

opertus mundi

A
**Single Digital Market
for Industrial
Geospatial Data Assets**

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www.opertusmundi.eu



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OM Project Identity

Full title: OpertusMundi – A Single Digital Market for Geospatial Data Assets

Objective: ICT-13-2018-2019: Supporting the emergence of data markets and the data economy

IA: (Innovation Action)

GA: 870228

Duration: 36m (1/2020-12/2022)



R&I; Big Data, Linked Data, Data infrastructures, Scientific Infrastructures
[Coordinator, Greece]



R&I; Data mining, ML, Semantic Web, information retrieval, software engineering
[Germany]



R&I; Big Data, ML, data integration & analysis, data science
[Netherlands]



SME; geospatial data infrastructures, GIS, EO, data management
[Greece]



SME; Earth Observation, geospatial data infrastructures, ML
[Slovenia]



Legal firm; electronic marketplaces, data sharing, online services, GDPR
[France]



SME; networking and branding, EO, incubation, communication
[Germany]



SME; geospatial analytics, geomarketing, business intelligence
[Austria]



SME; geospatial data management, Web GIS, SDIs, open source
[Germany]



SME; creative and design studio, UI/UX, branding, video, communication
[Greece]

Our Experience

Why us?

- **Geospatial Data**
 - geodata.gov.gr (full asset lifecycle, from publishing to service provision), Copernicus (DIAS, European Data Cube, EO-Learn)
- **Scientific Data Infrastructures**
 - hellenicdataservice.gr (scientific data, analysis services, Jupyter notebook integration)
 - OpenAIRE, EOSC, HBP (architecture, integration, workflows)
- **Open Source**
 - OSGeo, OGC reference implementations
- **Geospatial Web Services**
 - Full array of commercial web services & applications
- **Industrial Data Spaces**
 - Direct contributions to Reference architecture
- **Commercial-grade UI/UX**
 - Plethora of commercial applications/products & branding
- **Contracting and Licensing**
 - Extensive experience in contracting, T&Cs, licensing

Our Motivation

Data Economy

Geospatial Data

- The **foundation** and **value multiplier** of our **physical** and **digital economy**
 - **80%** of data is geospatial
 - **Cross-sector and cross-border** coverage
 - **Fluid** roles of producers & producers
 - Rich and complex a **value-chains** regardless of **size**
 - Extremely **valuable** and **costly** to produce and maintain
 - **Data Economy** heavily influenced from the open/public **geospatial** data landscape
 - **INSPIRE Directive** (authoritative, standards-compliant public environmental data)
 - **PSI Directive** (arguments of CBA and financial benefits for EU's GDP gains largely extrapolated from geospatial data value chains)
 - **OpenStreetMap** (crowdsourcing & open; new value chains)

Something missing?

The Market

- Comprehensive **technology foundations** driven by the **public sector** and **value of geospatial data**
 - **Large investments** to feed **science** and **decision-making** (e.g., EO, Census)
 - **Standards** for metadata, data, and services with **99,99%** vendor support (ISO, OGC, INSPIRE, OSGeo)
- However, these serve the public sector (curation, provenance) and not the industry (fit-for-purpose)
- Market dominated by **three basic models**
 - **Open data** (public, open, crowdsourced)
 - **Freemium** (e.g., Google Maps)
 - **Behemoths** (e.g., TomTom, HERE)
- And **one trend**
 - **Intertwine geospatial data** with **services**; streamline, simplify, democratized

Where is the data?

The Challenge

- Acute **realization** and **critique** from **consumers** regarding the market
 - **Open**: great for experimentation and ambitious companies, but low **quality**, marginal thematic **coverage**, complex **license** clearing, **integration**
 - **Freemium**: great for coverage and simplicity, but **walled-garden**, scaling **costs**, restrictive **business models**, questionable **quality**
 - **Behemoths**: great for **quality** & thematic **coverage**, explicit **lock-in**, rising **costs**
- The **demand** for **quality-assured**, **simple** to use, **rich**, **proprietary geospatial data** assets is there
- But is not **reaching** EU-wide geospatial data **owners** and **producers**

Buy _____ POI _____ data for _____ Germany _____ ?

