



# Ocean Protocol and E-Government

Trent McConaghy  
@trentmc0



ocean

# Questions

- How can governments go digital-native, *cost-effectively*?
- How can governments get the most out of data & AI?

# Outline

- Case study: Estonia. Data + identity + payments.
- Data & AI. Ocean!

# Digital-Native Case Study: Estonia



# Recent History of Estonia

- 1991 – independence from Soviet Union
- 1992 – new constitution
- 2001 – X-road data platform
- 2002 – citizen access to digital ID & signatures
- 2005 – join EU
- 2011 – use the Euro
  
- 2014 – E-Res validation
- 2015 – E-Res minimum viable product
- 2016 – E-Res Go-to-market
  
- 2017 – Estcoin idea raised
- 2018 – Token-friendly laws





# “Country-as-a-Service”

APIs:

Authentication

Digital Signing

Tax returns

Incorporation

Company profile

Personal profile

# Estonia E-Government Applications



## DigiDoc

DigiDoc is a system that's widely-used in Estonia for storing, sharing and digitally signing documents.



## Digital Signature

Digital signature enables secure, legally-binding, electronic document signing.



## e-Business Register

Enables entrepreneurs to register their new business online in minutes.



## e-Cabinet

A powerful tool used by the Estonian government to streamline its decision-making process.



## Electronic Land Register

A one-of-a-kind information system for storing real estate and land data.



## i-Voting

i-Voting allows voters to cast their ballots over the internet, from anywhere in the world.



## Keyless Signature Infrastructure

Estonian digital society ensures the integrity of its systems and data by using the KSI technology.



## Location-Based Services

A positioning service that detects device location & provides location information.



## e-Law

Allows public access to every piece of draft law that has been submitted since February 2003.



## e-Police

Revolutionizes police communication and coordination, maximizing effective policing.



## e-Precription

A centralized, paperless system for issuing and handling medical prescriptions.

## e-Residency

Estonian e-Residency is a digital identity that allows everyone in the world to do business online with ease.



## m-Parking

Allows drivers to pay for city parking using a mobile phone.



## Mobile-ID

Allows a client to use a mobile phone as a form of secure electronic ID.



## Mobile Payment

Enables payment for goods and services using mobile-phones.



## Population Register

The state database for basic information about each person living in Estonia.



## e-School

Allow students, teachers and parents to collaborate in the learning process.



## e-Tax

e-Tax has drastically reduced the time spent by individuals and entrepreneurs on filing taxes.



## Electronic Health Record

Integrates data from healthcare providers into a national record for each patient.



## Electronic ID Card

e-ID acts as definitive proof of ID in secure electronic environments.



## Smart Grid in Energy Sector

Estonian-developed innovation a number of cutting-edge solutions in the energy sector on the top of Smart Grid.



## Social Welfare e-Services

The social welfare benefit system is accessible by a convenient, online environment.



## State e-Services Portal

A one-stop-shop for the hundreds of e-services offered by government institutions.



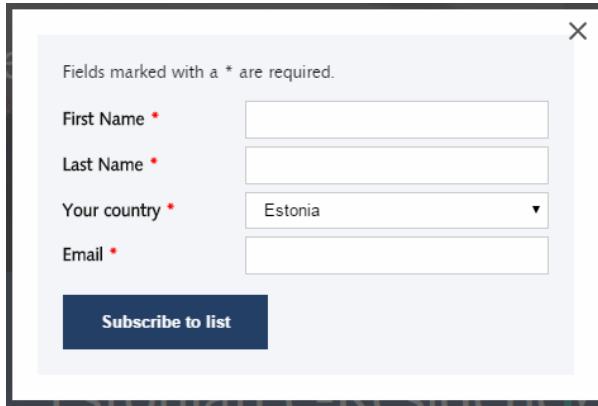
## X-Road

Allows databases to interact, making integrated e-services possible.

## **Example Service: E-Residency**

# E-Res Phase I: Validation

## Sept 2014 – March 2015



Fields marked with a \* are required.

First Name \*

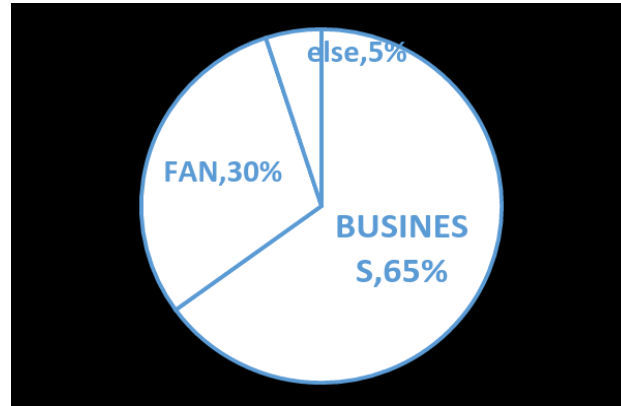
Last Name \*

Your country \*

Email \*

[Subscribe to list](#)

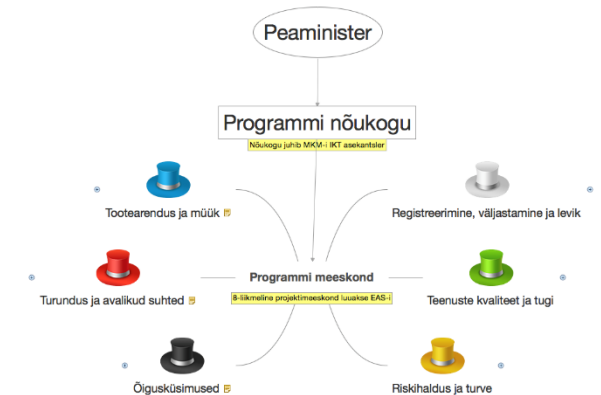
Landing page



Study



1st e-resident



Team, Board, Budget



# E-Res Phase II: Building Minimum Viable Product

## April 2015 – Aug 2016

### Processes

online application

embassies

automated due diligence

...

### Legal

losing „link to Estonia“

online bank account

visa centres

...

### Services

in English

bank transfers

APIs to incorporate, auth, sign

...

### Partners

business support

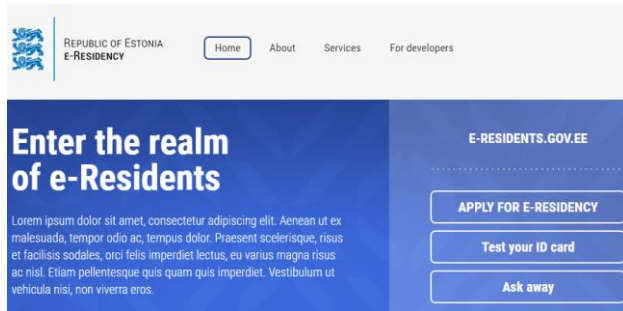
fintech services

IT & customer support

...

# E-Res Phase III: Go-to-Market

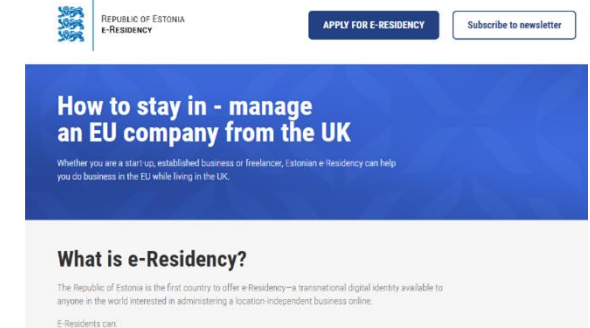
## Sept 2016 – ...



