Space for a Wasteless food supply Chain

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Eatable Adventures

Agenda

1. What is ESA, BASS introduction, Kickstart call description & BASS portfolio examples (Borja – 20')

2. Eatable Adventures (Julia – 10')

3. IBM Italia - Smart Waste Management for Food (Marco & Giulia – 10')

4. How to apply to the Kickstart call (Borja 10')

5. QA session (10')

We Are ESA

EUROPE'S GATEWAY TO SPACE

WHAT	22 Member States, 5000 employees
WHY	Exploration and use of space for exclusively peaceful purposes
WHERE	HQ in Paris, 7 sites across Europe and a spaceport in French Guiana
HOW MUCH	€6.49 billion = €12 per European per year

22

MEMBER STATES

• ESA Business Applications Space Solutions - BASS

The largest space innovation network in the world

- The go-to place for great business involving space to improve everyday life.
- Supporting European companies including start-ups and SMEs to develop businesses using space technology and data.
- Offering funding, business and technical support to help to generate successful business and create jobs.

BASS - Outcomes

SOCIO-ECONOMIC

Social, green value and economic sustainability

SPACE USE

Utilisation of space in new markets and user communities

INDUSTRY COMPETITIVENESS

European Industry competitiveness on global space and non-space markets

BASS - Cooperations

BASS - Space assets, users & markets

esa
SPACE SOLUTIONS

Space Assets...

- Earth Observation
- Satellite Navigation
- Satellite Communication
- Spaceflight Technologies
- Space Weather

... coupled with...

- Big Data analytics
- VR/AR
- Artificial Intelligence
- Mega-constellations
- Crowdsourcing
- IoT
- Cybersecurity
- Blockchain
- 5G (https://artes.esa.int/esa-5g6g-hub)

... to serve Users & Market

- Maritime
- Agriculture
- Environment
- Healthcare
- Financial
- Transport
- Education
- Media
- Energy
- Aviation

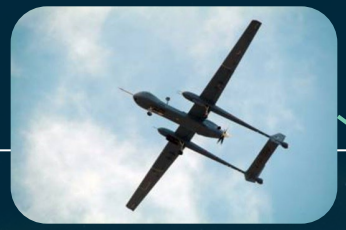
BASS offering

- Zero-equity funding (from €60K to €2M+ per activity).
- A personalised ESA consultant
- Technical support and commercial guidance
- Tailored project management support
- Access to our international network of ESA and partners
- Access to our network of investors
- Credibility of the ESA brand

Invested
€250m

Over
1200 businesses

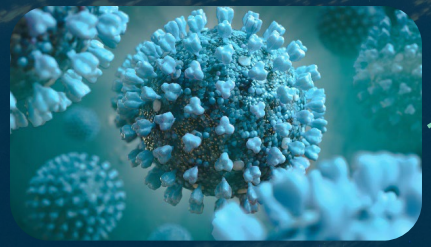
BASS - Thematic Variety



Safety & Security

Environment & Wildlife

Energy & Utilities

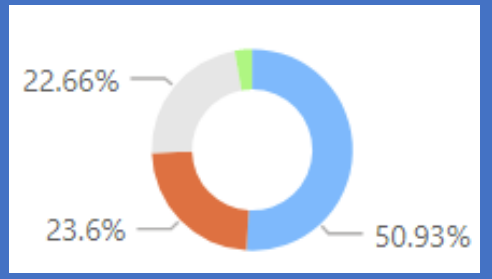


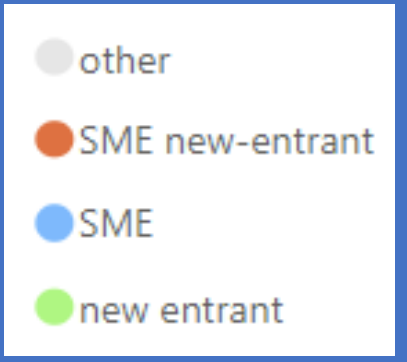
Health & Social Care

Agriculture, Forestry & Fishing

Transport & Logistics

2016 - 2023





>75% SMEs >33% Newcomers

Food Loss & Waste definition

Food waste - context

Global Waste Management Market Snapshot

- **Global Waste Management** Value in 2021 is, **US$ 726.6 Bn.** Expected value in 2031 **US$ 1.1 Tn.** Growth Rate (CAGR) 4.1 % annually.
- **Market Types:** Municipal, Industrial, E-waste. **Industrial segment** Accounted for **68.3% share** for Waste Management in 2021.
- **Growing industrialisation and urbanisation** as a key factor driving the waste management market.
- **Waste 4th** largest source of **emissions** (Europe), accounting for **3% of total greenhouse gas emissions in 2017** (combusting fuels 77 %, agriculture 10% and industrial processes 8%).

Contextual information and trends in food waste

- **931 million tons** (37% of total food waste) is wasted at consumer side In 2022. **61% Households,** 26% Food service, 13% Food retail.
- In 2022 (Europe), **153.5 million tonnes** of food was wasted, accounting for **227 million tonnes of CO2** or **EUR 143m in cost**.
- **Only 15% of organisations** have achieved (or are on track to achieve) their strategies on halving **Food waste** at retail and consumer levels and reducing **Food losses** along production and supply chains.

Sources: Capgemini Research institute, European Commission , Feedback global SDG 12.3,Transparency Market Research.

Kick Start Activity - Wasteless Food Supply Chain (KS)

Winners of the competition will run a 6 month study, to allow companies:

1. Engage with users and potential customers of the proposed service
2. Assess the technical feasibility of the Service
3. Develop the business model and plan

Investigate if proposed services / products address challenges related to food by driving the digitization of the food supply chain **by coupling downstream technologies with space tech capabilities**

ESA will provide funding of 75% (maximum Eur 60K to each winning team).

