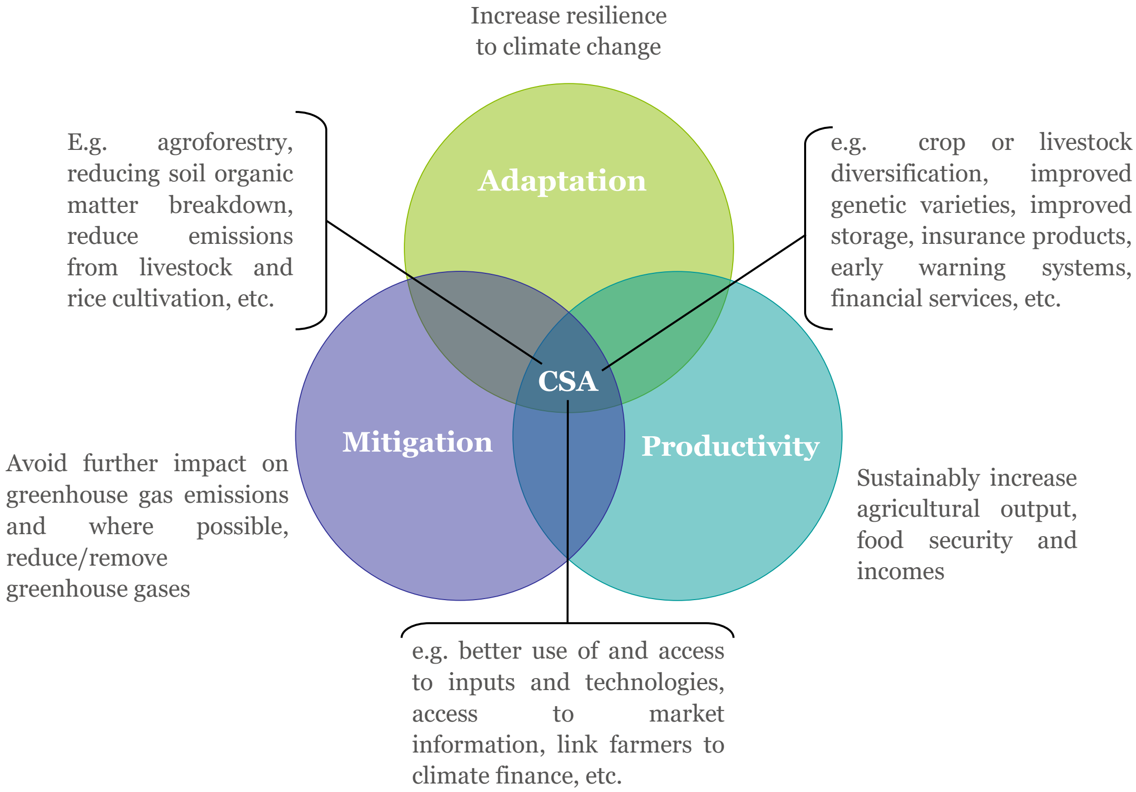
2.2 Climate-Smart Agriculture as a guiding principle

Climate-Smart Agriculture (CSA) is exactly about addressing these triple challenges of agriculture: productivity, climate adaptation and, where possible, climate mitigation. FAO defines Climate-Smart Agriculture as *"an approach to developing the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change (FAO, 2013)."*

Climate-smart agriculture integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges. It is composed of three main pillars:

1. sustainably increasing agricultural **productivity** and **incomes**;
2. adapting and **building resilience** to climate change;
3. **reducing** and/or removing **greenhouse gases emissions**, where possible.

Figure 3: Climate-smart agriculture



Climate adaptation entails a wide variety of strategies and practices to increase resilience to climate change by implementing risk management approaches to farm activities, farm outputs, agricultural prices, farm income or investments. Combining different risk management approaches can help farmers in shifting from managing disasters to managing risks in a cost-effective way by (World Bank, 2013).

The agricultural sector provides a high mitigation potential. Soil carbon sequestration, enhancing above-ground biomass and reducing methane emissions from livestock production and rice cultivation, are just some of the available agriculture-related mitigation actions (cf. figure 2). Nevertheless, given the relatively low contribution of low-income countries to global GHG emissions (IPCC, 2014), the FAO takes a rather conservative approach to climate change mitigation in the context of low-income, agricultural-based communities (FAO, 2013). Further deforestation or conversion of grasslands and wetlands should be avoided at all times, while carbon storage (in vegetation or soils) or reducing or removing emissions should be encouraged wherever possible.