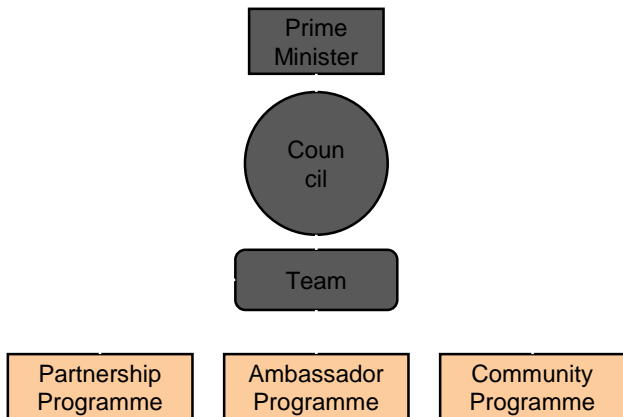
Materials



More services



Target markets



Community building



More locations



Partnerships, Advisory

# **Estonia Platform**

# Estonia E-Government Applications



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## X-Road

Allows databases to interact, making integrated e-services possible.

# The Foundation is Data. Then, Identity + Payments

## Govt apps

<p><b>e-Tax</b> e-Tax has drastically reduced the time spent by individuals and entrepreneurs on filing taxes.</p>	<p><b>Electronic Health Record</b> Integrates data from healthcare providers into a national record for each patient.</p>	<p><b>Electronic Land Register</b> A one-of-a-kind information system for storing real estate and land data.</p>	<p><b>State e-Services Portal</b> A one-stop-shop for the hundreds of e-services offered by government institutions.</p>	<p><b>i-Voting</b> i-Voting allows voters to cast their ballots over the internet, from anywhere in the world.</p>	<p><b>Social Welfare e-Services</b> The social welfare benefit system is accessible by a convenient, online environment.</p>	<p><b>e-Business Register</b> Enables entrepreneurs to register their new business online in minutes.</p>	<p><b>e-Cabinet</b> A powerful tool used by the Estonian government to streamline its decision-making process.</p>
<p><b>e-Police</b> Revolutionizes police communication and coordination, ensuring effective policing.</p>	<p><b>DigiDoc</b> DigiDoc is a system that's widely used in Estonia for storing, sharing and digitally signing documents.</p>	<p><b>e-School</b> Allow students, teachers and parents to collaborate in the learning process.</p>	<p><b>e-Law</b> Allows public access to every piece of draft law that has been submitted since February 2003.</p>	<p><b>Population Register</b> The state database for basic information about each person living in Estonia.</p>	<p><b>Mobile-ID</b> Allows a client to use a mobile phone as a form of secure electronic ID.</p>	<p><b>Location-Based Services</b> A positioning service that detects device location &amp; provides location information.</p>	<p><b>e-Residency</b> Estonian e-Residency is a digital identity that allows everyone in the world to do business online with ease.</p>

## 3<sup>rd</sup> party apps

## Middleware

<h3>Identity</h3> <p><b>Electronic ID Card</b> e-ID acts as definitive proof of ID in secure electronic environments.</p>	<h3>Payments</h3> <p><b>Stablecoin</b> €</p>
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## Platform

<h3>Data</h3> <p><b>Digital Signature</b> Digital signature enables secure, legally-binding, electronic document signing.</p>	<p><b>Data management</b> <b>X-Road</b> Allows databases to interact, making integrated e-services possible.</p>
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# Benefits of being digital native

- Less \$ spent on administration. (Estonia: 5x-10x)
- More comprehensive, faster, simpler gov't services for citizens
- More opportunities for citizens





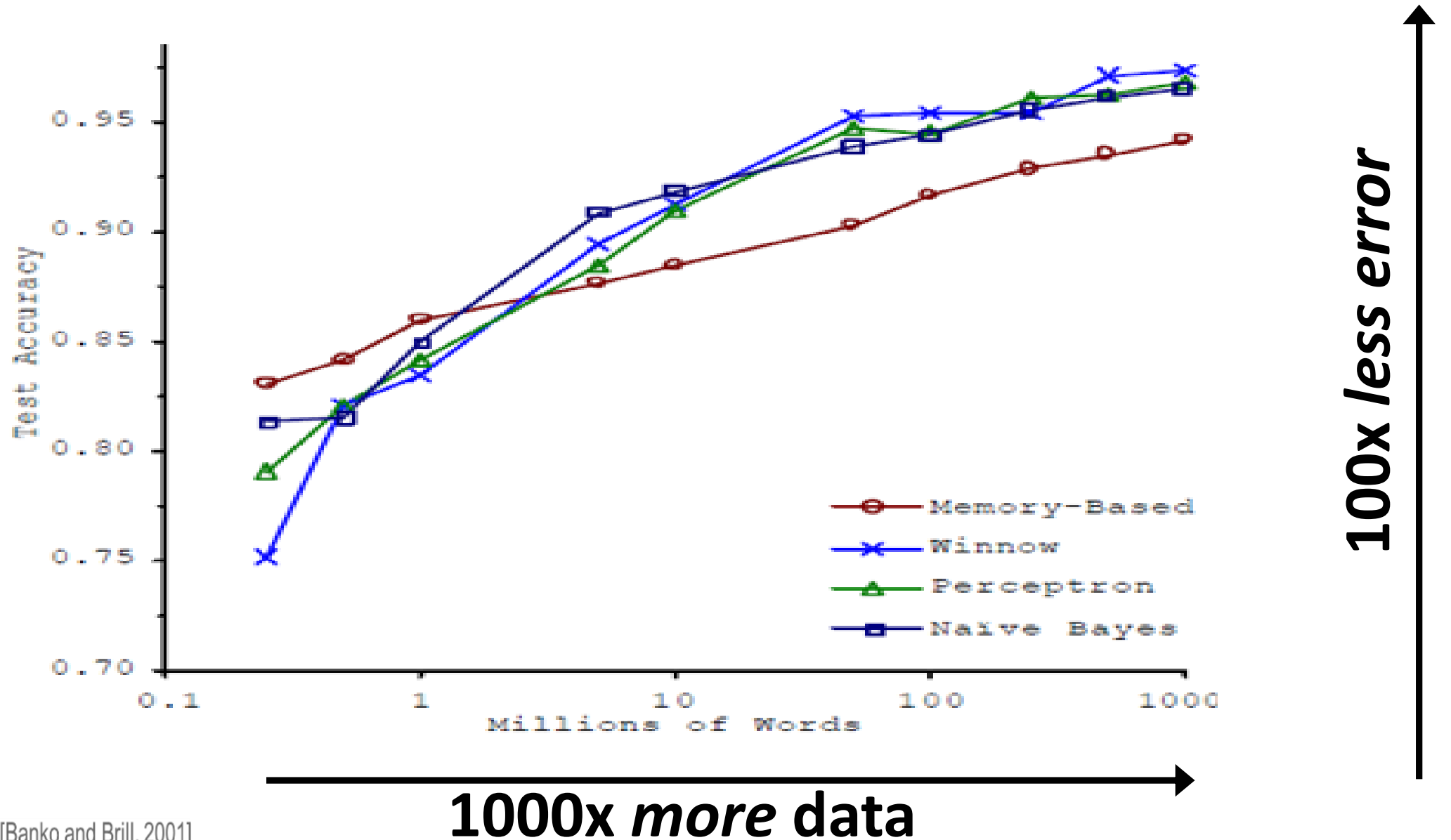
# Data & AI

# Potential Benefits of AI

- Save more \$. Examples:
  - Insights to better target \$
  - Automation
- Further improve gov't services. Examples
  - Health. Earlier & more accurate diagnoses. Targeted treatment.
  - AI help bots for online services
  - And many, many more



# AI Loves Data



**To unlock AI  
We need to unlock data**

# How to unlock data?

1. Connect data-haves with data have-nots
2. Unlock private data



# How to unlock data?

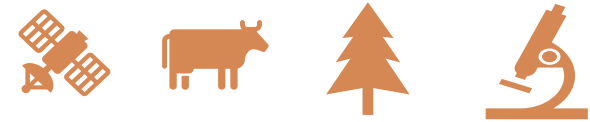
1. **Connect data-haves with data have-nots**
2. Unlock private data