Info before purchase

Mystery Shopper

Availability	Assets (%)
Description	58,62
Format	45,52
Documentation	10,34
Schema	11,03
Sample	31,03
English	57,93
Quality	23,45
Price	18,62
Contract terms	0,69
Not found	27,59

Digital Single Market

An Intervention is needed

- **EU Data owners and producers** continue with their established clientele, not being able to **harness** this **opportunity**
- The market of geospatial **owners** and **consumers** is **fragmented** and **disjoint across the EU**
 - There is no **single point** for **publishing, discovering** and **purchasing** proprietary geospatial data assets
 - Contracts and licensing terms provided by owners are not **homogenized** in a way that facilitates **comparison, evaluation, and reuse**
 - Proprietary **data owners** cannot provide the same level of **bundled service** offerings, increasing **effort** and **cost** for consumers to actually use the data
- We need to **aggregate offer** and **demand** across the EU, establish **fair** and **transparent** terms, **streamline** the full data asset **lifecycle**, and flexibly support **value co-creation**

High Value Data

HVD according to PSI

- **EU Open Data Portal Report (#15)**
- **Six (6) thematic categories**
 - Geospatial
 - Earth Observation and Environment
 - Meteorological
 - Statistics
 - Companies and company Ownership
 - Mobility
- **OpertusMundi directly targets 4 out of 6 HVD for proprietary data assets**
 - Geospatial, EO, Statistics, Mobility
 - The only IDM aligned by design with EU policies

The Marketplace

OpertusMundi will deliver a **trusted, secure, and scalable industrial** geospatial data market, which will act as a **single-point** for the streamlined and trusted **discovery, sharing, trading, remuneration, and use** of proprietary geospatial data assets, guaranteeing **low-cost** and **flexibility** to accommodate current and emerging needs of **Data Economy** stakeholders regardless of **size, domain, and expertise**

The ^{first} EU marketplace ^{for} geospatial data

Our Motivation

In a nutshell

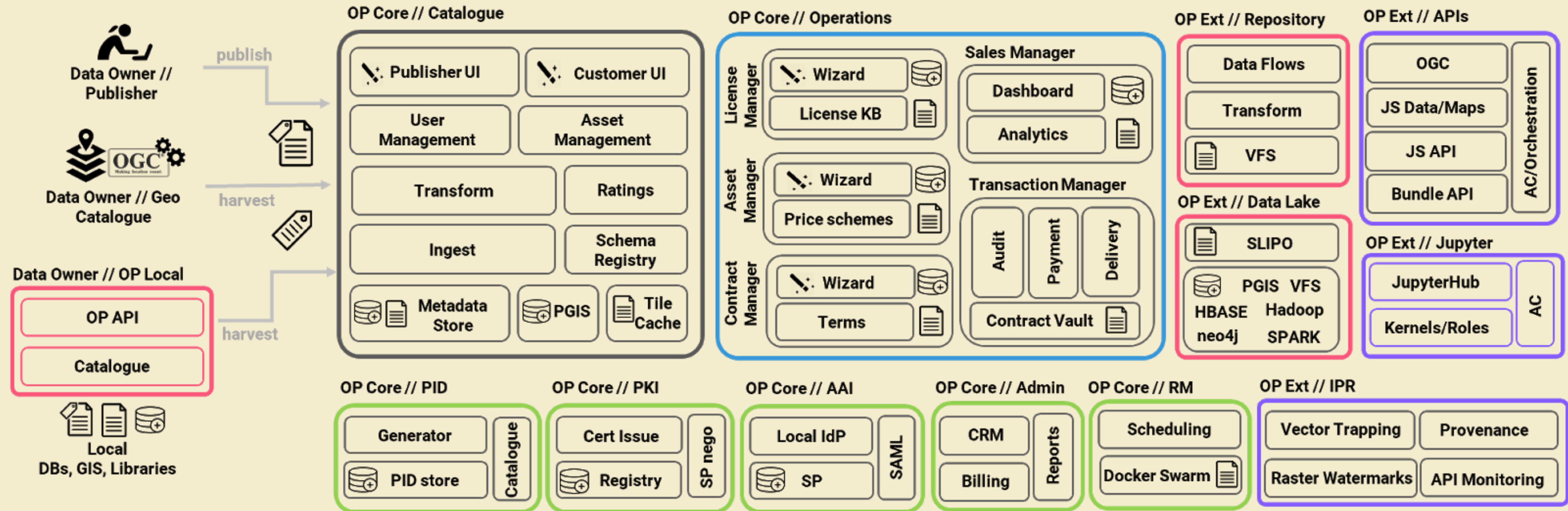
- **Geospatial** data is the most **valuable** category of industrial data assets
 - Yet there is no **digital marketplace** available for proprietary assets
- **Technical foundations** in place
 - Data publishing workflows, data management, value-added services
- This **can be a sustainable business**
 - Consumer need and demand is already there

