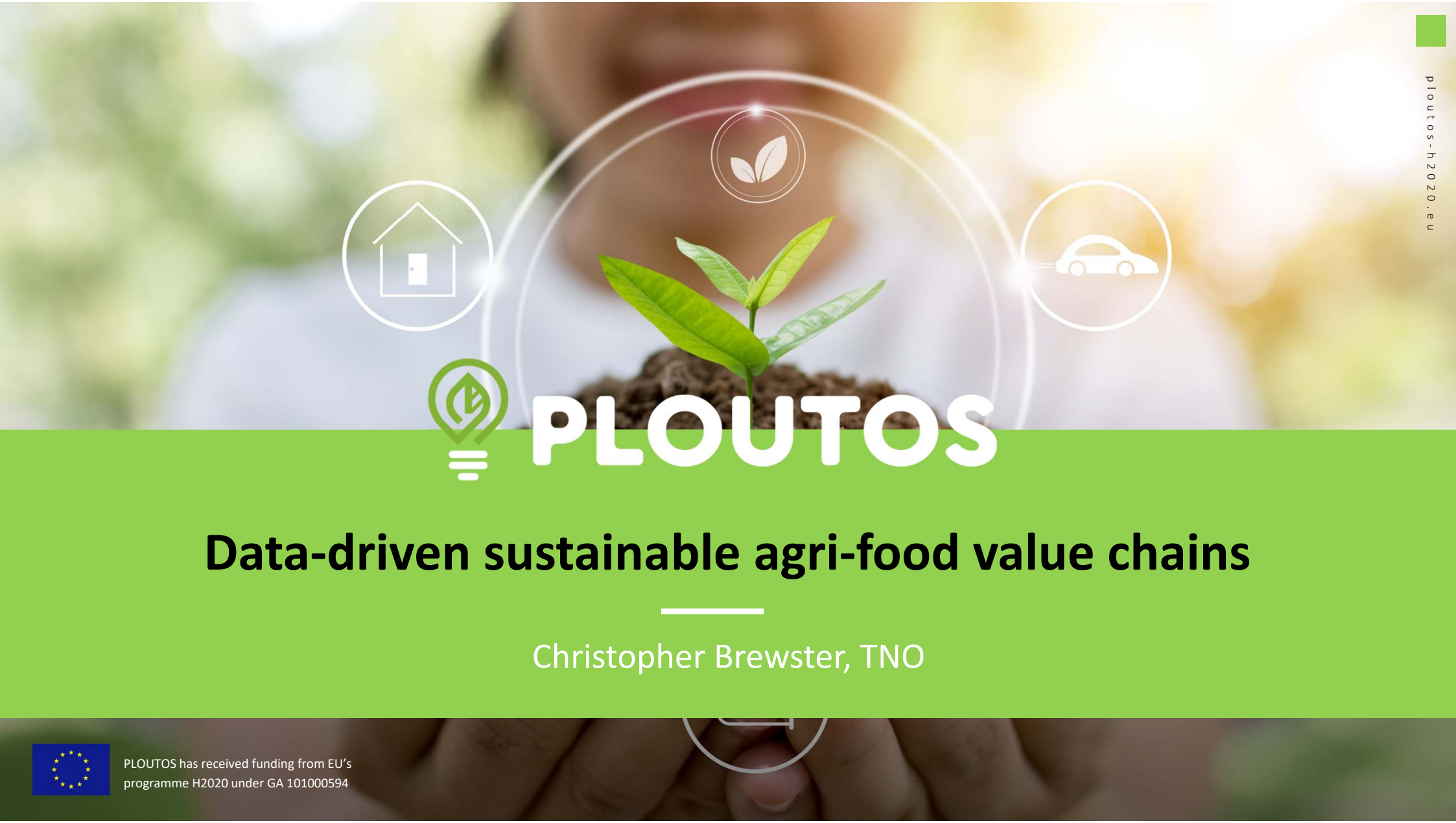

PLOUTOS

Data-driven sustainable agri-food value chains

Christopher Brewster, TNO

PLOUTOS has received funding from EU's programme H2020 under GA 101000594

Ploutos Project

In a nutshell

The main objective of Ploutos is to help **re-balance the agri-food value chain** & enhance its environmental, social and financial sustainability! To achieve that a **Sustainable Innovation Framework** is being developed to guide **behavioral, economic** & **technological innovation**! The results from the Framework will be showcased through the **Ploutos Innovation Academy**!

