CAPSELLA

Acceleration Programme

Challenge Descriptions

CAPSELLA Acceleration Programme

CAP01:

“Half the methane emissions from bio-waste in landfills”

to contribute to climate protection and resource conservation

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CAP01: “Half the methane emissions from bio-waste in landfills” to contribute to climate protection and resource conservation

Just so you do not start from scratch, please know that:

- Given the pressing need to reduce Greenhouse Gases (of which methane is the most potent!), we must start with the solutions with most impact and which cost least – or which can in fact make money for society and entrepreneurs. Studies show that smart harnessing of biowaste is not just low-cost way to reduce Greenhouse gases (GHGs) but a money-maker for future start ups – and so a positive social impact.

- Around the world biodegradable waste in landfills is the main factor for the generation of the greenhouse gas methane.

- Research into today’s practices show there is most potential for this where there is some form of separation of biowaste.

- Bio-waste is defined as biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants. It does not include forestry or agricultural residues, manure, sewage sludge, or other biodegradable waste such as natural textiles, paper or processed wood. It also excludes those by-products of food production that never become waste.

- The ecological and economical use of biodegradable waste creates an opportunity for the growth of new technological methods and businesses in this sector. As a derivative of green waste, compost and digestate is created, which is used as organic fertilizer or in order to replace peat in potting soil and plant substrates.

- The bio-waste recycling may also directly contribute to climate protection if the methane produced during the fermentation is used for energy production.

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- Specifically the production of methane from biowaste (and other biodegradable waste) is accounted for some 3% of total greenhouse gas emissions in the EU-15 in 1995.

- This environmental impact can be significantly reduced by the separate collection and recycling/use of organic waste.

- In addition the separate collection of bio-waste is necessary for the sufficient reutilization of organic matter and nutrients.

- The high-quality compost and digestate, which are suitable for agricultural or horticultural use, can be achieved only from separately collected bio-waste.

- The bio waste separation has many potential advantages such as the more effective treatment of the waste in incineration plants. It is without doubt that both, the recycling of compost and digestate on soils, as well as the energy recovery of bio- waste, contribute to climate protection and resource conservation.

- It is also worth noticing that the operation of the treatment plants determines how much of the greenhouse gases methane, nitrous oxide and ammonia is released during the process. That implies that many plant operators need to be awakened and their awareness of climate-relevant emissions from their bio-waste treatment plants has to be raised. It is clear so far that the beginning of all these potential applications and advantages have as a starting point the separation of bio-waste thus it is vital to create common awareness in this topic.

- Apart from the ecological benefits, there are schemes that have managed to reduce the unit cost of composting and make it sufficiently lower from the unit cost of landfilling waste.

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SO:

Armed with these pointers, and any other sources that may help you regarding this topic, create an innovative and viable business plan for a startup, that would respond to this challenge – (profitably!).

Just remember:

This involves a very broad range of applications and approaches including solutions: based on ICT and Open Data technologies or optimization of a procedure using IOT or based on a strictly business point of view such as a mediator or a consultant. For this, keep in mind that the immediate commercial use of the compost that is produced as a result of the green waste separation is not the only way to capitalize this process.

Final tip - please explore:

Fundraising options that are provided in this field (NB major schemes that are involved in this sector today have received some form of financial assistance, often partial funding by local or national government

How to activate and involve all the different stakeholders.

How your business could develop (scenarios for product or service development, expand into new markets, new applications…)

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Ideas following the use/waste/compost/fertilisation/crop cycle:

Target group consumers:
incentives to separate and do it carefully (prevent plastic etc on the fields)

Target group waste collectors (governments)
Instrument for awareness and quality programmes

Target group waste/compost processors
Instrument for quality and PR for their neighbours

Target group compost distributors and agro contractors
Instruments to optimise voluminous product streams

Target group farmers
Instrument to optimise use of compost: most on poorest parcels or management zones
(existing apps: ‘CAPSELLA compost calculator and CAPSELLA soil health assessment tool)
Instruments to give extra attention to consumers who separate (1st group)
like farm visits, offer to buy regional products...