Open from 25st September until 17th November 2023

Eligible use cases through food supply chain in this KS call

SatEO Satcom SatNav

esa

First mile

Last mile

Food production & sourcing

Food loss

Distribution Logistics

Food Loss

Consumers

Food waste

Recycling

Growing season tracking parameters

Cold chain Tracking parameters (T, expiry date, peak demands)

Education and awareness programs

Internet of waste

Livestock wearables

Monitoring and tracking of unsatisfactory products

Consumer rewards / discounts

Landfill monitoring

Examples of Business Applications in BASS

UKSRI – Food production

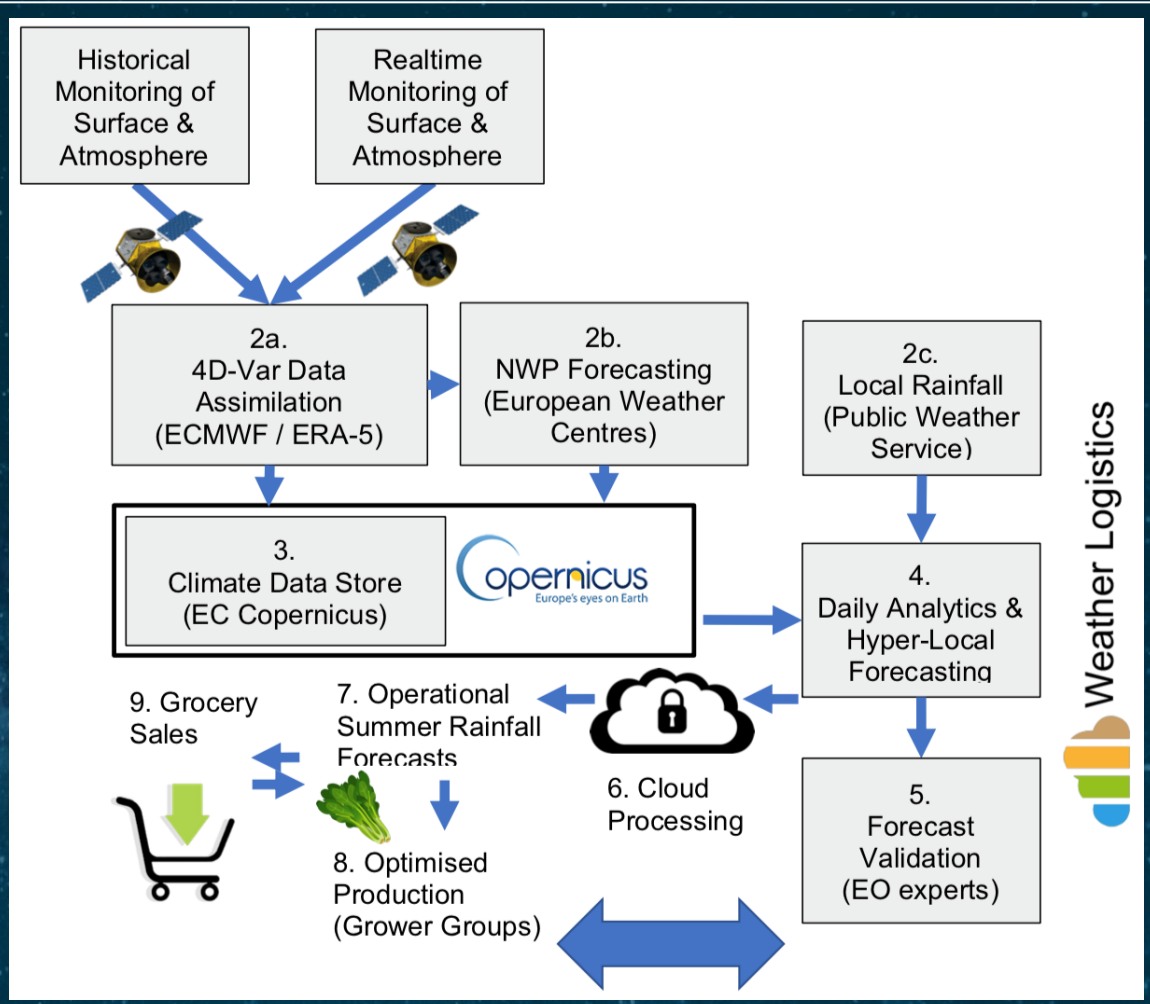
UKSI aims to reduce the mismatches between supply and demand for UK's salad Growers to minimise potential crop losses and reduces food waste by using EO technologies to forecast the crop yield through growing session.

Key benefits

- Growers obtain reliable long-term weather parameters forecasts
- Growers can prevent supply shortfalls or surpluses
- Reach buyer quality / volumes expectations for pre-arranged contracts

Targeted Users:

- Iceberg lettuces Growers
- Grower suppliers
- Supermarkets



Earth Observation: ECMWF (ERA-40, ERA-interim and ERA-5) and EC Copernicus Climate Change Service (C3S)

Sat-IS(F)Action- Food distribution

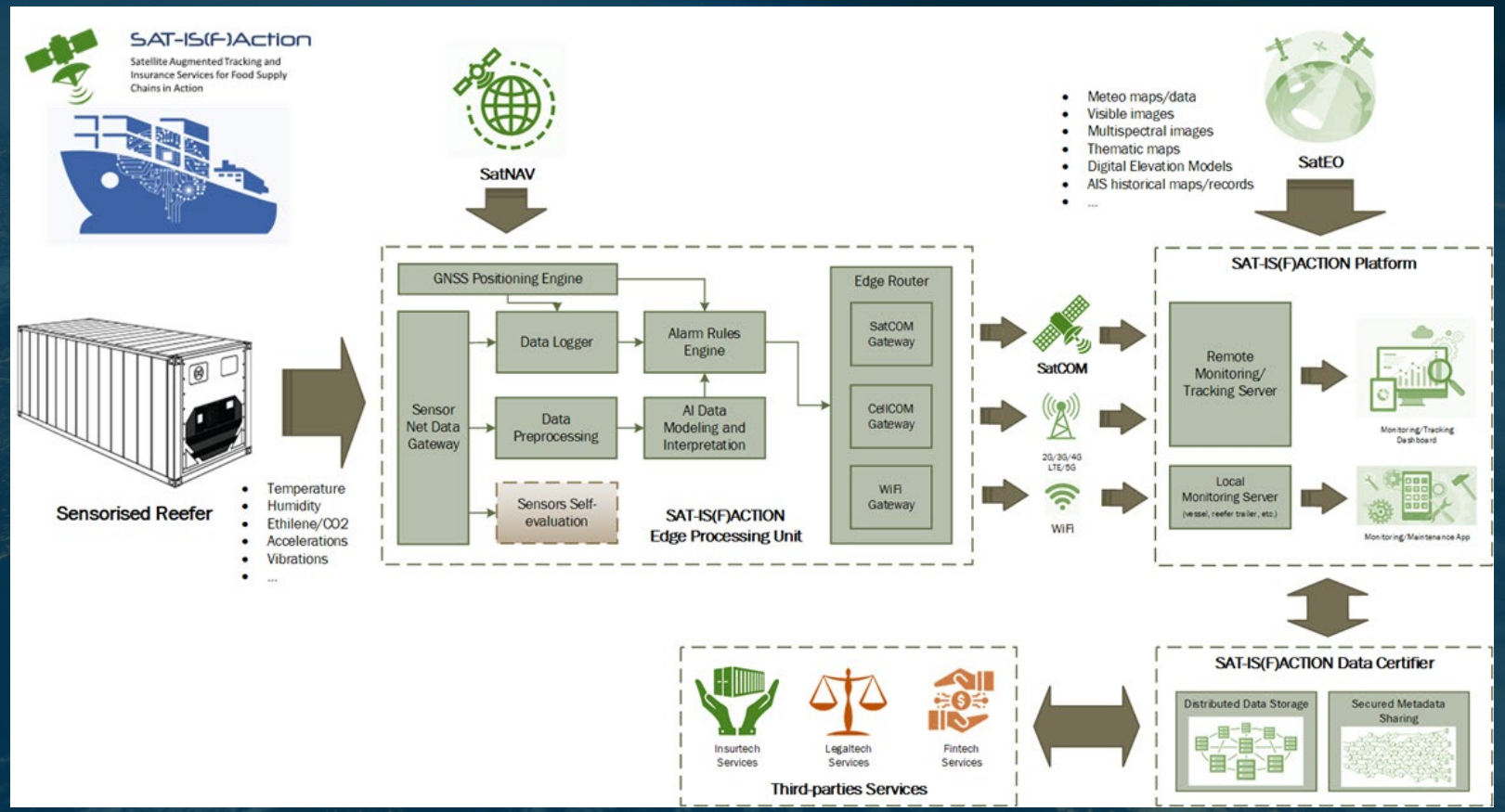
Sat-IS(F)Action aims to improve food cargo tracking increasing food supply chains reliability and affordability