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Ploutos Consortium

H2020 funded, 3 year, €8.5M project, 2020-2023

Coordinator

gaia

Partners

33 partners, 13 countries including farmers' organisations and farm businesses, food industry companies, traders/distributors, food brand owners, SMEs, α certification party, NGOs, public authorities/public service providers, DIHs

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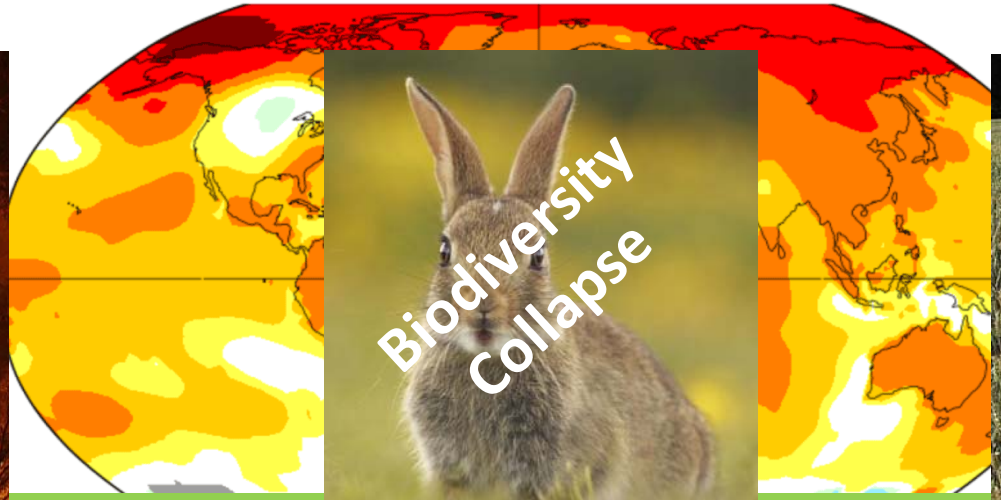
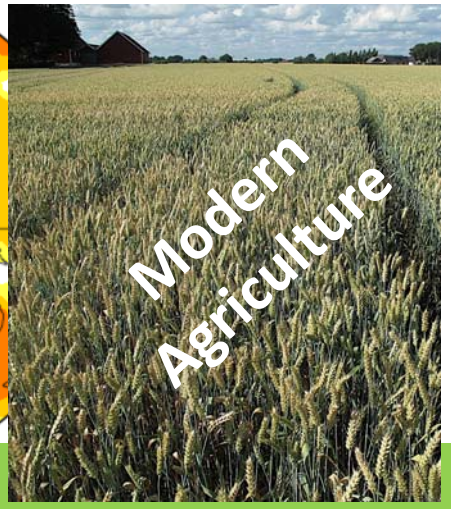
The Food System: A Global Predicament





- Temperature rise (2020 hottest year - NASA);
- Mass melting of Arctic and Antarctic ice;
- Unprecedented wildfires

- Danger of Ecosystem collapse in 20% countries globally;
- 40% of plant species at risk of extinction;
- Insect pollinator numbers collapsing;
- 68% drop in wildlife populations globally - 84% collapse in freshwater

- Food systems responsible for 34% of Greenhouse gas emissions;
- Causing huge land use change;
- Impacts on natural biodiversity;

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EU Green Deal, F2F & Ploutos

EU is tackling the global threats through **Green Deal** & **F2F** & **Ploutos** will be addressing the following core challenges:

