PROTECT

PROCURING INNOVATIVE CLIMATE CHANGE SERVICES

Pain Point workshops

Scoping more in-depth common challenges and needs of Climate services using EO

CORVERS

COMMERCIAL & LEGAL AFFAIRS

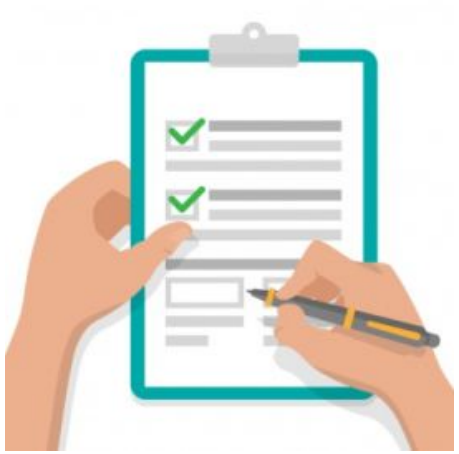
PROTECT consortium

12 & 13 September 2023

This project has received funding from the Horizon Europe Framework Programme (HORIZON) under grant agreement No 101060592

Agenda

1. Introduction: context, objectives and methodology
2. Results of the spring Pain Point workshops
3. 4 Challenges from a Climate policy perspective and the potential EO
4. Preliminary SOTA analysis
5. **Challenge in-depth and scoping needs**
6. Open discussion
7. Conclusions and next steps



Introduction

Context, objectives and methodology

Introduction: context, objectives and methodology

1. **Context:**
   - PROTECT is setting the grounds to prepare a proposal for the HE PCP HORIZON-CL6-2024-GOVERNANCE-01-15 (€ 19 million) call building on outcomes from GEOSS initiatives and PROTECT.
2. **Objectives:**
   - Validate and further scope the common needs.
   - Identify other use cases under the challenges.
   - Define the participants of the public buyers group.
3. **Today's methodology:**
   - Brief recap of the spring workshops results and SOTA analysis.
   - Challenge presentation and interactive discussions.
   - Q&A methodology.

Expected outcomes of the PCP call

- **Customisation/pre-operationalisation of prototypes end-user services in the area Climate Change Adaptation and Mitigation, building on the Copernicus Services that respond to the common needs and beyond state-of-the-art performance targets of the buyers group;**
- Reduction of fragmentation of demand for innovative solutions by enabling public procurers to **collectively implement a Pre-Commercial Procurement (PCP) in the area of climate adaptation and mitigation**, which, due to their nature, are better addressed jointly, or which they would not have been able to tackle independently;
- New opportunities for wide market uptake and economies of scale for the supply side through the use of **joint specifications, wide publication of results and – where relevant – contribution to standardization, regulation or certification to remove barriers for introduction of innovations into the market** and creation of new products, processes and/or services ready for market uptake, leading to viable new businesses, jobs and sustainable economic growth.

Pain Point workshop results

Use cases - Functional description - keywords

Marine and Coastal environment

As is (present) situation

The **mapping of flooded areas** in case of serious events can take weeks.
Municipalities do not have reliable tools to predict, prevent and respond in a timely manner.

Step 1 | Step 2 | Step 3 | Step 4 | Step 5

1. Implement one repository of (historical) data, and a single Application Programming Interface (API).
2. Connect rapid mapping and climate services to the repository.
3. Turn mapping into algorithms.
4. Use efficient hardware.
5. Apply the tools correctly, with a team with the needed skills.

Keywords: Rapid mapping of flooded areas, projection, prediction, intervention, high resolution, EO data, climate services, API.

Desired dreamed (future) situation

Rapid mapping **for predictions/projections** to identify risks and define benchmarks. This requires software for higher resolution and timely satellite information.

Marine and Coastal Environment: Is this use case relevant to your organization?

		Answers	Ratio
Yes		10	50 %
No		5	25 %
Perhaps		4	20 %
No Answer		1	5 %

Identified functionalities : 1. Rapid and reliable mapping of flooded areas for planning, preventing, predicting and post event intervention and cooperation.

		Answers	Ratio
Yes		14	70 %
No		2	10 %
Perhaps		3	15 %
No Answer		1	5 %

Sustainable Urban Communities

As is (present) situation

Facilities **where waste is stored** can suffer spontaneous fires 3 or more times a year. This happens especially in summer when the temperatures are higher. At present, although there is data on previous events, there is **no automated solution to predict fires** and take decisions to prevent them. Inspectors of environmental agencies monitor the facilities resulting in quite an effort for staff.

Step 1 | Step 2 | Step 3 | Step 4 | Step 5

1. Explore the technical borders to understand what is possible in order to provide frequent data updates, and establish the frequency for preparedness.
2. Develop a model out of (all) existing and new data for prediction of waste fires. Data aggregation, including all data from past waste fire situations can be useful.
3. Train the model based on defined conditions, relevant factors(e.g. evolving composition of waste through time, temperature)
4. Anticipate fire using data.
5. Notify action to prevent a fire timely.

Desired dreamed (future) situation

Automated notification of risk of fire so that the environmental agencies can take measures, such as contacting companies/industry that has/manage waste storage facilities, help **prevent** air pollution and damages.

Sustainable Urban Communities: Is this use case relevant to your organization?

		Answers	Ratio
Yes		8	40 %
No		4	20 %
Perhaps		8	40 %
No Answer		0	0 %

Keywords: Automated notification, waste fire, modelling, prediction, data aggregation.

Identified functionalities : 2.Thermal monitoring and predicting waste fire to avoid spontaneous ignition in waste storages and air pollution, using automated notification of risk of fire based on the modelling of certain conditions (like the level of humidity, air temperature, height of the pile of waste, etc.).

		Answers	Ratio
Yes		7	35 %
No		5	25 %
Perhaps		5	25 %
No Answer		3	15 %

Civil Security and Protection

As is (present) situation

Waste is dumped illegally and it is difficult for **law enforcement agencies** to trace the responsible of criminal behaviour. It is also not possible **to inform and prevent the flow of the waste cross-borders.** There is no data which can be used in criminal proceedings as proof.

Step 1 | Step 2 | Step 3 | Step 4 | Step 5

1. Examine current monitoring possibilities.
2. Define the type of substances illegally dumped in water based on previous experience and also the measures being taken in specific cases.
3. Notify timely environmental agencies, fire fighters and other relevant law enforcement agencies on potential risks and results.
4. Define possible interventions on site to prevent dumping and further damage.
5. Standardize the reports and data to be admissible in a civil and criminal court.

Desired dreamed (future) situation

Alerts are sent to competent authorities to prevent the illegal dumping of waste in the water and to inform of a possible risk preventing further (cross-border) damage. Standardized reports and information can serve in civil and criminal proceedings to establish responsibilities upon the applicable law in a specific judiciary system.

Identified functionalities : 3. Identifying illegal dumping of waste in water and sending automated alerts to law enforcement agencies to prevent the flow of waste causing cross-border damages, and producing standardized reports that can serve as proof of responsibility in (criminal) judicial proceedings.

		Answers	Ratio
Yes		8	40 %
No		6	30 %
Perhaps		4	20 %
No Answer		2	10 %

Keywords: Monitoring, waste dumping, toxic substances, notification, intervention, pollutants. Vegetation changes, traceability, identification of responsibility

Civil Security and Protection: Is this use case relevant to your organization?

		Answers	Ratio
Yes		9	45 %
No		6	30 %
Perhaps		5	25 %
No Answer		0	0 %

Energy and Utilities

As is (present) situation

The demand for sweet water is unpredictable. The supply and demand of sweet water is not connected. There are regulations determining the use of water from channels, treated water from the sewage and drinking water (in each EU Member State). There is no common language among different stakeholders in the water cycle chain. There is a lot of data in certain regions but the data hubs or repositories are not connected.

Step 1 | Step 2 | Step 3 | Step 4 | Step 5

1. Understand what is happening at present and the mechanisms in place (also from a policy perspective). Learn how the problem of drought regarding supply and demand of water is addressed, to define the type of new services that support coping with stress situations based on a common language. Understand which are the relevant responsible public authorities and users. Also, identify the data gaps.
2. Develop a system that combines data and uses AI for modelling.
3. Use database driven solutions to improve the distribution of water (e.g. identify saline concentration, pollution, substances, algea, etc.)
4. Provide information to water authorities that need to know how to collect, when and how to distribute water (treated in a certain way) to supply the specific demand, and avoid discharging sweet water.
5. Build a resilient system where different stakeholders (water companies, farmers, industry) cooperate during drought.

Desired dreamed (future) situation

The demand for sweet water is predictable. The regulatory landscape and policies are clearly defined. The system can cope with stress situations based on data for informed decision making and interventions. **Supply and demand for sweet water are connected based on needs of diverse users** (e.g., famers, companies, industry) and the understanding on the conditions and water quality required for different purposes. Decision and guidance from a policy perspective is achieved to understand the consequences and combine relevant data in the whole water chain cycle under a taxonomy.

Identified functionalities : 4. Predicting the demand for sweet water from different users aimed at connecting the supply and demand of water for diverse uses (such as farming) in the water value chain to tackle periods of drought.

		Answers	Ratio
Yes		9	45 %
No		5	25 %
Perhaps		3	15 %
No Answer		3	15 %

Keywords: Drought, AI for modelling, data combination, water demand and supply connection, water quality, distribution.

Energy and Utiities: Is this use case relevant to your orhganization?

		Answers	Ratio
Yes		10	50 %
No		5	25 %
Perhaps		5	25 %
No Answer		0	0 %

Agriculture, Forestry and other Land Use

As is (present) situation	Step 1	Step 2	Step 3	Step 4	Step 5	Desired dreamed (future) situation
Planning is realized based on data collected mostly manually in a database and analysed by field experts.	1. Combine existing data with new EO data. 2. Validate data with field experts. 3. Use AI to define scenarios. 4. Work on resilience plans based on input from data analysis and predictions. 5. Implement resilience plans.					**Automated analysis** supports the decision of experts in preparing resilience plans.

Keywords: Automated analysis, climate resilience plans, AI scenarios, forest and land, prediction, salinity, reproductivity.

Agriculture, Forestry and other Land use: Is this use case relevant to your organization?

		Answers	Ratio
Yes		11	55 %
No		4	20 %
Perhaps		4	20 %
No Answer		1	5 %

Identified functionalities : 5.Detecting climate vulnerability in the face of challenges like salinity affecting reproductivity of vegetation, through automated analysis that supports the decision of experts in preparing resilience plans.

		Answers	Ratio
Yes		8	40 %
No		5	25 %
Perhaps		5	25 %
No Answer		2	10 %

EU Survey results

Please prioritize the above functionalities based on the needs of your organization.

	1	2	3	4	5	Score
1. Rapid mapping of floods	**35.29%** 12	**47.05%** 16	**11.76%** 4	**5.88%** 2	**0.0%** 0	**4.11** 34
2. Predicting (waste) fire	**5.88%** 2	**11.76%** 4	**29.41%** 10	**23.52%** 8	**29.41%** 10	**2.41** 34
3. Identifying ilegal dumping of waste and tracing	**17.64%** 6	**5.88%** 2	**0.0%** 0	**41.17%** 14	**35.29%** 12	**2.29** 34
4. Predicting the demand for water to match supply and demand (specially in drought)	**11.76%** 4	**23.52%** 8	**29.41%** 10	**17.64%** 6	**17.64%** 6	**2.94** 34
5. Detecting climate vulnerability to prepare resilience plans	**29.41%** 10	**11.76%** 4	**29.41%** 10	**11.76%** 4	**17.64%** 6	**3.23** 34
No Answer	-70 % -14					

1

4

5

3

2

What is the best approach to prioritise the **four** challenges?

- Higher score
- Commitment from CAs to pursue the challenge
- Mixed approach

7 Possible challenges for the PCP

Resulting from cross-cutting analysis and consultations with procurers (pain point workshops, surveys, one to one exchanges)

1. Predicting the 'sweet' water demand to match supply & demand
2. Flooding in coastal areas and flooding from rivers
3. Predicting waste fires
4. Illegal dumping of waste and tracing
5. Detecting climate vulnerability to prepare resilience plans
6. Building and restoring resilient cities' infrastructure
7. Predicting peak traffic times & CO2 emissions by types of transportation

Next steps: Follow up discussions with lead procurers to form consortia of buyers around these topics, screening of relevant providers to prepare e-pitching sessions and Open Market Consultations in Fall.

Selected 4 Challenges – *across domains*

- **FLOODS** mapping and prediction
- **FIRE** prediction & prevention (tracing, identifying – e.g. illegal waste dump fires);
- Climate resilient **WATER** solutions (predicting, collecting data, planning);
- **SUSTAINABLE & RESILIENT INFRASTRUCTURE** in vulnerable urban & regional areas (integrated sustainable re-development, restoring & adaptation of old and existing buildings).




SELECTION CRITERIA: intention of lead procurer, interested public buyers, climate change impact, TRL 3-5, cross-border relevance.

Climate Change

Policy perspective

Climate Services

- **Climate services are customised solutions** that **transform climate-related data** together with other relevant information to help address a wide range of needs.
- They include for instance **projections, forecasts, economic analyses, assessments, counselling on best practices,** or any other solution or service in relation to climate that may be of use for the society at large.
- Because **CS allow all categories of end-users** to access and action relevant climate-related data, climate services are essential to support their needs related to climate mitigation and adaptation.
- The potential for new, innovative, connected climate services is untapped.

Floods in regional adaptation

- **Flood risks figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Marine & coastal: Flooding risks in almost all coastal regions: sea level rise [Med FR,ES,northern IT,northern DE,PL], marine submersion [North and Baltic seas,ES-n,IT-n,FR-se], extreme rainfall, thunderstorms and gales [PL,ES-n], combinations of those factors [DE-n,ES-n,NL,LT,FR-w]
  b) Sustainable urban communities: Risk of flooding in urban areas (heavy rainfall, river overflow, marine submersion, sea level rise), aggravated by soil degradation, itself amplified by droughts [BE,NL, IT,PL,FR]
  c) Energy & utilities: multiplication of flooding (extreme rainfall, sea level rise) to disrupt energy production [DE,LT,PL]; risk of landfill flooding [LT]
  d) Agriculture, forestry and other land use: Negative impact on land use from floodings combined with droughts, heavy rains, storms [IT-n,ES-n,LT,PL]; increasing flooding risk in agricultural areas [FI,DE-e,IT-w/n,FR]

Legal texts of reference at EU and national levels

- **EU foundational documents:**
  a) EU Floods directive (2007)
  b) EU Waste Framework Directive (2008)
  c) EU Water Framework Directive (2000)
  d) EU Strategy on Adaptation to Climate Change (2021)
- **At national levels:**
  a) Water laws/acts or amendments thereof; flood risk management plans
  b) Laws/acts on waste, waste management
  c) River basin management plans (RBMPs)
  d) National and regional climate adaptation strategies and action plans

This is also a dynamic process with cycles and multiple iterations

Legal texts relevant to the Floods challenge (EU level)

The EU Floods Directive

- Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (publ. 6 November, 2007)
- Each EU country is required to assess all areas under risk of significant floods, to create Flood Hazard Maps and Flood Risk Maps for such areas in terms of possible flood extent and assets & humans at risk, and to take adequate and coordinated measures to reduce flood risk
- The general public must have access to this information and a say in the planning process
- The Floods Directive is closely coordinated with the Water Framework Directive

Legal texts relevant to the Floods challenge (nat'l level)

Transposing the EU Floods Directive

- The Directive was transposed into national laws mostly between 2008 and 2010
- In most cases, this appeared either within new Water Laws, Water Acts, or updates / amendments of the current ones
- In complement: national flood risk management plans; plans at the level of regions / river basins / sub-regions
- Working Group set up within CIRCABC to support implementation of both the Floods Directive and the Water Framework Directive
- 6-year cycles to reduce the risk of flood damage: 1st cycle 2010-2015, 2nd cycle 2016-2021, 3rd cycle 2022-2027; results from 2nd cycle reported for 19 countries, public consultation concluded in 5 more, 3 ongoing or delayed

Fires in regional adaptation

- **Fire risks figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Sustainable urban communities: sharply increasing fire and wildfire risks in virtually every country, strongly amplified by heatwaves and urban heat islands
  b) Energy & utilities: increased risk of landfill fires [e.g. LT]
  c) Agriculture, forestry and other land use: fast-increasing risk of fires [BE,FI-s,IT-n/c,FR,DE,ES,,,]

Legal texts of reference at EU and national levels

- **EU foundational documents:**
  a) EU Floods directive (2007)
  b) EU Waste Framework Directive (2008)
  c) EU Water Framework Directive (2000)
  d) EU Strategy on Adaptation to Climate Change (2021)
- **At national levels:**
  a) Water laws/acts or amendments thereof; flood risk management plans
  b) Laws/acts on waste, waste management
  c) River basin management plans (RBMPs)
  d) National and regional climate adaptation strategies and action plans

This is also a dynamic process with cycles and multiple iterations.

Legal texts relevant to the Fire challenge (EU level)

The EU Waste Framework Directive

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
- Basic principles include waste management to avoid endangering human health, harming the environment, creating risks for water, air, soil, plants, animals, causing a nuisance through noise or odours
- It is built on a 5-step waste hierarchy: prevention > preparing for re-use > recycling > recovery > disposal
- It sets targets to every EU country
- There is a strong emphasis on circular economy objectives, which is prominently reflected in several national laws
- However, very limited reference is made to fire risks and illegal dumping, and generally to climate dimensions

Legal texts relevant to the Fire challenge (nat'l level)

Waste related texts

- Almost all EU countries have a Law on Waste or on Waste Management
- In a few cases, waste regulations are part of a broader environmental conservation law (France, Greece, the Netherlands)
- In Belgium and in Italy for instance, the waste sector is regulated by a set of more specific texts; in some cases, most of the regulations are at regional level (e.g. Austria)
- General waste regulations tend to be explicit on the categories of waste, specific risks, technical requirements, prevention of pollution; in contrast, they say little or nothing explicit about fire risks, only a few mention illegal dumping, and the link with climate change issues is not mentioned

Water issues in regional adaptation

- **Water quality and availability risks figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Marine & coastal: Quality degradation of coastal waters [FR], increased saltwater intrusions, salinization, freshwater shortages [FR-w,IT-c,ES,NL], decreased water quality [LT,IT-c], eutrophication of water bodies, damaged ecosystem services (ES-n,IT-c,DE-n]
  b) Sustainable urban communities: Water quality and quantity affecting a.o. energy and utilities [southern Europe, now also concerning BE,NL,DE-s]
  c) Energy & utilities: Increased frequency of droughts and of heatwaves [LT,PL,BE,DE,ES,FR,IT] with consequences on water quality and quantity;
  d) Agriculture, forestry and other land use: More frequent and longer droughts [DE,IT-n,NL,ES], often coupled with water quality and quantity concerns [BE,IT,ES-n,FR,LT], competition for water between urban and agricultural use; threats of lower water recharge and decrease in aquifer levels [FR-se,IT-s,ES,NL], risks on pastures and fodder [PL]; reduced river flows, higher transpiration and water stress [ES,FR]; impacts aggravated as more frequent or abundant irrigation required in agriculture [DE-w,IT-n,ES]

Legal texts of reference at EU and national levels

- **EU foundational documents:**
  a) EU Floods directive (2007)
  b) EU Waste Framework Directive (2008)
  c) EU Water Framework Directive (2000)
  d) EU Strategy on Adaptation to Climate Change (2021)
- **At national levels:**
  a) Water laws/acts or amendments thereof; flood risk management plans
  b) Laws/acts on waste, waste management
  c) River basin management plans (RBMPs)
  d) National and regional climate adaptation strategies and action plans

This is also a dynamic process with cycles and multiple iterations.

Legal texts relevant to the Water challenge (EU level)

The EU Water Framework Directive

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
- Latest version published in 2014; adaptation to climate change not included in the Directive itself but agreement from Member States in 2009 to integrate it in the 6-year River Basin Management Plans (RBMPs) elaborated under the WFD – *cf.* "River basin management in a changing climate - a Guidance document"
- Each EU Member State is required to use their RBMPs and Programmes of Measures to protect and, where necessary, restore water bodies in order to reach good status (chemical and ecological), and to prevent deterioration
- The Floods Directive is closely coordinated with the Water Framework Directive
- Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change refers to water (and particularly freshwater) availability and sustainability notably in its section 2.3.4

Legal texts relevant to the Water challenge (nat'l level)

Transposing the EU Water Framework Directive

- The Directive is implemented primarily through the RBMPs
- Some of the RBMPs are transnational (e.g. Danube, Elbe, Oder, Rhine, Sava) and are closely articulated with water policies in the different countries involved
- Each EU Member State is covered by between 1 and 14 RBMPs, managed at national or regional levels; some of the RBMPs ae not literally centred on one river and cover a hydrographic unit or region
- RBMP process includes identification of "significant water management issues" and broad public consultations
- Working Group set up within CIRCABC to support implementation of both the Floods Directive and the Water Framework Directive
- 6-year cycles: 1st cycle 2010-2015, 2nd cycle 2016-2021, 3rd cycle 2021/22-2027

Sustainable infrastructure in regional adaptation

- **Risks to sustainable infrastructure figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Marine & coastal: Flooding risks in almost all coastal regions: sea level rise [Med FR,ES,northern IT,northern DE,PL], marine submersion [North and Baltic seas,ES-n,IT-n,FR-se], extreme rainfall, thunderstorms and gales [PL,ES-n], combinations of those factors [DE-n,ES-n,NL,LT,FR-w]
  b) Sustainable urban communities: Swelling and shrinking soils resulting from hydrogeological instability [IT,FR-s], creating vulnerability for building foundations in urban areas, landslide risks
  c) Energy & utilities: Increased frequency of droughts and of heatwaves [LT,PL,BE,DE,ES,FR,IT] with indirect impacts of water scarcity or hotter waters on e.g. energy production; consequences of ocean acidification on infrastructures [FR-w]; extreme events and longer term processes threatening railways and roads [FR]; coupled issues on water availability / quality and energy production [large cities]

Legal texts of reference at EU and national levels

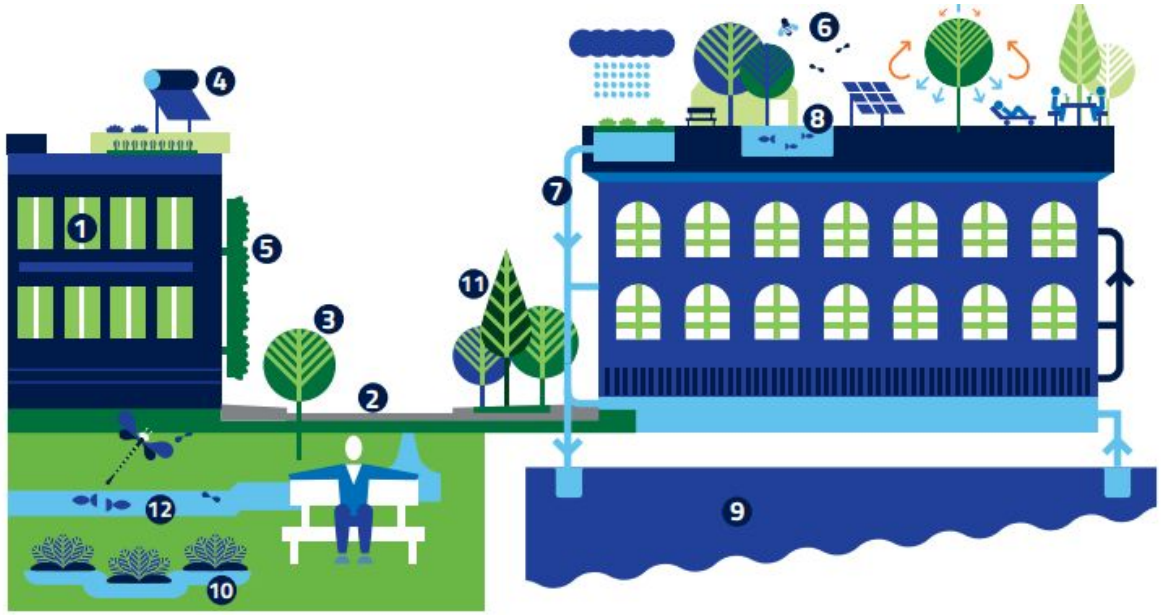
- **EU foundational documents:**
  a) EU Floods directive (2007)
  b) EU Waste Framework Directive (2008)
  c) EU Water Framework Directive (2000)
  d) EU Strategy on Adaptation to Climate Change (2021)
- **At national levels:**
  a) Water laws/acts or amendments thereof; flood risk management plans
  b) Laws/acts on waste, waste management
  c) River basin management plans (RBMPs)
  d) National and regional climate adaptation strategies and action plans

This is also a dynamic process with cycles and multiple iterations.

Elements from EU's Climate Adaptation Strategy relevant to the Sustainable Infrastructure challenge

- Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change (publ. 24 February, 2021)
- Systemic approach to support the further development and implementation of adaptation strategies and plans at all levels of governance; cross-cutting priorities: integrating adaptation into macro-fiscal policy, nature-based solutions for adaptation, and local adaptation action
- Support implementing nature-based solutions (NBS) on a larger scale, notably blue-green infrastructures, and the development of financial approaches and products that also cover nature-based adaptation
- Support the development of rapid response decision support tools to enrich the toolbox for adaptation practitioners
- Support the integration of climate resilience considerations into the criteria applicable to construction and renovation of buildings and critical infrastructure

Sustainable infrastructure – a space for multiple systemic interactions



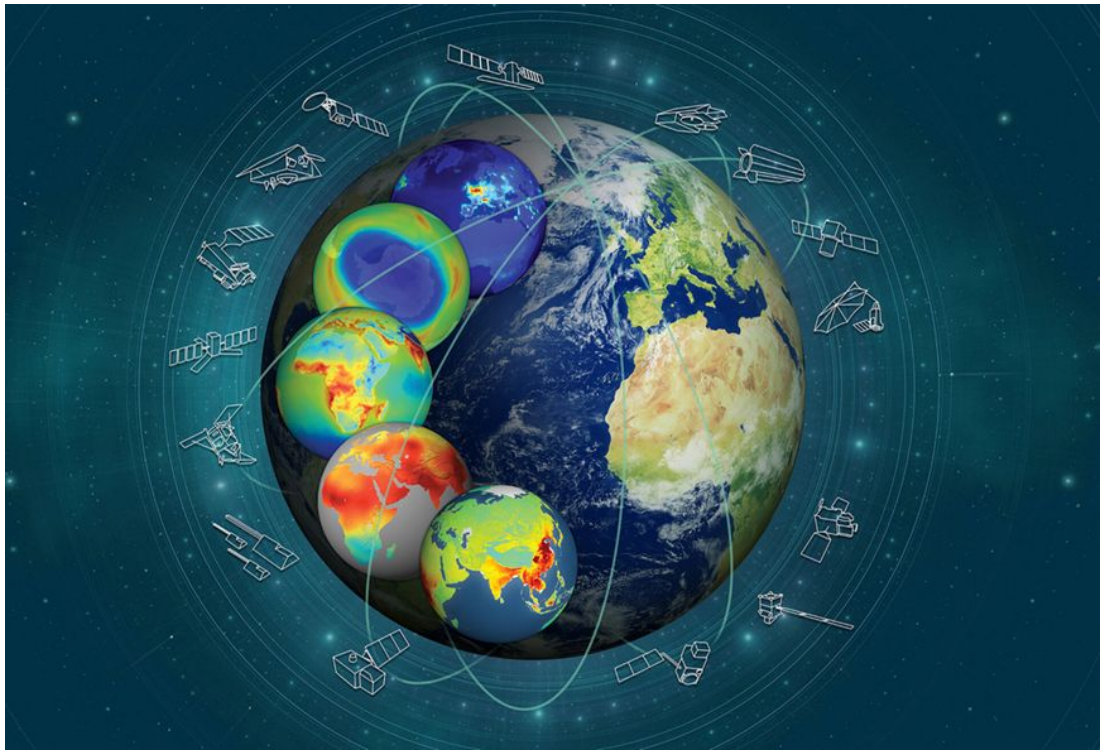
❶ Building ❷ Street ❸ Trees ❹ Solar water heating ❺ "Multi-functional" green wall
❻ "Multi-functional" roof garden ❼ Storm water harvesting and recycling ❽ Food production
❾ Ground water aquifer ❿ Constructed wetland ⓫ Pocket park ⓬ Urban streams and ponds

Credits: Blue Green Solutions / *Imperial College London, EIT Climate-KIC*

The Potential of EO

In the 4 Challenges

What is Earth Observation?



Credits: ESA - Earth observation data access portal

According to European Space Agency (ESA) , Earth Observation (EO) is defined as the process of acquiring observations of the Earth's surface and atmosphere via sensors mounted on satellites, aircrafts, drones or at the surface, resulting in data in the form of digital imagery.