CSA also aims to improve agricultural yields and incomes along the 3 dimensions of sustainability. This means that CSA practices are directed at increasing resource-use efficiency, while conserving, protecting and enhancing natural resources and improving and protecting rural livelihoods, equity and social well-being (FAO, 2017). Through the adoption of appropriate methods, products and technologies for the production, processing and marketing of agricultural goods, CSA can strengthen livelihoods and food security, especially of smallholders.

2.3 CSA and the development agenda

Climate-smart agriculture is an integral part of the sustainable food and agriculture approach of the 2030 Agenda for Sustainable Development. As such it is a key element in achieving many of the sustainable development goals (FAO, 2017). CSA is in particular linked to the SDG 2.4, one of the prioritized sustainable development goals of the Belgian Development Cooperation (Foreign Affairs, 2017).

SDG 2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

2.4 Barriers to adoption and scaling-up CSA practices

While "climate-smart agriculture" is a relatively new concept[2], many of the practices it aims to promote are established and proven practices, available 'on the shelf'. Widely known CSA practices[3] include agroforestry; integrated soil fertility management such as mulching, intercropping or crop rotation; land restoration; conservation agriculture; improved water management; new or improved genetic varieties or improved livestock or pasture management.

In spite of its proven potential, systematic response to climate change through CSA is still very limited in Africa. A number of technical, financial, political and socioeconomic barriers are limiting the adoption of CSA practices and technologies. Drawing on existing literature (FAO, 2017; FARA, 2018; World Bank, 2013), the list below provides a non-comprehensive list of barriers to the adoption of CSA practices.

- Labour requirements
- Inadequate or limited access to farm inputs, materials and technologies
- Up-front costs of (long-term) investments and limited credit and finance
- Unfavourable land tenure systems
- Inadequate or limited information, knowledge and skills
- Gender inequalities
- Social norms, values or attitudes
- Inherent uncertainty or risks of CSA practices (e.g. introduction of new crops)
- Established (market) relations
- Lack of 'long term' incentives
- Poor governance structures

Embracing the complexity[4] of farmers' realities and trying to understand those barriers will be crucial to scale-up CSA approaches and increase its impact.

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[2] CSA was defined and presented by FAO at the Hague Conference on Agriculture, Food Security and Climate Change in 2010

[3] This is not an exhaustive list. Relevant CSA practices depend on the context in which they are introduced. The 3 pillars of CSA proposed by FAO serve as guiding principles to evaluate the CSA potential of any practice in a given context: (1) sustainably increasing agricultural productivity and incomes; (2) adapting and building resilience to climate change; (3) reducing and/or removing greenhouse gases emissions, where possible.

[4] Climate-Smart Agriculture is part of the complex agri-food system, where many different actors, institutions and sectors interact. Such complex systems offer many different entry points for supporting CSA agriculture: from farm to fork, from input suppliers to farmers to processors to consumers, from policy makers to citizens, etc.

3 Digital innovation to foster CSA adoption

Continuous efforts in research and development are broadening the CSA portfolio with innovative approaches, services and products, such as better weather forecasting, early warning systems or risk insurance products for farmers. Such innovations have the potential to lower or even remove some of the existing barriers to the adoption of CSA for farmers and improve the overall enabling environment for climate-smart agriculture.

Many of these innovations are resulting from the proliferation of services and data provided by digital technologies like remote sensing, mobile money systems or the internet of things. It is impossible to provide a complete and up to date overview of all digital products and services that foster CSA, but some of the pioneering digital innovations include peer-to-peer communication tools for farmers; index-based crop insurance products facilitated through mobile money systems; smart sensors to track soil or farm characteristics; information services based on satellite or drone images; blockchain technology for land registry services; digital 3D simulations (virtual reality) for technical trainings; e-learning solutions; online trading platforms; etc.

4 Focus of the call for proposals

4.1 Specific objective of the call

The general objective of the call for proposals is "to increase use and access to digital solutions offering better living conditions in developing and emerging countries".

The specific objective of this call is to support the upscaling and adoption of CSA best practices in partner countries of the bilateral Belgian development cooperation. ***This is a call for scaling-up digital products or services that enable proven practical CSA techniques or technologies to reach to the minds and hands of farmers.***

This specific objective contributes to the SDG target 2.4: "By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality."