- **Environmental Pressures**: *need for organic farming, agrecology & other environmentally friendly approaches;*
- **Power relations**: *need for sustainable business models;*
- **Stakeholder behaviour**: *need for behaviour change across the agri-food chain!*

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Ploutos will **rebalance the agri-food value chain** touching upon the following issues of Green Deal & F2F:

- Reduce environmental **foot print**
- Support small scale **farmers**
- Empower **consumers**
- Improve **soil health** and carbon farming
- Reduce **food waste**
- Develop **ecosystem** service **payments**

Ploutos will integrate **Behaviour Innovation**, **Business Models** and **Digital Technology**:

- Using a **realistic approach** to the realities of agrifood system today;
- **Raising awareness** that changes **HERE** affect stakeholders **THERE**;
- Using an **integrative approach** that combines multiple perspectives!

Rebalancing the agri-food value chain

How will Ploutos rebalance the value chain?

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Sustainable Innovation Framework

A SIF will be developed within Ploutos to provide a toolkit for assessment and adaptation to changes according to three dimensions:

Behavioural Innovation

Adoption of a social innovation approach for:

- ✓ co-creation & new forms of connections &
- ✓ cooperation across the value chain

Business Model Innovation

Development of an approach to guide the:

- ✓ design
- ✓ assessment
- ✓ commitment &
- ✓ implementation of business models

Data-driven Technological Services

Extension & reuse of technologies to:

- ✓ make new business models possible &
- ✓ enable greater & more effective flow of data to & from farmers

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Sustainable Innovation Framework Impacts

Economic
Sustainability

All stakeholders along the value chain benefit from innovations that even reduce or increase profits or incomes

Social
Sustainability

Large numbers of stakeholders along the value chain benefit from the generated additional profits and incomes & other social benefits such as health, etc.

Environmental
Sustainability

Additional value is created minimizing the depletion of natural resources (water, soil, air, flora, fauna, etc.) & reducing environmental pollution

Ploutos will deploy SIPs to co-design, pilot, validate & assess approaches against their economic, environmental and social performance.

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Overview of Sustainable Innovation Pilots

No	Descriptive title	Countries Involved	Sector	Value chains
1	Supporting a frozen fruit value chain with small farmers, to optimise production, reduce environmental footprint and re-use the data for certification and subsidies	Greece	Frozen Fruit	1
2	Better food-chain contracts for improved durum wheat production	Italy	Arable / Pasta	1
3	Empowering consumers through crowdsourcing to take back control over their food and create healthy, sustainable, fair trade products	France, Greece, UK, Germany, Belgium	Cross-sector	≥10
4	Traceability solutions covering the horticulture greenhouses value chain to improve operations, sustainability performance and brand recognition	Spain	Vegetables	1
5	Smart Farming on rural farms demonstrating its benefit in the wider agri-food community and co-creating new food products and services	Ireland	Livestock, arable / Food tourism	≥2
6	Applying soil-passport approach rewarding land owners/users and a precision farming solution to increase soil health and sustainability	Slovenia	Cross-sector	≥2
7	Supporting wine producers in taking advantage of the changes in labelling regulations and enhancing their sustainability performance	Cyprus	Wine	1
8	Carbon Farming: compensating farmers for climate friendly soil management	Netherlands	Cross-sector / Organic	≥2
9	Facilitating the transfer of surplus food from farms to socially disadvantaged groups, by aligning logistics and processes	Serbia, N. Macedonia	Cross-sector	≥2
10	Increase sustainability in the grapevine sector by introducing payments for ecosystem services provision and parametric insurance to support losses from sustainable approaches	Italy	Fruit	1
11	Improving the sustainability of Balearics agri-food chains with Smart Farming and by using the collected info to organise agri-tourism activities	Spain	Vegetables / Agri-Tourism	1

Ploutos Innovation Academy

A virtual academy created to support stakeholders in co-designing and applying innovations in real life conditions, aiming to enhance the sustainability of the agri-food value chain.

ploutos-h2020.eu

1 Innovation Pilots

It will deliver the **expertise**, practical **experience**, **business modelling** and **ICT** from the value chains engaged in **11 the pilots**, through an ecosystem that stakeholders are able to get informed, co create, dialogue, discuss and demonstrate new technologies in a real world environment.