Two supporting technologies enable this intermediate step of processing EO data:

- artificial intelligence (AI)
- cloud computing

Copernicus Programme

- One of the largest EO programme managed by the European Commission
- Monitor and forecast the state of the environment on land, sea and in the atmosphere
- Support climate change mitigation and adaptation strategies
- Efficient management of emergency situations and the improvement of the security of every citizen
- Applications of EO data from the Copernicus programme

Credits: À propos de Copernicus | Copernicus

What is the role of Earth Observation in climate services (CS)?

Credits: Earth observation big data for climate change research - ScienceDirect

- EO data is playing a crucial role
- Satellites provide vital information regarding the state, evolution of the environment and human activities on Earth
- CS support the governments and businesses

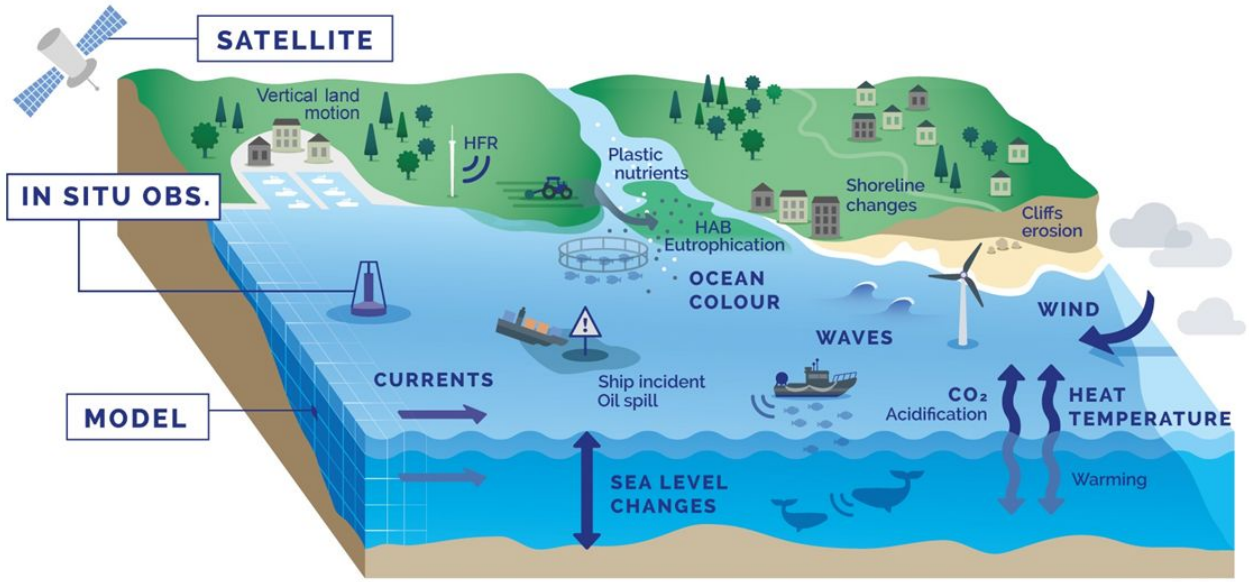
How can climate services apply to the 4 challenges?

FLOODS Challenge - Example of Usage

Category: Inland Waterways

Example of usage: Inland Waterways

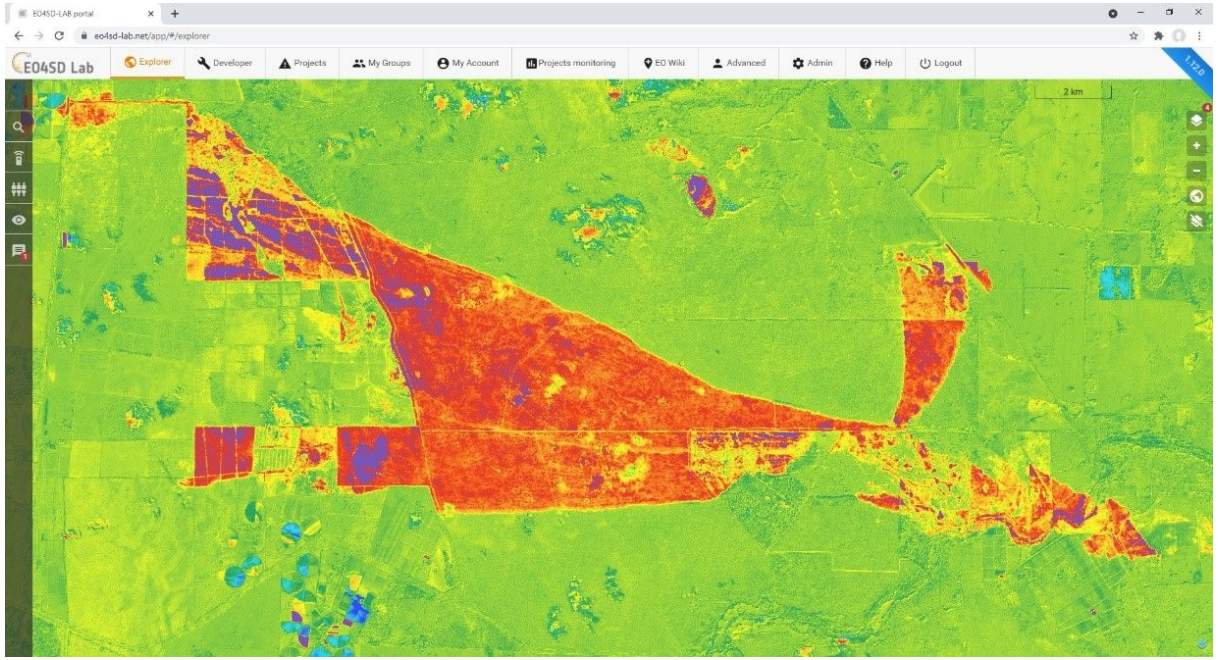
List of applications: EO data is used to detect periods of flood or low flow which may cause disruptions to waterway traffic, allowing the bodies responsible for the inland waterways to make informed decisions about traffic flows.



Credits: [Monitoring Marine Coastal Hazards with Earth Observations and Copernicus Data | CMEMS]

Credits: [The 2022 Market report is now available for download! | EU Agency for the Space Programme (europa.eu)]

FIRE Challenge - Example of Usage



Category: Civil security and protection

Example of usage: Monitoring of wildfires

List of applications: The increasing availability of Earth Observation (EO) data combined with the advanced analytics provided by Artificial Intelligence (AI) and Machine Learning (ML), along with the exceptional processing power of cloud computing can generate a service that can map fires and also provide fast, reliable and accessible information as required by the wildfire fighting community.

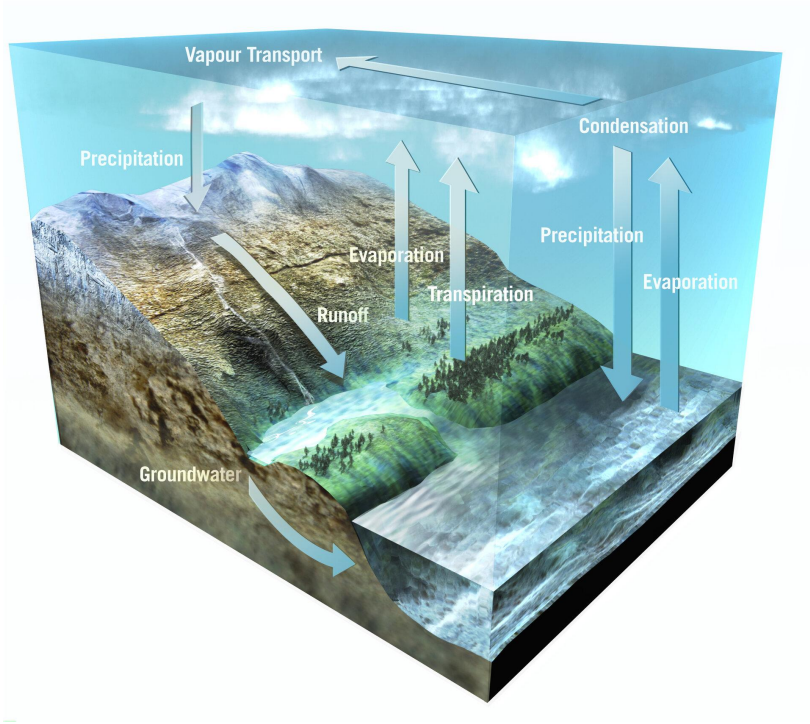
Credits: Artificial intelligence for Earth observation: monitoring of wildfires - eo science for society (esa.int)

Climate resilient Water - Example of Usage

Category: Agriculture, Forestry and Other Land Uses

Example of usage: Water Scarcity

List of applications: Data from the Sentinel-2 mission are key to the Copernicus Land Monitoring Service, which provides geographical information on land cover and its changes, land use, vegetation state, water cycle and surface-energy variables for a broad range of users across the world.



Credits: ESA - Satellites key to addressing water scarcity

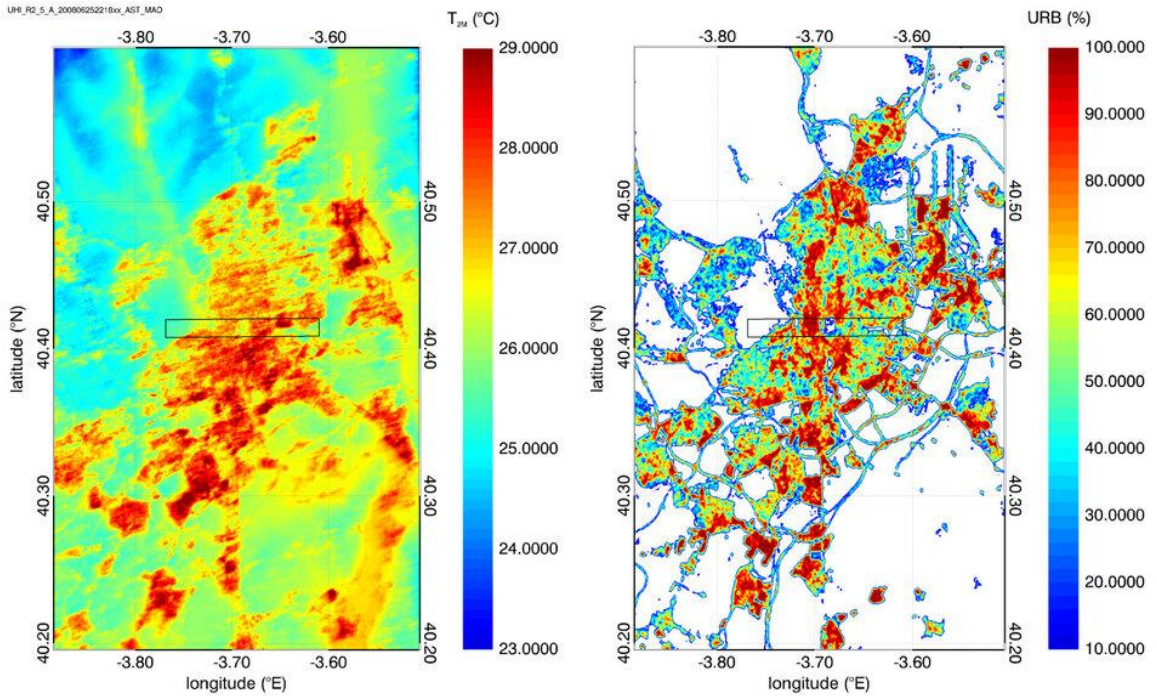
SUSTAINABLE & RESILIENT INFRASTRUCTURE - Example of Usage

Category: Environmental monitoring

Example of usage: Urban heat islands

List of applications: EO can support mapping temperatures and temperature variations across urban areas, e.g., as a means to alert health authorities of related risks for specific demographic groups.

Credits: The 2022 Market report is now available for download! | EU Agency for the Space Programme (europa.eu)



Parks cool areas of Madrid
Credits: ESA - Satellites predict city hot spots

SOTA analysis

Preliminary results

SOTA Methodology

- **Three activities:**
  a) The analysis of the Intellectual Property Rights - Listing the existing patents, standards
  b) COTS mapping
  c) Analysis of the material collected, transforming this into a list of technologies and assessment of the TRL level of these technologies

The main aim is to identify the room for innovation to set the grounds for a future PCP.

SOTA Methodology

- **Three activities:**
  a) The analysis of the Intellectual Property Rights - Listing the existing patents, standards
  b) COTS mapping
  c) Analysis of the material collected, transforming this into a list of technologies and assessment of the TRL level of these technologies

The main aim is to identify the room for innovation to set the grounds for a future PCP.

Task 3.2 Methodology (2)

Activity (a) – IPR Analysis

- **Macro analysis** of the total stock of **relevant patents, standards, standard essential patents**, to obtain information on their type, scope, breadth, content, radicalness and technical relevance, as well as the associated institutions and related suppliers owning intellectual property rights (IPRs).
- **The room for innovation/and or standardisation, the initial maturity level, the result that can be achieved in a given solution space, the associated expected timeline and investment will be determined.**
- After reviewing this analysis, an in-depth technical analysis of the most relevant documents will be performed by technical experts from GEKO, AV, CKIC. This will result in the **top 10 patents per application domain.**
- **This activity provides input to**:
  - **(1) the questions for the OMC**
  - **(2) the drafting of the tender documentation** (technical specifications and award criteria).
    One defining feature of the IPR search is the provision of information which is independent of industry bias (e.g. identified through research and not self-reported), which reduces the knowledge asymmetry between contracting authorities and the market.

SOTA Methodology (3)

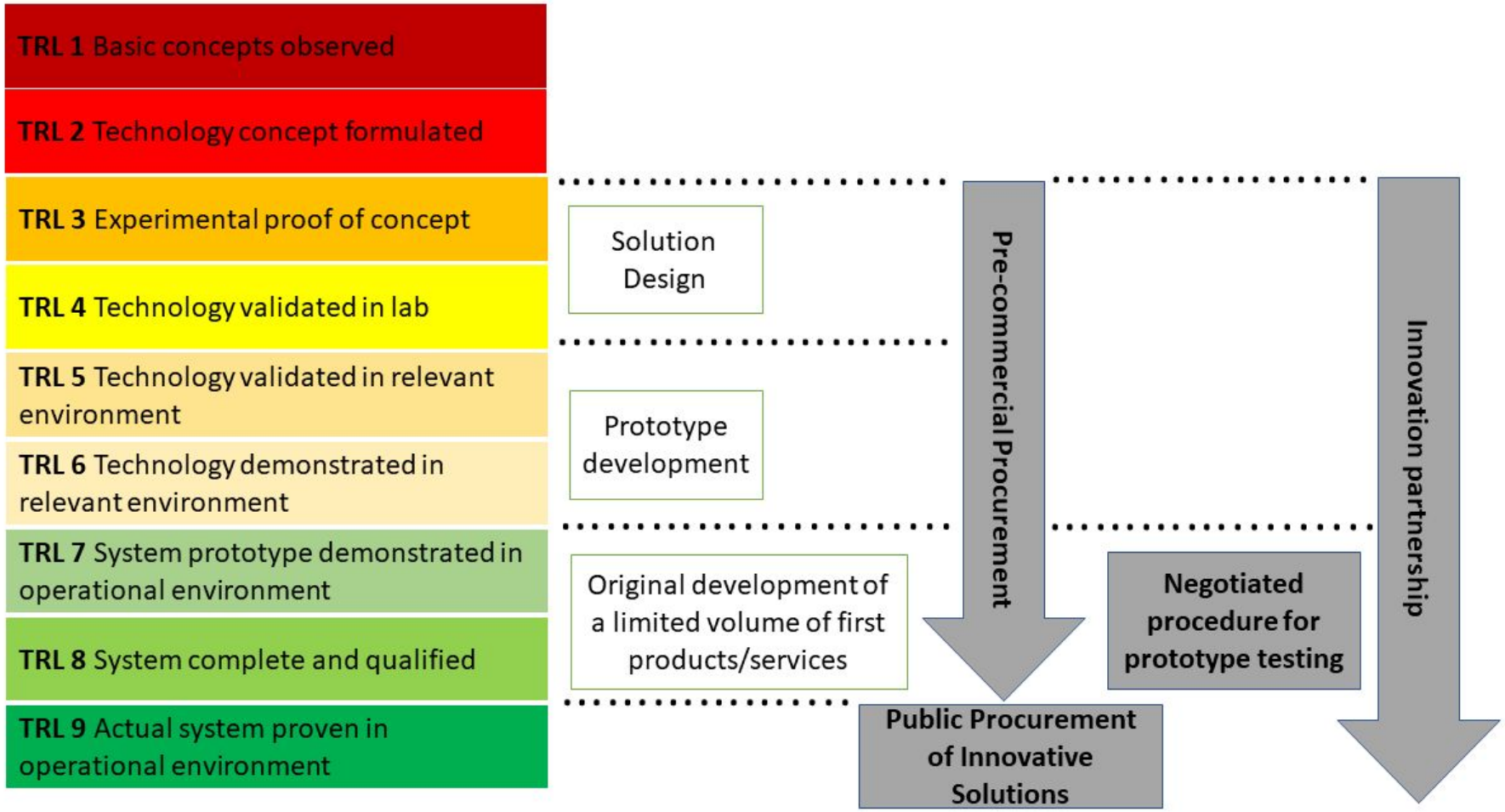
Activity (b) – COTS Mapping

- Identification and evaluation of the available Commercial-Off-The-Shelf (COTS) products which can satisfy the identified gaps.
- The aim is to identify **at least 5 COTS per application domain** & certification methods.

Activity (c) – TRL Level Assessment

- **After obtaining the outcomes of the previous tasks, the participants will work on identifying the TRL level of the technologies connected with selected COTS and macro analysis results.** Input to this task will be provided by the relevant research conducted under WP1.
- **GECO** shall gather material and select the **5 most relevant technologies per use case** that have been selected as critical for the needs of the Partners and are eligible for an upcoming PCP.
- **Explore the possibility of transversal technologies** to be used to more than one application domains.

Technology Readiness Level (TRL)



TRL for software used for mapping CS

TRL	Definition
1	Preliminary algorithmic stage. Publication of research results.
2	Individual algorithms or functions are prototyped.
3	Prototype of the main functionalities of the integrated system.
4	Alpha version. Preliminary release of non-mature software version; distributed to a community at an early stage of the software development life-cycle; that implements the main functionality of the software and by which preliminary verification and validation activities are archived.
5	Beta version. Preliminary release of non-mature software version; distributed to a community at an early stage of the software life-cycle, that implements the complete functionality of the software and by which preliminary verification and validation activities are archived.
6	Ready for use in an operational or production context, including user support, as a building block or a tool.
7	Demonstrator. Building block and tailored generic software product qualified for a particular purpose.
8	System qualified and ready to be applied in an operational environment.
9	Has been applied in the execution of an operational environment

Challenge 1 FLOODS

- The analysis revealed research on the
  - Methods for identifying the probability of occurrence of a flood event (risk indicators)
  - Flood measuring and trigger system (usually by making grids of the regios)
  - After event evaluation of the affected area
  - Flood map production
  - Systems and methods are provided for processing observation data.
- Technologies & tools: satellite imagery, computer vision, artificial intelligence, multi sensor input (drones etc), image analysis, statistical analysis, and mathematical analysis, kernel algorithm, visible-infrared band images of a region, water based network devices.

Patents and Standards preliminary search results

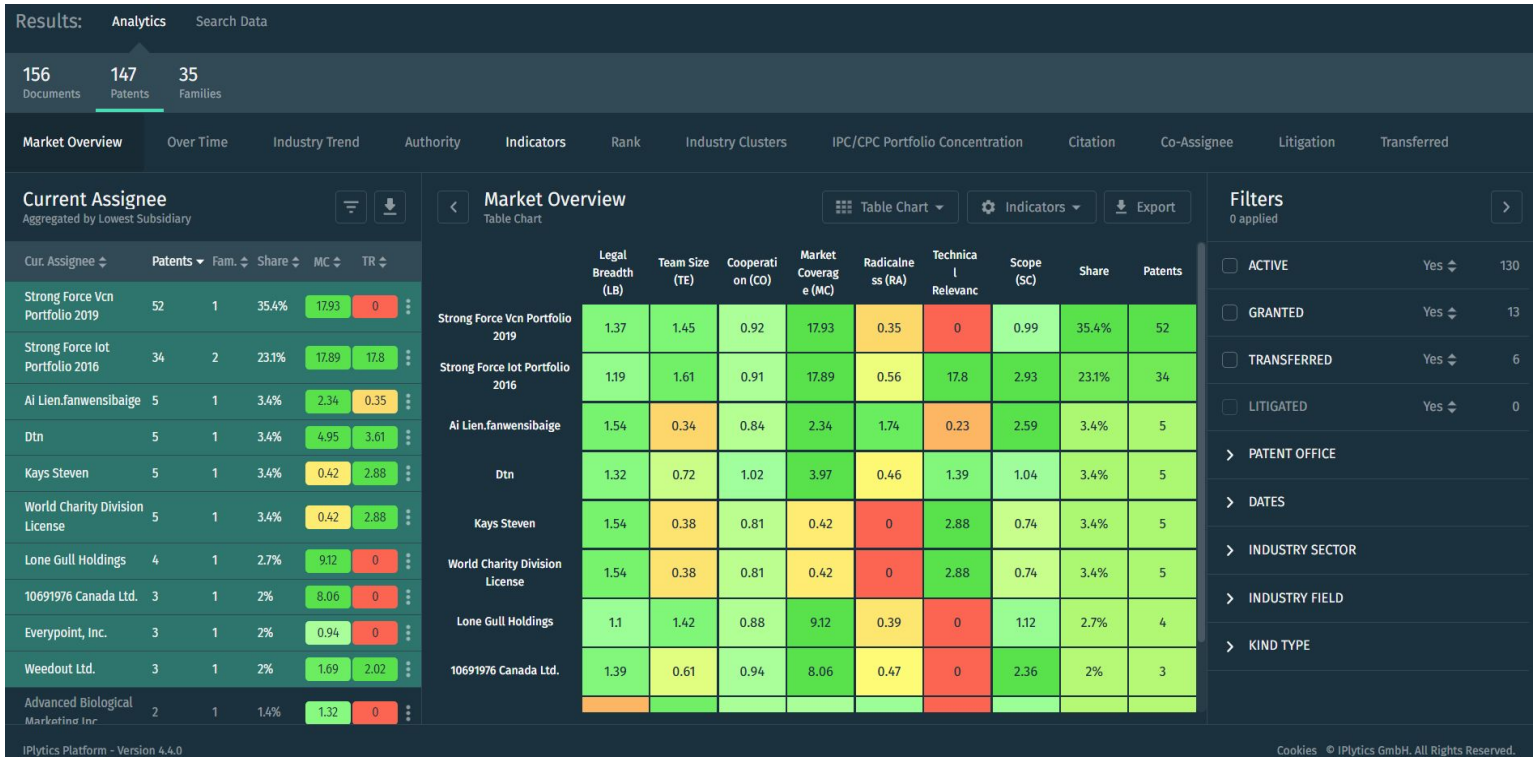
Challenge 1 FLOODS

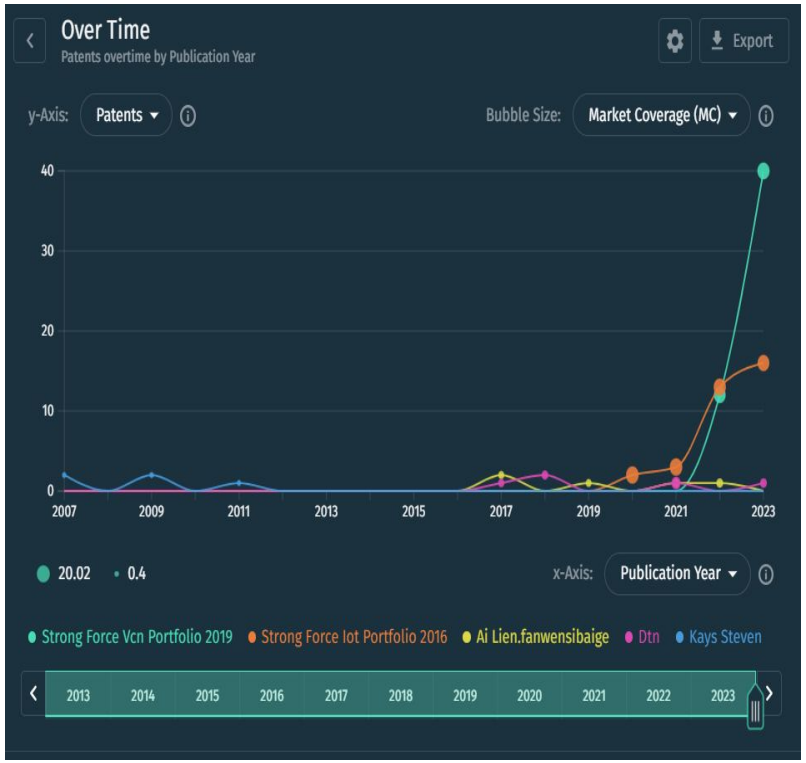
List of keywords used

- flood
- earth observation
- rapid prediction
- coastal
- river
- detect
- risk
- sea level rise
- Satellites
- internet of things
- drones

Example of Patents search

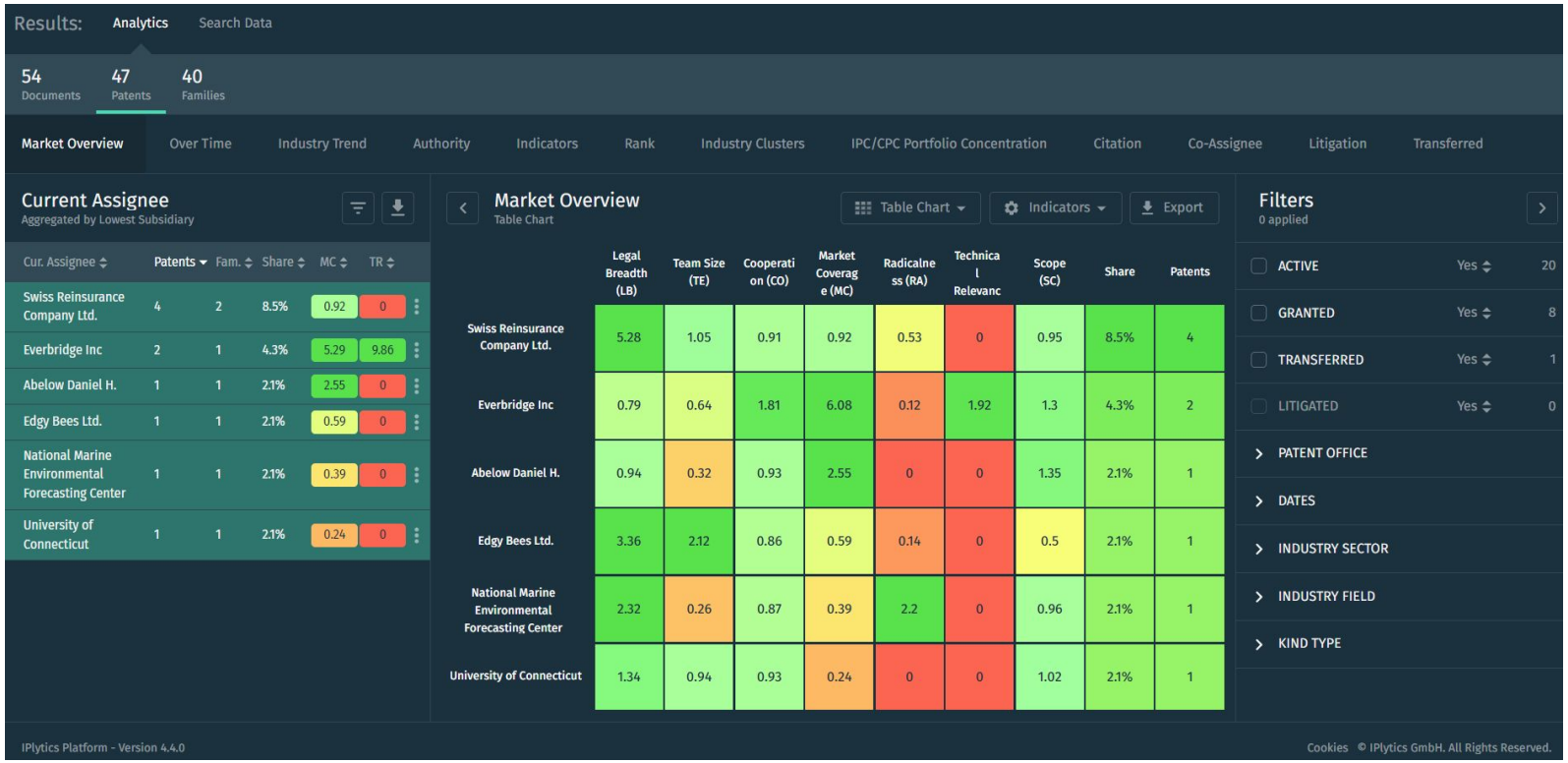
- (all:(flood)) AND (description_search:(earth observation)) AND (description_search:(rapid prediction)) AND (all:(drones))