# 1. Connect data-haves with data have-nots: easy to create data marketplaces / commons

**Govts, NGOs, enterprises**  
**With data & compute**



**Problem solvers**  
**(data scientists)**



**Data Sharing  
tool**

**DS**

**Data  
Market**

**DM**

**Data commons**

**Data science tools**  
**(sklearn, Tensorflow, ..)**



**Data management substrate**

# 1. Connect data-haves with data have-nots: easy to create data marketplaces / commons

Have data	Have AI (Want data)	Have data	Have data	Have AI (Want data)
Have AI (Want data)	Have data	Have AI (Want data)	Have AI (Want data)	Have data
Data marketplace	DM	Data commons	DC	Data Science Tools
DM	DM	DC	DC	DST
DM	DM	DC	DC	DST
DM	DM	DC	DC	DST



ocean

Data management substrate



ocean

# How to unlock data?

1. Connect data-haves with data have-nots
2. **Unlock private data**

**The most valuable data  
Is private data**








Data  
you  
have

***1 hospital***



(Private)  
Data you want  
***1000 hospitals***

**Data  
you  
have**

***1 hospital***

**Showstopper:  
Privacy & Control**

**Data you want**

***1000 hospitals***

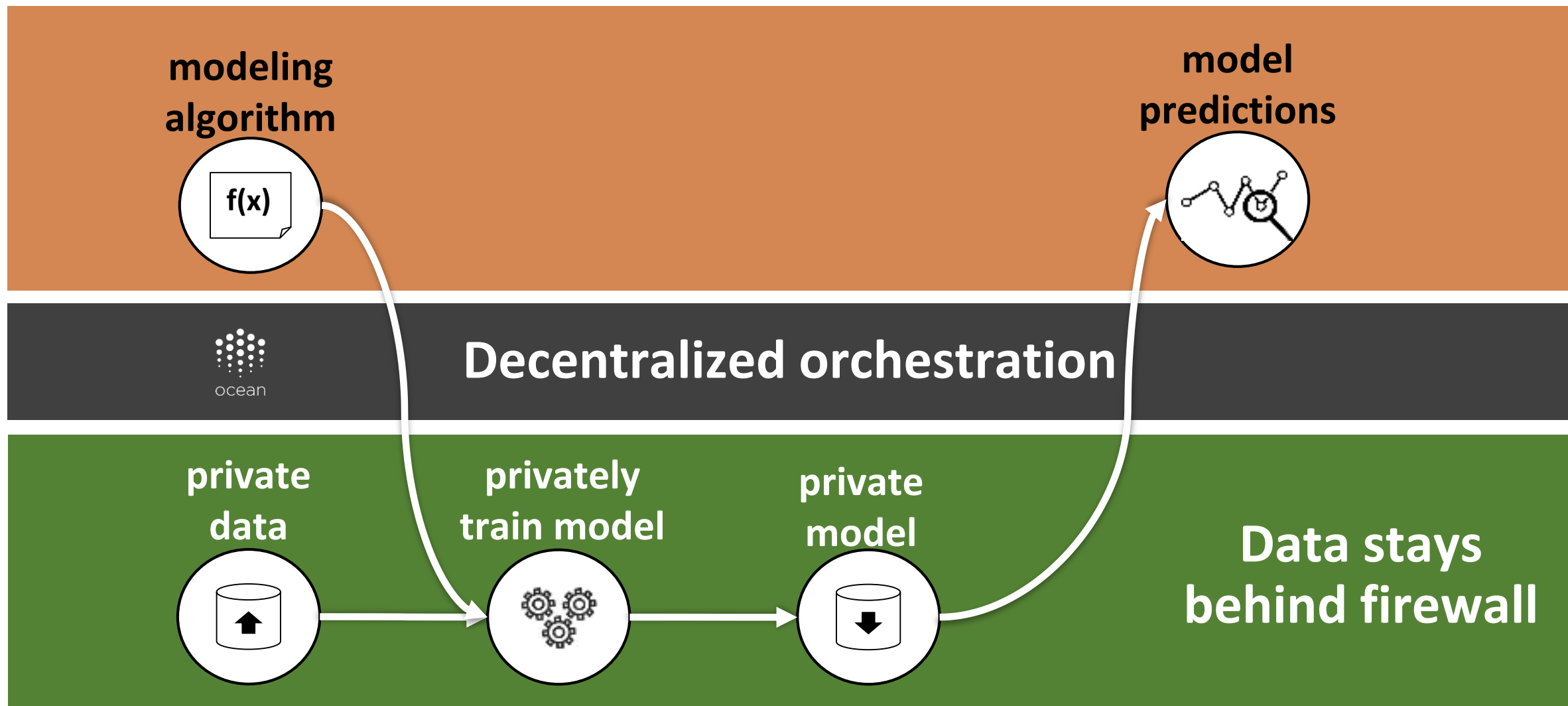
# Issue #2: Can't get more data without privacy & control problems

Accuracy ↑ ↑ ↑  
Lives Saved ↑ ↑ ↑



Privacy ↓ ↓ ↓  
Control ↓ ↓ ↓

## #2: Unlock the benefit of more data while keeping control & privacy: bring AI compute to the data



# #2: Can get more data, while maintaining privacy & control

Accuracy ↑ ↑ ↑  
Lives saved ↑ ↑ ↑



Privacy ✓  
Control ✓

# Ocean Commons: Open Data on an Open Substrate

[commons.oceanprotocol.com](https://commons.oceanprotocol.com)



[Channels](#)

[Publish](#)

[History](#)

[Faucet](#)

[About](#)



## Commons

A marketplace to find and publish open data sets in the Ocean Network.