2 Supporting Mechanism

It will be the **mechanism** for supporting the **implementation of innovative approaches** so the agri food sector will transform into a more sustainable one.

3 Applicability & Transferability

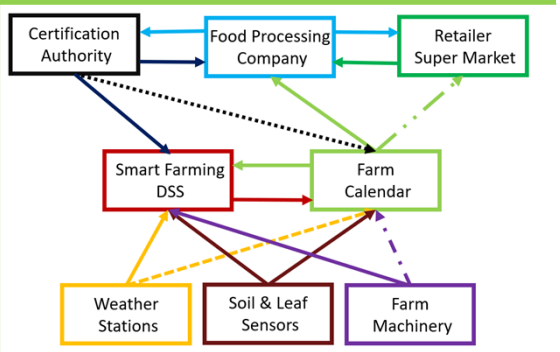
It will ensure that all the **sustainable oriented innovations** are desirable, feasible and can be combined between data driven technologies and sustainable collaborative business models, so it will **ensure its wide applicability** and **transferability**.

4 Innovative Business Models

The **validated business models** and other **related outcomes** resulting **from the SIPs**, will be provided in the form of practical examples and best practices to be adopted for use in similar cases in the agri-food sector.

GA 101000594

Ploutos Data Driven Technological Innovation



- ✓ **Core challenge is interoperability – between new and old systems, horizontally and vertically in the food system.**
- ✓ **The problem is not just technical, but concerns regulatory, legal, ethical, business models, and human behaviour.**
  - ✓ **Hence the close interaction with the business modelling and behaviour change aspects.**
  - ✓ **Hence importance of FAIR data principles (and potentially the CARE principles).**
  - ✓ **Enable operationalization of the "EU code of conduct" – bare minimum.**
- ✓ **We want to achieve positive outcomes for farmers – data for good, not for digital feudalism. Importance of stakeholder control over data, and mutualization of resources.**

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Design Principles and Approach

- ✓ Each pilot has a technical partner! (Some overlap)
- ✓ Ploutos technology builds on top and around existing solutions.
  - ✓ Reuse and Adapt best practices (hence no top level architecture)
- ✓ Respect and integrate with legacy systems where possible.
- ✓ Careful analysis of specific needs of each pilot.
- ✓ Common requirements identified as much as possible across the pilots:
  - ✓ Common data model
  - ✓ Common need to share data horizontally (e.g. around farm + services), and vertically (across supply chain, or with certifier)
  - ✓ Not true of all SIPs

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Design Principle: Technical analysis of SIPs

Almost all SIPs are aiming to achieve “Data interoperability” or “Traceability services” during the SIP realization.

Technology type	SIP id
“Smart farming” or “IoT” or “Data logging equipment for agricultural machinery”	1, 3, 4, 5, 6, 7, 8, 11
Traceability	1, 2, 3, 4, 5, 7, 9, 10, 11
Data interoperability, “Data sharing”, “Data driven technology"	1, 2, 3, 5, 6, 7, 9, 10, 11
Decision Support Systems (DSS)	2, 9, 10
Insurance platform	2, 10
Data driven technology	5
API for satellite imagery	8
Algorithms for detection of measures from the raw data	8

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Design Principles: Standardised semantics and seamless integration

Prefix	Name
ENVO	Environment Ontology
s4agri	SAREF4AGRI
SSN	Semantic Sensor Network
SOSA	Sensor Observation Sample Actuator
OM	Ontology of units of Measure
Weather	BIMERR Weather Ontology

- ✓ **Ploutos Common Semantic Model (PCSM)**
  - ✓ Based on standard ontology engineering principles
  - ✓ Maximal reuse of existing ontologies – ones that are available, accessible and not proprietary
  - ✓ The (PCSM) should be a small, core model that covers the main common concepts in the agrifood domain ranging from the farm via the supply chain to the consumer
  - ✓ Capable to be extended with additional domain specific ontologies where needed
- ✓ **The rest of the architecture is also based on semantic technologies (SPARQL, Reasoning engine, etc.)**