Example of Patents search

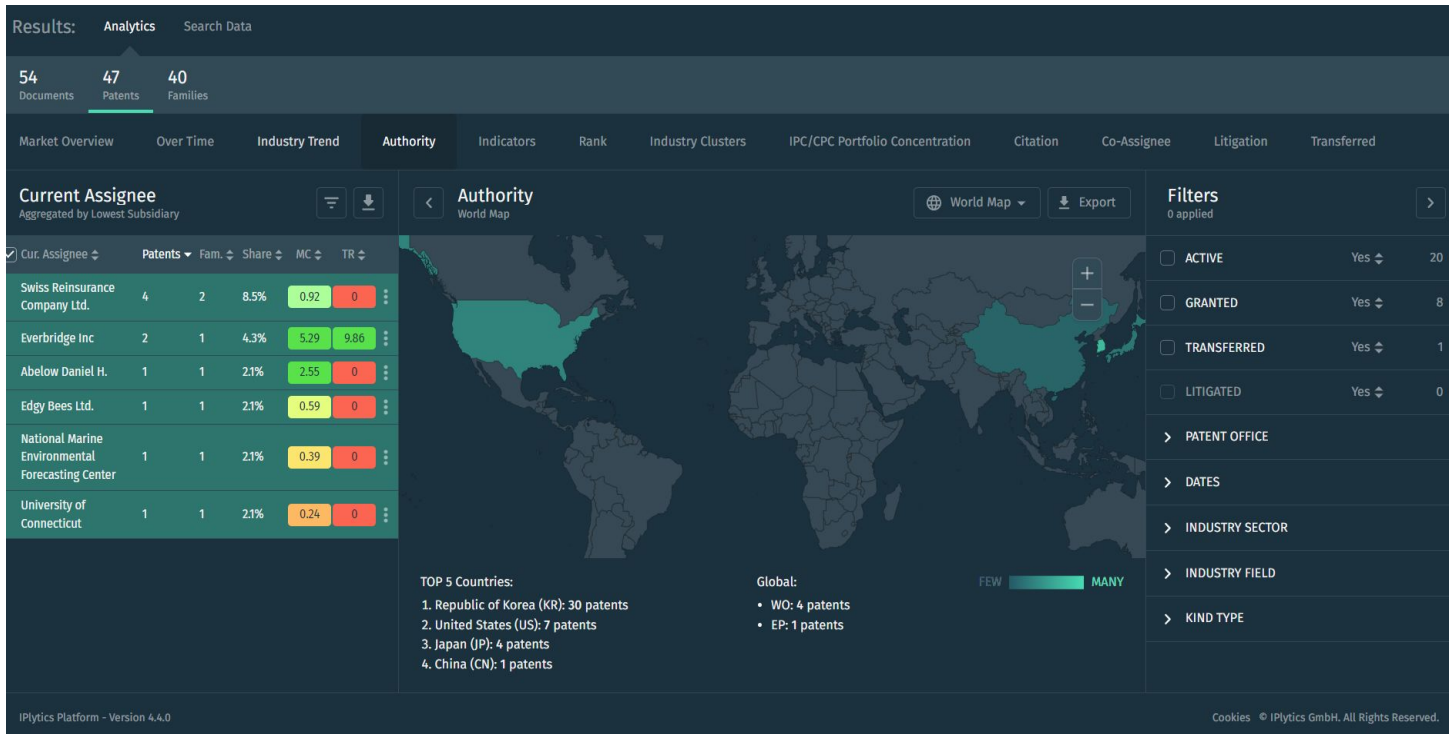
- (all:(coastal)) AND (all:(river)) AND (all:(flood)) AND (description_search:(earth observation)) AND (description_search:(detect)) AND (description_search:(risk)) AND (all:(Satellites))



Publication No.	Cur. Assignee	Applicant	Inventor(s)	Title (English)	Abstract (English)	Indus. Sect.	Active	TR	MC
US20210149929A1	University of Connecticut	University of Connecticut	SHEN XINYI | ANAGNOSTO...	SYSTEMS AND METHODS T...	A system and method to ...	Electrical engineering	Yes	0	0.24
US20230068107A1	Swiss Reinsurance Compan	Swiss Reinsurance Compan	DE JONG ROGIER | SCHELS...	Monitoring and risk index...	A measuring and monitor...	Electrical engineering	Yes	-	1.08
WO2022063839A1	Swiss Reinsurance Compan	Swiss Reinsurance Compan	SCHELSKE OLIVER | DE JO...	MONITORING AND RISK IN...	A measuring and monitor...	Electrical engineering	Yes	-	0.8
EP4217955A1	Swiss Reinsurance Compan	Swiss Reinsurance Compan	SCHELSKE OLIVER | DE JO...	MONITORING AND RISK IN...	A measuring and monitor...	Electrical engineering	Yes	-	1.16
CN114091756B	National Marine Environme	National Marine Environme	Not Available	Township tsunami risk as...	The invention relates to a...	Electrical engineering	Yes	-	0.39
WO2023052570A1	Swiss Reinsurance Compan	Swiss Reinsurance Compan	SCHENKEL DAVID | SRINIV...	AERIAL AND/OR SATELLIT...	An aerial and/or satellite...	Electrical engineering	Yes	-	0.65
WO2022074643A1	Edgy Bees Ltd.	Edgy Bees Ltd.	HASKIN MENASHE | MAKM...	IMPROVING GEO-REGISTR...	A Geo-synchronization sy...	Electrical engineering	Yes	-	0.59
KR101799861B1			Not Available	Flood damage adjustmen...	More particularly, the pre...	Chemistry	No	2.02	0.07
KR20170081589A			LEE WOO SUNG	Typhoon Disaster Dischar...	The present invention rel...	Other fields	No	1.11	0.05
KR20200099259A			LEE WOO SUNG	Tsunami disaster prevent...	The present invention rel...	Other fields	No	0	0.08
KR101570665B1			Not Available	Flood disaster control sy...	The present invention rel...	Other fields	Yes	4.38	0.1
US10856127B2	Everbridge Inc	RedSky Technologies, Inc.	MAIER NICHOLAS M | EISN...	Method and system for a...	An emergency location in...	Electrical engineering	Yes	1.92	5.74
KR20140094481A			LEE WOO SUNG	Peace retained reclamati...	More particularly, the pre...	Other fields	No	0	0.1
KR20140094482A			LEE WOO SUNG	Global nuclear power rea...	BACKGROUND OF THE INV...	Mechanical engineering	Yes	2.73	0.02
KR20180019134A			LEE WOO SUNG	Dual-structure fast react...	The present invention rel...	Mechanical engineering	No	6.89	0.02
JP2906165B2			Not Available	Protective equipment	Not Available	Mechanical engineering	No	1.45	0.1
KR20160093580A			LEE WOO SUNG	Public water landfill of fis...	The present invention rel...	Other fields	No	0	0.05
KR20160101884A			LEE WOO SUNG	Marine products cultivati...	The present invention rel...	Mechanical engineering	No	0	0.03
JP2017122713A			TAKAHASHI MASATO	DIRECTION INFORMATION ...	PROBLEM TO BE SOLVED: ...	Instruments	Yes	4.96	0.15
KR20170012880A			LEE WOO SUNG	Gas cooling reactor facilit...	The present invention rel...	Mechanical engineering	No	0	0.03

Example of Patents search

- (all:(coastal)) AND (all:(river)) AND (all:(flood)) AND (description_search:(earth observation)) AND (description_search:(detect)) AND (description_search:(risk)) AND (all:(Satellites))

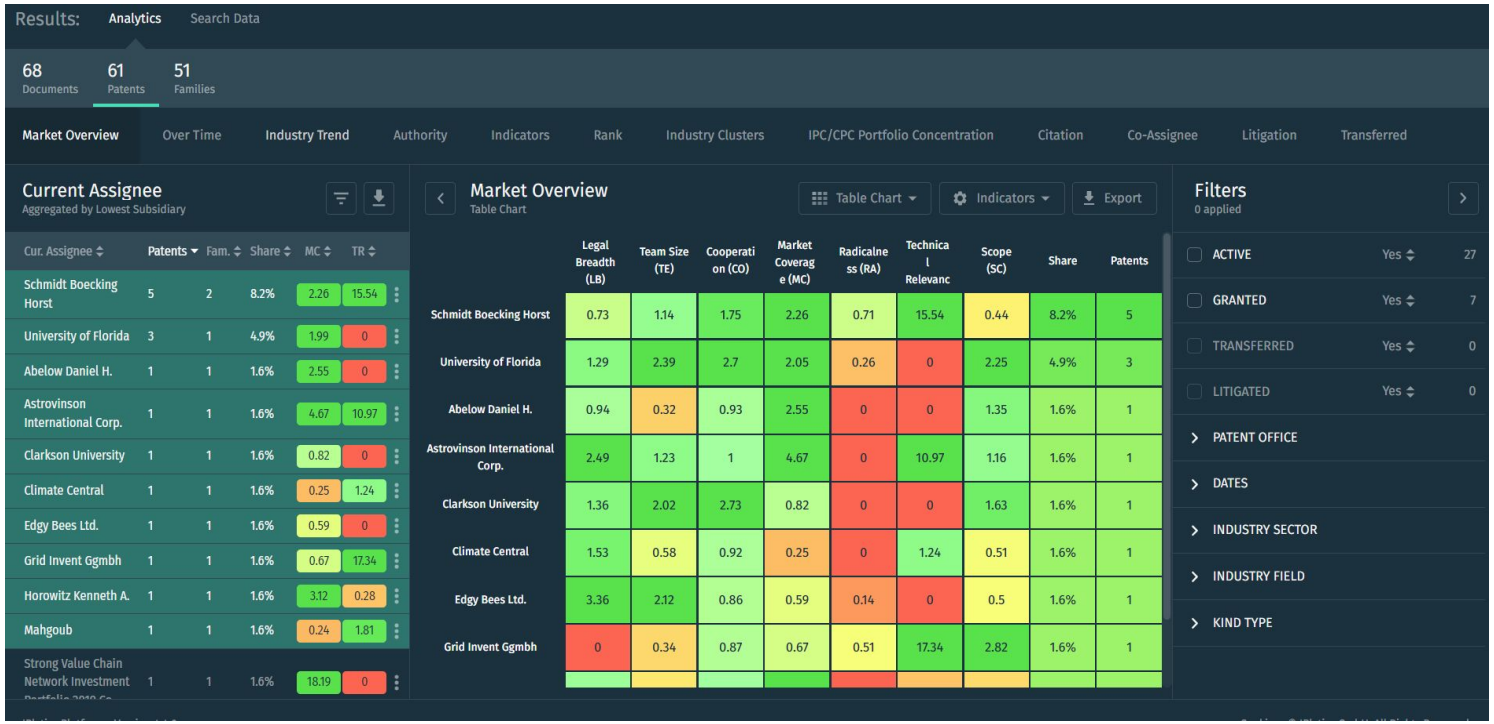


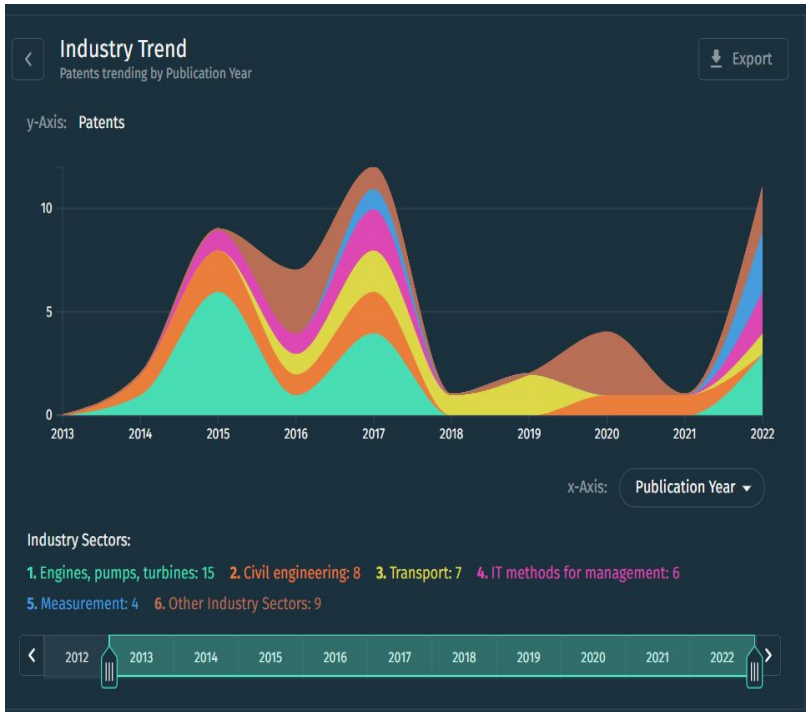
ABSTRACT

A measuring and monitoring system is proposed comprising a plurality of measuring sensors and measuring devices by means of which geographically cellularly delimited measuring parameters are acquired. The measuring parameters are aggregated to a BES index, wherein the measuring parameters are selected in relation to the desired measurement accuracy of the biodiversity and ecosystem services (BES) index. The measuring and monitoring system comprises selectable, various biodiversity and ecosystem services at least comprising measuring parameters for measuring the habitat intactness and/or pollination and/or air quality and local climate and/or water security and/or water quality and/or soil fertility and/or erosion control and/or coastal protection and/or food provision and/or timber provision. The measuring and monitoring system further permits the quantitative acquisition/measurement of risk indices based on the measured ecosystem services as a function of sectoral economic services.A measuring and monitoring system is proposed comprising a plurality of measuring sensors and measuring devices by means of which geographically cellularly delimited measuring parameters are acquired. The measuring parameters are aggregated to a BES index, wherein the measuring parameters are selected in relation to the desired measurement accuracy of the biodiversity and ecosystem services (BES) index. The measuring and monitoring system comprises selectable, various biodiversity and ecosystem services at least comprising measuring parameters for measuring the habitat intactness and/or pollination and/or air quality and local climate and/or water security and/or water quality and/or soil fertility and/or erosion control and/or coastal protection and/or food provision and/or timber provision. The measuring and monitoring system further permits the quantitative acquisition/measurement of risk indices based on the measured ecosystem services as a function of sectoral economic services.

Example of Patents search

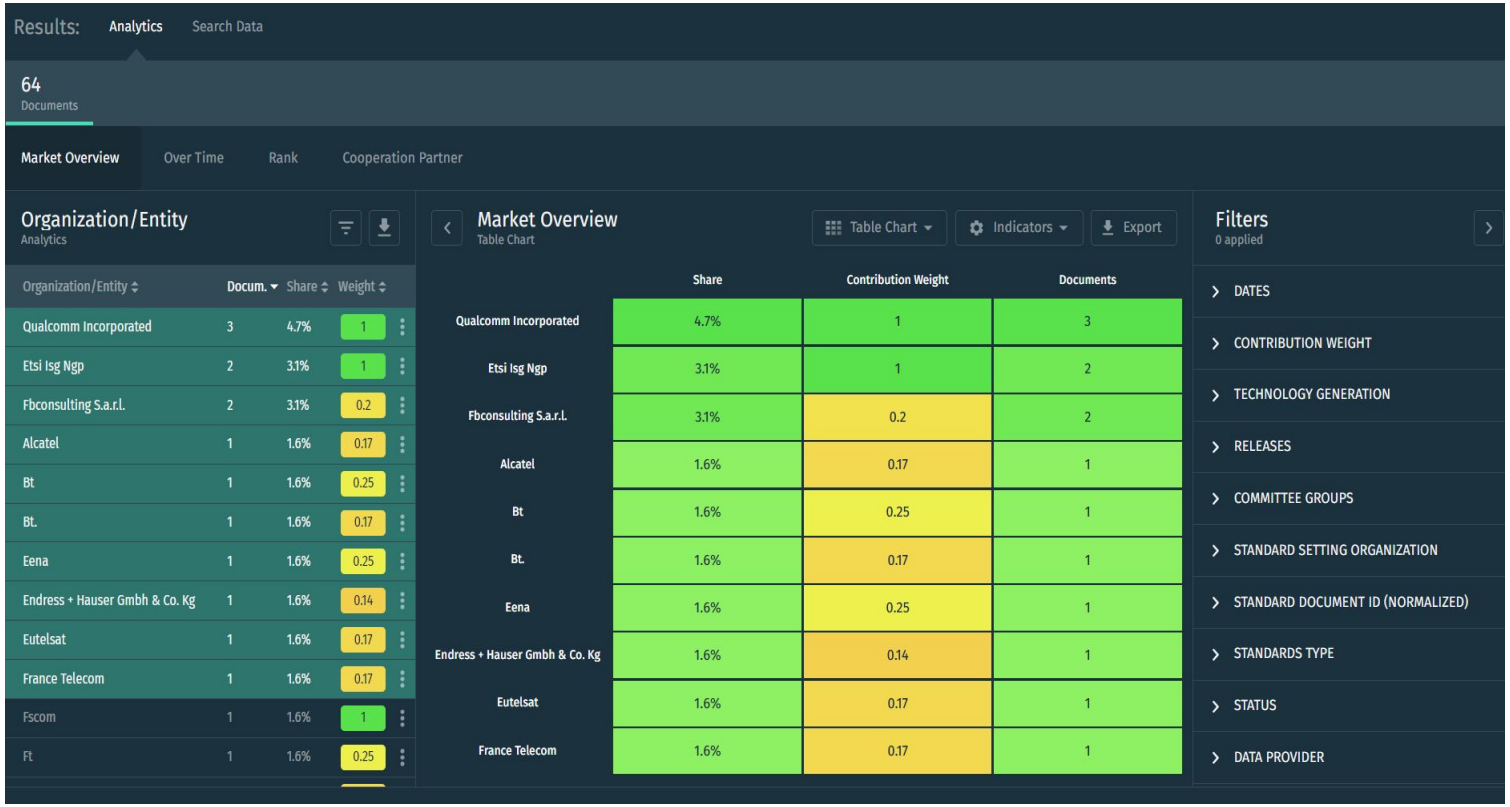
- (all:(coastal)) AND (all:(flood)) AND (description_search:(earth observation)) AND (description_search:(sea level rise)) AND (all:(internet of things))





Example of Standards search

- (all:(flood)) AND (description_search:(earth observation)) AND (description_search:(detect))



Challenge 2 Fire

- The analysis revealed research on the
  - Methods for identifying fire risk level
  - Early warning- prediction
  - Fire management system (status, monitoring & forecast –estimated progression)
  - Maps & graphical representation of fire information
  - **None of the results was related to waste fire specifically but the inventions identified can provide a technological basis for the challenge**
- Technologies & tools: satellite imagery, multi sensor input (drones etc), satellite images , vegetation information, and weather data, statistical analysis, and mathematical analysis, cloud-to-ground lightning distribution characteristics, water based network devices.

Patents and Standards preliminary search results

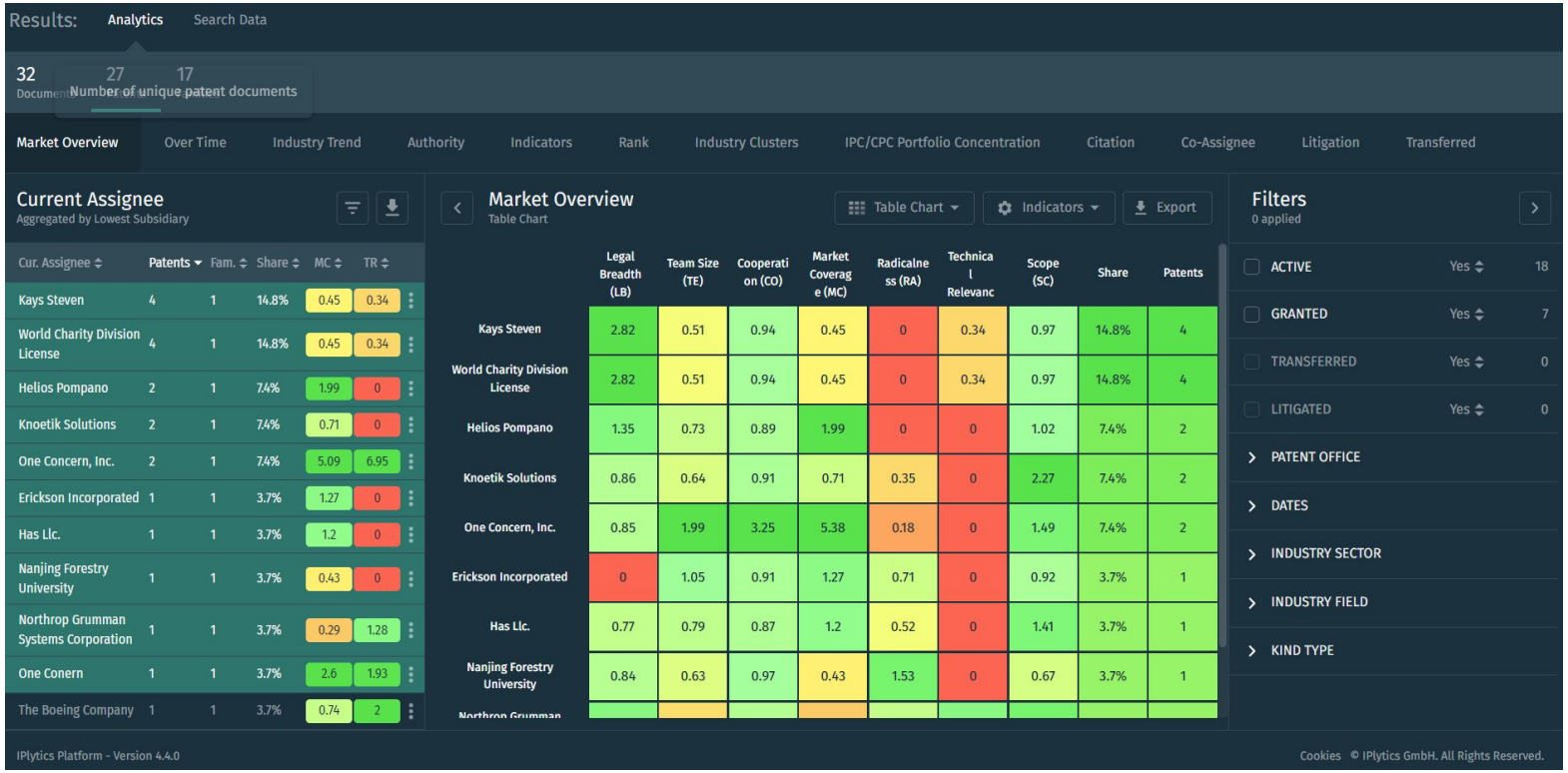
Challenge 2 Fire

List of keywords used

- fire ignition
- monitoring of fire
- prediction
- forest fires
- Wildfires
- satellites
- Earth Observation
- waste fire
- fire prevention
- fire risk
- fire prediction
- Automated notification
- Artificial Intelligence
- drones

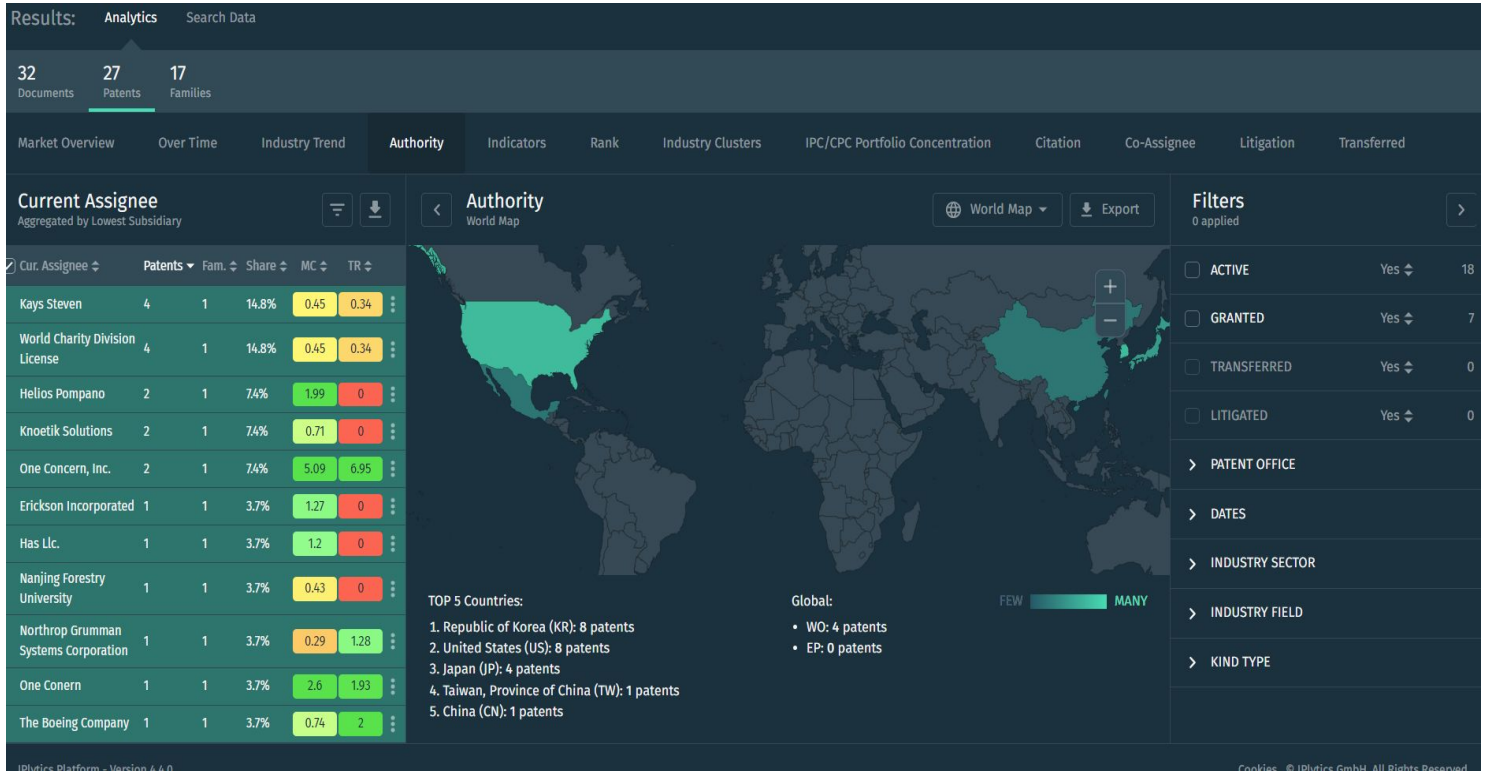
Example of Patents search

- (all:(fire ignition)) AND (description_search:(monitoring of fire)) AND (description_search:(prediction)) AND (description_search:(forest fires)) AND (description_search:(wildfires)) AND (all:(satellites))



Example of Patents search

- (all:(fire ignition)) AND (description_search:(monitoring of fire)) AND (description_search:(prediction)) AND (description_search:(forest fires)) AND (description_search:(wildfires)) AND (all:(satellites))



TITLE (ENGLISH)

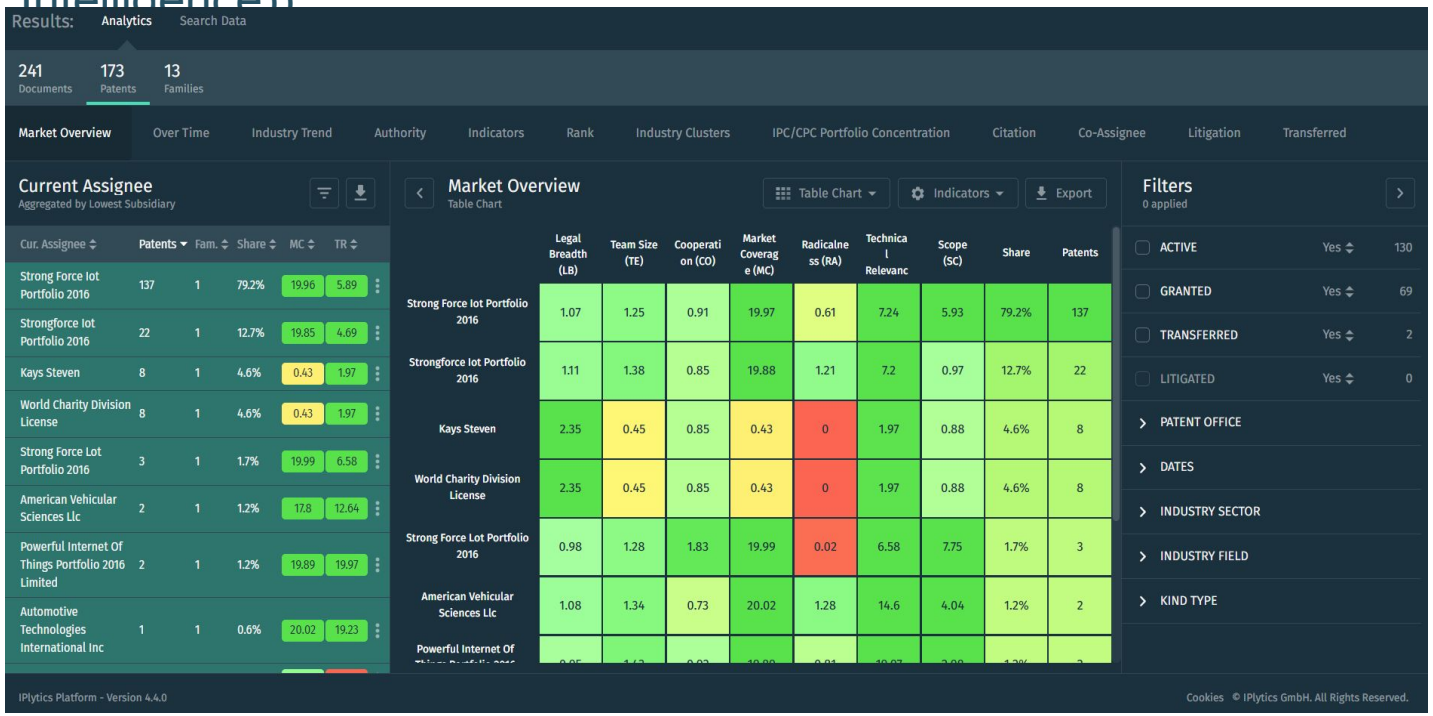
Fire management tool with versatile user interface

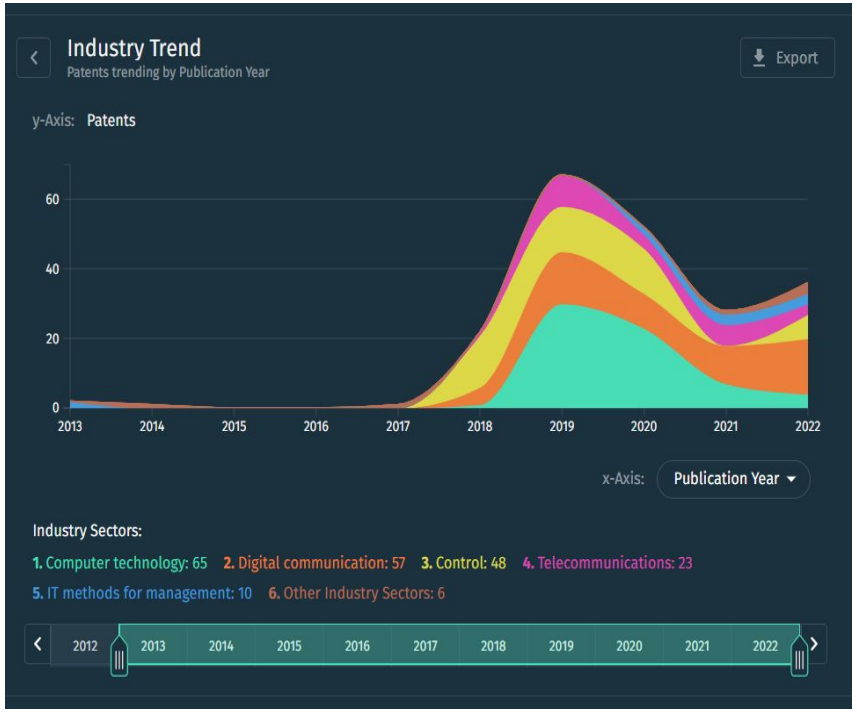
ABSTRACT

Methods, systems, and computer programs are presented for providing a user interface for fire management. One method includes an operation for estimating, by a fire management system, a fire state in a region and a forecast of an evolution of a fire at multiple times. The fire management program provides a user interface presenting fire information based on the estimated fire state and the forecast. The user interface includes a map of the region, a graphical representation of the fire information, and a time bar for selecting a time for the fire information. Additionally, the method includes an operation for receiving, via the user interface, a selection of the time for the fire information. The selected time is one of a past time, a present time, or a future time. The fire management program presents in the user interface the fire information for the selected time.Methods, systems, and computer programs are presented for providing a user interface for fire management. One method includes an operation for estimating, by a fire management system, a fire state in a region and a forecast of an evolution of a fire at multiple times. The fire management program provides a user interface presenting fire information based on the estimated fire state and the forecast. The user interface includes a map of the region, a graphical representation of the fire information, and a time bar for selecting a time for the fire information. Additionally, the method includes an operation for receiving, via the user interface, a selection of the time for the fire information. The selected time is one of a past time, a present time, or a future time. The fire management program presents in the user interface the fire information for the selected time.