SEARCH

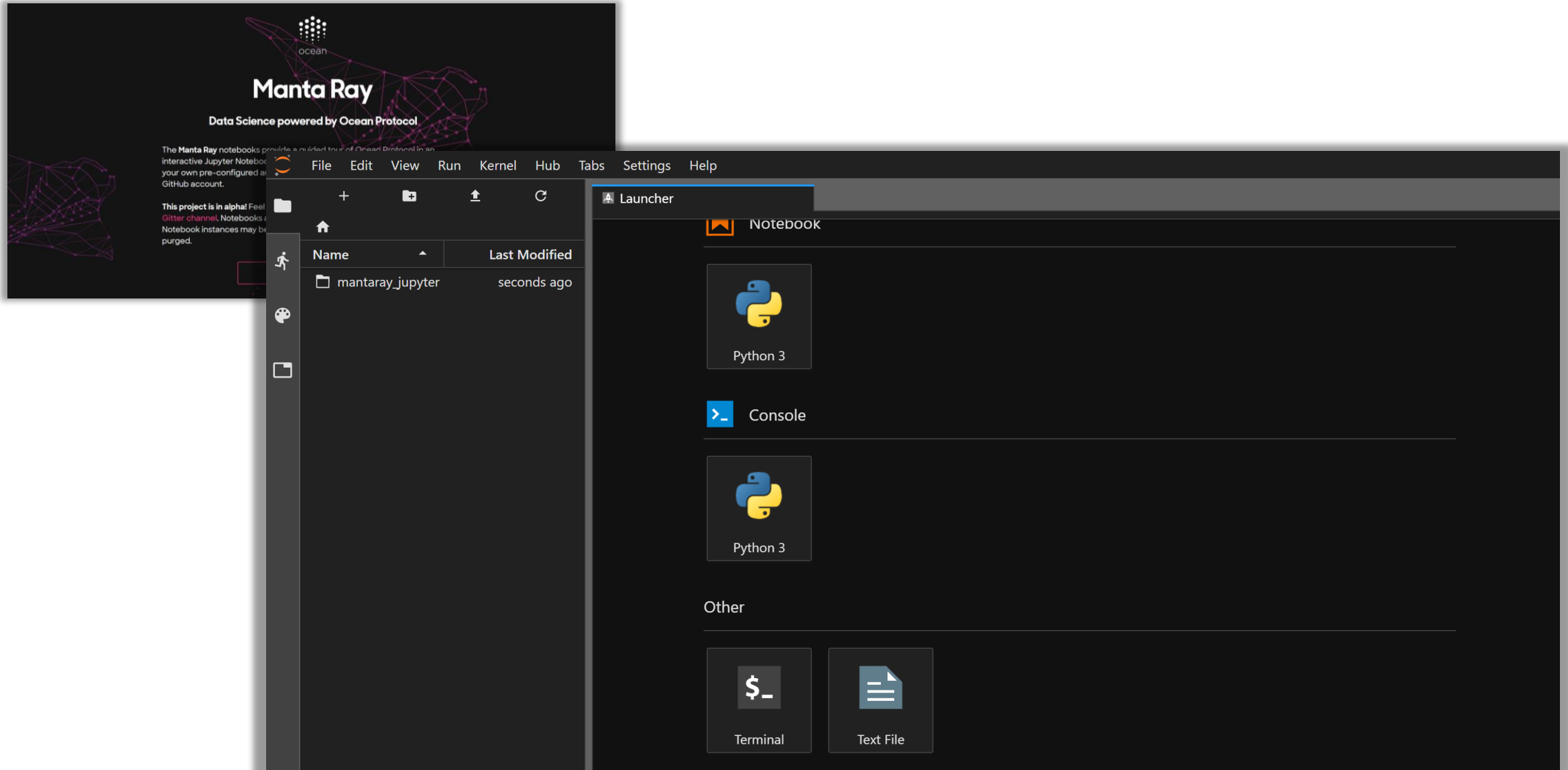
Featured Channel

AI For Good



# Ocean MantaRay: Data Science on Hosted Jupyter Notebooks

[datascience.oceanprotocol.com](https://datascience.oceanprotocol.com)



The screenshot displays the Ocean MantaRay Jupyter Notebook interface. The interface is dark-themed and features a 'Launcher' window. On the left side of the launcher, there is a file browser showing a folder named 'mantaray\_jupyter' with a 'seconds ago' timestamp. The main workspace on the right contains a 'Notebook' section with a Python 3 kernel icon, a 'Console' section with a terminal icon, and an 'Other' section with 'Terminal' and 'Text File' options. The background shows a 'Manta Ray' logo and text: 'Data Science powered by Ocean Protocol' and 'The Manta Ray notebooks provide a guided tour of Ocean Protocol in an interactive Jupyter Notebook on your own pre-configured GitHub account. This project is in alpha! Feel free to report bugs in our Gitter channel. Notebooks and Notebook instances may be purged.'

Two jellyfish are shown in a dark environment, illuminated from below. The jellyfish on the left is a reddish-orange color, while the one on the right is a mix of orange, yellow, and purple. Both have long, thin tentacles that are glowing with a blue and purple light. The background is black, with some faint blue and purple light trails.

# Applications In unlocking data & AI



**Collaborators: ConnectedLife, TU Munich, NU Singapore**

**Use case: Better predict Parkinson's by connecting data across borders**





**Govt of Singapore Data Authorities (IMDA):  
Sandboxes for SG govt, enterprises and startups to build data-centric  
applications with regulatory cover**



**Grow Asia (WEF Spinoff):  
Help small farmers allocate their fertilizer better, to increase yields**

# Collaborator: AI Commons (ITU, XPRIZE, ..)

## Use case: a substrate to help scale #AIforGood



Fred Werner  
@fredwerner73

Following

On stage at World AI Summit with @xprize @FondationBotnar @SColesPorter @trentmc0 @frossi\_t announcing #AIcommons and @ITU #Aiforgood Global Summit. Big congrats to @SColesPorter and team for another amazing #wsai18!!



10:30 AM - 11 Oct 2018

Secure | https://www.aicommons.com

## PARTICIPATE

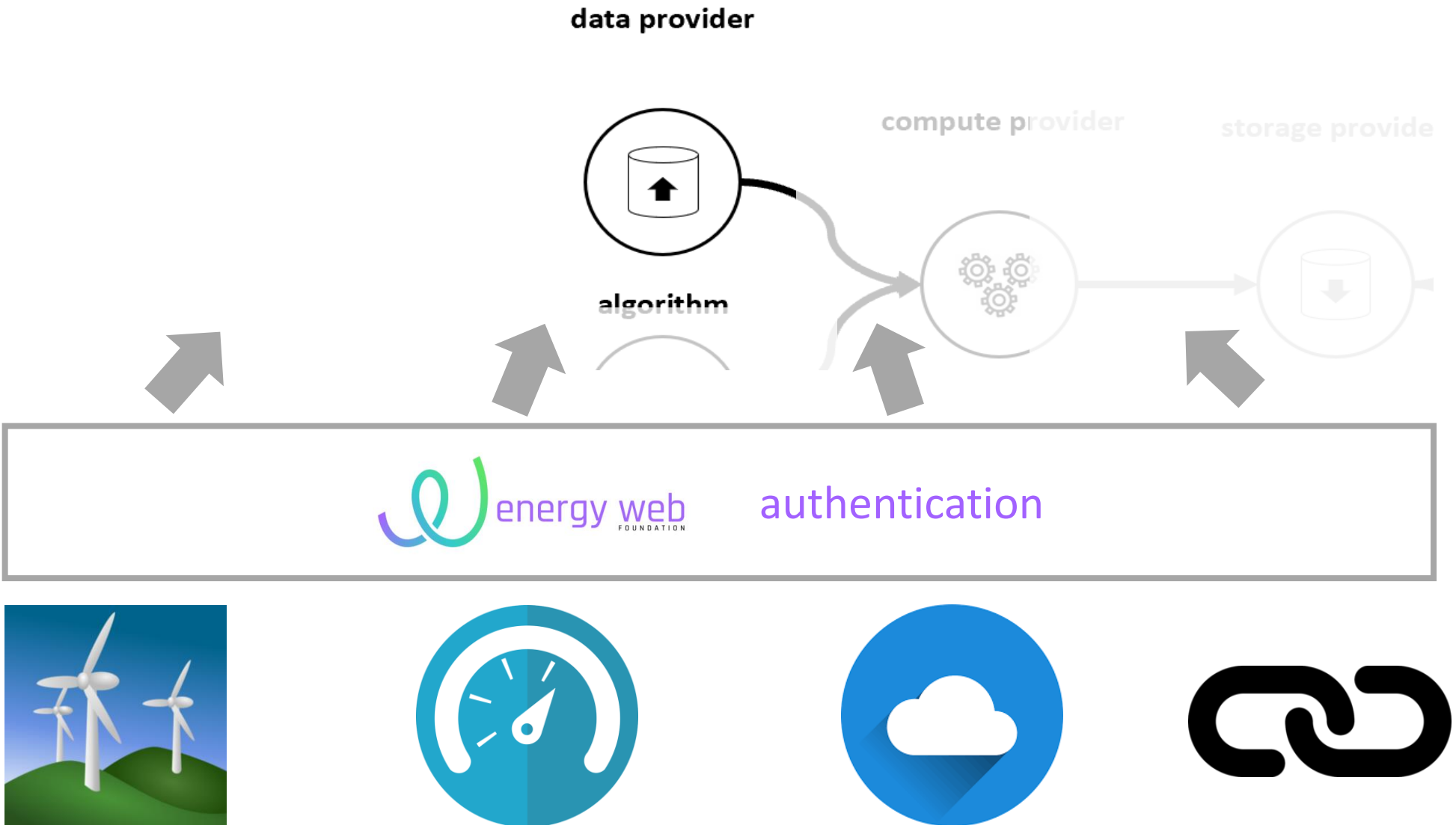
*Join the journey and let's solve the world's most pressing challenges with AI.*

Participating in AI Commons means joining forces to unlock the potential of Artificial Intelligence to drive a new era of development, growth and productivity for all. It is a collective effort with multi-sectoral support from the entire ecosystem impacted by the advancement of AI practitioners and beneficiaries. **Together we are pushing the boundaries of AI to solve real-world problems.**