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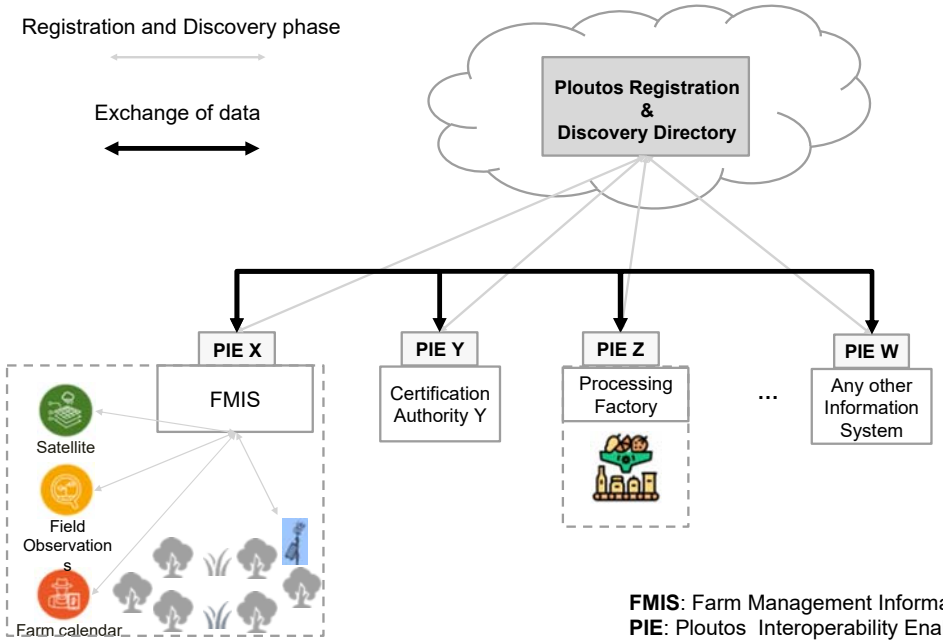
Design Principle: Controlled flow of data

Core challenge in data sharing architectures is to protect business confidentiality and maintain trust!!

- ✓ Objective: achieve the controlled and technically sound flow of data among the various information providers and consumers without at the same time disturbing the current operations of the underlying systems.
- ✓ Objective: Data are not shared with a common third party but are exchanged directly among peers



FMIS: Farm Management Information System
PIE: Ploutos Interoperability Enabler

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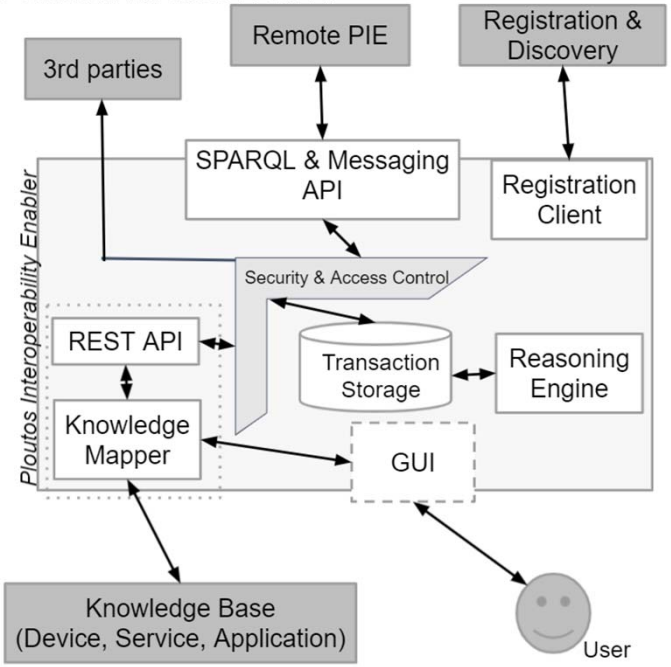
Ploutos Interoperability Enablers (PIE)

- ✓ The PIE's main role within the Ploutos architecture is allowing knowledge bases to exchange data in an interoperable manner with other participants of the Ploutos data sharing network.