Targeted Users:

- Logistics Services Providers (LSPs)
- Insurance Services Providers (ISPs)

Key benefits

- More accurate and reliable freight/food shipments tracking Insurance Services (LSPs)
- Data intelligence services for decision support and intervention (LSPs)
- Innovative freight/food delivery insurance services (ISPs).
- Relevant data/info collection, aggregation and certification for legal/insurance claims (ISPs)



30 LSPs & 10 ISPs interviewed to define needs and requirements.

Satellite navigation & Satellite communications

WJETSS - Food distribution (II)

WJETSS focus to minimize the total value of damaged or destroyed transportable, consumable, perishable.

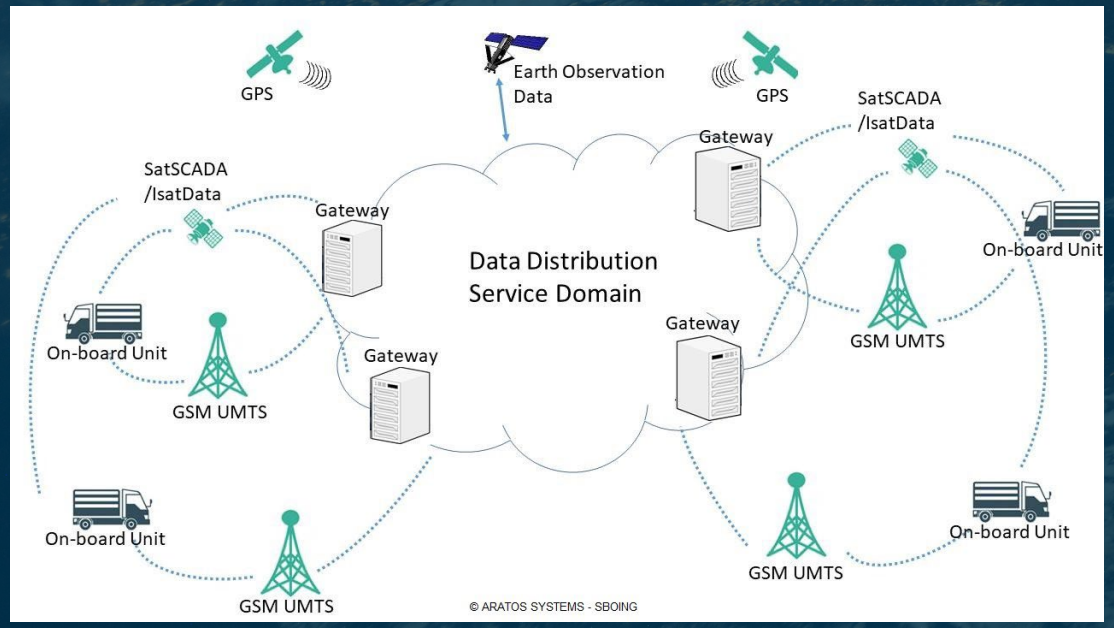
KRI-KRI S.A. MILK INDUSTRY, MAKIOS LOGISTICS S.A., GONDRAND TRAFFIC BV.

Targeted Users

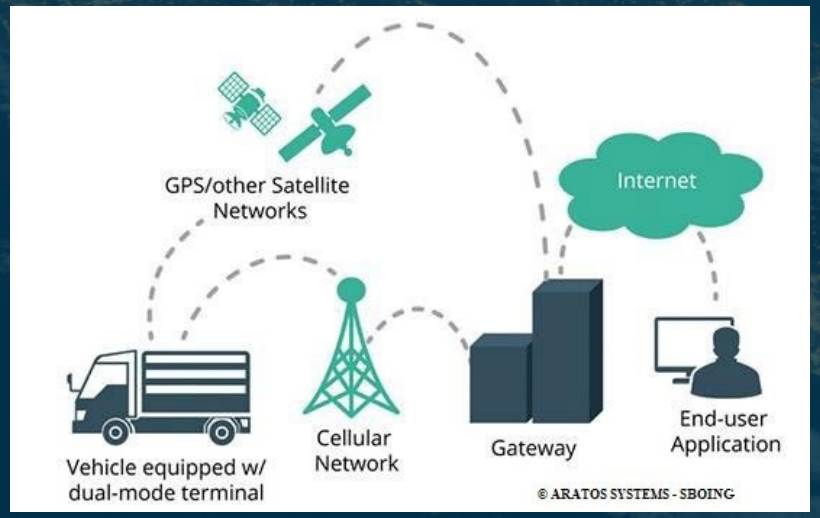
- Producers
- Logistics service providers
- Retailers

Key benefits

- Producers: End-to-end verification of the quality of products transported.
- Consumers (retailers): will be able to verify the products consumed before or after having bought them
- LSP can use the evidence of quality as a competitive advantage.



Satellite navigation: M2M MultiGNSS over a hybrid communication infrastructure



AMBROSIA - Food supply Chain

AMBROSIA aims to provide a food traceability end-to-end solution consisting in a food safety and traceability infrastructure and a data analytics platform addressing the concern of food safety and provenance.