Example of Patents search

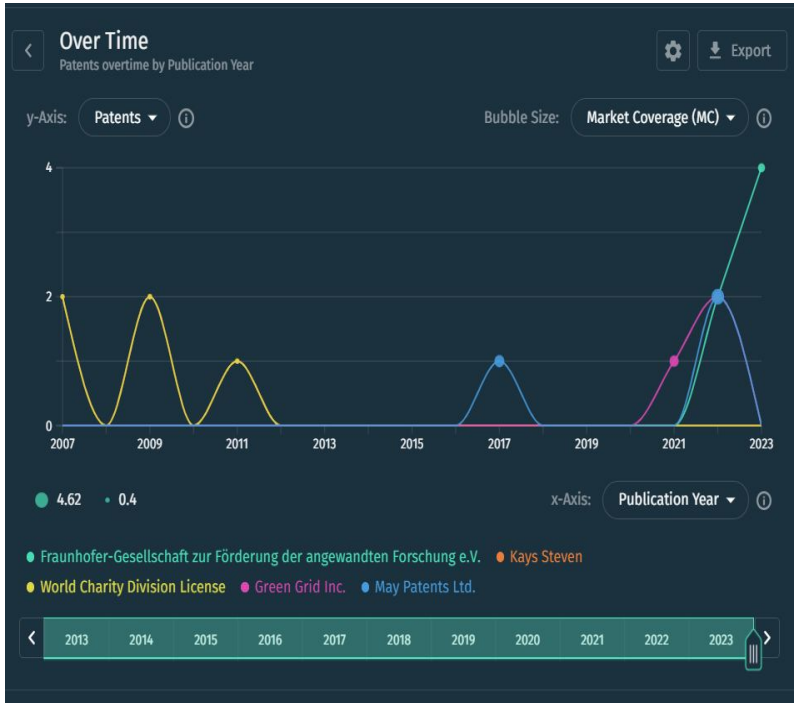
- (all:(Earth Observation)) AND (description_search:(waste fire)) AND (description_search:(fire ignition)) AND (description_search:(fire prevention)) AND (description_search:(fire risk)) AND (description_search:(fire prediction)) AND (description_search:(Automated notification)) AND (all:(Artificial Intelligence))





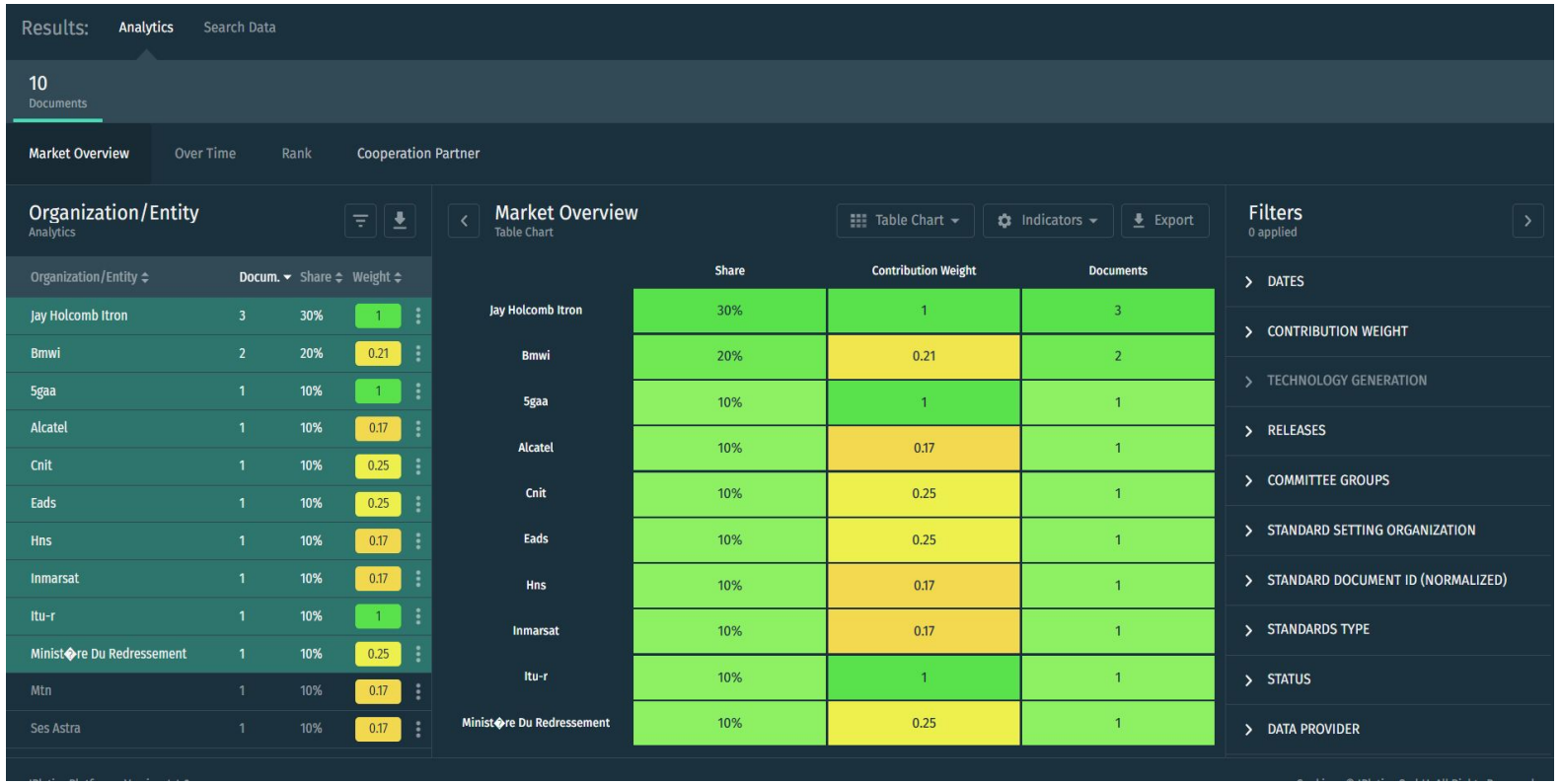
Example of Patents search

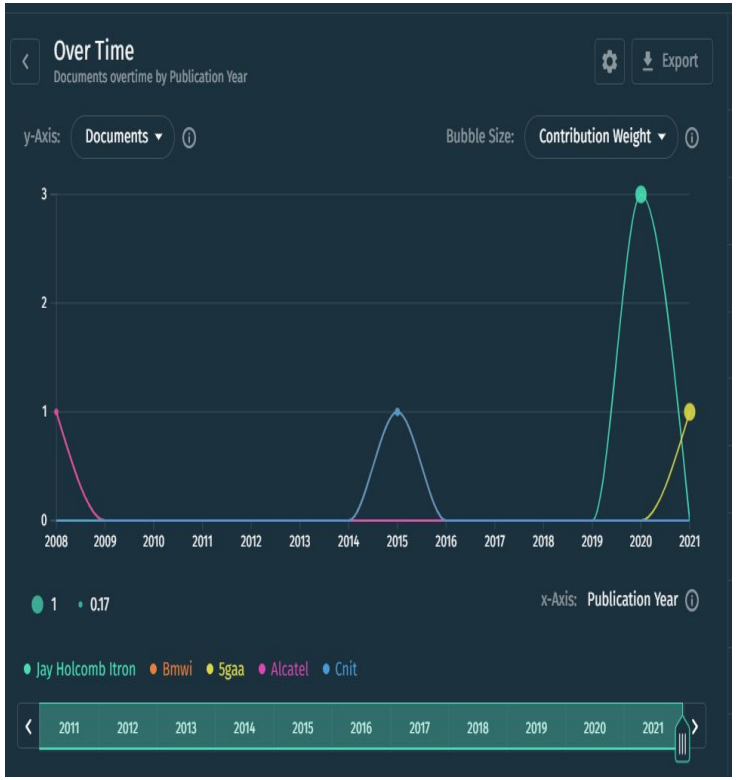
- (all:(Earth Observation)) AND (description_search:(wild fire)) AND (description_search:(fire detection)) AND (all:(drones))



Example of standard search

- (all:(Earth Observation)) AND (description_search:(fire prediction)) AND (all:(satellites))





Challenge 3 Water

- The analysis revealed research on the
  - Methods for identifying the probability of occurrence of a drought
  - Systems and methods are provided for processing observation data
  - Methods for identifying risk level
  - Early warning- prediction
  - Water and drought management system (status, monitoring & forecast –estimated progression)
  - Maps & graphical representation of water information
- Technologies & tools: satellite imagery, multi sensor input (drones etc), computer vision, satellite images , vegetation information, and weather data, statistical analysis and mathematical analysis, water based network devices, ground measuring data, GUI, use of database management systems future data.

Patents and Standards preliminary search results

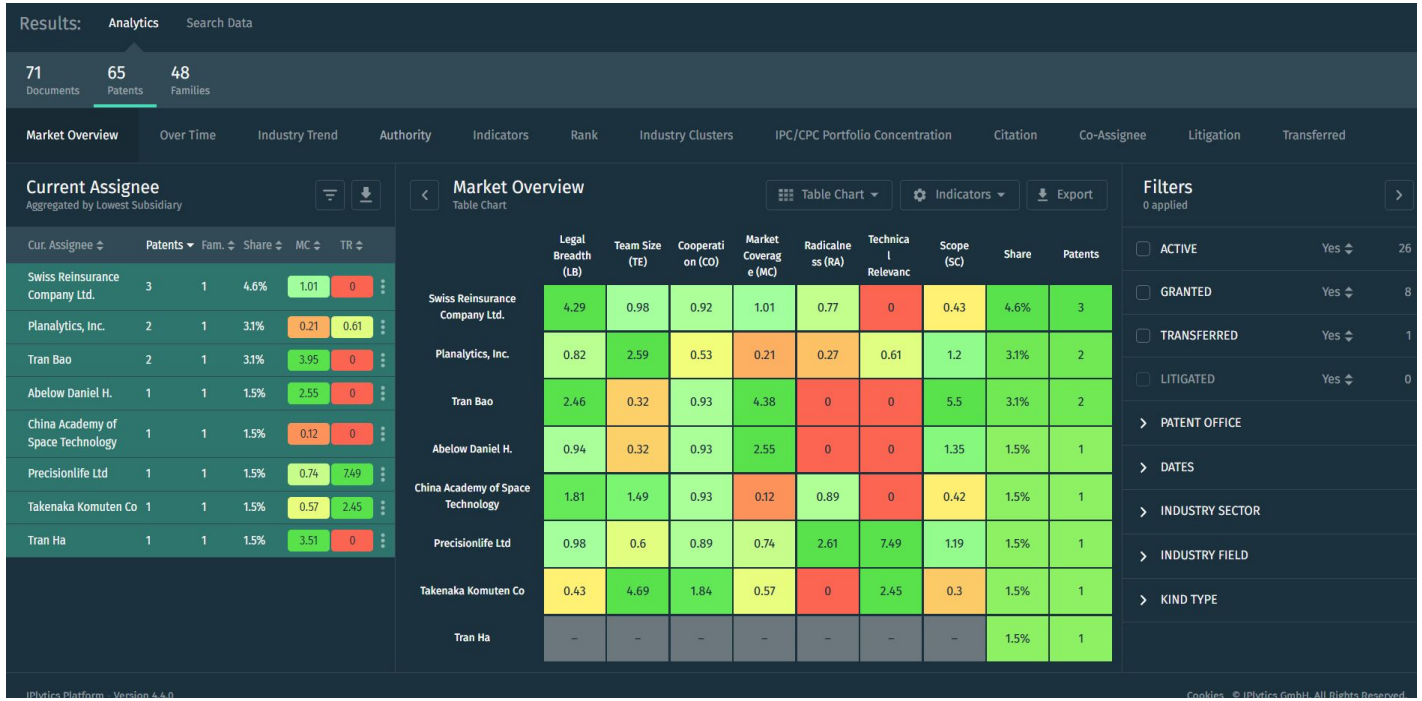
Challenge 3 Water

List of keywords used

- drinking water
- Earth observation
- drinking water management
- water quality
- Drought
- satellites
- fresh water
- water detection
- AI
- water demand

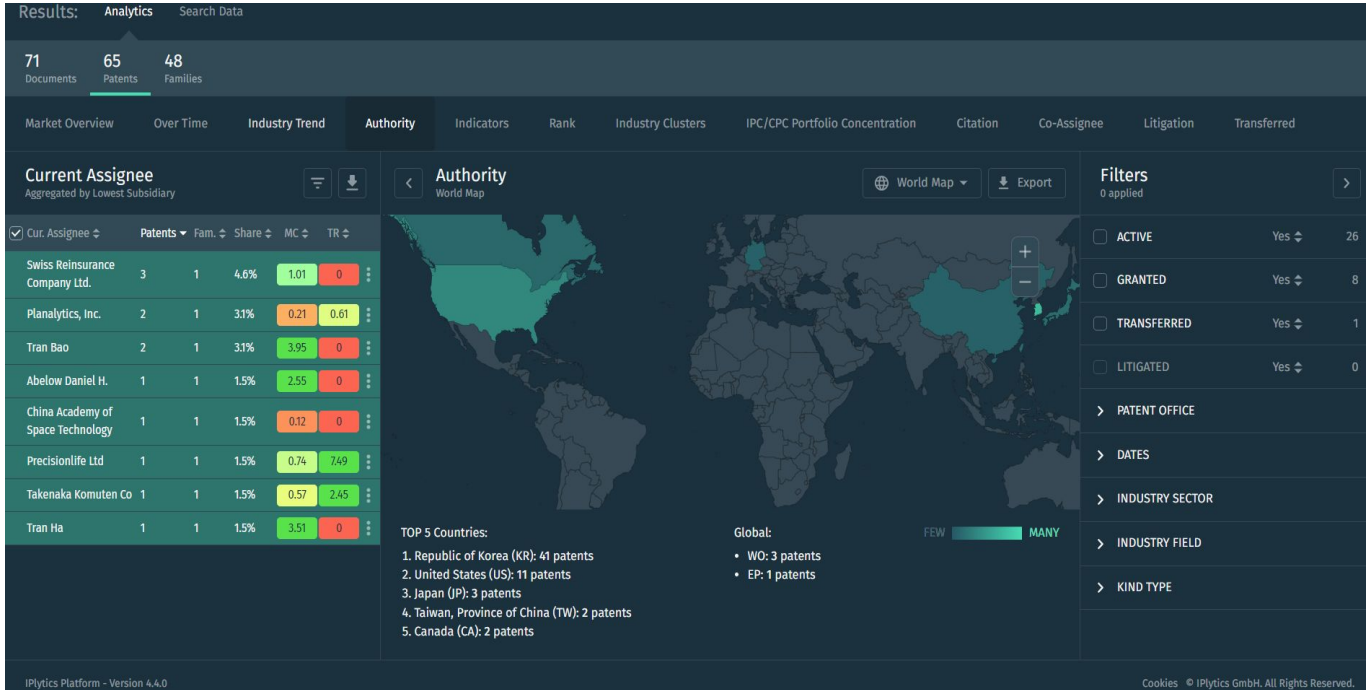
Example of patent search

- (all:(drinking water)) AND (all:(Earth observation)) AND (description_search:(drinking water management)) AND (description_search:(water quality)) AND (description_search:(drought)) AND (all:(satellites))



Example of patent search

- (all:(drinking water)) AND (all:(Earth observation)) AND (description_search:(drinking water management)) AND (description_search:(water quality)) AND (description_search:(drought)) AND (all:(satellites))



ABSTRACT (ENGLISH)

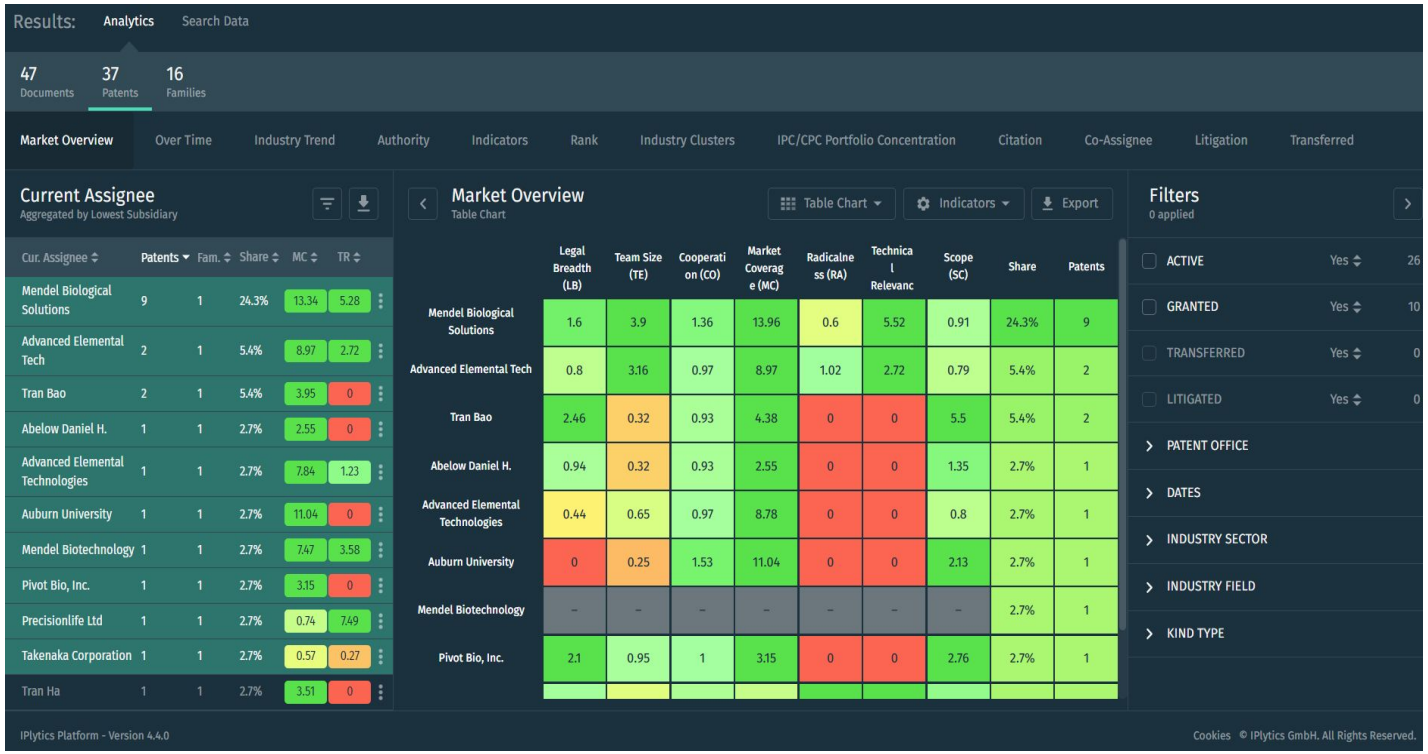
The invention discloses a method for improving regional underground water reserve estimation precision, which comprises the following steps: obtaining monthly-scale land water reserve change delta TWS 0 (ii) a Method for extracting soil water content change delta SM of monthly scale in global scope by utilizing GLDAS hydrological model 1 Snow water equivalent change Δ SWE 1 And vegetation canopy water reserve change delta PCSW 1 (ii) a Extraction of soil water content change delta SM of monthly scale in global scope by using WGHM hydrological model 2 Snow water equivalent change Δ SWE 2 And the water reserve change of the vegetation canopy delta PCSW 2 (ii) a Calculating to obtain the underground water reserve change delta GWS in the month scale 1 And Δ GWS 2 (ii) a Change in groundwater reserves Δ GWS according to measured monthly scale of research area 0 For Δ GWS, respectively 1 And Δ GWS 2 Carrying out evaluation; selecting the underground water reserve change delta GWS with the optimal monthly scale according to the evaluation result Superior food And outputting the result of the change of the un-

Show more

DESCRIPTION

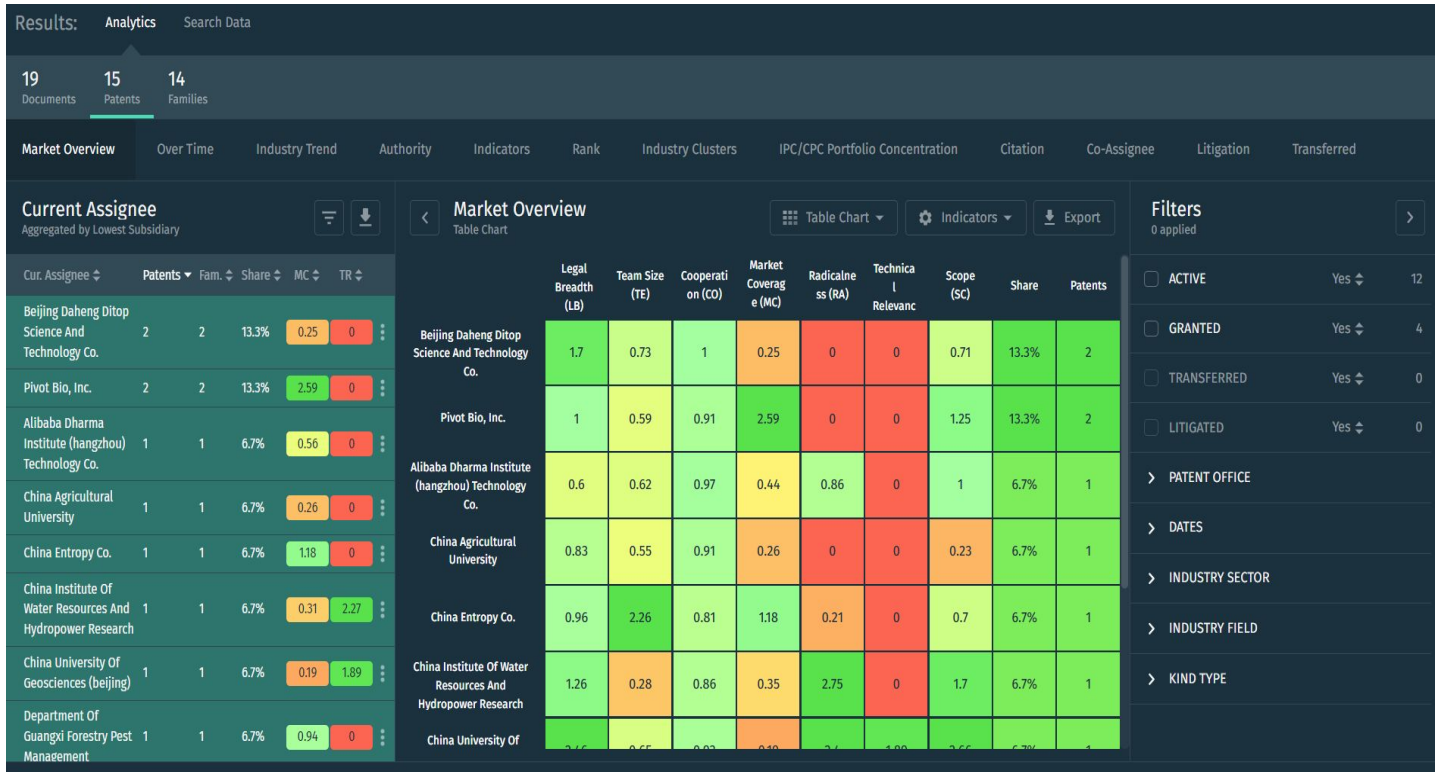
Example of patent search

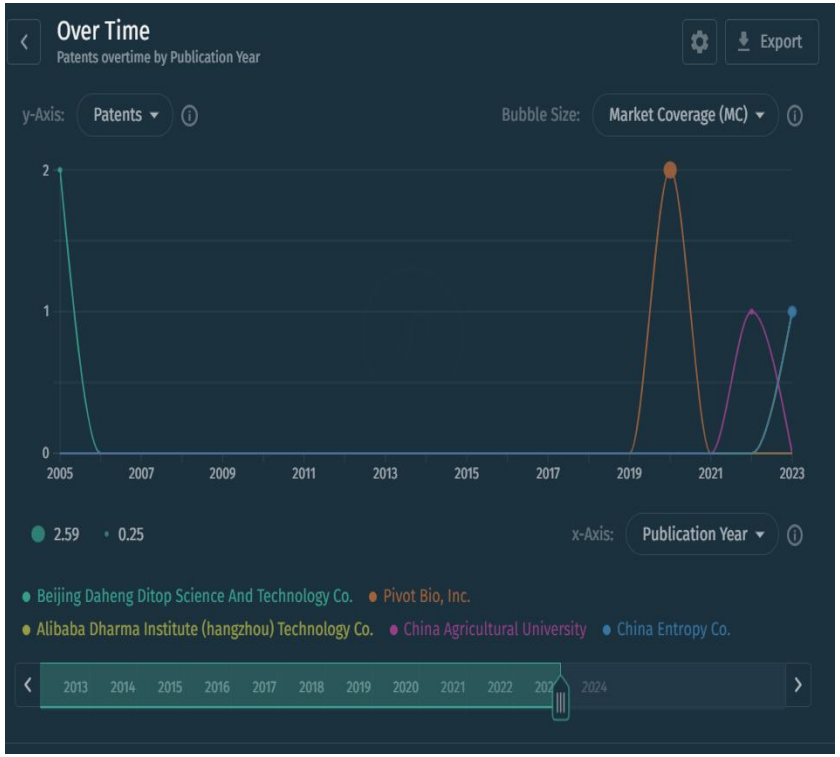
- (all:(drinking water)) AND (all:(fresh water)) AND (description_search:(Earth observation)) AND (description_search:(water detection)) AND (description_search:(drought)) AND (all:(AI))