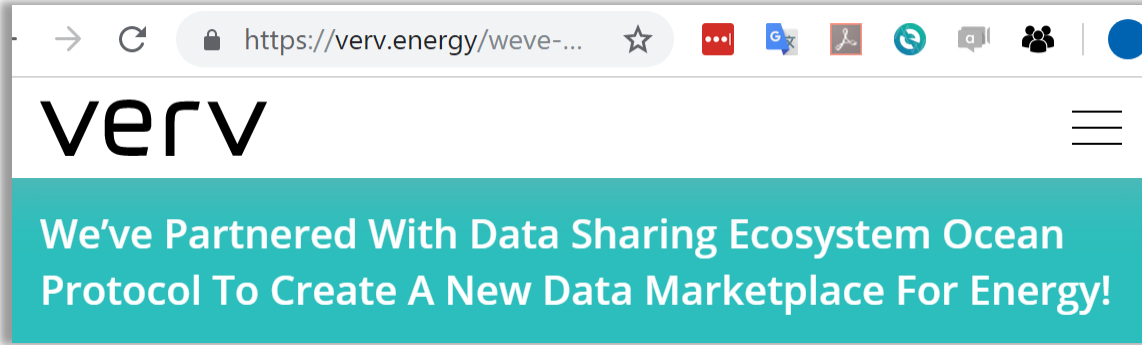
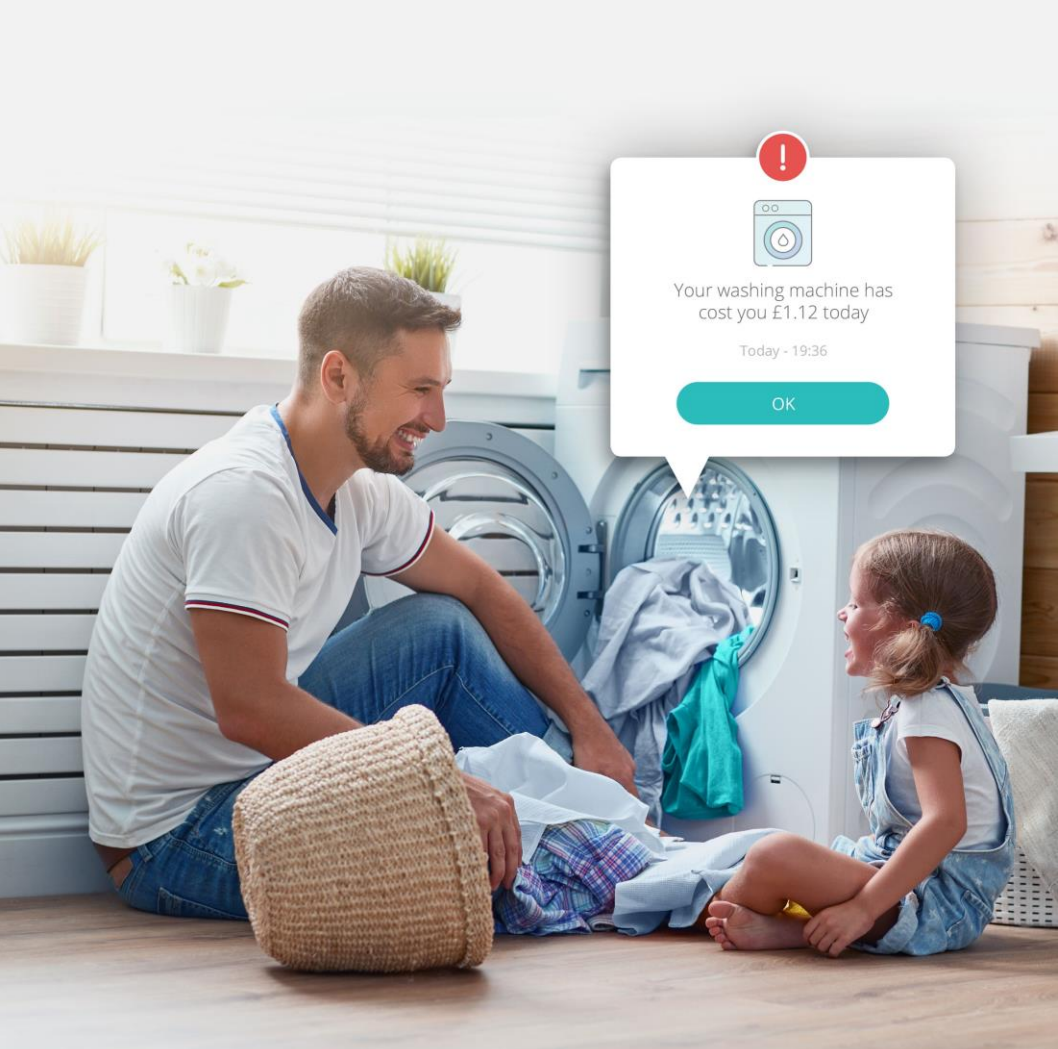
# Collaborator: EWF

## Use Case: EWF-authenticated data (from internal, Web2, Web3)



# Collaborator: Verv

## Use case: Sell household energy meter data in a data marketplace, with goal of \$0 energy bills



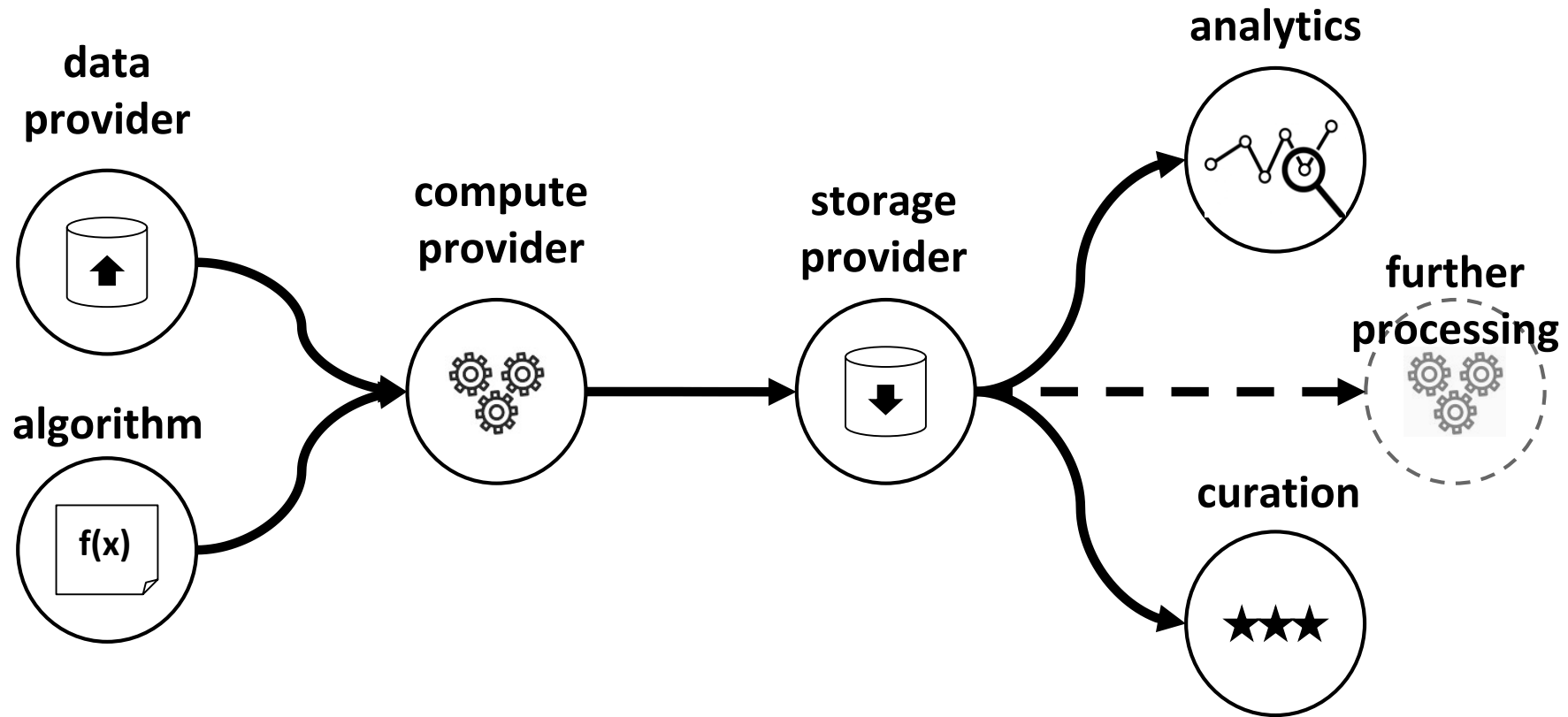
[Image source: www.verv.energy]



# About Ocean & Ocean Tech

# Ocean is a decentralized network for access management

This unlocks marketplaces & compute-to-data.