Targeted Users:

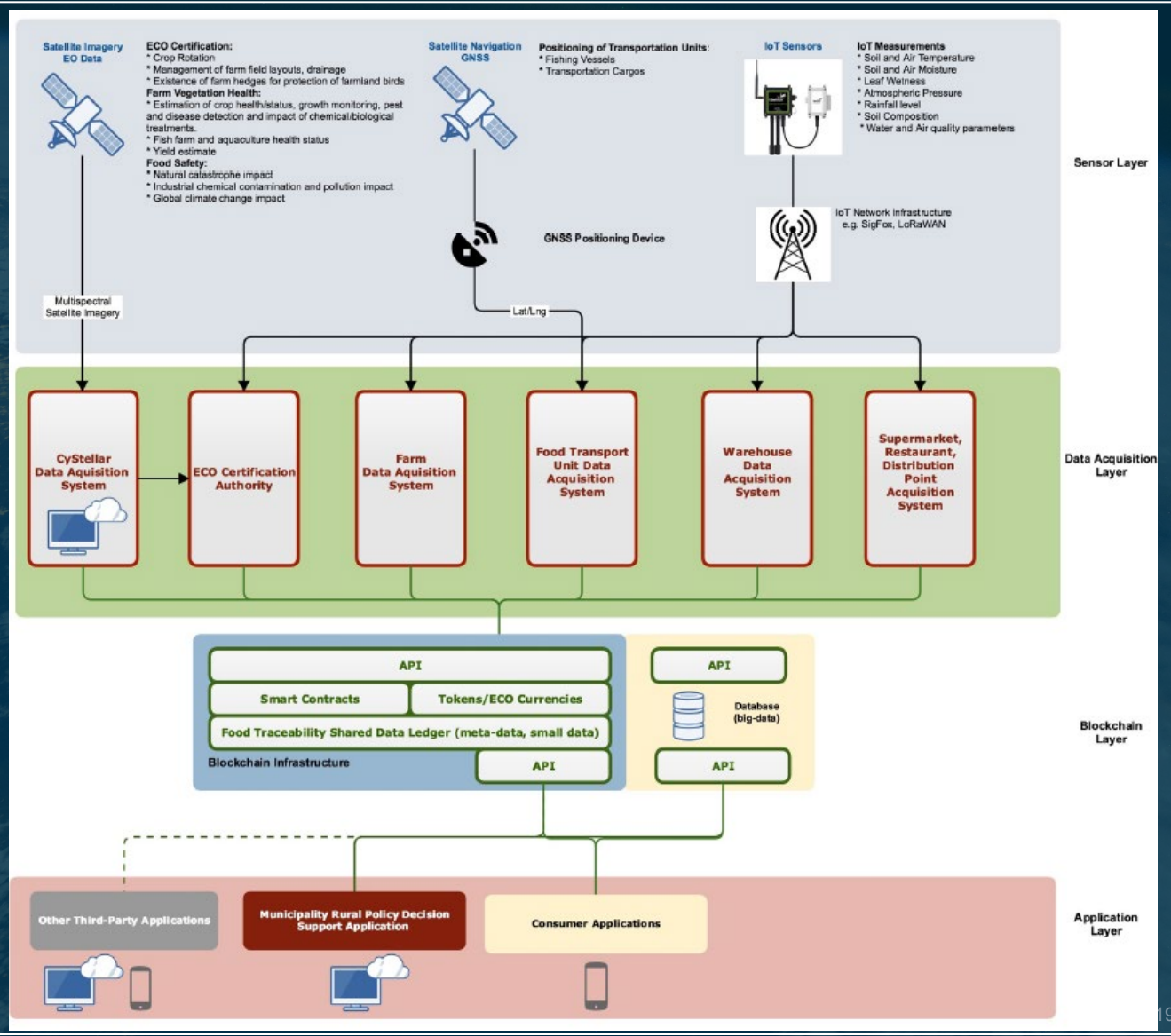
- Producers
- Processors
- Distributors
- Consumers
- Public bodies / NGOs / Certification Authorities and regulators

Key benefits

- Ability to execute faster and more targeted product recalls (including food recall insurance aspects).
- Near real-time visibility that to improved product labelling and tracking practices through the Food supply chain.
- Analyse the supplier base, the local food distribution system and to implement supplier development programs or sustainability management systems

ESA-AMBROSIA
FOOD TRACEABILITY

Satellite navigation & Earth Observation



I-FishSAT- Food supply Chai

I-FishSAT

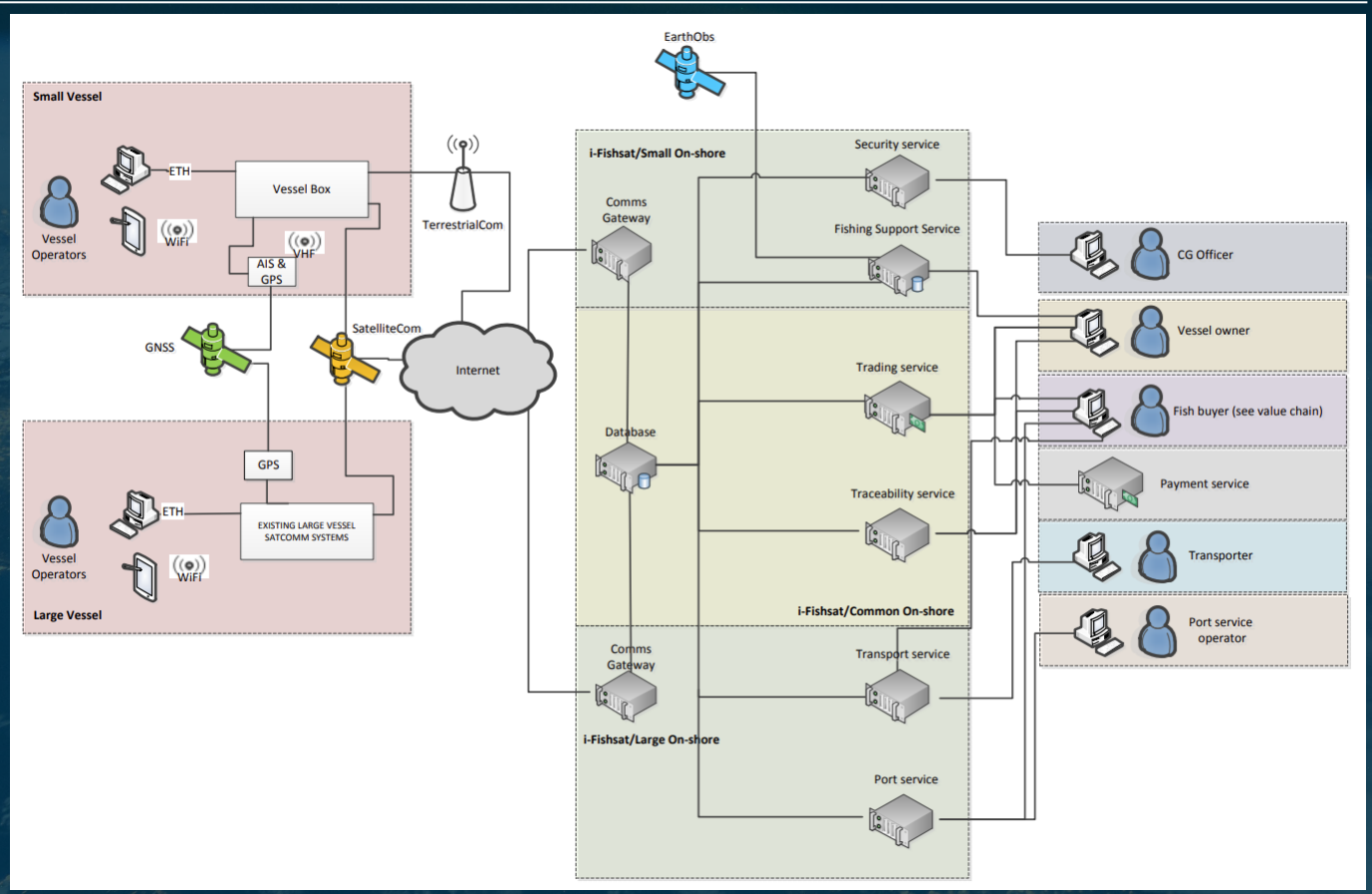
- Focus to streamline the seafood value/supply chain, and transform it from to a Europe-wide open marketplace for fresh seafood transactions where due return is delivered to stakeholders that provide value-added services for the benefit of our natural marine resources