CAPSELLA Acceleration Programme

CAP02:

“Build an easy to use service for farmers to safeguard soil health”

and integrate farmers’ observations with data from remote sensing

CAPSELLA Acceleration Programme

CAP02:"Build an easy to use service for farmers to safeguard soil health" and integrate farmers' observations with data from remote sensing.

Healthy soil is essential for producing good and healthy food. Farmers work hard every day to maintain and improve the physical, biological and chemical soil fertility. Your challenge is to develop a tool for farmers to monitor the condition of the soil - ideally by integrating his/her observation on field with available remote sensing data.

Just so you do not start from scratch, please know that:

A location aware application has been developed in CAPSELLA to support farmers with local qualitative soil health analysis and with sharing knowledge and experience on this topic with other farmers. The result of the ground evaluation of soil health will be provided to challenge participants that can use these data to elaborate the analysis.

The European Union Copernicus Earth Observation data (Sentinel 1 and 2) along with Copernicus Climatic Change Service will provide a lot of data that could be used to provide support to farmers.

Important tips to explore your challenge:

The general challenge will be to use machine learning and modeling techniques to establish relationships between soil health features, crowdsourced data about soil health self-assessment, sensor data and Remote Sensing data (multispectral and/or radar). There are several challenges that can be tackled within this broader mission:

How might we use remote sensing data to classify the fields by crop type, soil type or soil risks (erosion, compaction,...)?

How might we integrate in the same system sensor and Remote Sensing data from different sources, resolution, quality?

How might we evaluate the quality of crowdsourced soil health observations?

How might we adapt the models results to different climatic and agronomic conditions (e.g. South EU countries vs North EU countries)?

CAPSELLA Acceleration Programme

CAP03:

“Design a tool to predict climate change impact on grapevine growth stages”

to ensure a sustainable and resilient viticulture and wine sector in Europe

CAPSELLA Acceleration Programme

Challenge#3:“Design a tool to predict climate change impact on grapevine growth stages” - to ensure a sustainable and resilient viticulture and wine sector in Europe

Viticulture and winemaking is a hugely important socio-economic sector in Europe. The most famous winemaking regions in Europe share some very specific environmental characteristics, where climate often plays a central role. Climate change can significantly affect grape yield and wine quality in the future.

Just so you do not scratch from scratch, please know that:

- Depending on its different stages of its vegetative and reproductive cycles, The vine undergoes morphological and physiological changes. The duration of each of these phenological stages differs between grapevine varieties, and is generally related to the thermal conditions in in which it grows. Prediction the evolution of these ‘stages’ is of utmost importance in planning viticultural activities and winemaking decisions.

- The length of the growing season, for each variety, is directly related to mean temperature of the growing-season. Additionally, the length of the growing season is linked to soil moisture, air temperature, and crop-management practices. Trends recorded in the recent past on many viticultural regions in Europe show an increase in the growing-season mean temperatures. Furthermore, climate change projections show there will be significant changes in both the growing season temperatures and precipitations in the next decades.

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Challenge#3:“Design a tool to predict climate change impact on grapevine growth stages” - to ensure a sustainable and resilient viticulture and wine sector in Europe

- Although grapevines have several survival strategies, the projected climate changes over the next decades urges adaptation and mitigation measures to be taken by the whole winemaking sector. Short-term adaptation measures can be considered as a first protection strategy and should be focused at specific threats, mostly changes in crop-management practices (e.g., irrigation, sunscreens for leaf protection). In the long term, a wide range of adaptation measures should be considered (e.g., varietal and land allocation changes).

- These are significant sustainability and biodiversity challenges across the grapevine-based industry and there is a growing need to solve the aforementioned information problems to support the decision making of the relevant stakeholders, given the projected climate change and adaptation to it.