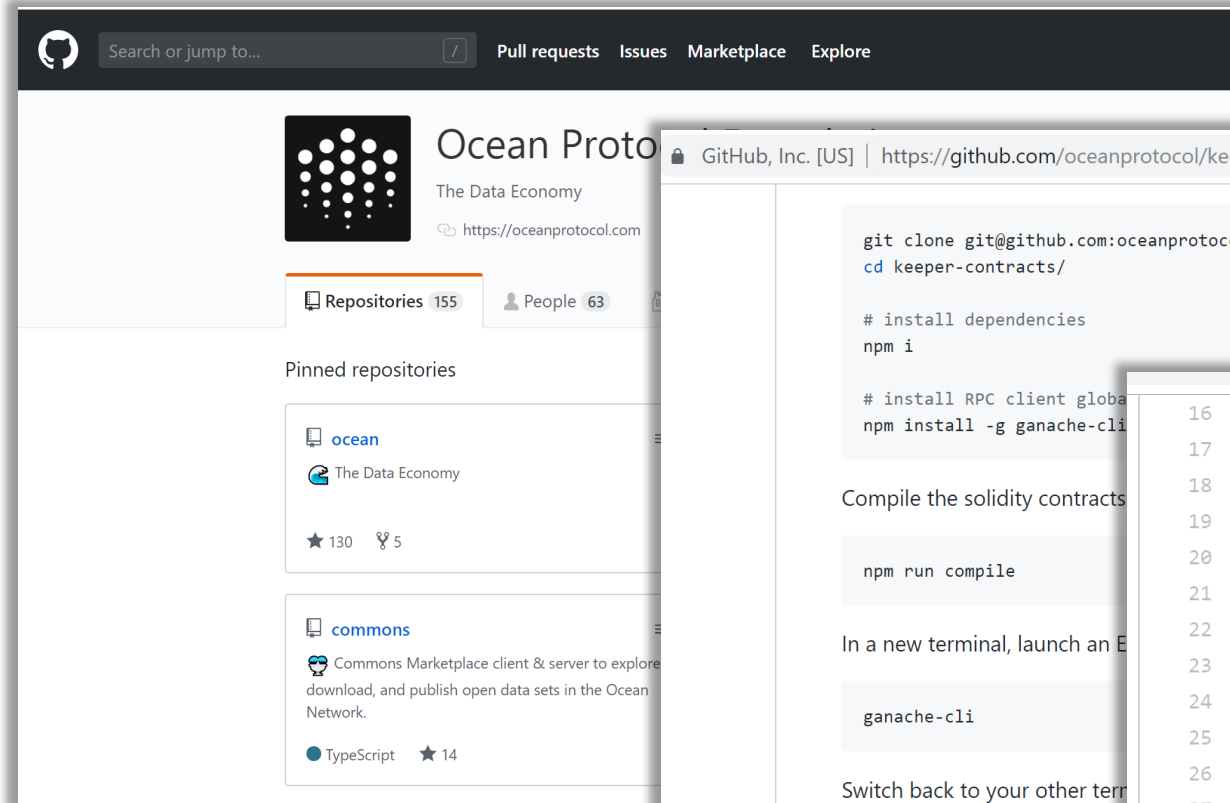


# On Ocean Tech Stack

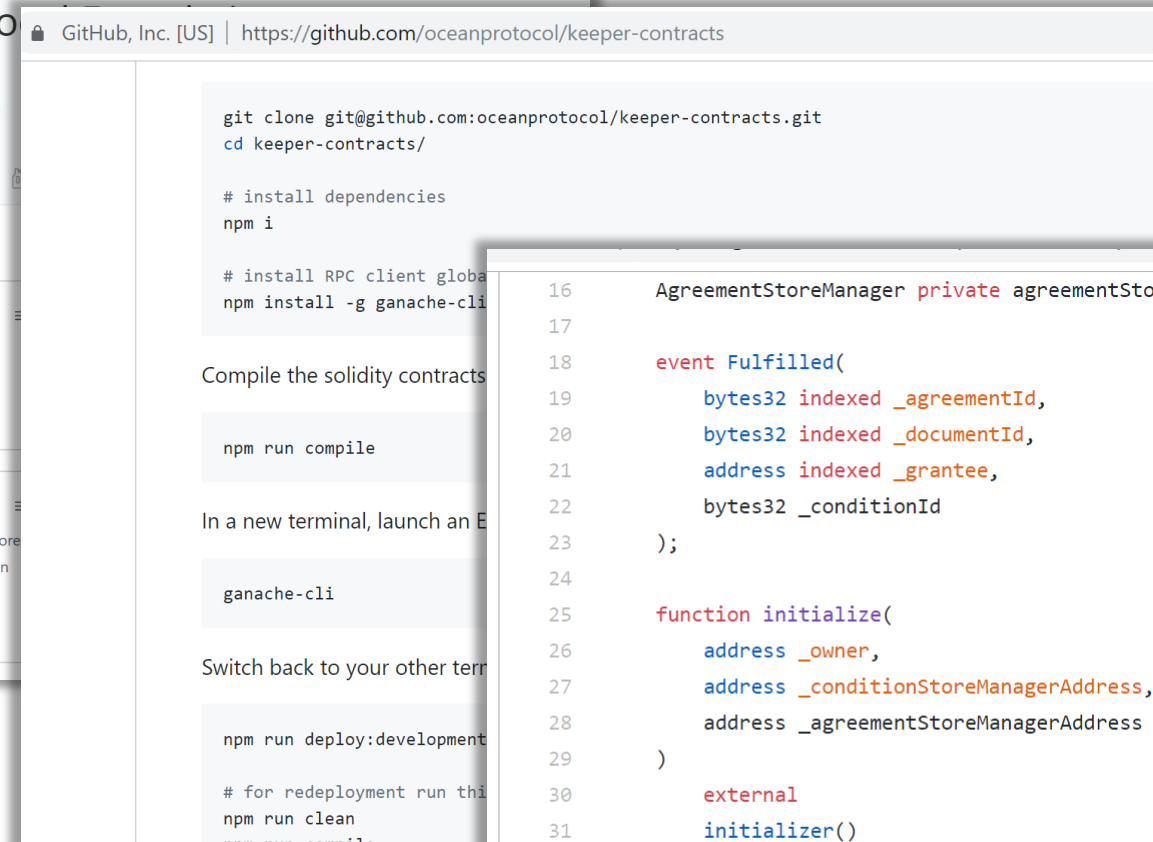
- Built from scratch with SW tooling of 2017-present
- Decentralized identifiers (DIDs) & objects (DDOs), verifiable credentials, JSON
- Private EVM network (Parity POA)
  - Extensibility via custom smart contracts for any functionality on top
  - Plug-in identity (uport, Sovrin, ..) also using DIDs, DDOs, etc
  - Built-in payments; opportunity for stablecoins
  - Decentralized control -- no single point of failure
  - Provenance of transactions in identity, payments, data
- Interoperability to other networks (ERC20 Token Bridge)
- Scalable secret sharing via proxy re-encryption (using Parity Secret Store)
- SDKs in Python 3.x, JS / ES6 (Squid)
- AI ready: Jupyter, Anaconda, scikit-learn, TensorFlow.

# All Ocean Code is Open, With Thorough Docs

[github.com/oceanprotocol](https://github.com/oceanprotocol), [docs.oceanprotocol.com](https://docs.oceanprotocol.com)



The screenshot shows the GitHub profile page for Ocean Protocol. At the top, there is a search bar and navigation links for Pull requests, Issues, Marketplace, and Explore. The profile header includes the Ocean Protocol logo, the name "Ocean Protocol", the tagline "The Data Economy", and the website URL "https://oceanprotocol.com". Below the header, there are statistics for "Repositories 155" and "People 63". The "Pinned repositories" section lists three repositories: "ocean" (The Data Economy, 130 stars, 5 forks), "commons" (Commons Marketplace client & server to explore, download, and publish open data sets in the Ocean Network, TypeScript, 14 stars), and another repository partially visible.