Key benefits

- Tools to help fishermen meet their compliance obligations (reducing discard waste or reducing inefficient practices).
- Tools to help authoirities meet their monitoring requirements.
- Reduce the cost of fishing operations

Targeted Users (involved users between brackets) :

- Producer organisation (NESFO, Denerlandse-Visserbond, Lega Pesca, FEDERPESCA, Associazione Cooperativa Pesca Porto Ercole, S. Maria Assunta Soc).
- Transport provider (S.T.E.F. Group)
- Fishing ports (Ijmuiden and Peterhead)
- Fisheries enforcement authority (Italian Coast Guart)



Satellite navigation, Satellite communications and Earth Observation

Organic Plausibility Checker

Organic Plausibility Checker aims to minimize fraud in the organic food supply chain and to increase trust in the sector.

Key benefits

- Reduces the organic field inspection time by 25%
- Ensures transparency and authenticity of inspection
- Drives digitalisation of certification process and organic control

Targeted Users: Organic Control Bodies, farmers, traders and organic authorities. Control Bodies were identified as the best opportunity.

Over 100 control bodies interviewed to define the service specifications

Image Credits: GreenEO Gmbh.

Satellite navigation: Using GPS, Galileo for field location

Earth Observation: Sentinel 1, sentinel 2, Landsat 8, Landsat 9, Planet Scope

Vuna Nexus - Recycling

Vuna Nexus aims to demonstrate and validate the use of a solution based on an innovative technology able to produce a safe, effective and certified fertiliser resulting from the recycling and treatment of urine, based on a Human Spaceflight technology (MELiSSA initiative).

The proposed solution works like a small autonomous wastewater treatment plant that uses urine collected in urinals and urine-diverting toilets to treat it in a series of biological and physical steps. Nutrients are extracted and concentrated into a certified fertiliser (Aurin) which can be distributed to farmers.

Human SpaceFlight technology

, Targeted Users:

- Construction sector
- Farmers → collecting human and livestock urine to produce & sell Fertilisers

It is time to give the floor to our external speakers

Earth Observation

Where Modern Satellites meet the Food System to Reduce Food Waste

JULIA ESPESO BISCHOFBERGER
Ecosystem Director at Eatable Adventures

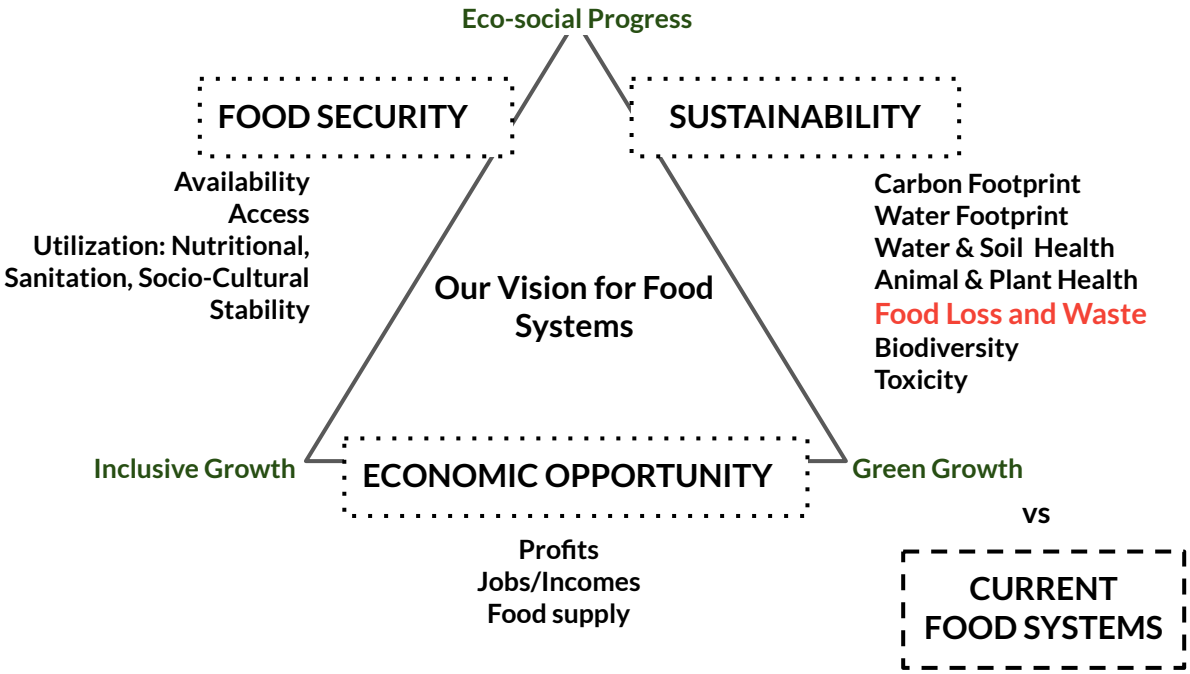
EATABLE ADVENTURES

esa SPACE SOLUTIONS

EATABLE ADVENTURES

Food System Development

A complex web of entangled activities



Source: Global Agriculture Market, Jan. 2023. https://www.thebusinessresearchcompany.com/report/agriculture-global-market-report
World Bank, March 2023, https://www.worldbank.org/en/topic/agriculture/overview