Important tips to explore your challenge:

One potentially rich avenue to addressing this challenge could be an application which facilitates specific stakeholders (i.e. farmers and researchers) to take informed decisions about scheduling appropriate viticultural cultivation techniques (i.e. harvesting, prunning, etc

CAPSELLA Acceleration Programme

CAP04:

"Connecting local Organic Producers with Consumers & Food Businesses"

and help Localise the Food System

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Just so you do not start from scratch, please know that:

Today, more and more consumers across Europe are interested in fresh, organically produced food. However, many small, regional, organic farmers still do not have direct access to the market, while consumers are often not aware of the existence of local food delivery schemes, or even the presence of an organic farm in their vicinity.

This means we must make food supply chains that are local, climate friendly and transparent. How can we develop an ICT and Open Data technology solution to do this?

To achieve this, it is important to directly connect local small and medium, independent organic producers with individual consumers and food businesses. The products might come from all kinds of organic growers and farmers, including professionals, food communities and/or social enterprises (ie. community gardens, community supported agriculture, etc).

SO:

Your challenge is to create and launch an innovative online service based on Open Data, to realise the potential of online communities who communicate, socialise and manage these supply chains (eg. availability and demand of products, payments, delivery management and other logistics).

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CAP05:

"Design an App for handling data on locally adapted plant varieties"

to make the right choice about what varieties to grow and local needs

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CAP05: "Design an App for handling data on locally adapted plant varieties"

to make the right choice about what varieties to grow and local needs

Just so you do not start from scratch, please know that:

- Diversity in farmers' fields has increased – as has the use of 'intraspecific diversity' as a strategy to reduce the use of chemicals whilst improve nutrition. This requires an extensive knowledge of different varieties and how they respond to biotic and abiotic stresses in several locations and in several years.

- Farmers, technicians and researchers working on the dynamic management of agrobiodiversity in low input sustainable farming systems have a key role in the maintenance and continued evolution of such diversity. They are often organized in networks that promote dialogue, experimentation and collaboration between farmers as well as synergies with other actors of the food chains and with researchers. Working on locally adapted varieties and genetic seed material requires networks providing a high level of detail about varieties, and persons managing such varieties.

- In particular these networks store information about varieties and their use by farmers in different areas and years, and about the farm and agro ecological conditions of the farm and traditional knowledge linked to the varieties grown.

- It is important to integrate farmers' knowledge with quantitative environmental data. this is why it is important to find a tools that links data on varieties with data on soil or climatic information would allow to connect and find the right correlations between varieties and climatic zones.

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to make the right choice about what varieties to grow and local needs

- Moreover, the identification of an ICT tool to manage a database of varieties, users, farmers and farms with the information coming from experimental fields will be the basis for organising data from on-farm conservation experiences. Once organized, those information should be combined with soil and climate data.

Privacy and restricted access to data on genetic resources, landraces and traditional knowledge are perceived as extremely important by farmers. Variety data - collected by seeds networks - are not for commercial use. This aspect should be taken into consideration in the development of the ICT tool that could be suitable for farmers.

Storing information about seed circulation and varieties performance is paramount to make the right choice about what varieties to grow in each environment and according to local needs.

SO:

Equipped with this information, build an app that:

Improve efficiency of data entry in a context that involves several people in several locations at the same time, reducing the risks of errors and facilitating the management and the analysis of data.

maintains the ownership and privacy of data collected by each users or group of users, with the possibility to share selected data with other users.

Connect the variety data to the ones of official databases on soil and climate.

CAPSELLA Acceleration Programme

CAP06:

“Extending the CAPSELLA platform services”

and make it valuable to the broader agriculture community

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CAP06: “Extending the CAPSELLA platform services” and make it valuable to the broader agriculture community

Solutions to global problems such as food security, mitigation of/adaptation to climate change or soil quality degradation, should come from locally available resources and knowledge. That’s why CAPSELLA launched its platform for Open-Innovation to support bottom up solutions for agro-diversity, from field, to seed, to fork.
This challenge asks how might we go beyond the infrastructure CAPSELLA provides and make it valuable to the broader agriculture community.