The screenshot shows a GitHub pull request for the "keeper-contracts" repository. The browser address bar indicates the URL "https://github.com/oceanprotocol/keeper-contracts". The pull request content includes a list of instructions for cloning the repository and installing dependencies. The instructions are: "git clone git@github.com:oceanprotocol/keeper-contracts.git", "cd keeper-contracts/", "# install dependencies", "npm i", "# install RPC client globally", and "npm install -g ganache-cli". Below the instructions, there are three code blocks: "npm run compile", "ganache-cli", and "npm run deploy:development". The pull request also includes the text "Compile the solidity contracts" and "In a new terminal, launch an E".

```
16 AgreementStoreManager private agreementStoreManager;
17
18 event Fulfilled(
19     bytes32 indexed _agreementId,
20     bytes32 indexed _documentId,
21     address indexed _grantee,
22     bytes32 _conditionId
23 );
24
25 function initialize(
26     address _owner,
27     address _conditionStoreManagerAddress,
28     address _agreementStoreManagerAddress
29 )
30 external
31 initializer()
32 {
33     Ownable.initialize(_owner);
34
35     conditionStoreManager = ConditionStoreManager(
36         conditionStoreManagerAddress
```

# On Ocean Protocol

Is:

- A protocol (standard): specifications of how machines communicate
- And, a community: 8K stakeholders, 250 ambassadors, 30 advisors
- And, a nonprofit foundation to steward the protocol & community
- And, networks that implement the protocol, both public & private

Characteristics of protocol / networks:

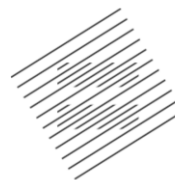
- Decentralized – no single point of failure
- Global & open public network, or private network
- Reconciles privacy
- Can plug in legals



# Collaborators with Ocean Protocol



innogy



parity<sup>n</sup>



AI SINGAPORE



pwc



Z

AI COMMONS



connectedlife



GNOSIS



Chainlink



Unilever



Johnson & Johnson



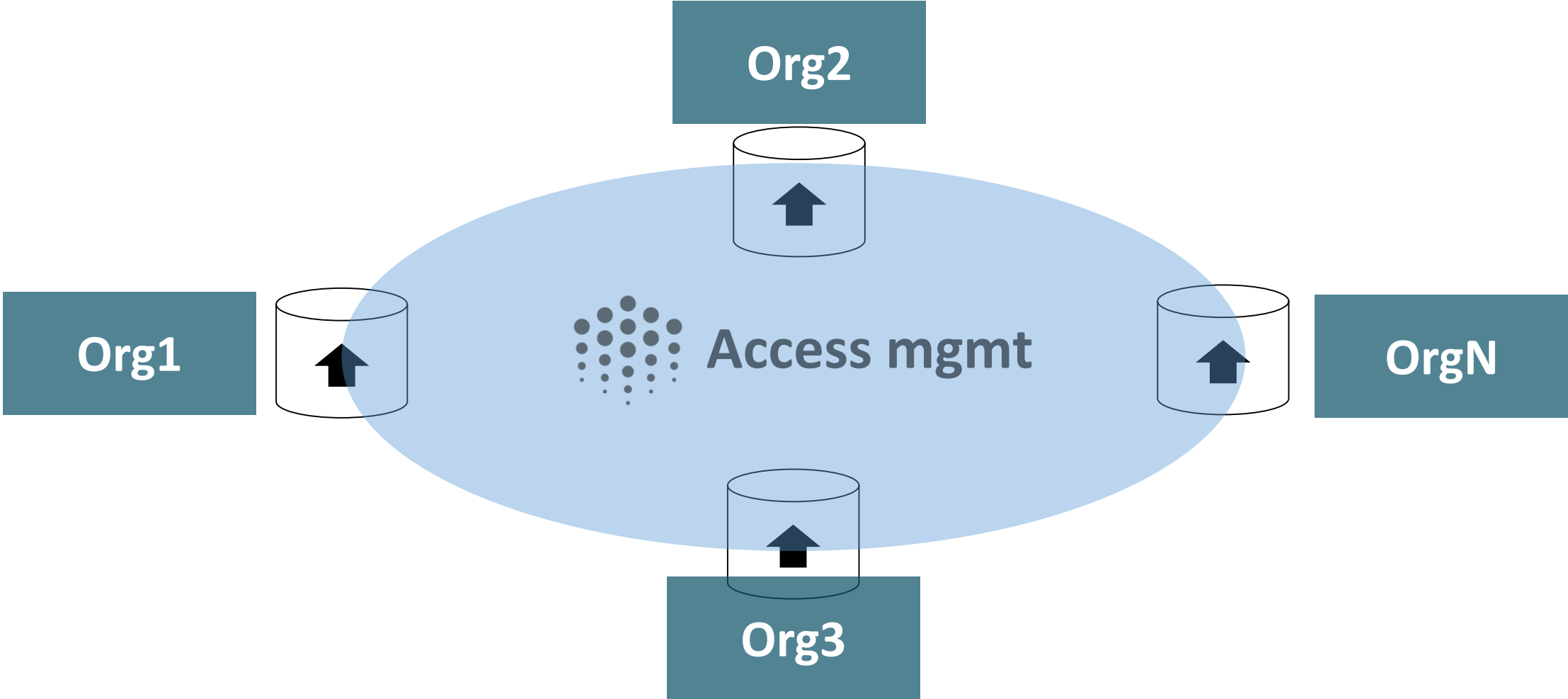
ocean

# Ocean & E-Government



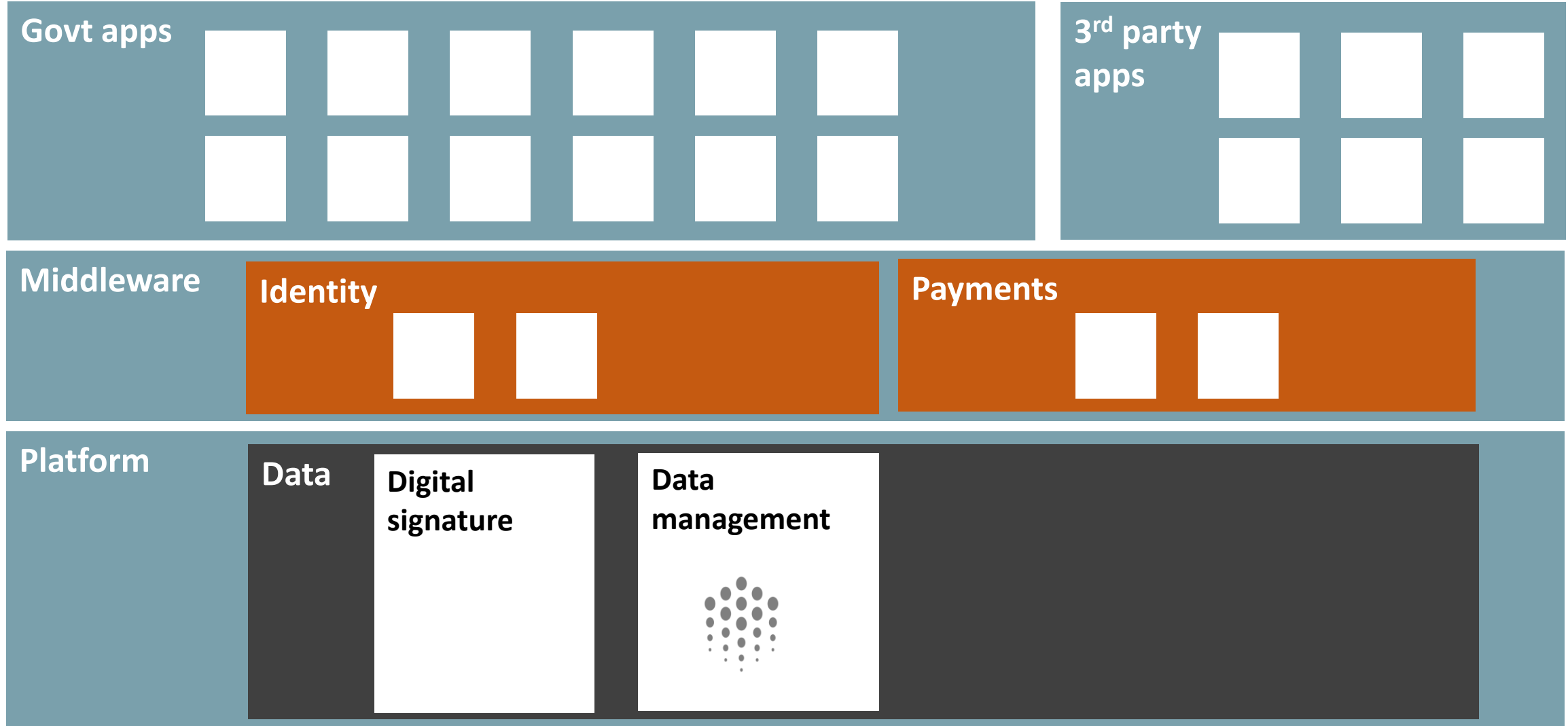
# Use Case: Data access management among your govt orgs / offices, or between your org & collaborators.