THE FOOD WASTE CHAIN

Field + Harvest

40%

Food Processing

5-20%

Distribution

5-15%

Market

10-15%

EATABLE ADVENTURES

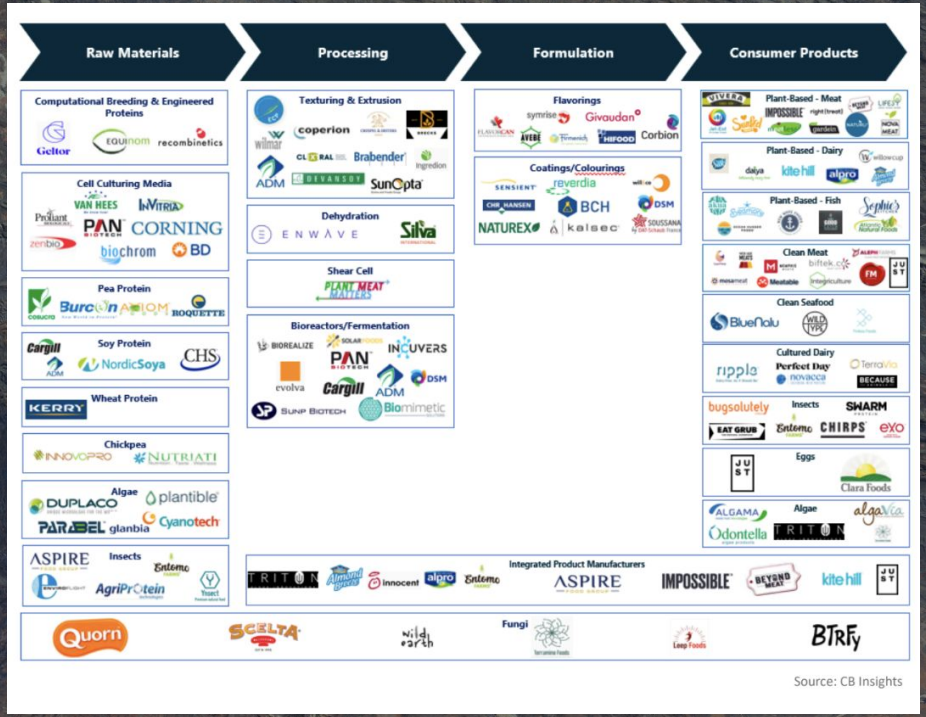
Technology has a profound role in modern food systems

The **Agri-Food industry** is one of the **latest industries adopting technology**, and with the current state of the art in technologies, especifically satellite technologies, **a data management revolution can happen in this market**

EATABLE ADVENTURES

The future of food implies the disruption of the entire value chain, using technology - and startups play a pivotal role

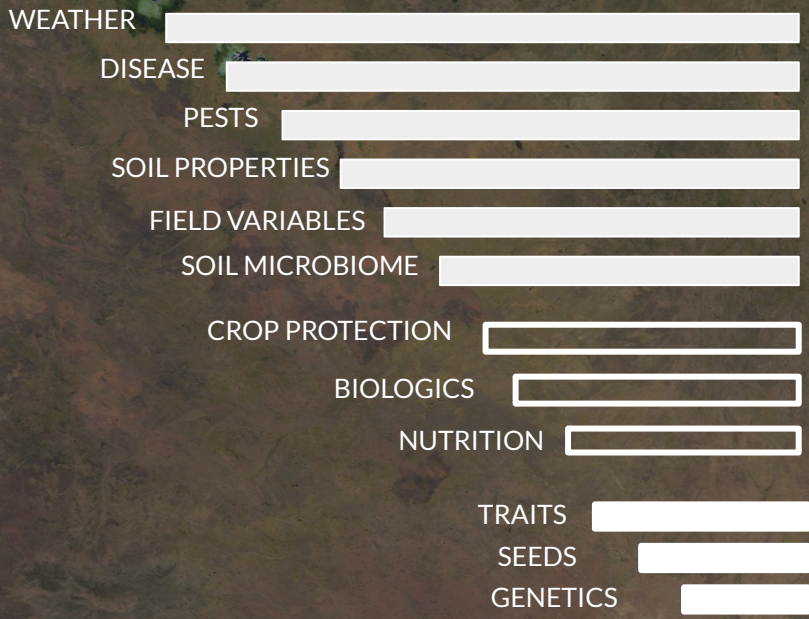
Connectivity & access to **internet based communications** and **services; as well as earth observation,** both for population in rural areas, and for off-grid equipment and operations has the potential to disrupt the whole chain



EATABLE ADVENTURES

AGRO

Critical, **complex variables** influence **crop production**



Environment

Inputs

Crops

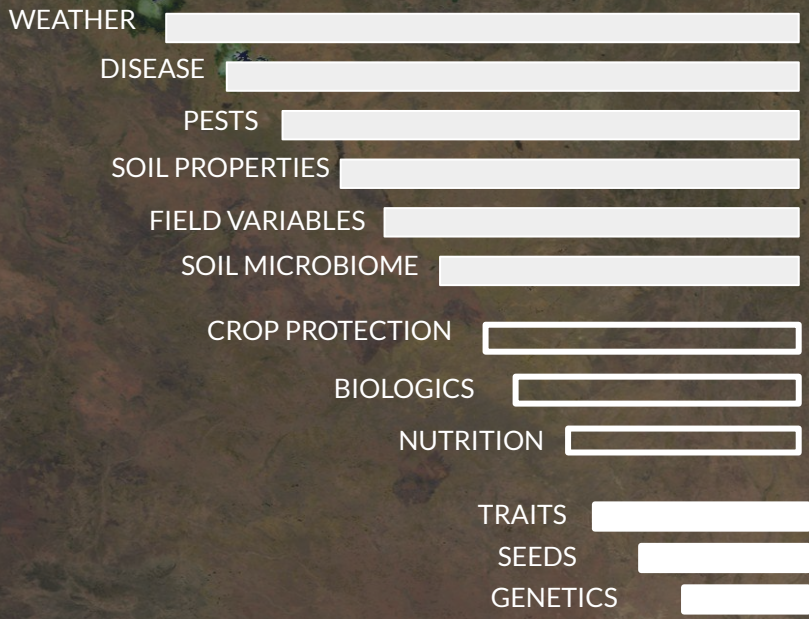
Farming Practices

Market Volume for Agriculture is $13,398.79 B (2023), set to grow to $19,007B (2027) at a CAGR of 9.1%

EATABLE ADVENTURES

AGRO

There are multiple use cases where **satellite technologies** can **provide value**



PRECISION AGRICULTURE

WEATHER FORECASTING

OFF-GRID S.C. OPTIMIZATION

LAND USE & CROP MONITORING

YIELD PREDICTION

IRRIGATION MANAGEMENT

PRICE MONITORING

EATABLE ADVENTURES

DISTRIBUTION

Satellites provide with **real-time data on the location and condition** of food shipments, including temperature and humidity. This information helps ensure that food products are **transported** and **stored** under the appropriate conditions.