Example of patent search

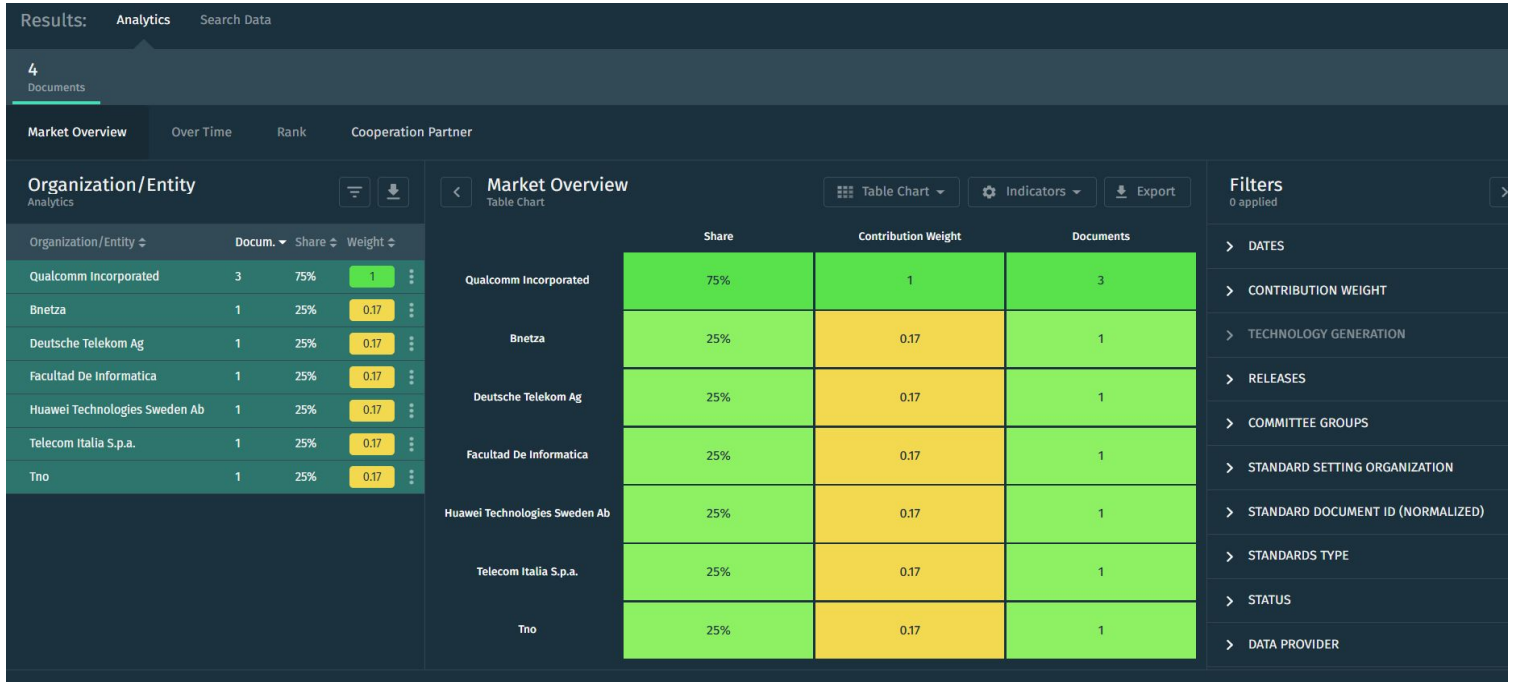
- (all:(drought)) AND (description_search:(Earth observation)) AND (description_search:(crop field)) AND (description_search:(water demand)) AND (all:(machine learning))





Example of standard search

- (all:(drinking water)) AND (description_search:(earth observation)) AND (description_search:(drinking water management))



Challenge 4 Sustainable Infrastructure

- The analysis revealed research on the
  - After event evaluation of the affected area
  - Creation of a thermal map of a region
  - Urban heat island detection method
  - Systems and methods are provided for processing observation data.
  - Analysis of urban morphology
  - Methods for monitoring and managing urban water resources and hydrology through a network of stations
  - Early warning-prediction
  - Methods for identifying risk level
- Technologies & tools: digital aerial and satellite imagery, photography, computer vision, artificial intelligence, multi sensor input (drones etc), image analysis, statistical analysis and mathematical analysis, airborne and spaceborne sensors, deep learning, ground-based data gathering, remote sensing data, data modelling, open source geographical data, image processing, remote sensing image and high-resolution remote sensing image.

Patents and Standards preliminary search results

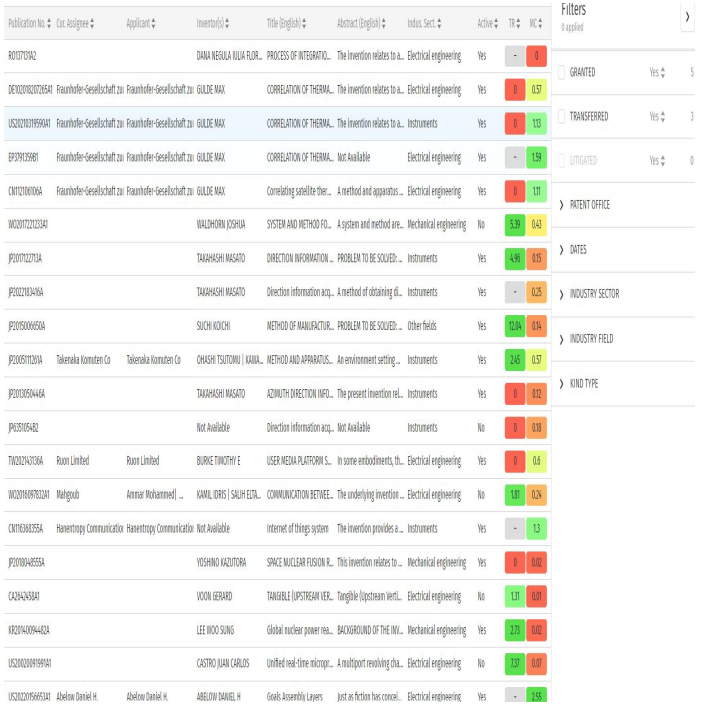
Challenge 4 Sustainable Infrastructure

List of keywords used

- Earth Observation
- urban heat islands
- urban planning
- Infrastructure
- satellites
- mapping urban areas
- Ground sensors
- heat island effect
- rural areas
- neighbourhoods

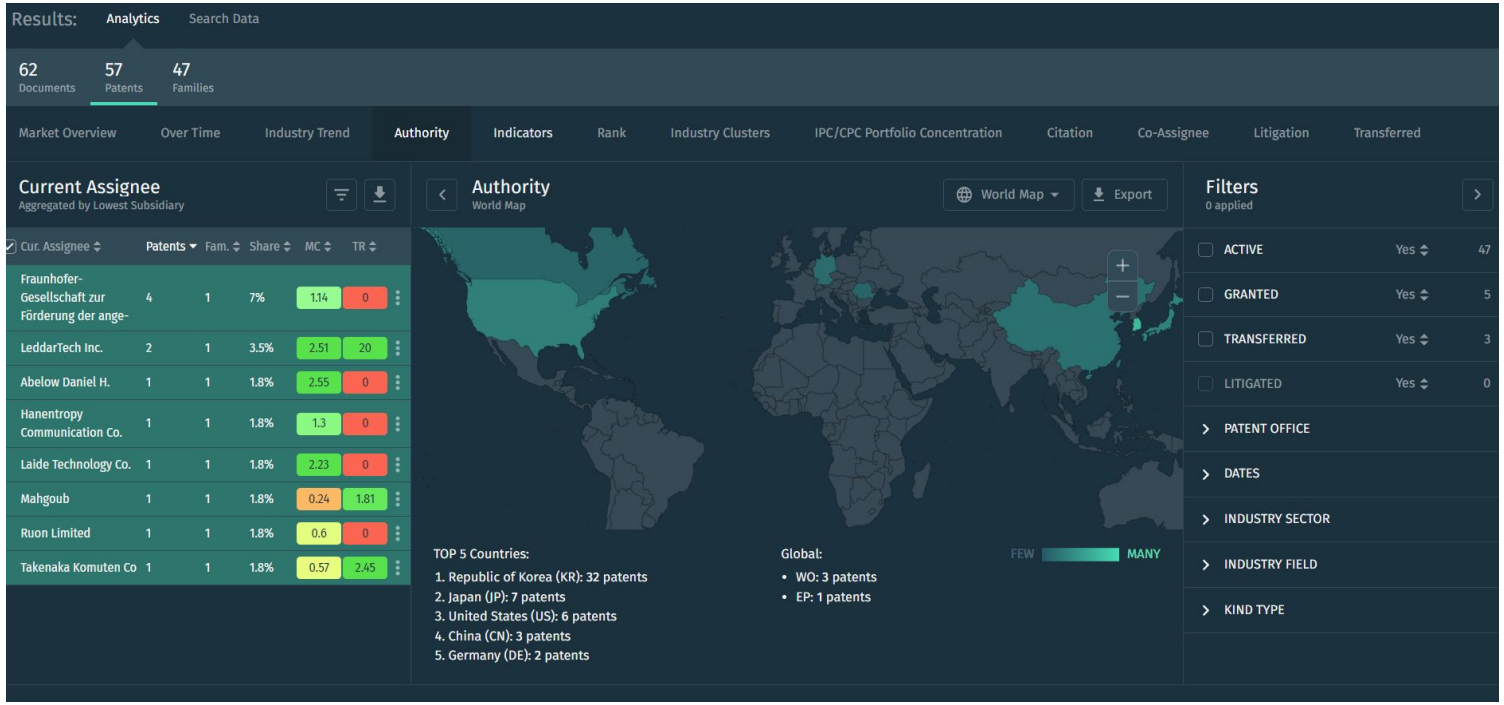
Example of patent search

- (all:(Earth Observation)) AND (description_search:(urban heat islands)) AND (description_search:(urban planning)) AND (description_search:(infrastructure)) AND (all:(satellites))



Example of patent search

- (all:(Earth Observation)) AND (description_search:(urban heat islands)) AND (description_search:(urban planning)) AND (description_search:(infrastructure)) AND (all:(satellites))



ABSTRACT (ENGLISH)

Not Available

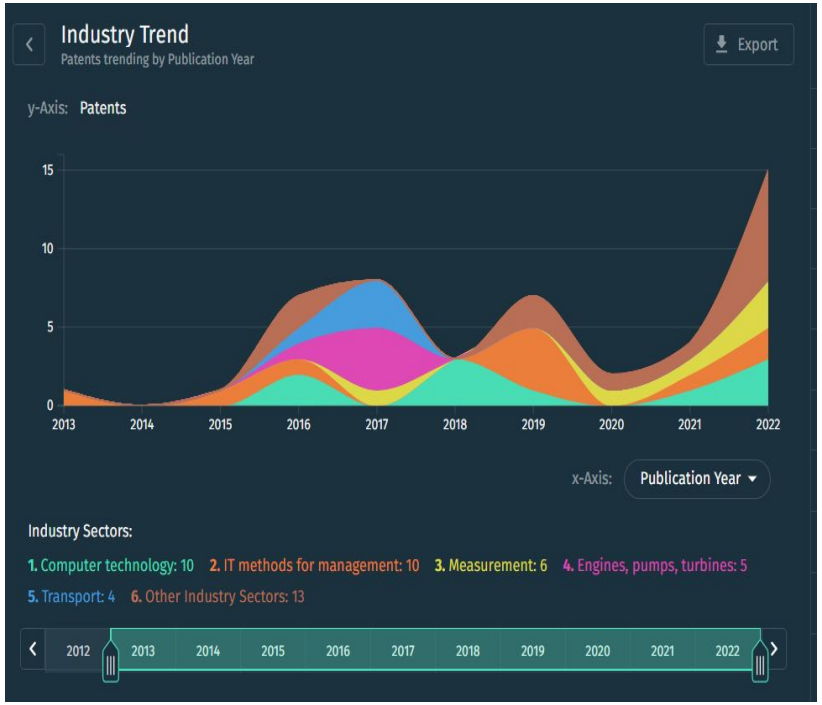
DESCRIPTION

The present invention relates to the determination of high spatial resolution thermal maps using thermal satellite imagery. A land surface temperature (LST, Land Surface Temperature) that is determined as precisely as possible is an important part of many different applications, e.g. in the detection of forest fires, the measurement of local maxima in the city temperature distribution (UHI, Urban Heat Island), in the determination of vegetation indices in in agriculture or in modeling the local and global climate. The large-scale and precise measurement of the land surface temperature has only become possible with the use of satellites. For example, the temperature is not measured directly, but derived from the radiance at the detector on board the satellite. The radiance R λ is the radiation (energy) emitted by a surface in a given time in a given spectral range in a given direction and is given in watts per square meter steradian. The detector itself records a gray value image in which the brightness of an individual pixel can be assigned to a measured radiance. Gray values DN are assigned to radiance R, for example, using a linear

Read more

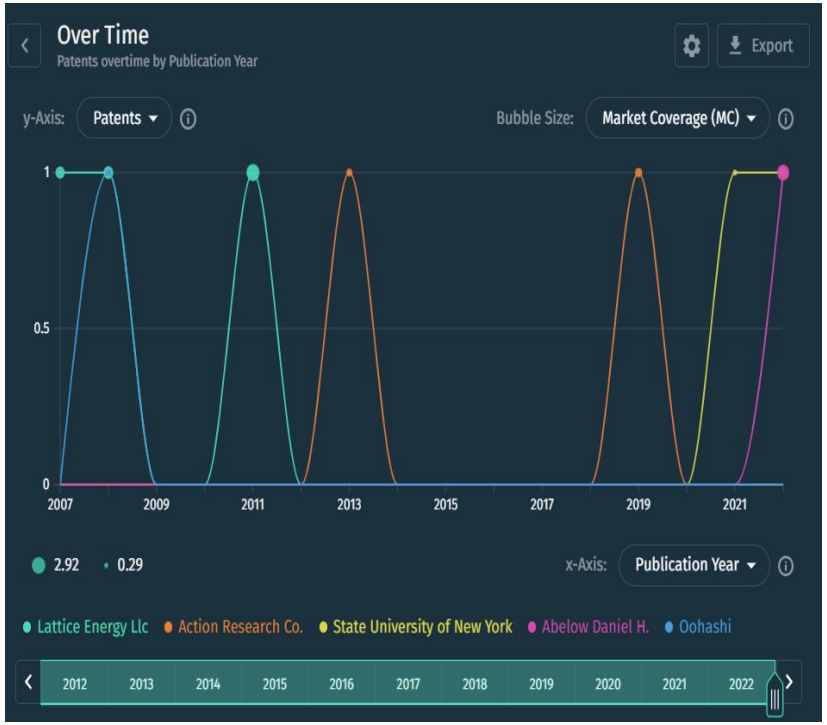
Example of patent search

- (all:(Earth Observation)) AND (description_search:(urban heat islands)) AND (description_search:(mapping urban areas)) AND (all:(Ground sensors))



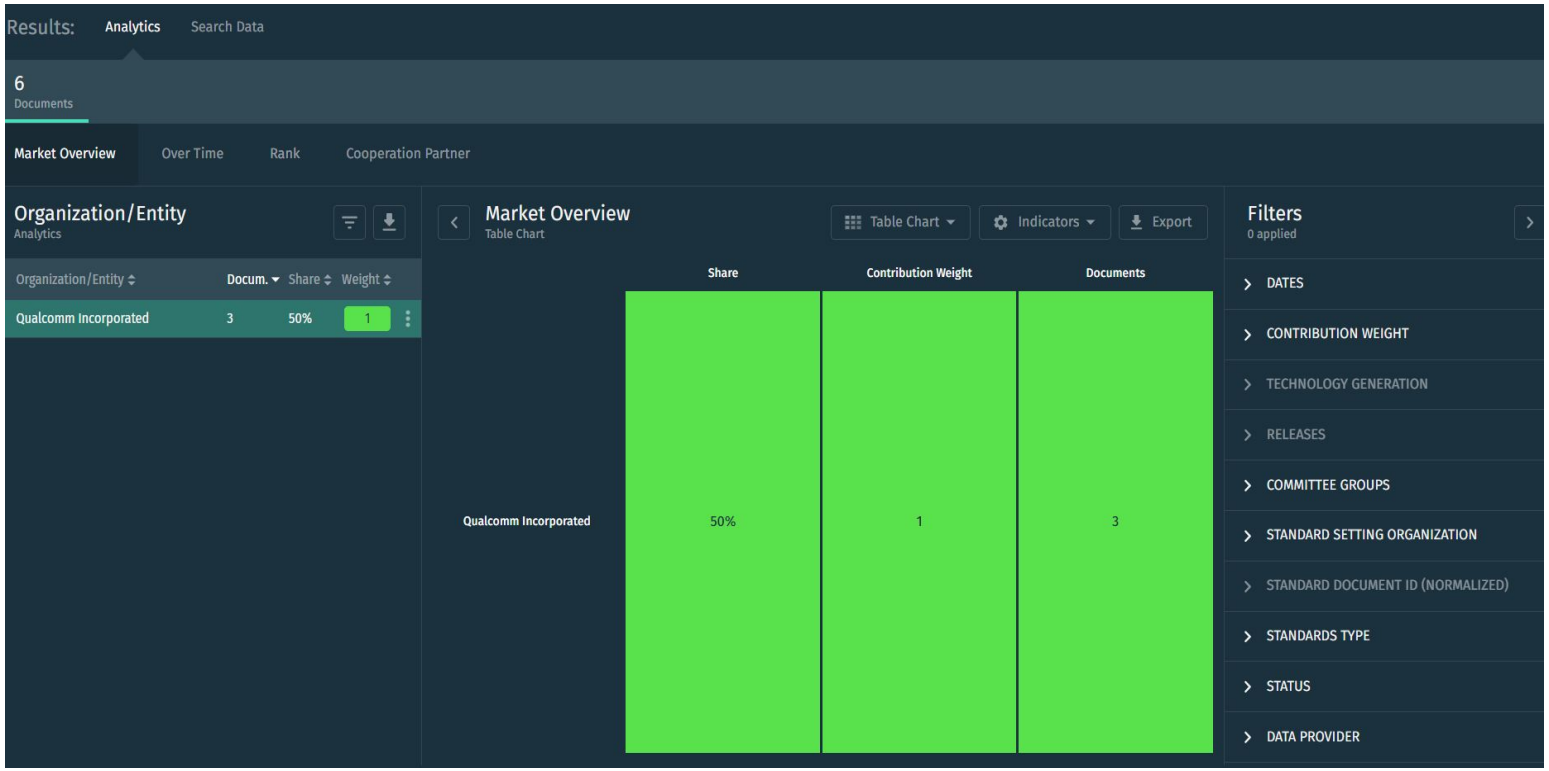
Example of patent search

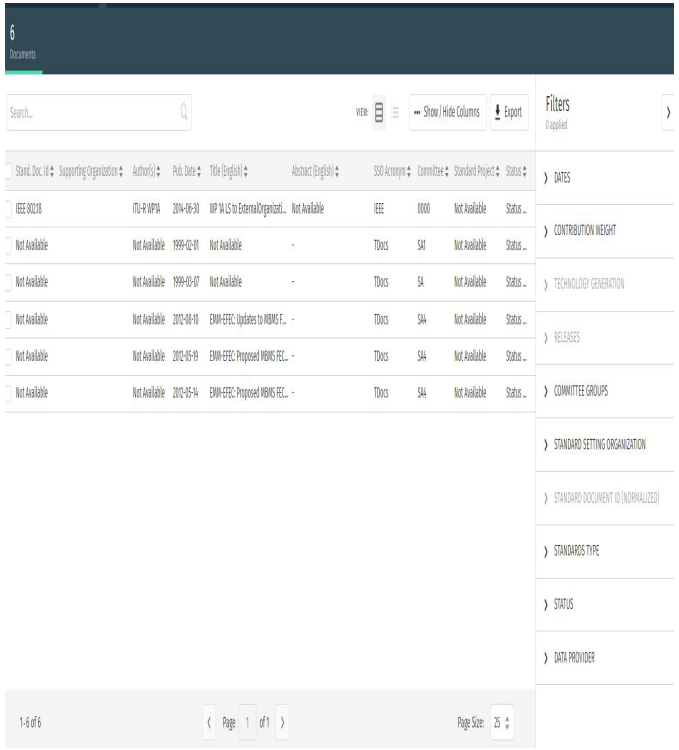
- (all:(Earth Observation)) AND (description_search:(heat island effect)) AND (all:(rural areas)) AND (all:(neighborhoods))



Example of standard search

- (all:(Earth observation)) AND (all:(heat island effect))





Challenge in-depth

Floods, Fire, Water resilience and Sustainable Infrastructure

FLOODS mapping and prediction – *current situation*

- Currently, the mapping of flooded areas (marine, coastal areas and rivers) during severe events can take weeks, resulting in **delays in response and prevention**. Public organisations **lack reliable tools** for predicting, preventing and responding to such events in a timely manner.

Question: Do you agree? Would you like to add anything else?

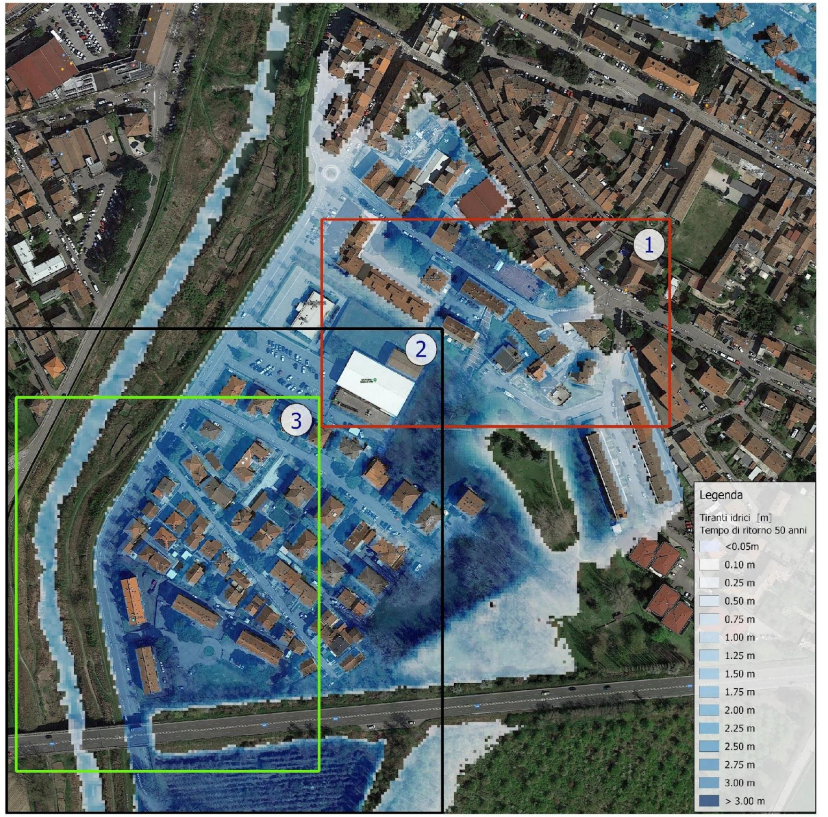
Flood Risk Intelligence is the key for DRR and CCA

Flood Risk Intelligence

- High Resolution data at building level
- Past, Real-time and Future Climate Change scenarios

BEFORE Flood Maps – Early Warning

- Support Emergency Operations
  - Support Eraly Warning
  - Displacement of people at high risk
  - Put in place rapid mitigation measures for reducing the damages
- Rapid Mapping tools
  - What if scenarios
  - River Breaching or overtopping
  - Extreme Sea Level
- High Resolution Data
  - LIDAR Data



SaferPlaces

Alluvione del 3 maggio 2023 a Faenza località Borgo Durbecco

Confronto tra aree allagate da ripresa aerea e mappe dei tiranti idrici (tempo di ritorno 50 anni) prodotte dalla piattaforma SaferPlaces

Currents Gaps and Innovation Needs

High resolution data gaps

- Lack of flood data and risk maps
- Uneven coverage at global level
- Parametric Insurance Not Possible

Complex tools for selected experts

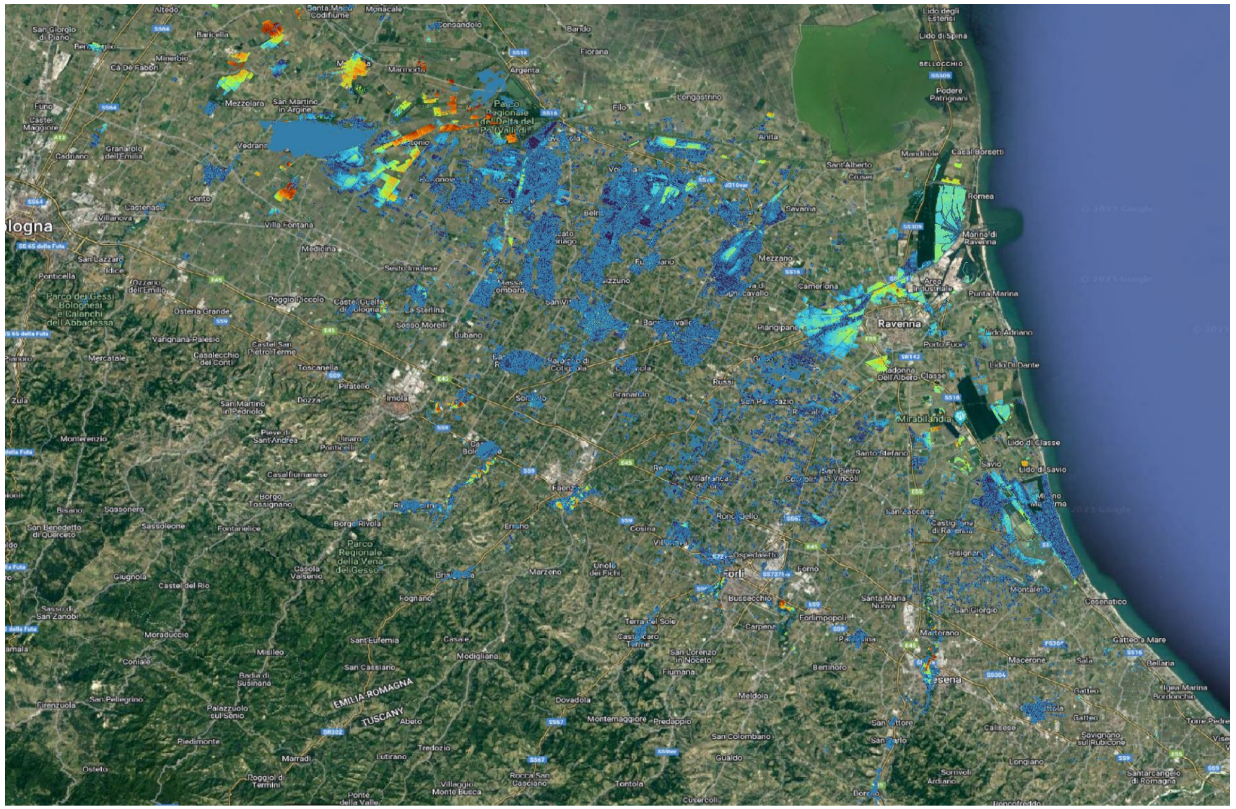
- Cost, Time and CPU-intensive Solutions
- Targeted highly skilled professionals

Static View of Flood Risk

- Not Possible to simulate a changing Resilient City with Adaptation and Mitigation infrastructures
- Multiple hazards/damages and climate scenarios