4.2 Indicator for the specific objective

The contribution of and progress toward the specific objective will be measured through the Enabel approved Development and Cooperation Result Indicator:

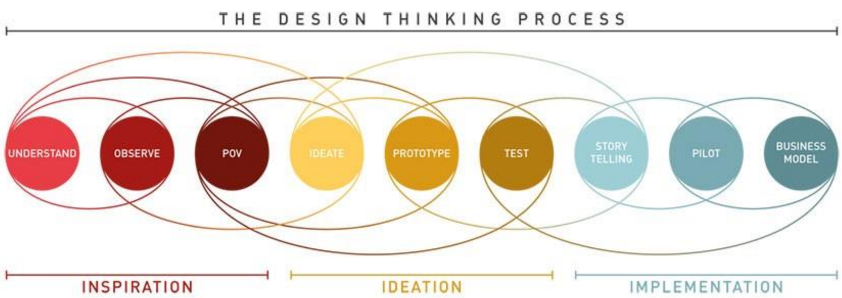
"Number of ha of agricultural area under environmentally sustainable exploitation"

4.3 Target group and needs assessment

The target group of this call for proposals are public or not-for-profit organizations that want to diffuse and **scale-up digital innovations** linked to the subject of this call for proposals.

The road from the design of an innovative concept to scaling it up is far from linear and requires numerous iterations between the different stages. While applying for a grant, organisations will be asked to clearly demonstrate they have already gone through the "Inspiration, Ideation and Implementation" stages presented in figure 4, especially the previous pilot phase and its derived business model.

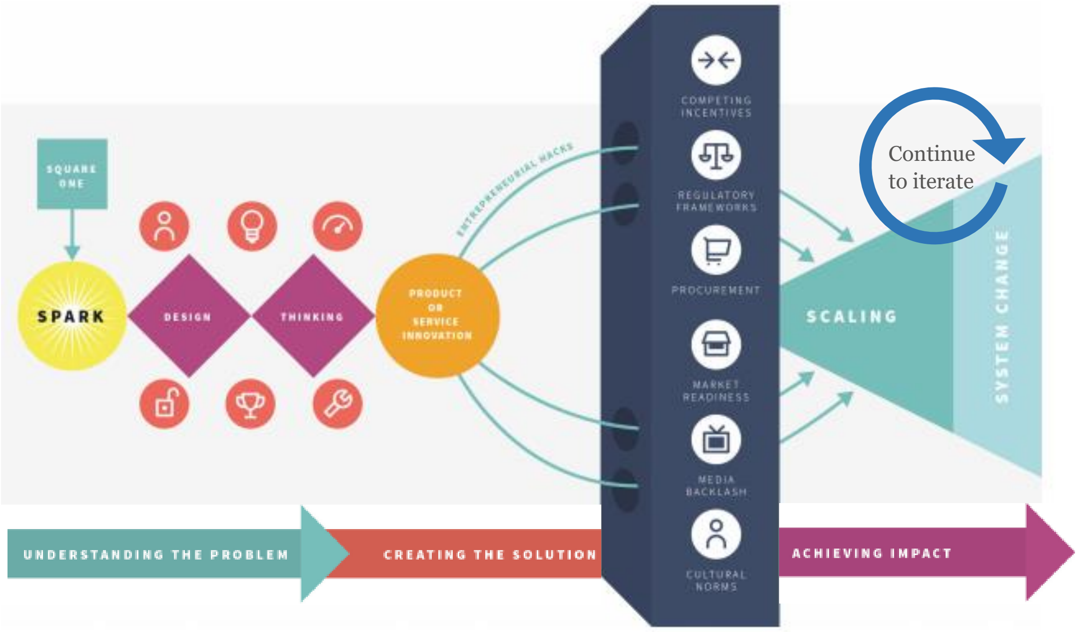
Figure 4: the design thinking process stages before the scaling-up (The Interaction Design Foundation)



When entering the real world of systemic complexity and power dynamics, digital innovations often face serious challenges in technology adoption and diffusion and often fail to generate the expected impact. Barriers to scaling include amongst others: agro-ecological conditions, technical challenges, lack of support and information to the intended users, policy resistance, competing rules and incentives, power dynamics in play, cultural norms, etc. Through this call, Enabel wants to support promising digital initiatives to cut through these barriers. Figure 5 visually represents this transition from an ideation and design process to scaling and achieving impact.

According to Rowan et al. this transition can be facilitated through 'entrepreneurial hacks'. *"This is about being agile and responsive both when challenges present themselves and opportunities open up. It means being able and willing to iterate both product and strategy in response to circumstance."* (Rowan et al. 2017)

Figure 5: model for scaling and diffusion of innovations (Adapted from Rowan et al. 2017)



Enabel wants to foster digital innovation at large and therefore does not want to put forward an a priori list of eligible digital technologies. Digital innovative solutions can include amongst others the use of sensors and smart devices, inclusive knowledge management systems, remote sensing, mobile applications, communication technologies, blockchain technologies, etc. Rather, Enabel will focus on the potential impact of those technologies when selecting eligible projects. By filling in their project proposal, applicants are invited to demonstrate these potential impacts.

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