Satellite Navigation

Satellite Communication

→ Monitoring and tracking of unsatisfactory products

Earth Observation

Satellite Communication

Satellite Navigation

→ Cold Chain Tracking Parameters (Temperature, expiry date, peak demands)

EATABLE ADVENTURES

RECYCLING

Satellite Technology can **help forestal food spoilage**, identify **dumping sites** and monitor **landfills and composting sites.**

Satellite Navigation

Satellite Communication

→ Internet of Waste

Earth Observation

→ Landfill Monitoring

EATABLE ADVENTURES


AGRAIN
Innomy
EATABLE
ADVENTURES

KEY TAKEAWAY_

There is an **unprecedented opportunity** to transform these systems throughout the value chain, by harnessing **technology** and **innovation** and accelerating innovation among **grassroots entrepreneurs** around the world to research, develop, deploy and scale transformative approaches

EATABLE ADVENTURES

Thank you

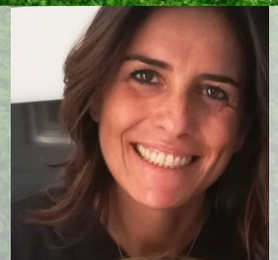
JULIA ESPESO BISCHOFBERGER
Ecosystem Director at Eatable Adventures

EATABLE ADVENTURES

esa SPACE SOLUTIONS

IBM SMART WASTE MANAGEMENT for FOOD

MARCO MOSCHELLA
Manager Sustainability & Waste Management
Marco.moschella@it.ibm.com



GIULIA TIERAN
IoT & Hybrid Cloud Program Manager
Giulia_tiera@it.ibm.com

Enhance Circular Economy Strategies with IBM Digital Platforms to avoid Food Waste

The Food Dilemma

One third of all food produced is lost or wasted –around **1.3 billion** tonnes of food –costing the global economy close to $940 billion each year.

46% edible wasted mass of fruit and vegetables

If one quarter of the food currently lost or wasted could be saved, it would be enough to feed **870 million** hungry people.

Up to **10%** of global greenhouse gases comes from food that is produced, but not eaten.

502kg
Waste production annually in Italy per capita

But the good news is, reducing food waste is the most effective thing individuals can do to address climate change.

The Digital IBM Platform Framework for Waste Management

Design-out Waste	***DEFINE NEW BUSINESS MODELS AND PROCESSES***	
	IDENTIFY NEW WASTE TYPES and SUPPLY CHAIN	
Recycling	***NEW DECOUPLING and SEPARATION TECHNOLOGIES***	
Repair, Reuse	***PARTNERSHIPS and ENVIRONMENTAL COMMUNITIES***	
Regenerate	***DATA SHARING FOR SUSTAINABILITY AND PERFORMANCE MANAGEMENT***	
Reduce emissions	***TRACKING WASTE, GEOLOCALIZATION AND OPTIMIZATION***	

IBM SMART WASTE MANAGEMENT with BEAM

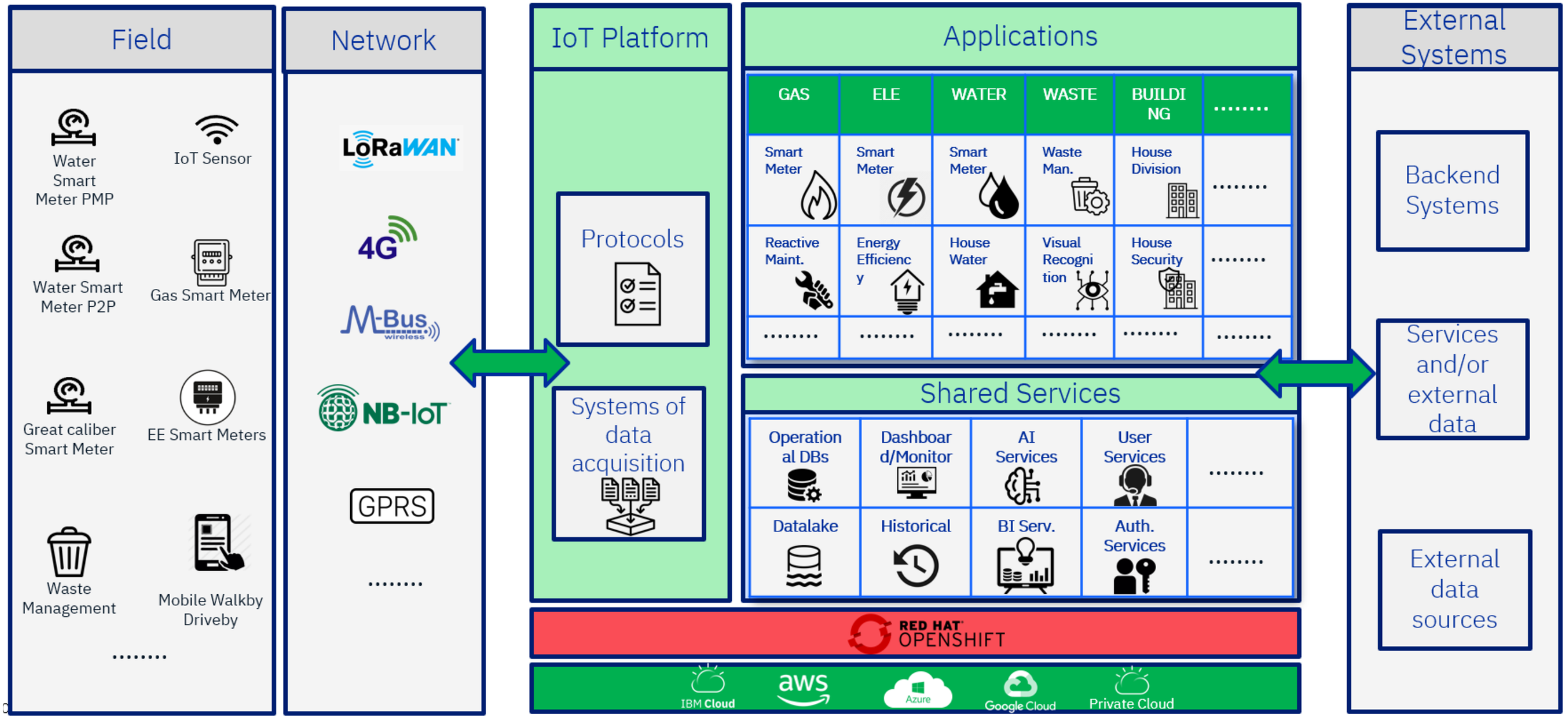
IoT	TARIFF	AI	PLANT Mgt	WFM
IoT IBM Platform Through the use of active and passive sensors, it detects the degree of filling, emptying, handling of containers, device diagnostics and sustainability data.	**Pay-as-you-throw** IBM Platform through the management of door-to-door and transfers from smart caps collect data useful for management systems such as SAP for the calculation of pay as you throw strategy	**Waste Quality** A video system on board the vehicle allows to obtain information on the quality of the plastic collected in the single collection round through the use of artificial intelligence models.	**Disposal Centers** IBM Platform is able to return information on how much recycled waste disposed of has been carried out by each citizen thanks to Municipal Disposal Center Management.	**IBM Platform** manages with the SAC and mobile App the planning and final accounting of the environmental services of collection and sweeping the handling of containers, sending reports, bulky recovery, km travelled and km cleaned,