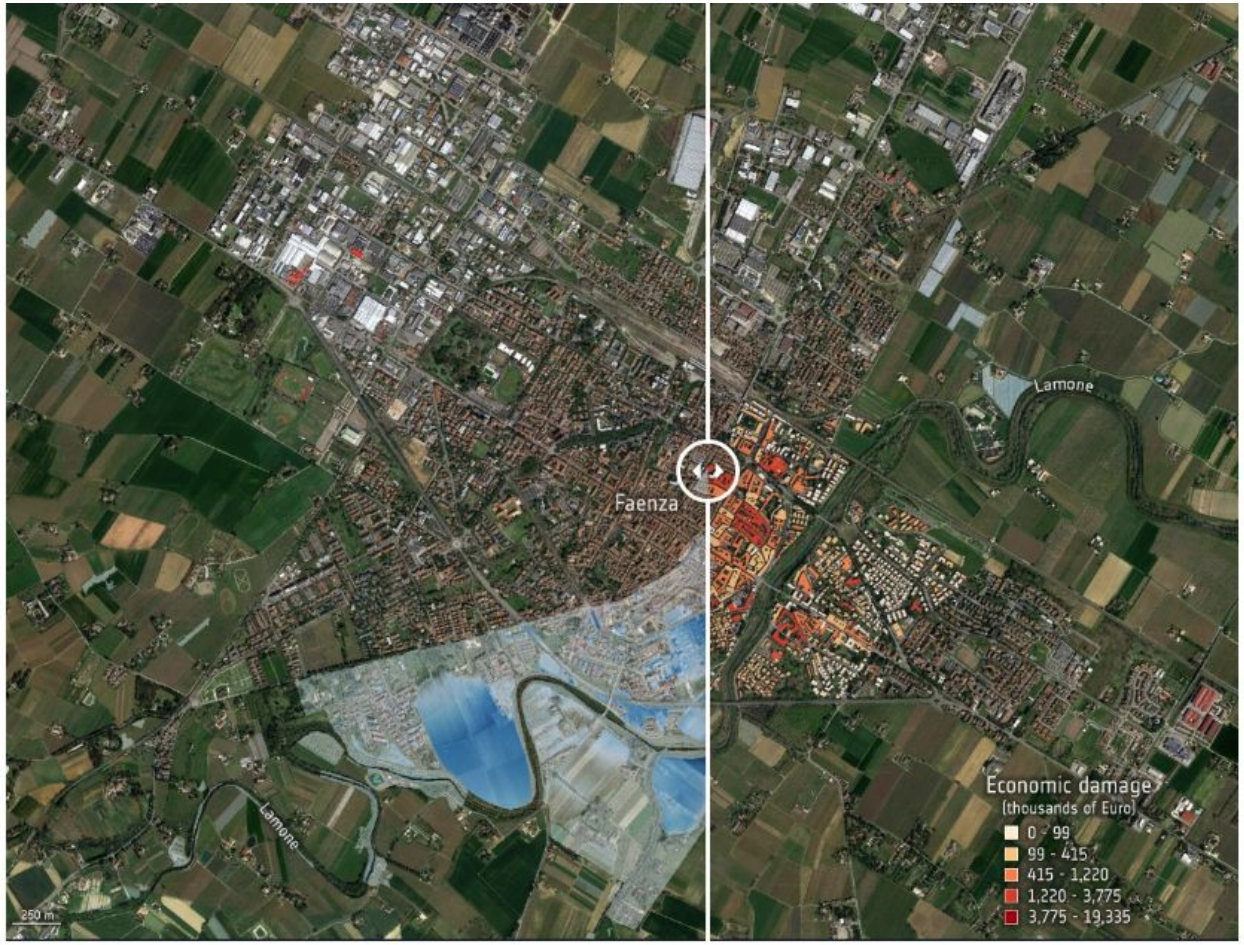
AFTER Flood Maps – Post Event Analysis

- Flood Mapping from Satellite images
  - Copernicus Sentinel
  - Cosmo Sky Med
- From Flood Mask to Flood Depth
- Damage Assessment building by building



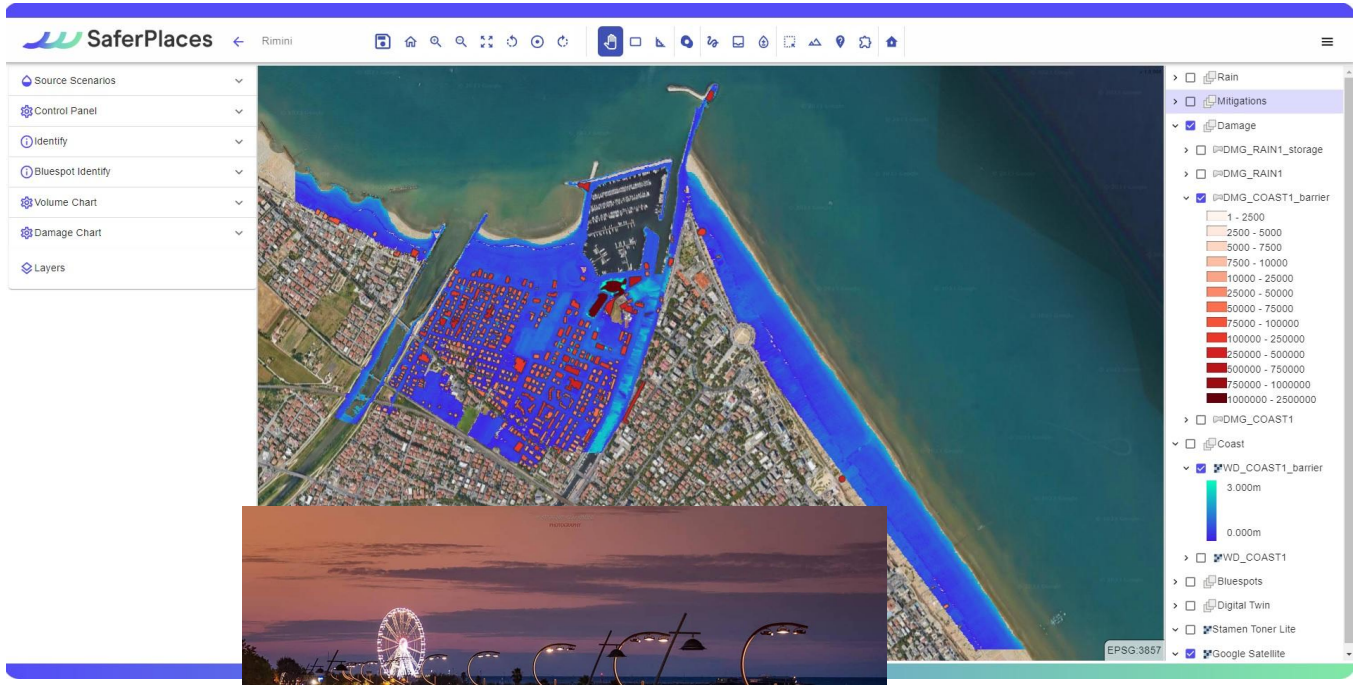
AFTER Flood Maps – Post Event Analysis

- Flood Mapping from Satellite images
  - Copernicus Sentinel
  - Cosmo Sky Med
- From Flood Mask to Flood Depth
- Damage Assessment building by building



BE READY Flood Maps – Climate Adapataion

- Support Land Use Planning and Adapatation Strategies in Cities
  - Identification of hot spot Risk
  - Support in localizing and designing mitigation measures
    - Physical Barriers
    - Nature based Solution



Digital Twin Solutions

FLOODS mapping and prediction – *steps/actions*

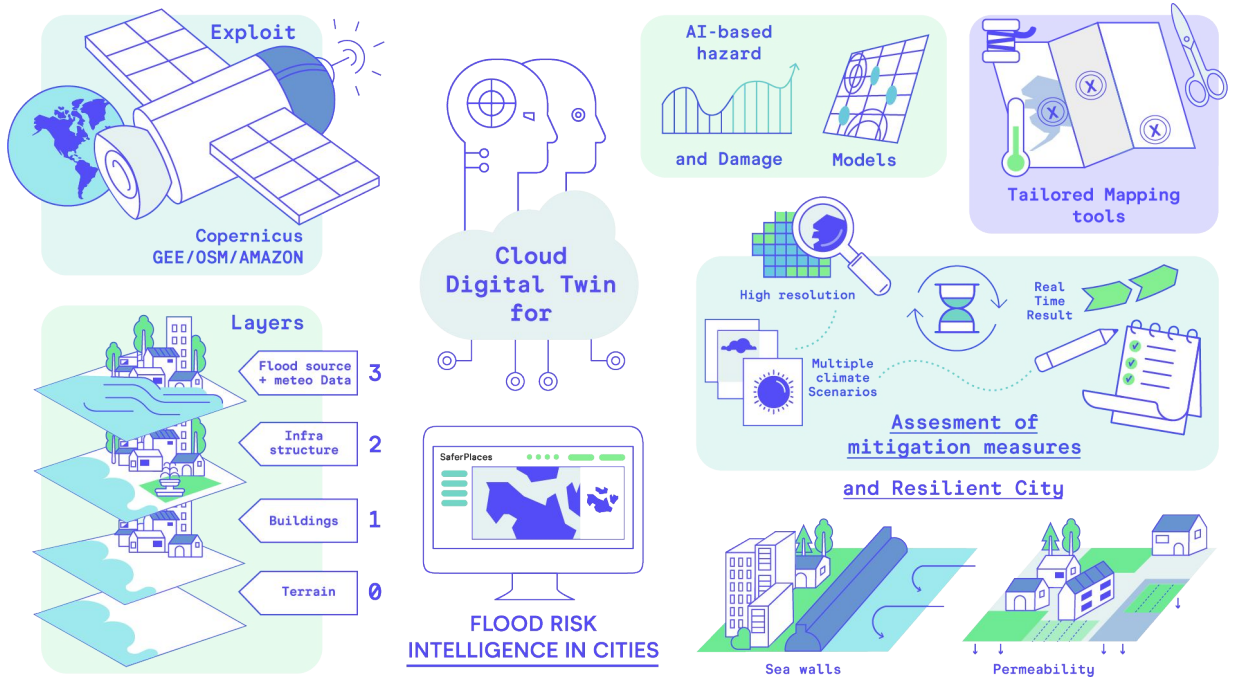
- Some foreseen steps are:

1. Implementing a **unified repository for historical data** along with a single Application Programming Interface (API)
2. **Connecting rapid mapping** and climate services to the repository
3. Transforming mapping processes into **algorithms for more efficient and automated analysis**.
4. Utilising **efficient tools and systems** to support the mapping and analysis tasks.
5. Ensuring proper utilisation of the tools by **a skilled team** with the necessary expertise.

Question: Do you agree? Would you like to add anything else?

FLOODS Climate Services

1. Digital Twin and EO, climate and geospatial data integration
2. **Cloud and API based solution**
3. Fast algorithms for real time mapping
4. Specific routine for what if scenarios
    1. Changing Climate
    2. Resilient Cities
5. User friendly and tailored for non expert in hydrodynamic model



FLOODS mapping and prediction – *desired outcome*

- The desired outcome is to establish **a system for rapid mapping that enables predictions and projections to identify risks and define benchmarks**. This will involve the development and utilisation of software capable of **higher resolution and timely acquisition of satellite information**.

Question: Do you agree? Would you like to add anything else?

FIRE prediction, prevention, tracing – *current situation*

- Currently, there are **several scenarios of fires initiated by different causes** and having a harmful effect on the environment.
- One scenario or use case relates to **facilities where waste is stored and prone to spontaneous fires**, occurring three or more times a year (in one city). These incidents are particularly prevalent during the summer months when temperatures are higher. While data on previous fire events exist (temperature conditions, height of piles, heat waves, composition of garbage, location of storages or disposals) **there is no automated solution available to predict fires and make informed decisions for prevention.** As a result, environmental agency inspectors bear the responsibility of monitoring these facilities, placing a significant burden on staff resources.

Question: Do you agree? Would you like to add anything else?


milieudienst
Rijnmond

WASTE FIRES

Kees Koudenburg

PROTECT

CHALLENGE

WASTE FIRES

- Definition:
  An uncontrolled fire in a waste storage site

- +/- 77 waste fires/year in the Netherlands
- +/- 60 waste fires/year in Sweden
- +/- 25 waste fires/year in Austria

IMPACT

FINANCIAL COSTS

- Soil remediation
- Water treatment
- Damage of buildings and equipment
- Loss of recyclables

SOCIAL COSTS

- Impact on Health
- Sense of security
- Odor complaints
- Redirection of taxes

ENVIRONMENTAL COSTS

- Discharge of pollutants like $PM_{2.5}$ and Dioxins

WHERE & HOW?

TYPE OF WASTE SITES

- Recycle centres
- Landfills

MAIN CAUSES

- Spontaneous ignition
  - Sweden: 55% of the cases
  - North-Rhine-Westfalen: 33% of the cases
- Unknown
- Lithium/ion batteries

CONTRIBUTING FACTORS

- Type of waste / contamination
- Amount of waste
- Ambient temperature (variation and level)
- Ambient moisture content / rainfall
- Wind
- On-site remediating factors

USE CASE

Prediction of waste fires with AI by combining remote sensing, historical and weather data.

FORESEEN STEPS

EXPLORING BOUNDARIES

AGGREGATING DATA

MODEL DEVELOPMENT

TRAINING THE MODEL / ON-SITE VALIDATION

UTILIZATION OF PREDICTIONS

IMPLEMENTING NOTIFICATIONS

QUESTIONS?

Parallelweg 1
3112 NA Schiedam

Tel. 010 246 80 00

info@dcmr.nl
www.dcmr.nl

FIRE prediction, prevention, tracing – steps/actions

- In this waste fire use case, the foreseen steps are:

1. Exploring the **technical boundarie**s to understand the possibilities of providing frequent data updates and establishing the required preparedness frequency.
2. Developing a **comprehensive model using both existing and new data** to predict waste fires.
3. **Aggregating all data** from past waste fire incidents can be instrumental in this process.
4. , such as the evolving composition of **Training the model based on defined conditions and relevant factors**waste over time and temperature variations.
5. Utilizing the gathered data to **anticipate fire occurrences**, enabling timely preventive actions.
6. Implementing **automated notifications to alert environmental**; agencies about the risk of fire, empowering them to take necessary measures such as engaging contracted companies or industries experienced in managing waste storage facilities. This proactive approach aims to prevent air pollution and minimize potential damage.

Question: Do you agree? Would you like to add anything else?

FIRE prediction, prevention, tracing – *desired outcome*

- The desired outcome is an **automated notification system that promptly identifies the risk of fire** (in waste storage facilities). This allows environmental agencies to take swift and appropriate measures, such as engaging qualified companies or industries with expertise in waste management. By preventing fires, this solution aims to mitigate air pollution and reduce potential damage associated with such incidents.
- It is expected to obtain an **automated notification system based on the processing data including COPERNICUS data.**

Question: Do you agree? Would you like to add anything else?

FIRE prediction, prevention, tracing – *other use case*

- Another use case or fire scenario (also for wild/forest fire) **relates to identifying, tracing, and tracking the cause (and the culprit) of the fire.**
- It is challenging for law enforcement agencies to **trace the individuals responsible for criminal behavior** (e.g., setting fire or dumping substances that cause fire to official waste dumping sites/facilities).
- In the event that a fire consumes part of a waste dumping site**, it is vital to be able to compare the site's condition before and after the fire**. This comparison would enable us to determine the amount of waste that was burnt and, consequently, evaluate the environmental damage caused.
- Additionally, **the same technology could be used to establish whether the amount of waste entities dump into the site matches the amount they report officially**.
- There is a **lack of effective measures to inform and prevent** the cross-border effects.
- The **absence of usable data hinders the ability to gather evidence** for criminal proceedings.

Question: Do you agree? Would you like to add anything else?

FIRE prediction, prevention, tracing – *steps/actions*

- In this identification, trace and track use case, some foreseen steps are:

1. Conducting a **comprehensive assessment of existing monitoring capabilities** to identify gaps and potential improvements.
2. Defining the **types of substances that are commonly illegally dumpe**d, drawing from previous experiences and specific case studies.
3. Develop a **model that uses both existing and new data** to compare the amount of waste before and after an incident occurs.
4. Aggregate all data from **past waste fire incidents** or incidents involving the dumping of more waste than officially reported.
5. Developing appropriate **measures to address these incidents**.
6. Establishing timely **communication channels** between environmental agencies, firefighters, and other relevant law enforcement entities to promptly notify them of potential risks and share investigation outcomes.
7. Defining and implementing **possible interventions to tackle (wild) fires** and/or at dumping sites to prevent further illegal activities and mitigate damage.
8. **Standardizing the reporting and data collection processes**, ensuring the admissibility of the gathered information in both civil and criminal courts. This will enable the establishment of responsibilities in accordance with the applicable laws within specific judiciary systems.

Question:
Do you agree? Would you like to add anything else?

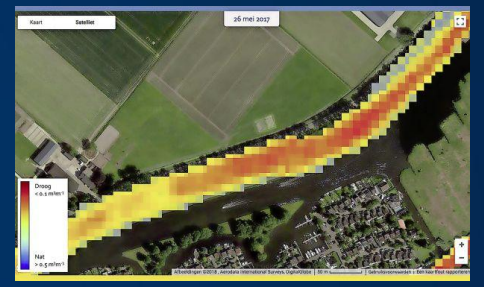
FIRE prediction, prevention, tracing – *desired outcome*

- The desired outcome is the implementation of **an alert system that sends notifications to competent authorities**, aiming to prevent the illegal dumping of waste/ illegal activities that could lead to fires in dumping sites and mitigate the risks of cross-border damage.
- The system would enable us to **compare the state of the waste** dumping site before and after the fire, determine the amount of burnt waste, and define the extent of environmental damage.
- Additionally, the system would be able to **verify if the amount of waste entities dump into the dumping site is consistent with their official reports.**
- Furthermore, **standardized reports** and information should be readily available and admissible in civil and criminal proceedings. This will facilitate the establishment of responsibilities in accordance with the applicable laws and regulations within the specific judiciary system.

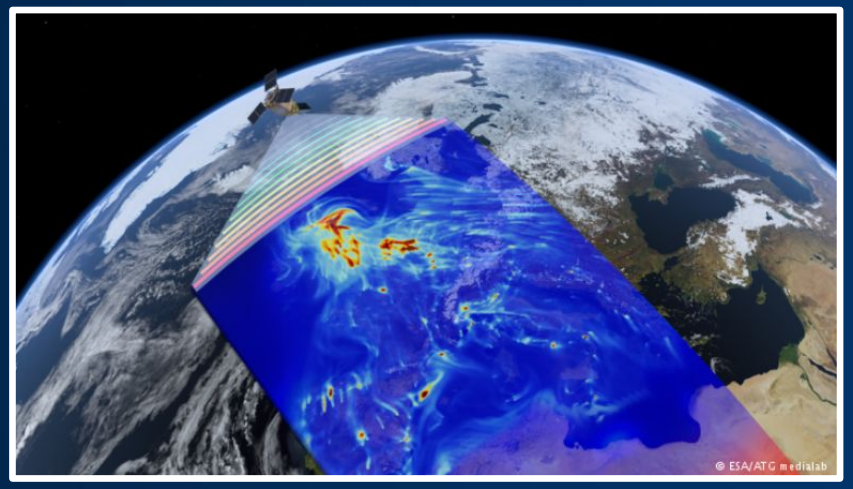
Question: Do you agree? Would you like to add anything else?

Water Management from space in NL

The SAT-WATER program



PROTECT PAIN POINT WORKSHOP
WATER CHALLENGE
13 September 2023



Dr. Hans J.C. van Leeuwen, STOWA
Programleader SAT-WATER
&
Dutch Water authorities & Ministries
& Het Waterschapshuis

AGENDA

Agenda:

- ***Introduction: The Sat-Water Program for the Dutch WaterBoards***
- **SAT-WATER Program: blue print for operational Information for national policies?**
- **SAT-WATER Program & Cooperation in European context**
- **PROTECT Challenge: Next R&D of Climate resilient Water solutions (what are the needs)**

Information production Watermanagement
Satellite Applications = SATWATER Program

Slogan: "Van Wetenschap naar Waterschap" or "From Science to WaterManagement

Landingsbaan/Launch: "from innovation to implementation"

Users: Waterboards, Ministries, DrinkingWatercompanies, etc

stowa 50 JAAR

PROTECT

hetWaterschapshuis

Wetenschap (universiteiten; kennisinstituten)

Science

Toegepaste Wetenschap (STOWA)

SAT-WATER

5-10 jaar

Landing in ICT-Informatiesysteem structuren (HWH)

hetWaterschapshuis

Het Landingsbaan Principe

5-10 jaar

Landing op de werkvloer

Disruptive

2-5 jaar

Implement ation

12-25 jaar

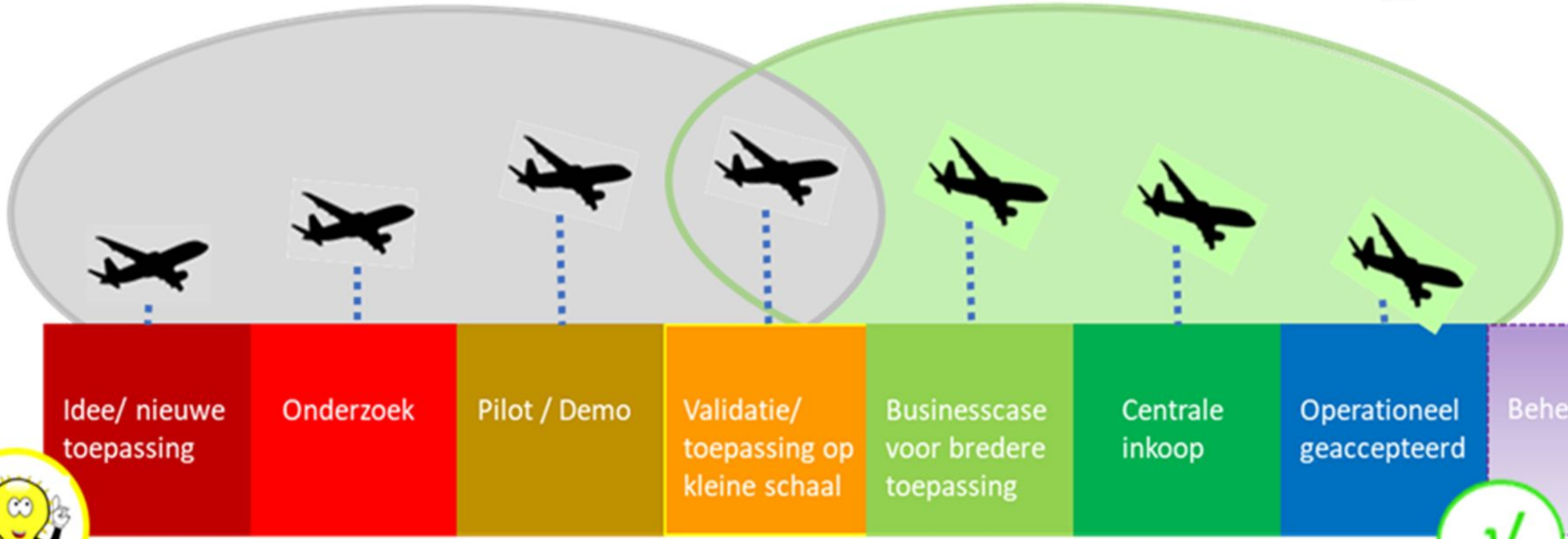
- Information acquisition (Satellite & Field)
- Knowledge, Algorithms, Field experience
- Processing & integration (Data Science)
- Implementation of Application (Open data & SW)
- Validation (Technical & Use/Organization)
- Organization (acceptation, Business case, & Procurement Process)
- Hybrisation with working process (CoP)
- Acceptance and Scaling up (more use)
- Management & Maintenance/continuity (Archive)

stowa 50 JAAR

PROTECT

hetWaterschapshuis

SAT-WATER

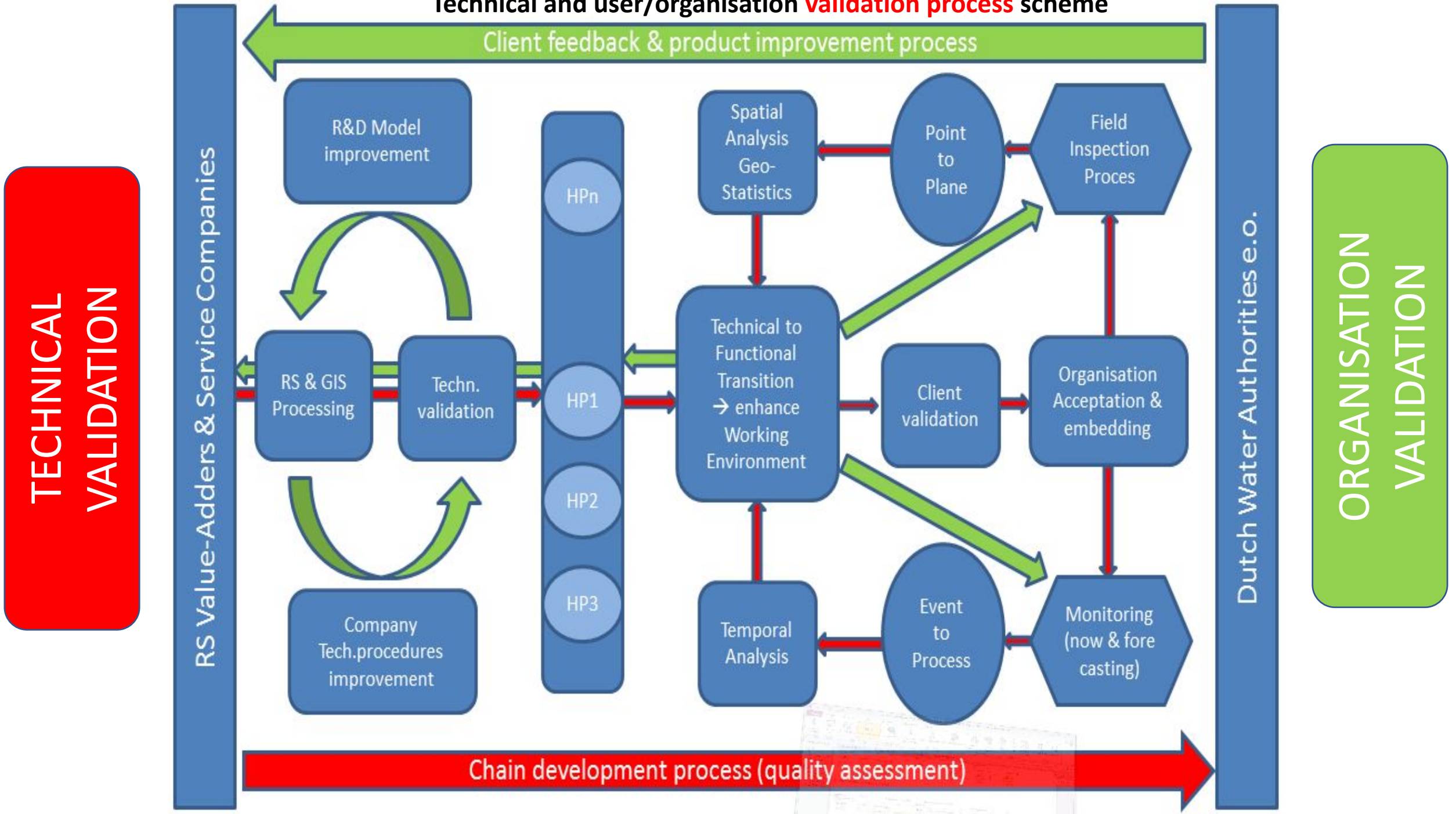


Samenwerking STOWA en Het Waterschapshuis

Van Wetenschap Naar Waterschap
From Science to WaterManagement

Landings Baan/ Launch		Soil-Water Balance(OWASIS	Verdamping Evapotranspiration	Soil (profile) Moisture	Rural Subsidence	(peat)dike Drought Monitoring	Water Quality	Digital Canal inspection	Depth Canal	NL Veranderdetectie Mutation Rural objects	National Irrigation Indicator
Phase	step						HDSR	WDOD			
Idea	1										
Research	2									SBIR fase 1	
Pilot/demo	3	ESA /STOWA/SBIR	STOWA/SBIR	SBIR	SBIR	STOWA	ESA			SBIR fase 1/2	
Validation (technical/ organisation)	4	SBIR OWASIS	SBIR SATDATA 2.0	SBIR soil moisture	SBIR Rural Subsidence i-ZAK/BODIS STOWA	**SBIR waterschap / STOWA**	CYMONS			SBIR fase 2	**Embedding national Water Instrumentation NHI**
Business Case & Central Procurement & acceptance	5		BC SATDATA 3.0	**BC bodemvocht**	**Validation & acceptance**	**Validation**	**Validation**	BC skipped		**BC verander detectie**	
Operational Information	6	OWASIS	SATDATA 3.0					Disruptive			
CoP/Support	7										

Technical and user/organisation validation process scheme



Satellite information input to Models/DSS !!

stowa

OWASIS 2.0

esa

INPUT DATA

MODEL AS SERVICE

STORAGE & DISTRIBUTION

Historical

- Precipitation (radar)
- Evaporation (Satellite based)
- Groundwater & Soil Moisture data

Forecast 10 days

- Precipitation
- Evaporation

ECMWF

extended Water balance solver

System characteristics (soil type, land use, elevation,...)