Just so you do not scratch from scratch, please know that:

The CAPSELLA platform is a great infrastructure for running and testing pilot applications, which respond to the basic needs of the farmers and the citizens in an innovative way, whatever their domains.

The CAPSELLA platform is therefore designed under the following principles: (i) able to support different scenarios and requirements, (ii) to be extensible and pluggable, (iii) to implement the FAIR guidelines, (iv) to offer a set of independent services and (v) to provide data, metadata and analytics services agnostic of the various data types

CAPSELLA Acceleration Programme

CAP06: "Extending the CAPSELLA platform services" and make it valuable to the broader agriculture community

The platform offers:

- The CAPSELLA Authentication service: The authentication service of CAPSELLA is exploited by the rest of the systems and by any application that is developed on top of the platform. It acts as a central point of authentication and authorisation and is based on the LDAP protocol

- The Data Management System: Offers data storage, retrieval and query facilities on top of the available datasets. It currently supports tabular data, geospatial, json and relational data types

- The Metadata Catalogue: The main CAPSELLA catalogue offering browse and search facilities over the available datasets based on their accompanied metadata. It is based on the well known CKAN data portal

- The CAPSELLA Data analytics and Management System: Offers analytics services, like sentiment analysis and opinion mining on various datasets, mostly focusing on social media sources, but also on the CAPSELLA generated datasets

- The CAPSELLA interoperability services: Contains a set of services for being interoperable with external OAI-PMH repositories and in addition to make available the CAPSELLA catalogue metadata using the OAI-PMH specification.

Documentation is available on: https://ticketing.madgik.di.uoa.gr/redmine/projects/capsella-public/wiki/Platform_Services and all our REST services offer a Swagger interface.

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CAP06: “Extending the CAPSELLA platform services” and make it valuable to the broader agriculture community

SO:

Equipped with this information, and any other sources that may help you regarding this topic: create a service that exploits the CAPSELLA platform and datasets that creates value for the broader agriculture or implement a machine learning algorithm (i.e. classification, prediction models) as a service which applied either on existing CAPSELLA datasets or new datasets which will then be published to its Data Management System.

Tip to explore:

An interesting service could connect semantically the CAPSELLA datasets with external ones. for example, a generic ontology could be exploited for linking the various datasets. this could be a rich area to explore.
Additionally, explore the CAPSELLA metadata catalogue portal to identify interesting datasets that could be used as an input to your machine learning algorithm implementation, like any available CSV dataset: http://capsella.madgik.di.uoa.gr/dataset?res_format=CSV

CAPSELLA Acceleration Programme

CAP06:

“Build a tool to spread knowledge about the importance of agrobiodiversity and its benefits for the planet and our health”

CAPSELLA Acceleration Programme

CAP7: "Build a tool to spread knowledge about the importance of agrobiodiversity and its benefits for the planet and our health"

Just so you do not start from scratch, please know that:

Agrobiodiversity is the result of the interaction between the environment, genetic resources and management systems and practices used by culturally diverse peoples, and therefore land and water resources are used for production in different ways. Thus, agrobiodiversity encompasses the variety and variability of animals, plants and micro-organisms that are necessary for sustaining key functions of the agro-ecosystem, including its structure and processes for, and in support of, food production and food security (FAO, 1999a).

- Local knowledge and culture can therefore be considered as integral parts of agrobiodiversity, because it is the human activity of agriculture that shapes and conserves this biodiversity.

- Research and experience have demonstrated that biodiversity will not only increase productivity and guarantee better food quality on our tables and economic returns also in terms of an healthier population

- Moreover it reduces the pressure on agriculture, especially in areas that are fragile and makes farming systems more sustainable.

SO:

Build A tool to make citizens aware of the importance of agrobiodiversity and how it contributes to conserving the structure of ecosystems and species diversity – which in turn makes our world a better and more enjoyable place.