SAP · turbonomic · enVizi an IBM Company · IBM Watson · BEAM · IBM maximo · The Weather Company An IBM Business · IBM Cloud · Red Hat OpenShift · aws · Azure

IBM **Consulting**
Sustainability Services

IBM

Overall Architecture of BEAM IoT



IBM Smart Waste value propositions / use cases examples

IBM VALUE PROPOSITION / USE CASES (public)

- End-to-end Waste Management with SAP Waste & Recycling
- IBM Smart Waste Management System (BEAM Platform)
- Smart Waste Mobile and Web Applications for Waste Management
- Collaboration Platform for Circular Economy
- Plastic Waste Visual Inspection for quality identification
- Waste bins fill percentage IoT data gathering with BEAM
- Blockchain in food supply chain and hazardous waste tracking
- IBM Vegetation Management
- IBM Environmental Intelligence Suite
- IBM Carbon performance APIs
- Sterling Fulfiller Optimizer (SFO)
- Waste Plants predictive maintenance
- Full-scope geographic integration with ESRI for Waste MAnagement
- Smart Waste applications with SAP BTP
- Route optimization with BEAM

BLOCKCHAIN

SUPPLY CHAIN

GAMIFICATION

IOT

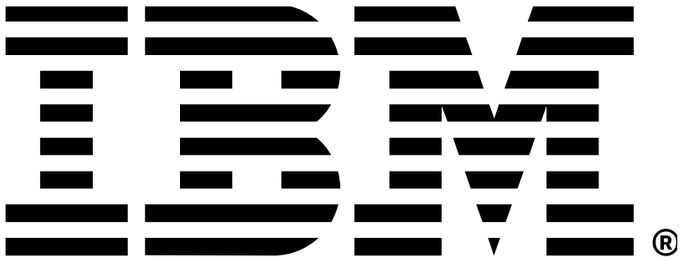
APIs

Webapp

SPACE DATA

OPPORTUNITIES for FOOD WASTE

- Track food origin or food waste with blockchain
- Monitor filling percentage of food waste bins with IBM Beam Digital Platform and LoRa sensors connected with space data
- Mobile application with gamification to incentive the users in disposing waste food to the dedicated bins or compost machinery
- Communities Food Waste machinery for compost production to track the zero waste progress of the community
- Optimize Food Distribution Supply Chain based on space data provision
- Waste collection routes optimization according to filling percentage or geographical / wheather data and space data provision



How can I apply?

Who can apply?

To be eligible for funding, your team must be based in one of the following countries: *Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, Slovenia, Sweden and the United Kingdom.*

If you are considering applying, you must inform your National Delegation to obtain a letter of authorisation allowing the funding of the proposed activity. Contact details of each National Delegate can be found here → https://business.esa.int/national-delegations

Please note that currently, Austria, Greece and Switzerland are not supporting Kick-Start activities. The Netherlands have opted out of supporting this particular Kick-start initiative.

However, if your team is based in Germany, Luxembourg or United Kingdom you do not have to contact your National Delegate. The abovementioned Delegations have pre-authorised this Kick-start opportunity

How can apply?

1. Register your team on ESA-STAR registration today! → Click here

2. When the Kick-Start opens on 25 September 2023 visit ESA-star Publication and search for this "Space For a Wastless Food Supply Chain" opportunity to download the official competition documents. → Click here

3. Use the official documents to prepare your proposal.

4. Reach out to your National Delegate (if applicable) to request a Letter of Authorisation. Contact details of each National Delegate can be found here → Click here

5. Submit your proposal via ESA-STAR Tendering before the deadline of 17 November 2023 → Click here

Proposal Template

Your Proposal should include the following information:

1. Executive Summary (max 1 page)

2. Business potential (max 5 pages)

3. Technical Concept (max 5 pages)

4. Team and Resources (max 3 pages)

5. Management (max 4 pages)

6 Financials (max 2 pages)

Kick-Start Study Tasks

	Study Kick Off Month 0	Mid-Term Review Month 3	Final Review Month 6	Study Outputs
Task 1	Engage with Users and Customers			Service requirements
Task 2	Investigate Technical Feasibility			Service Architecture definition
Task 3	Explore Economic Viability			Business Plan

Overall Aim of the Kickstart

Kick-Start

Explore the technical feasibility and commercial viability of a service

Demonstration Project

Develop the application and pilot the service with end users on board

Operational Service

Ultimate aim is to have an economically sustainable service

Before applying, check that

1. Your team is proposing a service that could become operational in the near future (1-4 years)

2. Your idea tackles a challenge relating to halving Food Waste

3. Your idea uses satellite data or space technology (e.g. satellite communication, earth observation or navigation)

4. Your team is eligible for funding and has attained a letter of authorisation from the National Delegate (if applicable)

5. There is a market for your service and potential users/customers will be involved in the Kick-Start

QA session

Opening Date
25 September 2023

Click here and visit
Space for a Wasteless Food Supply Chain | ESA Business Applications

Thank you!

Borja Pickering
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