- ➢ PIE is deployed as a lightweight service (docker)
- ➢ Administered by the information provider – Security & Access control
- ➢ Data translator:
  - ✓ Custom data model to standards based ontology (and reverse)
  - ✓ Reasoning capabilities – additional knowledge extraction

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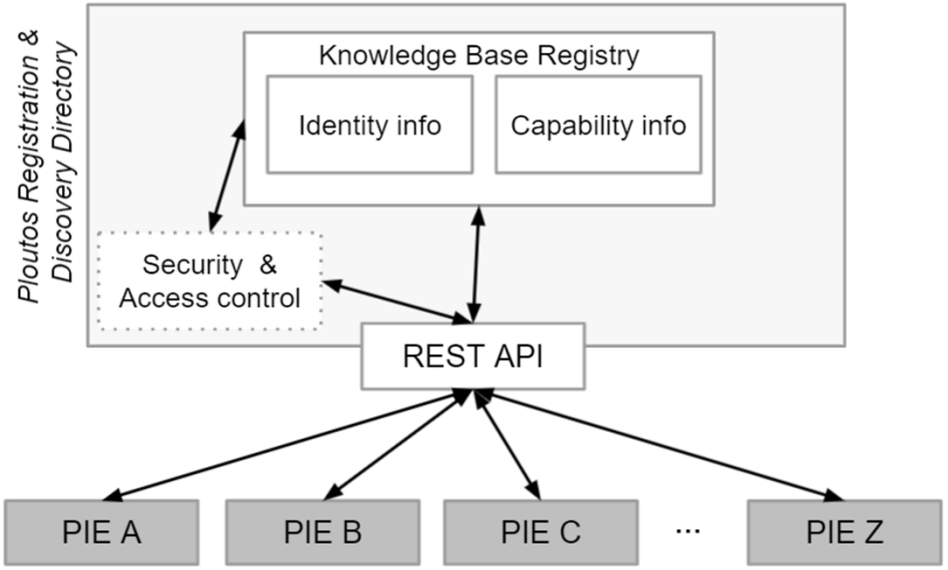
Ploutos Registration and Discovery Directory (PRDD)

- ✓ PRDD will be deployed at a cloud server system accessible on Internet.
- ✓ Core objective to allow the registration of the various PIE along with their characteristics, to support orchestration of knowledge discovery.



- ➢ Changes in the data sharing network are handled seamlessly.
- ➢ Established open-source Semantic Web technologies are leveraged to provide knowledge models and reasoning capabilities

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Strategic Impact

What will be the strategic impact of Ploutos project?

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Ploutos Results

Expected strategic impact of Ploutos Project

- ✓Gain understanding of perceptions, incentives & barriers of stakeholders to redefining roles & cooperation in the value chain;
- ✓Provide opportunities for new business models to be applied in the agricultural sector;
- ✓Provide targeted supporting services delivered using innovative methods, so as to increase farming & agricultural production competitiveness;
- ✓Deploy innovative technologies, which will ensure the flow of data & information with the specific intention to strengthen the position of farmers in the value chain;
- ✓Enable more effective data capture & data feedback, & ensure greater information & research flowing to agricultural production units; and
- ✓Validate the results in the eleven (11) Sustainable Innovation Pilots.

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PLOUTOS

THANKYOU

Speaker

Christopher Brewster
Data Science Group, TNO

For more info:
https://www.tno.nl/en/professors/christopher-brewster/

W: Ploutos-h2020.eu

T: @ploutos_h2020

F: @ploutosh2020

L: ploutos-h2020

Coordinator

Nikos Marianos
Coordinator
GAIA EPICHEIREIN SA

For more info:
n_marianos@neuropublic.gr
https://www.c-gaia.gr/