Critical Mass

Key cross-cutting directions

- **Build trust**
 - **Providers:** protect IPR, complement existing channels; bring clients
 - **Consumers:** rich info for assets (before purchase), terms and conditions, scale
- **Keep it simple**
 - **Providers:** publish assets, monitor revenue, provide value-added services
 - **Consumers:** search, buy and use
- **Fair and transparent**
 - Contract terms, remuneration, business models, legally sound
- **Automate**
 - Streamline lifecycle, avoid human intervention (i.e., like a standard eMarketplace), minimize OPEX
- **Sustainable**
 - Do not be greedy and short-sighted, flexible revenue streams, new business models for value co-creation

Architecture



Birds-eye View

OP Core
Publish and trade assets

OP Ext
Provide value-added services

OP Management

Birds-eye View

OP Core
Publish and trade assets

Decouple data from
value-added services
(we will not touch your data)

- **Single point of entry** for consumers and providers
 - Does not manage assets; only their metadata
- **Consumers** can search, compare and purchase
 - Multi-faceted search and recommendation
 - Clear T&Cs and price **before** purchase
- **Owners** publish asset and define terms/price
 - Harmonized EU contract templates (wizards)
 - Harmonized price models
- **Payment** is performed via the platform
- **Delivery** is performed by the platform or the owner

Birds-eye View

- **Provides an open-ended suite of value-added services (VAS)**
 - Manages assets; services of increasing intrusiveness
 - Clear **T&Cs** and **revenue-sharing** in advance
 - Unrestricted **opt-in** and **opt-out for owners**
- **Owners** select asset/VAS to provide
 - Service instantiated and published automatically
 - Sales integrated into owner dashboard
- **Consumers** purchase assets exactly in the same way
- **VAS**
 - file storage (+ profiling),
 - data management (geoDB), OGC, mapping/tilling, integration (KG),
 - Jupyter notebooks, bundles (data & services/workflows)

OP Ext
Provide value-added services

Provided only with explicit
consent (contract)
(you can trust us with your data)

Birds-eye View

- **Business modelling**
 - All services managed via the same **workflow engine**
 - Flexibility, scaling, security
- **Auditable**
 - Full tracking of asset lifecycle and transactions
 - Basis for dispute resolution and transparency
- **Security**
 - Industry-standard hardening & encryption
- **Contracts & Price models**
 - Knowledge base (core, terms), versioning
 - Contract vault
 - Governs all marketplace relations (provider, consumer, platform)
- **Resource Management**
 - Automated demand-aware management of cloud resources
- **Analytics**
 - Dashboard for owners and consumers
- **Helpdesk**

OP Management

USPs

What makes us different

- **No fees for data sales or registration**
 - Negligible system utilization; build a user base; new revenue streams
- **One place to find, purchase and use geospatial data assets**
 - Both an intermediary and a service provider; keep clients after they have purchased an asset
- **Simple services everyone can use** (we are not targeting only geo-experts, but everyone using geo data and services)
- **Traceable and auditable** (build trust for owners)