- Water availability
- Soil Moisture
- Ground water levels
- Water demands

Database history & forecasts

FTP

HydroNET Portal

API

hetWaterschapshuis

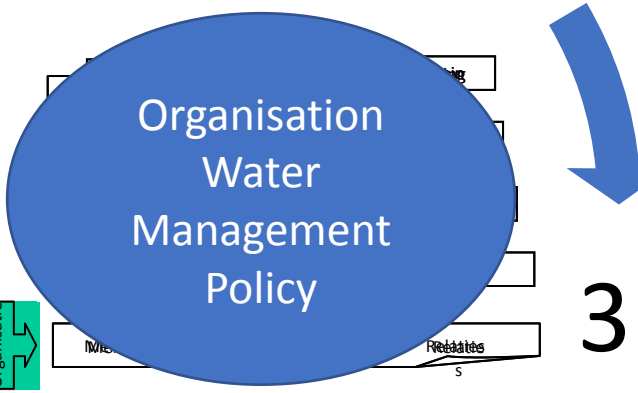
Use in

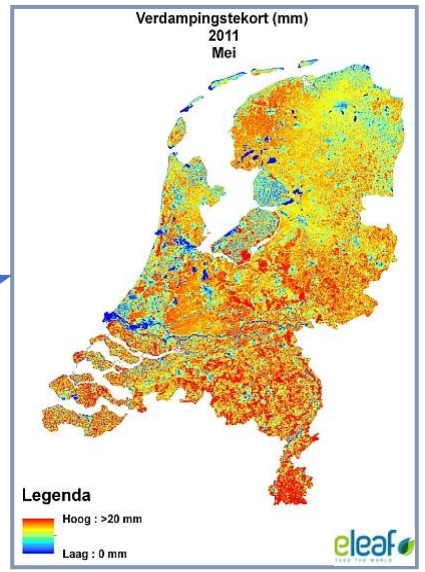
Water Manage-ment & Policies DSS

Input to integral systems (BIGDATA & AI)
Smart Governance on water management

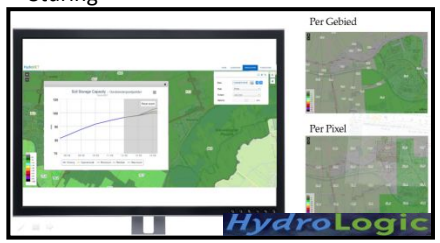
1. Governance: smarter & better cooperation
2. Meteo & Info Network &
3. RS monitoring &
4. Modelling, AI
5. Smart management by better information

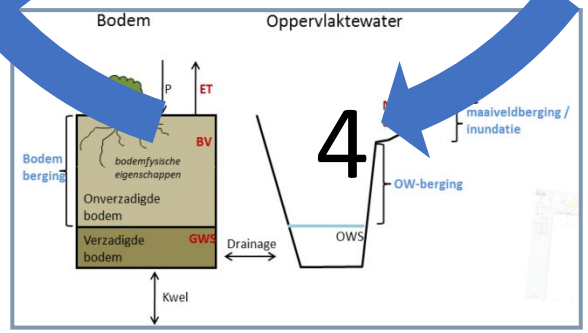
NHI

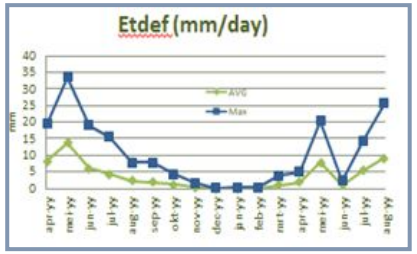




Operationele Sturing







SAT-WATER

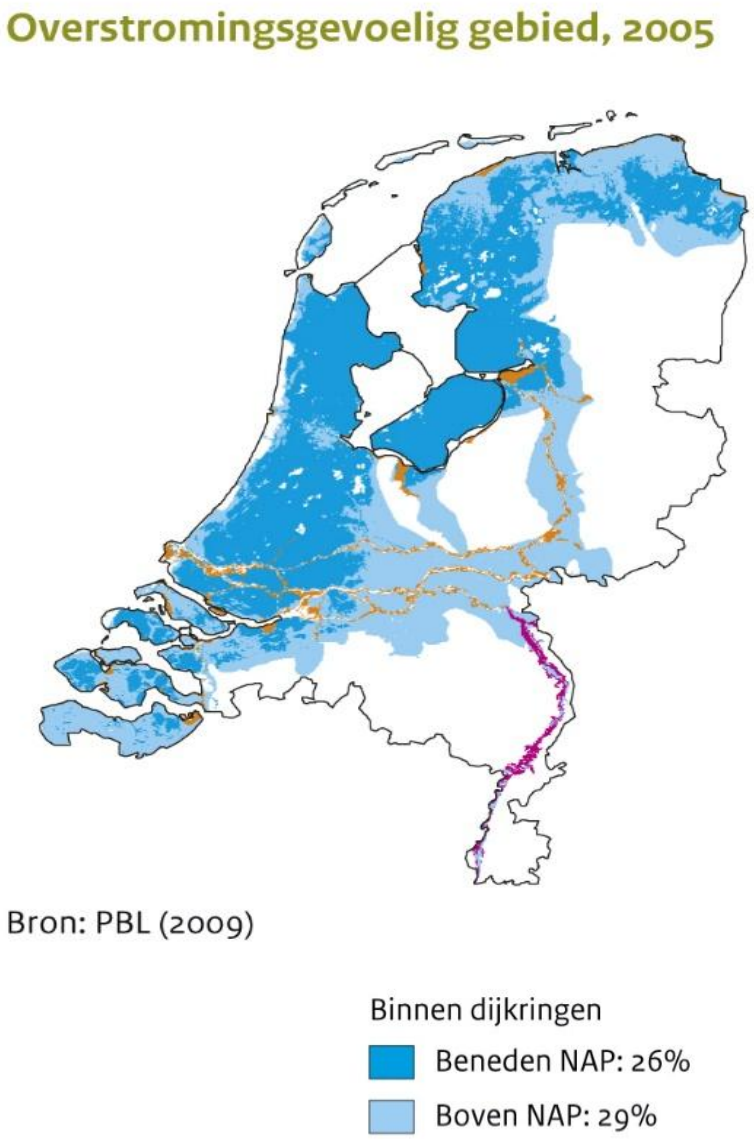
esa

Dutch Deltaprogramma Zoetwater

stowa

OWASIS-NL Improved water availability information for water manager

- **Efficient water management** is crucial to the Netherlands dry.
- **Drought** en **availability of sweet/fresh water** is becoming more and more problematic due to climate change.
- Lack of information on wateravailability and **available storage capacity** is a growing issue in current operational watermanagement.



Monitoring Drought en Wateraccess

using available soilmoisture storage (info from OWASIS)

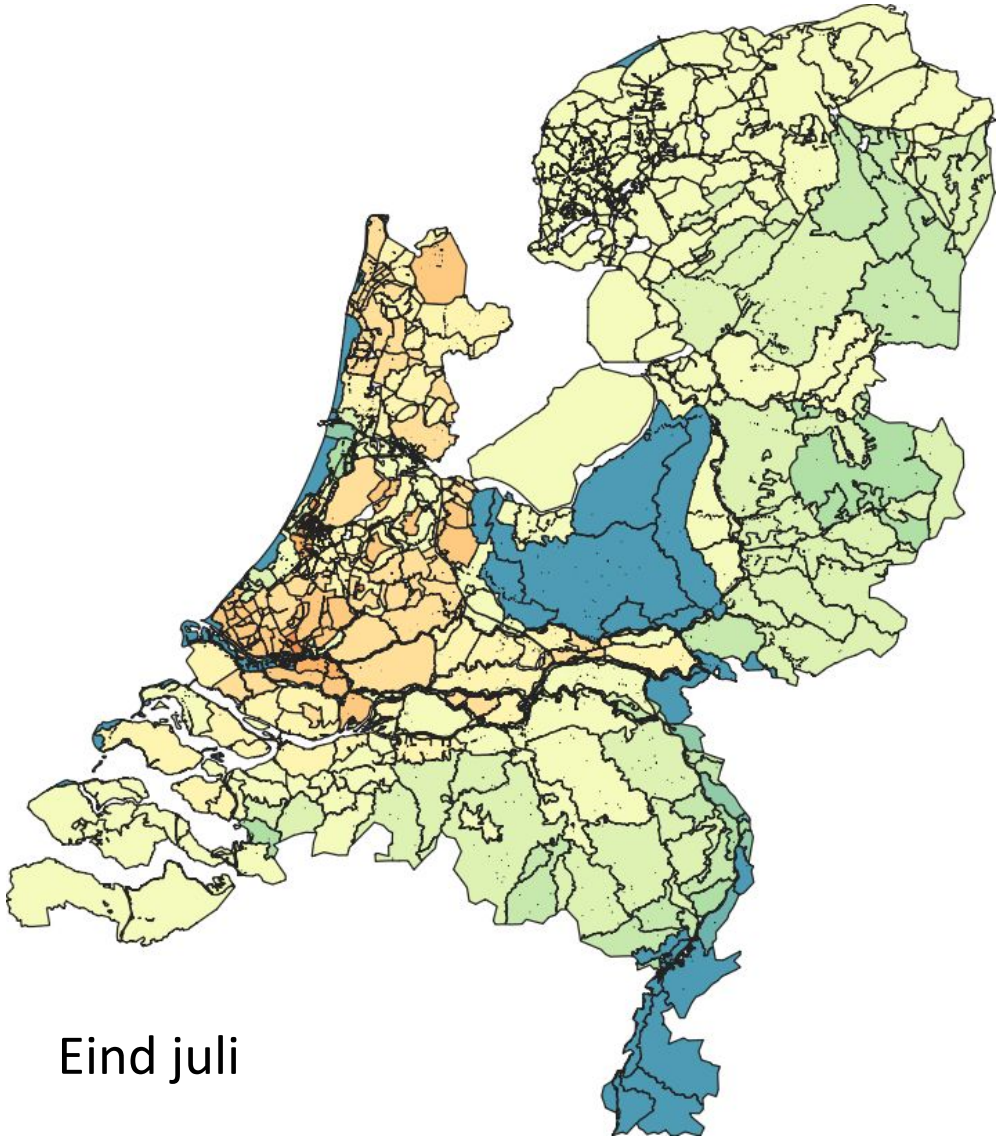
with actual evapotranspiration SATDATA 3.0 data in watermanagement areas

HydroLogic

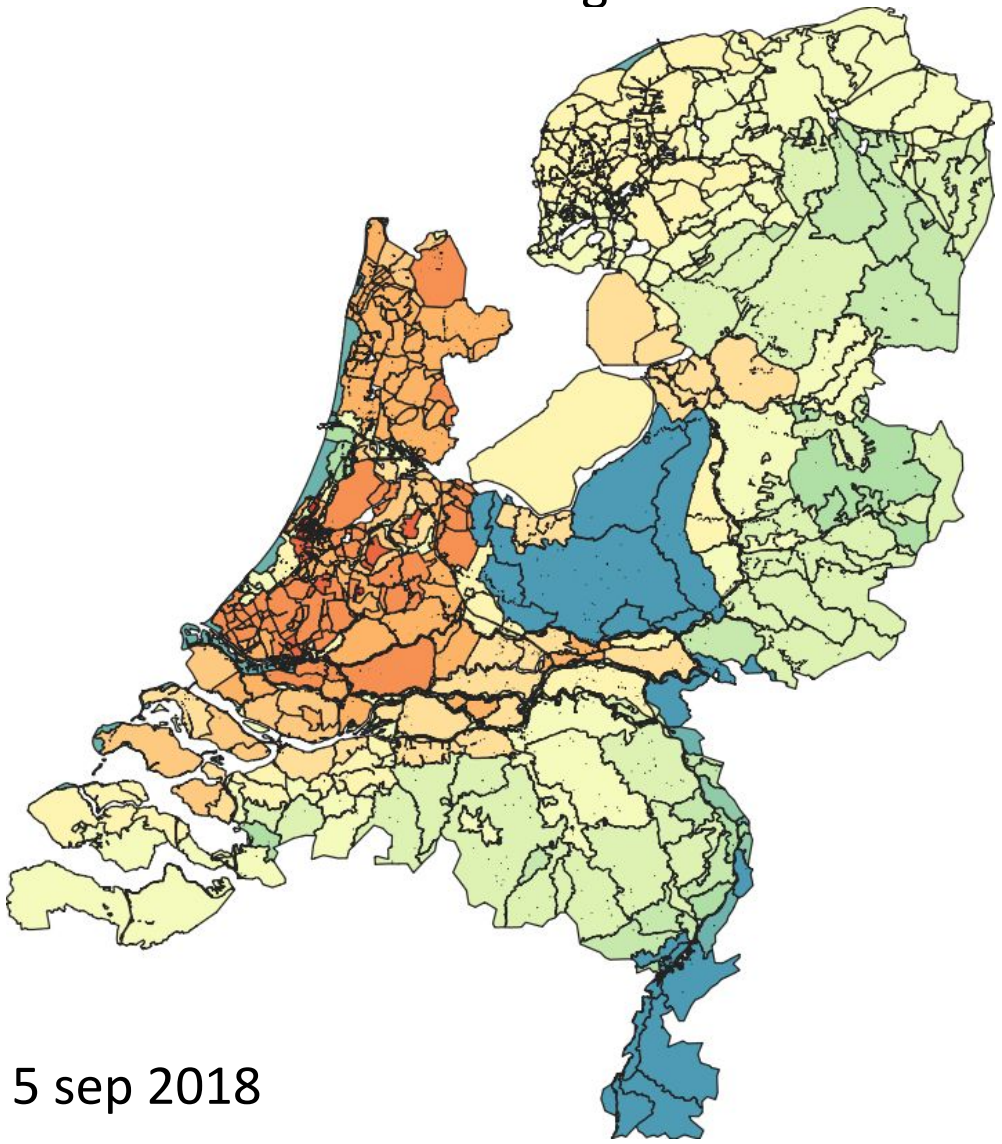
VanderSat

stowa

SAT-WATER



Eind juli

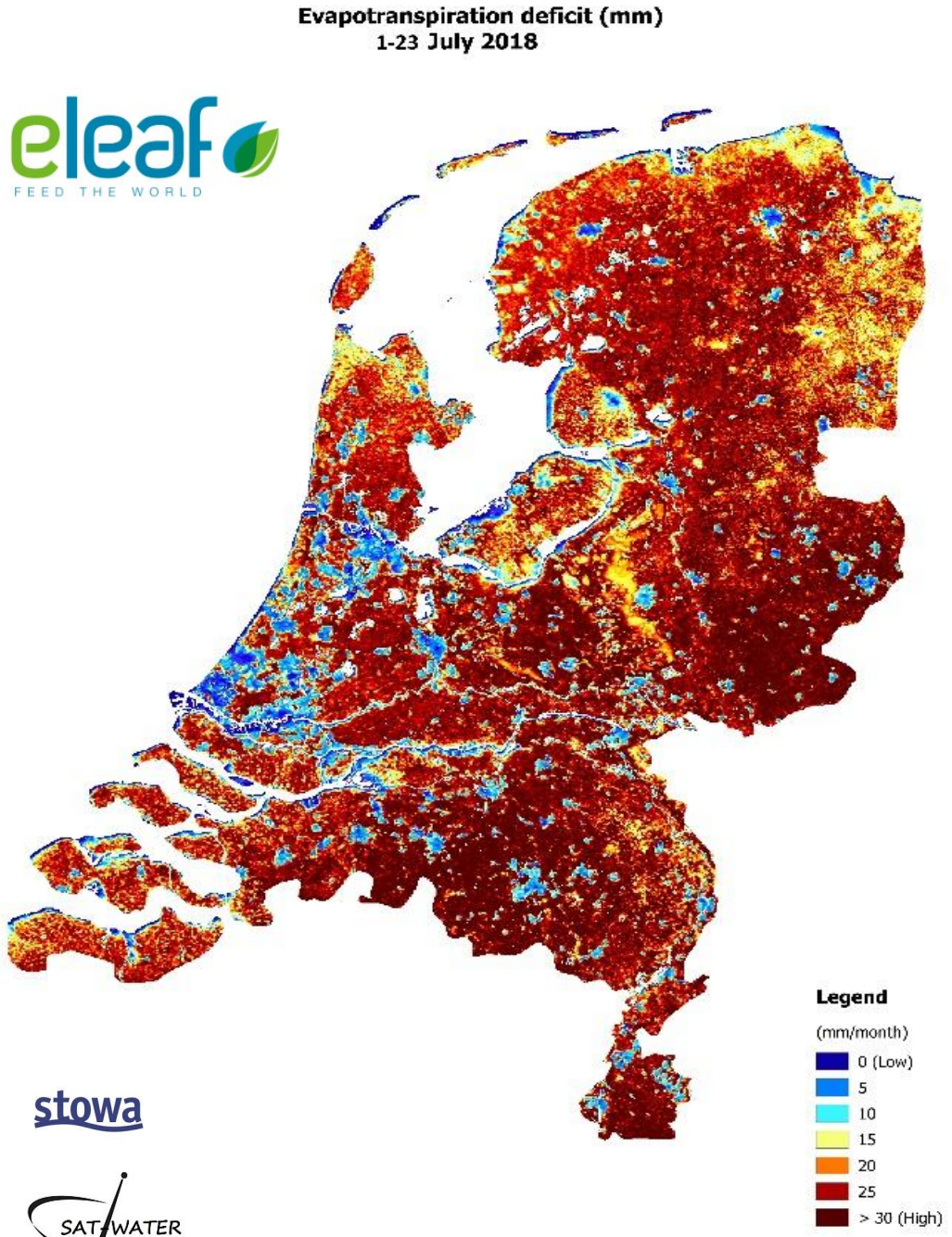


5 sep 2018

Legenda

Beschikbare bodemberging (mm)

- 0 - 25 mm
- 25 - 50 mm
- 50 - 75 mm
- 75 - 100 mm
- 100 - 125 mm
- 125 - 150 mm
- 150 - 175 mm
- 175 - 200 mm
- 250 - 300 mm
- 300 - 400 mm
- 400 - 500 mm
- 500 - 600 mm
- 600 - 700 mm
- 600 - 700 mm
- 800 - 1000 mm
- > 1000 mm

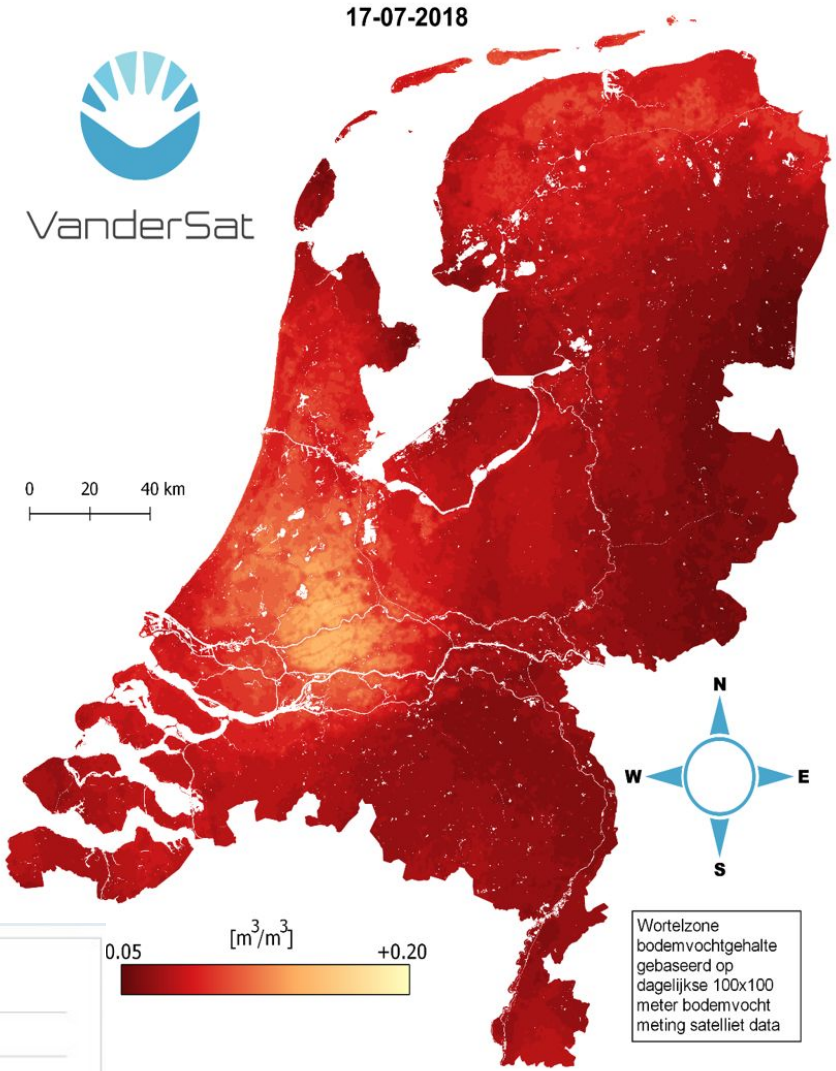


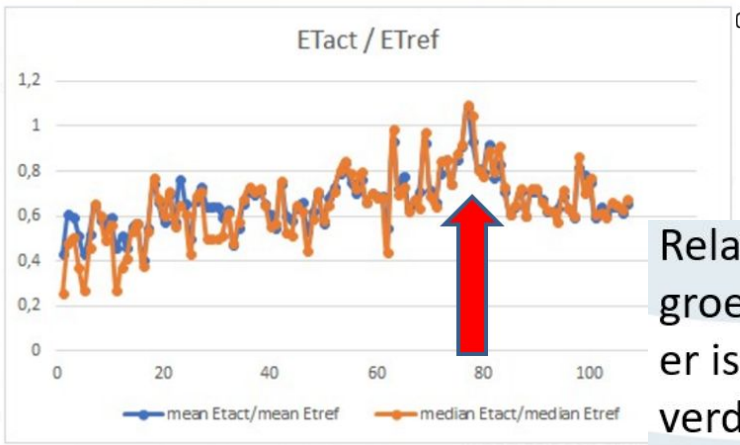
stowa

Bodemvocht

Wortelzone
Gebaseerd op 100x100m
bodemvocht data uit satelliet
(zie later Planet/VdS)

Letop:
Hoge Zandgronden Z & O NL
Veen-weide gebied West NL





Relatieve verdamping eind juni slaat om: groeibeperking van gewassen zichtbaar: er is bijna geen water meer om te verdampen door gewas

OWASIS on drought & waterexcess: practical level

1. **Actual Moisture Content soil profile Water management area (peilgebied)**: Waterboards use OWASIS to assess the status of profile watercontent every day (for operational measures in times of waterexcess and drought)
2. **To pump or keep the water in management area:** Waterboarrds use OWASIS in combination with weather predictions to advice the water managers
3. **Waterbalance**: Waterboards use OWASIS as indicator for interactive waterbalance insights (e.g. Waterschap Brabantse Delta in their crisisroom for alerting and communication or water management measures)
4. **Information dashboard ARK/NZK (amsterdam region)**: Ministry Infra & Water (Rijkswaterstaat) use OWASIS to present regional difference in soil moisture for mutual smart management (between the water areas).

OWASIS: what on policy level?

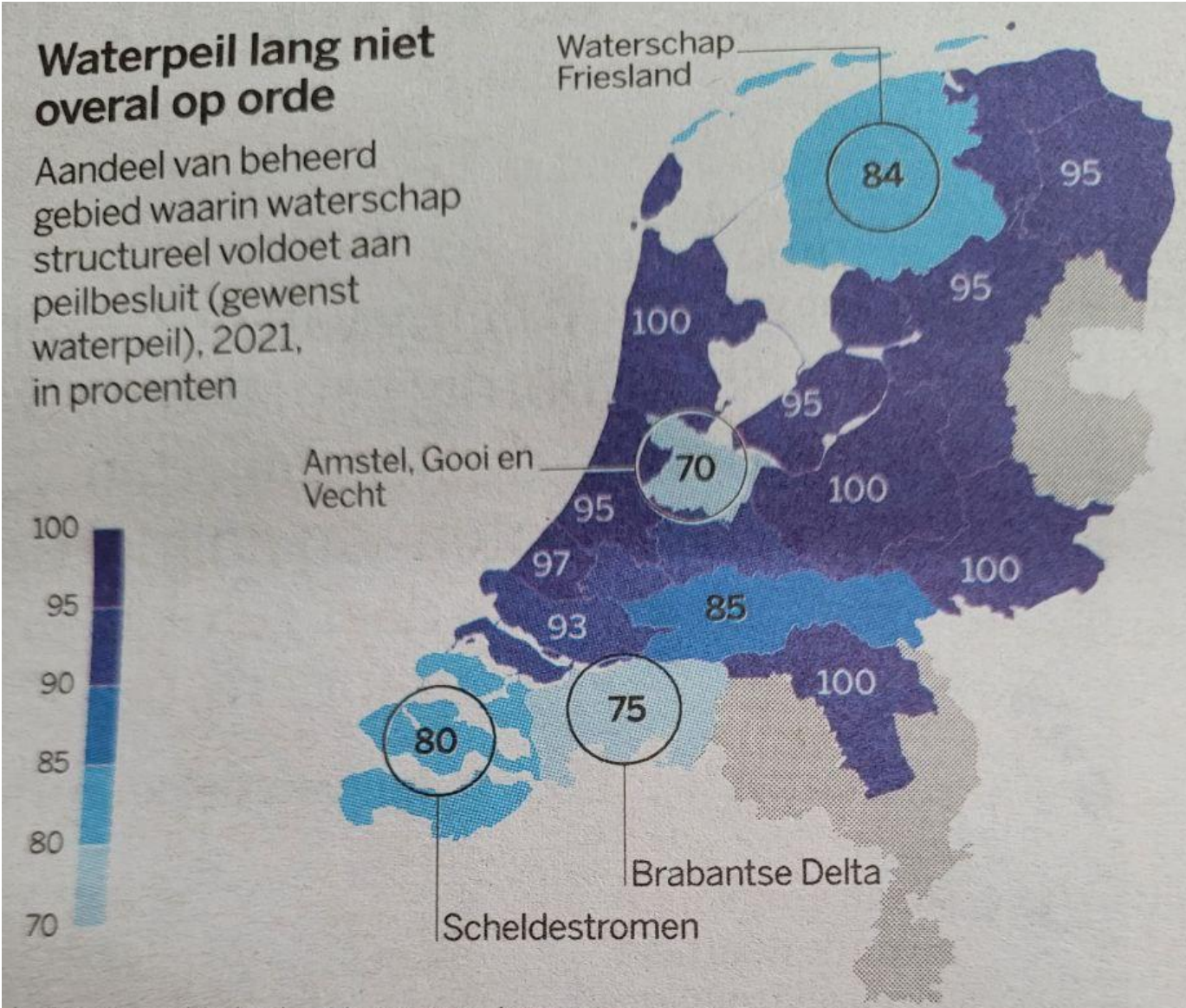
1. **Effect/impact monitoring:** Waterboards use OWASIS to evaluate the impact/effects on the change from winter to summer waterlevels
2. **Validation - waterbalance.** Indirectly OWASIS is used as indicator to validate waterbalance models and daily (field)measurements
3. Operational **Decision Support systems** (VIDENTE, peilbeheer)
4. To **advice waterboards** on the transition from summer to winter water levels (& vice versa)
5. And **many other functions in the policy cycle** not yet discovered (reference level (0-meting), time-series (trends/anomalies), monitoring & evaluation, Cost-benefits and efficiency, etc.

Examples RS use for Climate Adaptation (on top of former water excess and drought examples) related to the Water Challenge (PROTECT PCP)

- Greenhouse gas emission indicators (water management):
  - In case of droughts: CO2 emission by peat oxidation (subsidence)
  - In case of water excess: CH4 en N2O emission in anaerobic soil conditions
- Salinization risks (due to increase of drought and seepage pressure by sea level rise)
- Insight in the available sweet water storage in large Lakes like Ijsselmeer (relevant for the Dutch National LCW commission decision support)
- Insight in the amount of local water storage (saturation level) in soils in times extreme climate conditions in management areas (to anticipate timely for local flooding (e.g. Limburg 2021)
- Insight in drought conditions (agriculture & nature), irrigation limitations/ban, etc
- Transition/monitoring of the rural area functions in future (distribution of blue, green grey infrastructure)
- etc.

Waterpeil lang niet overal op orde

Aandeel van beheerd gebied waarin waterschap structureel voldoet aan peilbesluit (gewenst waterpeil), 2021, in procenten



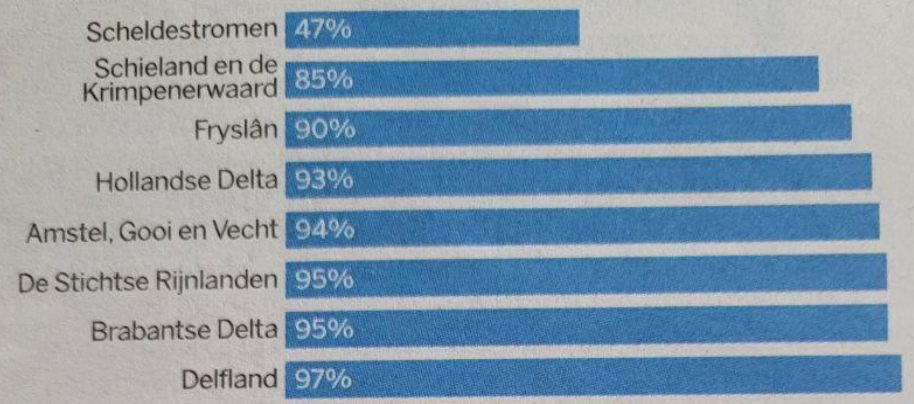
In de grijze gebieden kent het waterschap een 'vrij afwaterend watersysteem' en zijn er geen peilbesluiten

140323 © de Volkskrant
Bron: Unie van Waterschappen, Waterschap Scheldestromen; kaartgegevens hWh

Press VK'14mrt23

Gewenst waterpeil niet altijd haalbaar

Aandeel van gebied waarin het waterpeil technisch haalbaar is

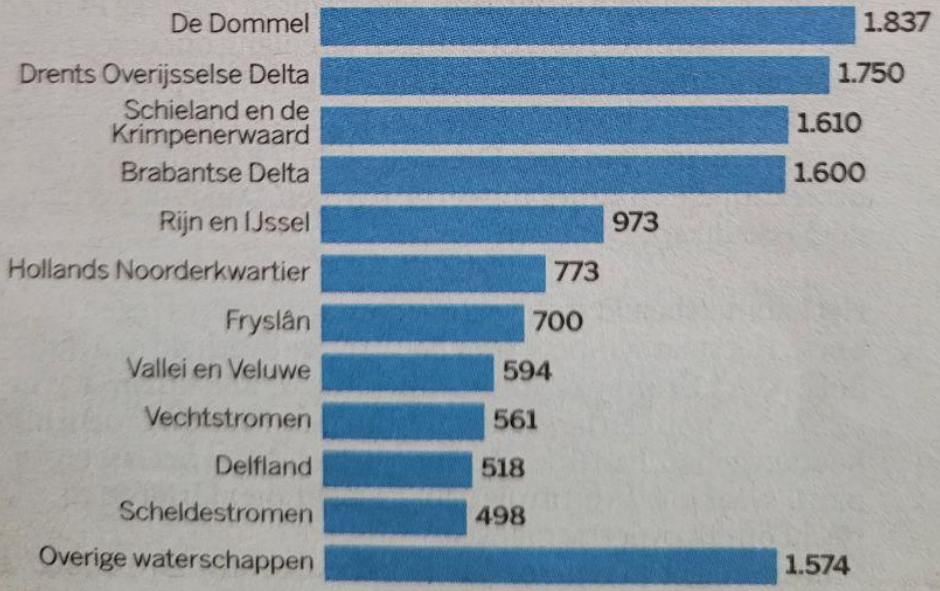


Voor de overige water- en hoogheemraadschappen is het peilbesluit voor 99% of 100% technisch op orde.

140323 © de Volkskrant. Bron: Unie van Waterschappen

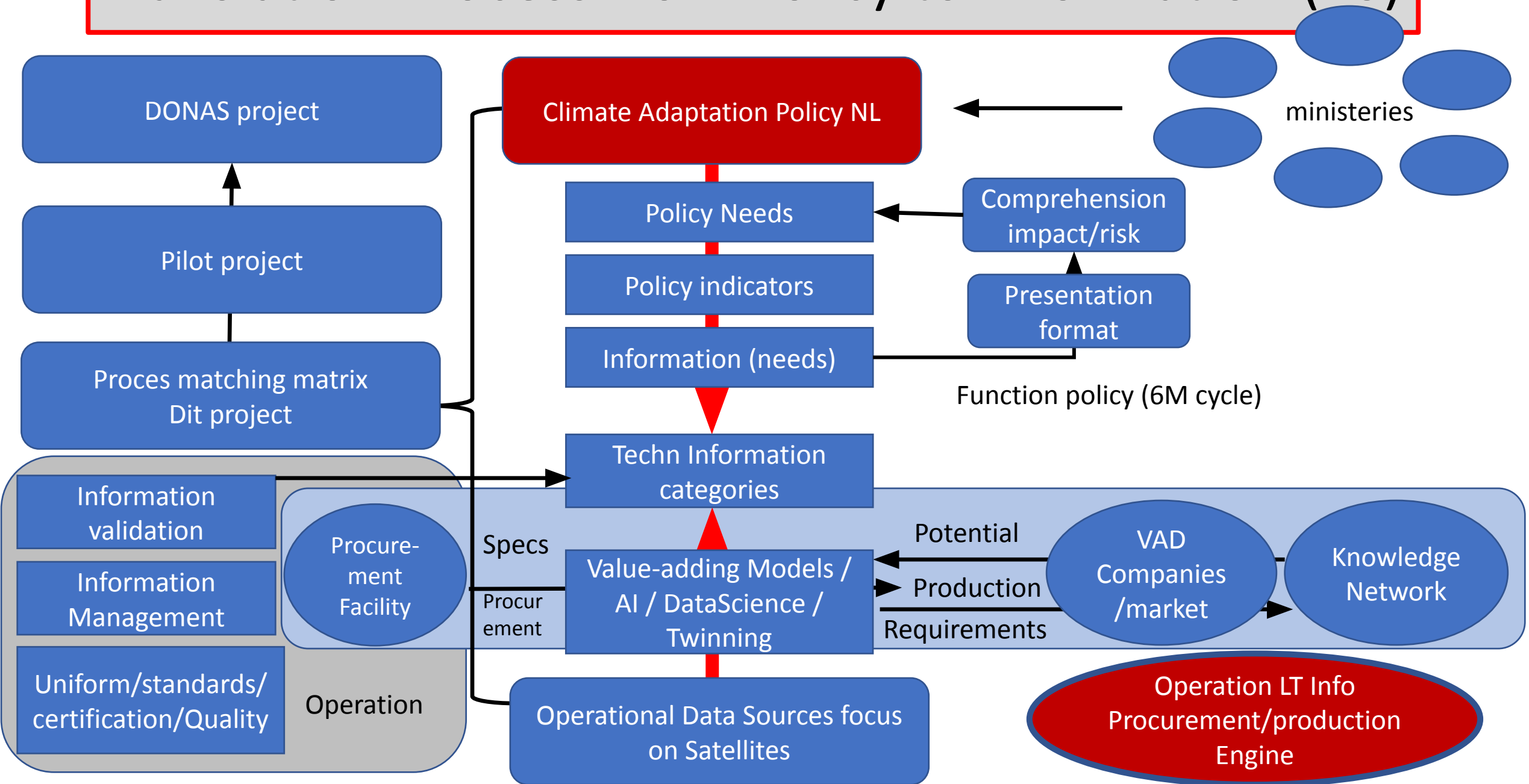
Duizenden hectaren voldoen niet aan overlastnorm

Aantal hectaren waar (nog) niet wordt voldaan aan normen voor wateroverlast, per waterschap (2021)



140323 © de Volkskrant. Bron: Unie van Waterschappen

Translation Process from Policy to Information (RS)



stowa 50 JAAR

PROTECT

hetWaterschapshuis

hetWaterschapshuis

Business case based on needs WaterBoards

Belangrijkste functionaliteiten van een data platform

Sensoren

Externe databronnen

Interne databronnen

Kennis instituten

Innemen van data

- Periodiek (batch)
- Real time (events)
- Near real time (berichten)
- ...

Organiseren & opslaan van data

- Archiveren
- Opslaan in datawarehouse / data lake
- Governance, Privacy, Beveiliging
- Master Data Management
- Transformeren naar juiste formaat
- Datakwaliteit bewaken

Leveren van informatie

Analyseren

- Trend analyse
- Performance
- What-if
- Simulatie
- Zoeken, ontdekken
- Cognitieve analyse
- KPI
- ...

Produceren

- Rapport
- Dashboard
- Kaarten
- Data bestand
- Alert, signaal
- Beslissing voorstel
- Zoekresultaat
- ...

Distri-bueren

- Periodiek (batch)
- Real time (events)
- Near real time (berichten)
- ESB
- ...

Dashboards

Ra...

Inko... energ...

Randvoorwaarden

- Handreiking voor data ... het ...ata

Requirements oa:

- **standards (data, privacy, AI, etc)**
- **legal/procurement/contract / competition**
- **Acceptation (local procedures, etc)**

Data Source

Data Management

Info production & Management

Disemination and Presentation Watermanagers

Operation

SAT-WATER

SAT-WATER Program: Blue print for National use

Waterboards, ministries: monitoring **needs** in the frame of:

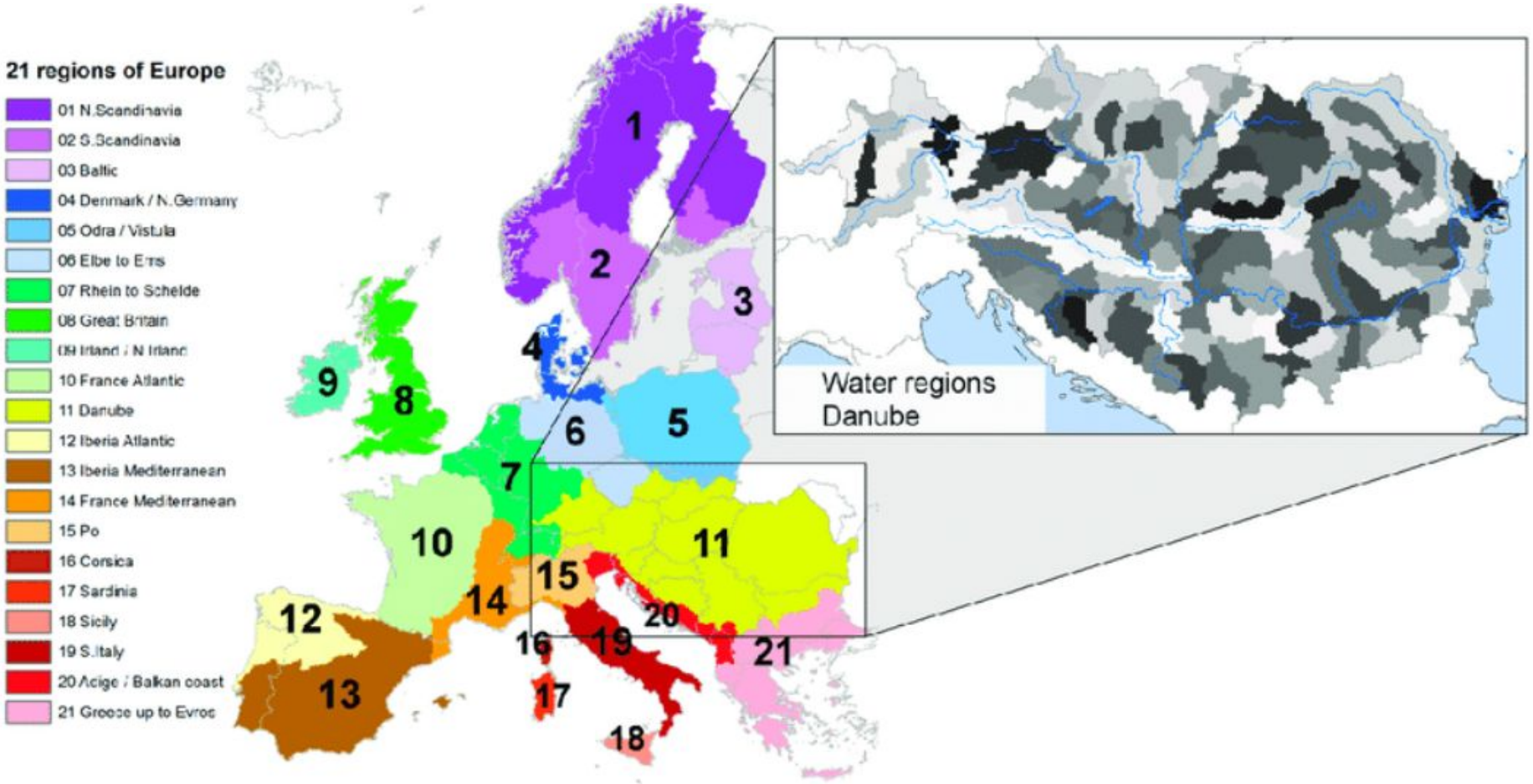
- Delta Program (oa. DPRA), Sweet/Silt Water, Subsidence, etc.
- Agriculture transition (oa. subsidence, waterquality, waterquantity)
- Natura2000 policy (waterquality, waterquantity)
- Climate Adaptation (DONAS, 6 ministries) (drought, waterexcess, heat, sealevel-rise/floods) & related emissions of greenhouse gasses
- Etc.

SAT-WATER Program & reach out for Europe

National monitoring (water management) and **need for cooperation** with other similar EU-member states programmes on the EC policies in order to learn from each other and cooperate on supra national level is essential (e.g. watershed level, atmosphere and coastal issues, etc.) !!

Exchange mechanisms between national & European (member state) programmes need to be encouraged! Discussion on how to join? (Copernicus, ESA or user groups?)

Watermanagement regional/national/European infrastructure



The 21 regions of Europe, as defined by river basins, climate and socio-economics. Right insert: the smaller "water regions" for the Danube river basin. The 21 regions of Europe, as defined by river basins, climate and socio-economics. Right insert: the smaller "water regions" for the Danube river basin.

European/national water monitoring

- Monitoring Water Quantity and Quality (regular): https://www.rijkswaterstaat.nl/en/water/water-management
- Monitoring extreme high water & Early warning (crisis): https://www.rijkswaterstaat.nl/en/water/water-management/monitoring/efas
- Main waterway network & maintenance, construction & traffic management (European level): for economic drivers like Transport, Storage, recreation cooperation Netherlands, Germany (Rhine), Belgium (Scheldt): https://www.eurisportal.eu/

European/national/regional watermanagement (https://www.efas.eu/en/monitoring)

- EFAS collects near real-time water level and river discharge observations to display national/regional threshold exceedances
  - European wide, observation-based flood monitoring:
    - EU-EO & insitu/model based instrument https://emergency.copernicus.eu/mapping/ems/rapid-mapping-portfolio
    - National data on hydrology & meteo & satellite based information: https://www.efas.eu/en/share-your-data-efas

  Dutch examples on national operational EO based information products: e.g. OWASIS (hydrology), WIWB (meteo)
  - Gridded meteorological maps (CEMS
    - National data on hydrology & meteo & satellite based information: https://www.efas.eu/en/share-your-data-efas

  Dutch examples on national operational information products: e.g. KNMI, WIWB (meteo)
- EFAS provides a number of hydrological monitoring products based on LISFLOOD simulations driven by observed meteorological input
  - Soil moisture and snow water equivalent (mostly model based, maps on national initial conditions),

  Dutch examples on national operational EO based information products: e.g. LIBV, soil moisture & OWASIS)

PROTECT Challenge: Next R&D of Climate resilient Water solutions through PCP

- Who are the relevant users?
- What is missing now?
- What is needed for the future?
- PROTECT PCP (Climate-EO R&D shopping list).
- How to test innovative Climate resilient Water solutions?

Needs (hWh) from PROTECT water Challenge: Cooperation on EU scale (watermanagement)

- Need for exchange of national information &knowledge(!) is crucial for European scale information monitoring. Therefore a combination of forces of knowledge, Government & business/market (KGB model) is required!
- Need for scaling: embedding the national/regional scale (local finetuning, validation & acceotation) into this framework in order to cooperate is also a prerequisite
- Therefore the (inter)***operability*** information provision (including, standards, management & maintenance of archives, procurement/contracting, regulations on AI, IP, etc.) on national level to support regional/national/European waterpolicies is crucial
- This requires a national strategy & implementation on continous monitoring/information production, which is qualified (calibrated and validated to local/national and European standards (exchange)

Example of bleuprint (?) of information production on EO (Earth Observation):

The Dutch Waterschapshuis and STOWA national water management information production hub (through its SAT-WATER programme)

stowa 50 JAAR

PROTECT

hetWaterschapshuis

Questions
& Discusion

Climate resilient water solutions – *current state*

- Currently, there is **unpredictability in the demand for fresh water, and there is a lack of connection between the supply and demand of fresh water.**
- Regulations exist in each EU Member State that determine the use of water from various sources, such as channels, treated sewage water, and drinking water, and different purposes such as for agriculture.
- There is a **lack of a common language among different stakeholders** (users involved such water companies, industry, farmers, etc.) involved in the water cycle chain.
- While data is available in certain regions, there is a lack of connectivity between data hubs and repositories.

Question: Do you agree? Would you like to add anything else?

Climate resilient water solutions – *steps/actions*

- In this use case, some foreseen steps are:

1. Gaining a **comprehensive understanding** of the current situation, including existing mechanisms and policies in place.
2. Exploring how **drought-related issues** regarding water supply and demand are addressed and **determining the type of new services** needed to support coping with stress situations based on common language.
3. Identifying the **relevant responsible public authorities and their intended uses**, while also identifying any **existing data gaps**.
4. Identifying the **different users and purposes for the supply of water** like in agriculture.
5. Developing **a system that combines EO data and utilizes Artificial Intelligence (AI) for modelling purposes**. This system should effectively integrate and analyze relevant data to provide actionable insights.

Question: Do you agree? Would you like to add anything else?

Climate resilient water solutions – *steps/actions*

- In this use case, some foreseen steps are:

1. Utilizing **database-driven solutions to enhance the distribution of water**. This involves identifying factors such as saline concentration, pollution levels, substances, algae presence etc., using EO data, to ensure efficient and informed water distribution.
2. Providing **accurate information to water authorities** regarding who needs to collect water, when and how to distribute it in a treated manner, to meet specific demands and avoid unnecessary discharge of sweet water.
3. Establishing a **resilient system where different stakeholders, including water companies, farmers, and industries, collaborate during drought periods**. This collaboration should be based on a comprehensive understanding of the water conditions and **quality requirements for different purposes**. Guidance and decisions from a policy perspective should be achieved to comprehend the consequences and combine relevant data throughout the entire water cycle chain under a unified taxonomy.

Question:
Do you agree? Would you like to add anything else?

Climate resilient water solutions – *desired outcome*

- The desired outcome is a **predictable demand for fresh water.**
- The **regulatory landscape and policies** should be clearly defined, providing a cohesive framework for water management.
- The system should be **capable of effectively handling stress situations** through data-driven decision making and interventions.
- The **supply and demand for fresh water should be interconnected based on diverse needs of users such as farmers, companies, and industries,** while also considering the specific conditions and water quality requirements for different purposes.
- A comprehensive **understanding of the consequences and a combined approach to relevant data within the entire water cycle chain** should be achieved and facilitated by effective policy guidance.

Question: Do you agree? Would you like to add anything else?

Sustainable & resilient infrastructure – *current state*

- Currently, there is a **need for integrated sustainable** re-development, restoring & climate adaptation of existing neighborhoods both in urban and rural areas.

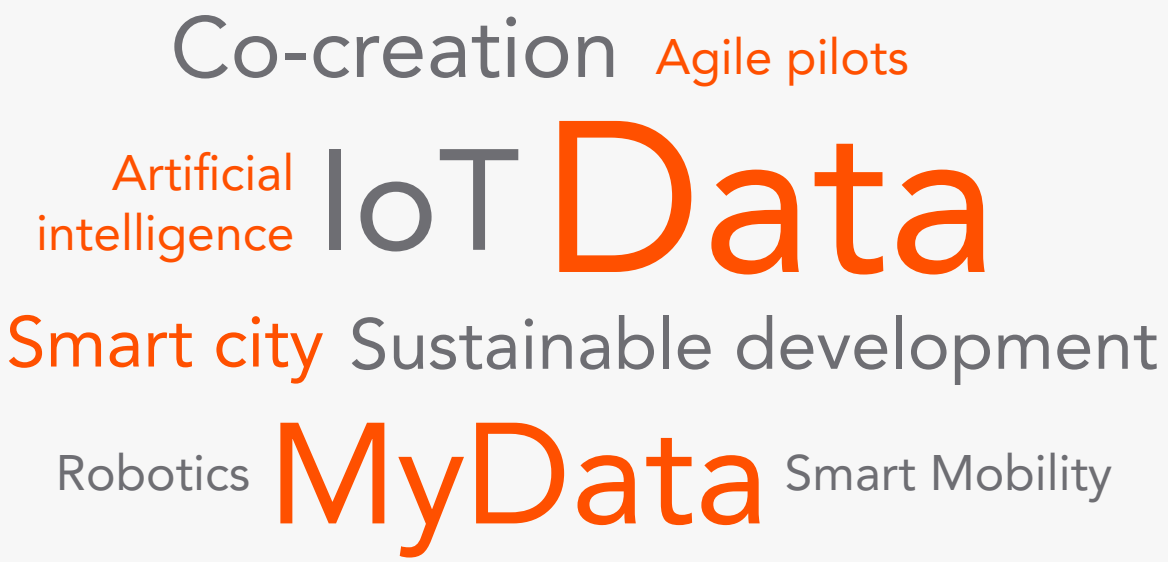
Question: Do you agree? Would you like to add anything else?

What is Forum Virium Helsinki?

- A non-profit innovation company of the City of Helsinki.
- Established in 2005.
- Three programmes: smart city, smart mobility and data.
- Employs 60 top experts.
- Annual project funding of EUR 6–10 million.
- The company is financed by the City of Helsinki and the EU.
- Customer satisfaction 4.4/5.
- Impact:
  - New companies
  - Smart Kalasatama
  - Open data


LAB
DATA
We will strengthen Helsinki's ability to utilise data, new technologies and digitalisation.
We will help businesses utilise Helsinki as a development platform.
We will be a revitalising and agile expert organisation.
VISION:
Helsinki will be the most functional smart city in the world.

Experience with PCP



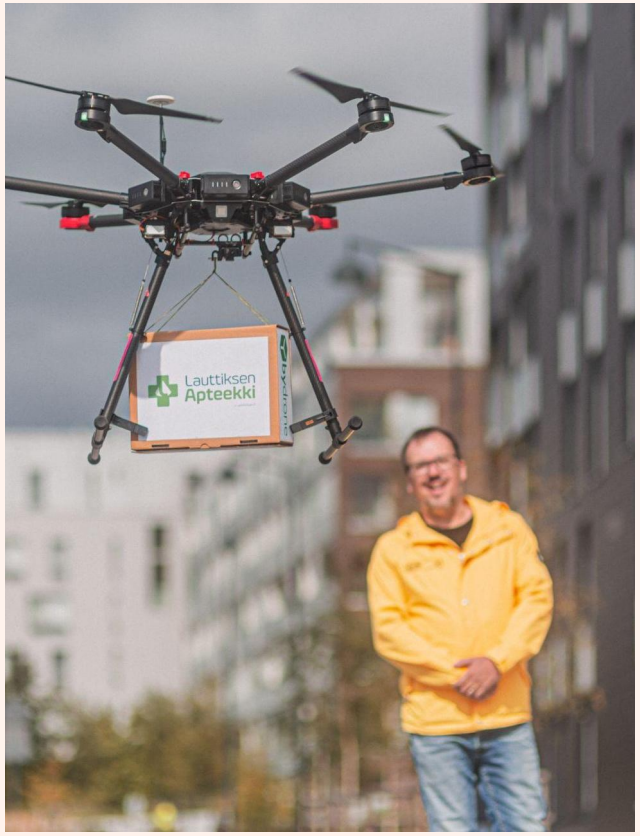
- Silver "for new technologies to assist elderly people in their everyday lives" https://www.silverpcp.eu/
- Select4Cities "to develop a data-driven, Internet-of-Everything (IoE) platform for large-scale urban co-creation" https://www.select4cities.eu/
- FABULOS "to buy R&D for the operations of fleets of autonomous buses and to accelerate the introduction of automated last-mile solutions entering the European market" https://fabulos.eu/
- AI4Cities "to find solutions to make their mobility and energy domains more carbon neutral with aid of AI" https://ai4cities.eu/
- (+upcoming one, stay tuned)

Some of our use cases

- Nature-based solutions to tackle flood risks in case of heavy rains, especially surrounding critical infrastructure (e.g. railways, hospitals, energy network etc.).
  - Additionally: finnish buildings largely wooden, massive insulation etc, can’t survive flooding
  - Snow (amount, moisture level) growing challenge
- Heat mitigation with NBS
- Local energy production/energy renovations

Some of our use cases, cont'd

- EO for identifying the most critical sites (e.g. urban heat island, areas losing greenery/impervious surfaces) and potential sites for solar etc.
- Urban hydrology after storms/heavy rain
- Early warning/alert systems for authorities/public
- Existing NBS and implementation strategies
- Tools for evaluating impact of NBS/climate change/future urban development/construction to urban heat (effectiveness of adaptation measures)
- Impact/cost evaluation tools for energy renovations (https://helsinginilmastoteot.fi/en/energy/energy-renovation-what-why-and-how/)



Sustainable & resilient infrastructure – *steps / actions*

- In this use case, some foreseen actions are:

1. Developing an **integrated solution (using EO data)** with regard to the re-development, restoration and climate adaptation of existing neighborhoods to address/prevent:
    - **heat island effects**
    - **flooding**
    - **droughts**
    - **water scarcity**
    - **in neighborhoods & rural areas**

Question: Do you agree? Would you like to add anything else?

Sustainable & resilient infrastructure – *steps/ actions*

- In this use case, other foreseen actions are:

1. Measuring the **effectiveness of climate adaptation measures** and applied adaptations.
2. Developing an **integrated climate service that combines possible adaptation measures** such as heat island and water scarcity prevention, measures that address flooding and droughts in neighborhoods & rural areas for modelling purposes and possible scenarios with existing limitations (e.g., narrow streets, protected historical monumental buildings, bridges, water scarcity faced by farmers, etc.) and given other priorities such as green, energy transition, parking.
3. Exploring **most common limitations, barriers and impossibilities** that stand in the way of implementing climate adaptation of the existing infrastructure. Using the outcomes to find an innovative solution given these limitations

Question: Do you agree? Would you like to add anything else?

Sustainable & resilient infrastructure – *desired outcome*

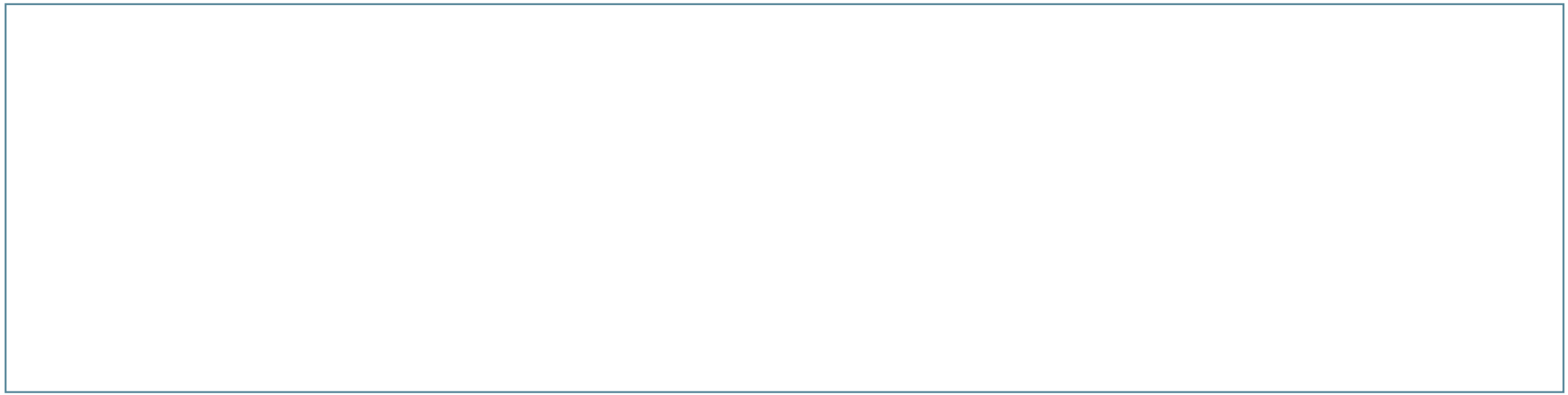
The challenge is to find a **solution to climate adaptation for this complex situation** (vulnerable urban &/ rural areas with a combination of heat, flooding, water scarcity and droughts) using integrated climate services.

Question: Do you agree? Would you like to add anything else?

Open discussion

Feedback

Other use cases



Other notes

Conclusions

Next Steps

Conclusions and next steps

- The **OMC documents will integrate the input from Pain Point Workshops**, including specific questions.
- Public buyers can participate as **observers in the e-Pitching sessions** (18 – 19 September)
- **Publication of the PIN** (20 September) – interested public buyers can be listed,
- **Open Market Consultation** (15 -16 November) – participation of public buyers is important.
- Preparation of the **Public Buyers Group** – expression of interest
- Development of the **Business Case** – based on the OMC results
- Design of the **Procurement Strategy** – based on the OMC results

PROTECT
PROCURING INNOVATIVE CLIMATE CHANGE SERVICES

Thank you!

Contact:

Stephan Corvers
s.corvers@Corvers.com

Ana Lucia Jaramillo
a.jaramillo@Corvers.com

Matty van Sloten
m.vansloten@Corvers.com

CORVERS
COMMERCIAL & LEGAL AFFAIRS

This project has received funding from the Horizon Europe Framework Programme (HORIZON) under grant agreement No 101060592