Joint Challenges

Collaboration

Challenges affecting most IDPs

- **Legal foundations**
 - Client legal status (companies vs. individuals)
 - Contract Law (EU-wide, national)
 - Harmonized contracts & terms
 - P2B, e-Commerce, KYC/KYB, GDPR
- **Liabilities**
 - Platform to providers, platform to consumers, providers to consumers
- **Business models**
 - Balancing critical mass vs. revenues
 - Types and sustainability
- **Commercial entity**
 - ePayments, invoices
- **Trust**
 - Auditable; IPR; dispute resolution

Thank you

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User Pitch

Choose your
own path

Data providers

- **Maintain full control over your data**
 - Multiple options that fit your needs
 - Opt-in and opt-out without restrictions
- **Benefits**
 - EU-wide reach; expand your market share
 - Streamline transactions and payments
 - Bundle your assets with services
 - Fair and transparent remuneration; no surprises
- **What you can do**
 - Advertise your assets
 - Sell your assets
 - Sell the asset as a service
 - Auditable; IPR; dispute resolution

Advertise

- **Sign up/log in**
- Fill in **information** about your assets
 - Add **metadata** or **import** any existing
 - Set the **price**
 - Select from multiple supported pricing models
 - Set your **terms**
 - Adjust an EU contract as you prefer
 - **Publish**
- You are good to go!
- We will keep **no commission**
- **Why select this option?**
 - You want to gain an **international audience** but do not feel comfortable uploading your data in our secure data lake
 - You want to test things out and **start small**
- What you will be **loosing**?
 - We cannot provide advanced metadata for your assets, automate their delivery, protect them, nor generate additional revenue for you
- How do **purchases** take place?
 - Consumers find your asset and purchase it
 - You provide them directly to consumers and after we receive confirmation, transfer the payment to you

Direct Sales

•Sign up/log in

•Fill in **information** about your assets

- Add **metadata** or **import** any existing
- Set the **price**
 - Select from multiple supported pricing models
- Set your **terms**
 - Adjust an EU contract as you prefer
- Upload your asset to our **secure data lake**
 - We automatically generate **metadata** helping consumers to know your asset
 - **Free** if the total size of your assets is <100GB; 0,02 Euros/GB/year for **more**
 - We protect your IPR via **watermarking**
- **Publish**

•You are good to go!

•We will keep **no commission for sales**

•Why to select this option?

- You want to gain an **international audience**
- You want to increase your **revenues**
- You want to reduce your admin **overhead**
- You want to improve customer's **satisfaction**

•What you will be **loosing**?

- **Nothing!** You can still sell your assets through your **current channels** and **opt-out** whenever you want

•How do **purchases** take place?

- Consumers **find** your asset and purchase it
 - We can transform it in other formats if consumer requests it
- We **deliver** the asset and transfer the **payment** to you

Asset as a Service

•Sign up/log in

•Select any of your **published assets**

- Or you can **upload new assets** which will **only be** available as a service (so no one can download them)
- Select the **service type**
 - OGC WMS/WFS, custom tiles, databases, notebooks, analysis bundles
 - Services and more opportunities for increased revenues all the time
- Accept our **terms** and **remuneration**
 - **Fair** and **transparent**; you provide the asset, we provide the service
- **Publish**

•You are good to go!

•We will keep a **commission**

•Why to select this option?

- You want to expand your **services**
- You want to increase your **revenues**
- You want to address **consumer demand**
- You want to reduce **CAPEX/OPEX**
- You want to gain an **international audience**

•What you will be **loosing**?

- **Nothing!** You can still sell your assets through your **current channels** and **opt-out** whenever you want

•How do **purchases** take place?

- Consumers **find** the service and purchase a license (subscription)
- We **deliver** the service, keep our **commission** and **bill** your account

What you also get for free

- **Dashboard**
 - All your activity in **one place** via a simple to use secure web-based application
 - Rich analytics for your **sales** across all channels
 - Manage your **account**, roles in your organization, payment preferences, and more
- **Your assets & services**
 - Manage your asset's metadata, terms, price whenever you want
 - Add, remove, enrich your assets
- **Your clients**
 - Know your clients and their preferences, request and get feedback
- **Organization**
 - Assign and manage different roles in your organization
- **Unified messaging**
 - One place for notifications and message exchange with clients and the platform
- **Secure Storage**
 - All your contracts and assets are available in our secure storage
- **Helpdesk**
 - Technical, business, legal questions? We got you covered
- **What if something goes wrong?**
 - Your assets are tracked via our digital watermarks for each **unique transaction**
 - Our contracts limit your **liability** towards clients, **protecting** you from claims
 - We are responsible for ensuring the client's **SLA**, not you

We can help you grow

- **You produce aerial imagery**
 - Systematically or ad hoc, from a few to thousands every year, it doesn't matter
 - Let your assets be **found** across the world, individually or as a set, and via **web services** customers actually want
- **You want a geospatial database**
 - You own or create geospatial assets and want a **scalable, low-cost** data management and processing solution
 - Let us do the work and offer it **as a service** to you and your customers, **scale** as you go, from a PostGIS to a Spark cluster
 - Get access to **bundled** state-of-the art **geo-processing** and **analysis** frameworks, also available via **Jupyter notebooks**
- **You want beautiful maps**
 - You want to use **custom map tiles** and **interactive** maps, or use a selection of **beautiful maps** we have already created for the web and mobile
 - Use our streamlined **visual editor** and let us do the heavy-lifting. We will create and serve the maps to you and your clients
- **You want your own Web GIS**
 - You want to provide a fully-fledged Web GIS for your organization or your clients
 - We can provide it as a **turn-key solution**, with no effort from your side, ready to use with **your data or any other data you purchase**
- **You only produce a few geospatial assets**
 - Size and frequency do not matter, even the smallest and narrowest geospatial asset may be **valuable** for someone else
 - **Monetize** them and **let consumers find you**

Find data,
build with
data

Data consumers

•One-stop shop for geospatial data assets

- Find, compare and purchase geospatial data for EU
- Any type of data, regardless of domain, size, or type
- Buy a single file, a collection, or a subscription, it's your choice
- Bundled services to extract value from your asset; from simple maps to complex geo-processing, we got you covered

•Benefits

- Detailed, rich, fit-for-use **metadata**; find the asset **you need**
- Clear **licensing**: know what you can do **before purchase**
- Streamlined, secure **payment** and **delivery** as with any other marketplace

•What you can do

- Purchase assets
- Use assets

Purchase and use assets

- **Sign up/log in**
- **Search for the asset you want**
 - Rich metadata, intelligent search
- **View and compare**
 - Preview key asset information, compare with other assets
 - Clear terms, restrictions and price
- **Purchase**
 - Agree on the terms, receive the corresponding contract, and pay
- **Delivery**
 - Select how you want the asset to be delivered
- We will keep **no commission**
- **The asset is now yours, what next?**
 - You can use it as you would normally do
- **But you can do so much more!**
 - **Save, manage and share** files with co-workers in our secure **cloud storage**; all assets you purchased, plus any other file you want
 - Use your asset in any of our **value-added services**
 - Build maps, integrate, analyze, build a web service, and so much more

What you also get for free

- **Dashboard**
 - All your activity in **one place** via a simple to use secure web-based application
 - Manage your **account**, roles in your organization, payment preferences, and more
- **Your assets**
 - Manage the assets you have purchased
- **Unified messaging**
 - One place for notifications and message exchange with clients and the platform
- **Secure Storage**
 - All your contracts and assets are available in our secure storage
- **Helpdesk**
 - Technical, business, legal questions? We got you covered

Geospatial services for all

Value-added Services

- **Your one stop for geospatial services**

- Use the data you have **purchased**, or any other **data you have**
- **Services for all**; from beautiful tiles, to data science

- **Benefits**

- Start small and simple, grow as needed, opt-out whenever you want
- **Cloud-based, scalable and secure**
- **Low-cost, fair** pricing with no hidden fees; pay for what you use

- **What you can do**

- OGC Services
- Web mapping
- Data management & analysis
- Data Science
- Bundled services