Substrate: Your own private net, or Ocean public net



# Data management for e-govt

## It's the foundation. Then, Identity + Payments



# Data management for e-govt

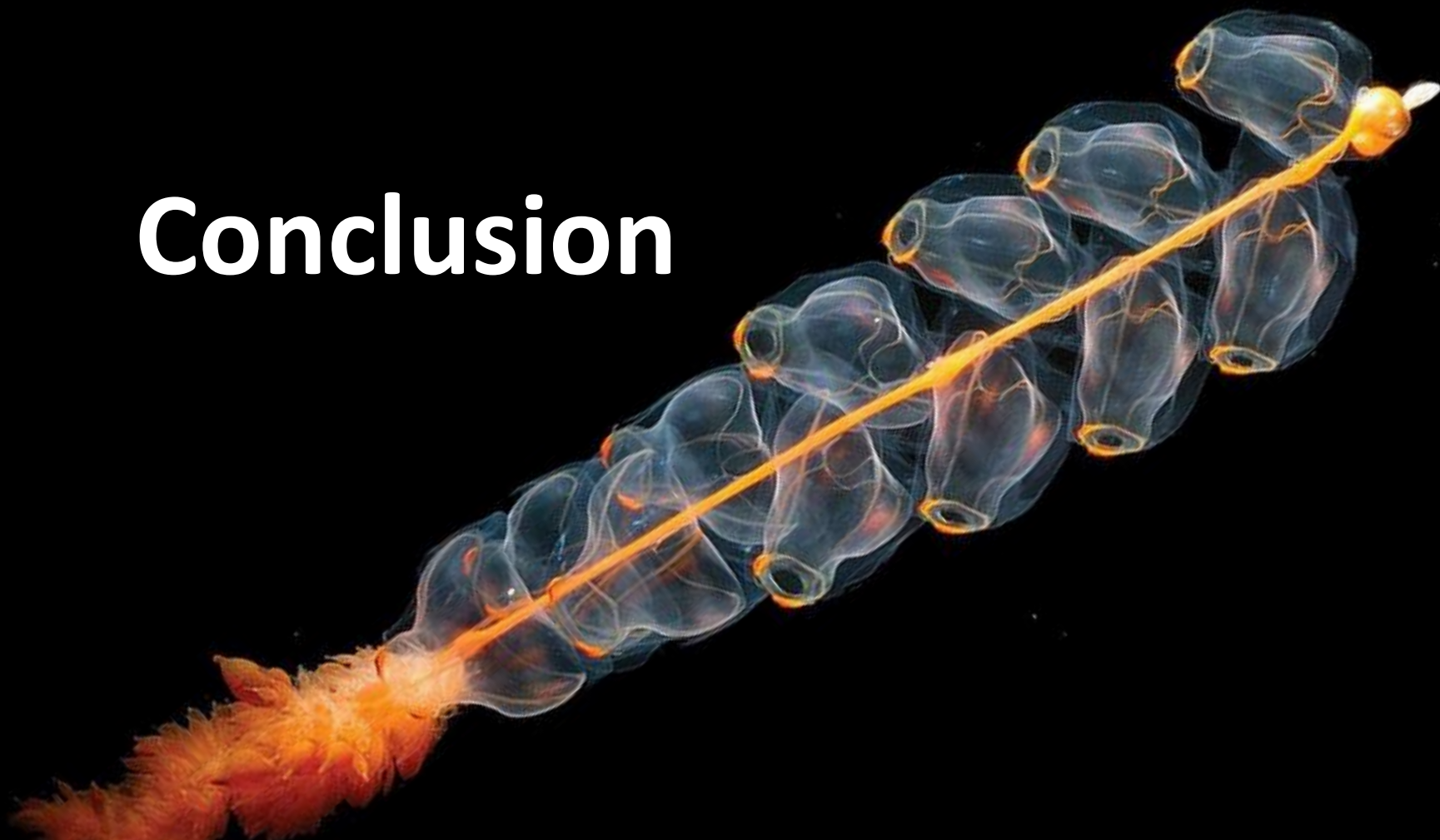
## Benefits

- Use modern SW tools & building blocks:
  - DIDs, DDOs. Foundation for plug-in identity + payments.
  - Extensibility via EVM smart contracts
  - SDKs in Python 3.x, JS / ES6
- Parity Secret Store for proxy re-encryption
- No single point of failure
- Provenance of transactions in identity, payments, data
- Unlocks data for use by AI:
  - Marketplaces
  - Bring compute to data (Q1 2020)

**We (Ocean Protocol Foundation) are looking for government collaborators to explore Ocean for cost-effective data management**



# Conclusion



# Questions asked

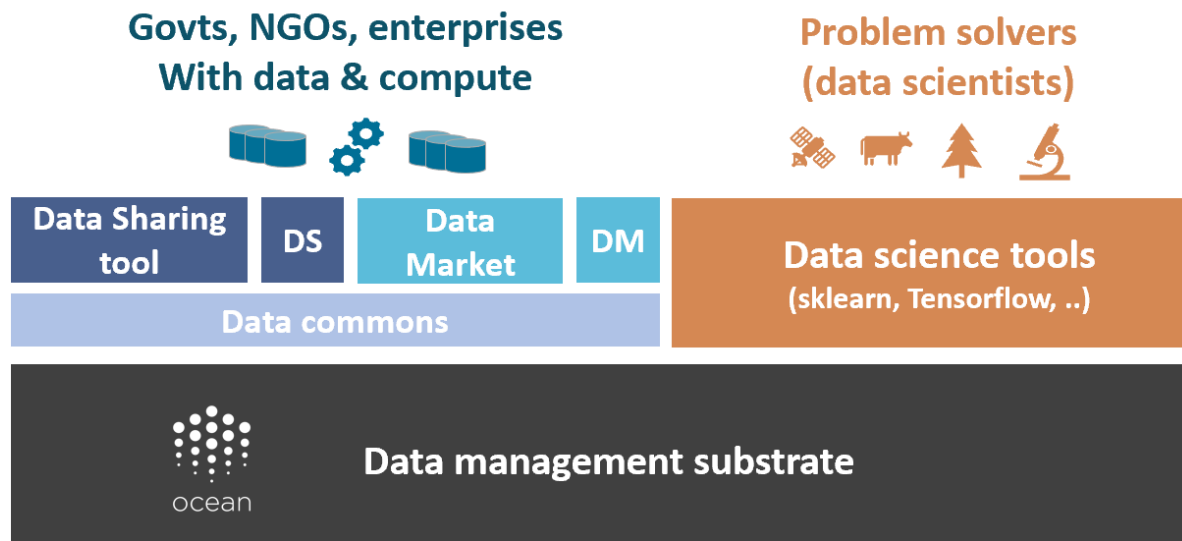
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- How can governments get the most out of data & AI?

# Discussed

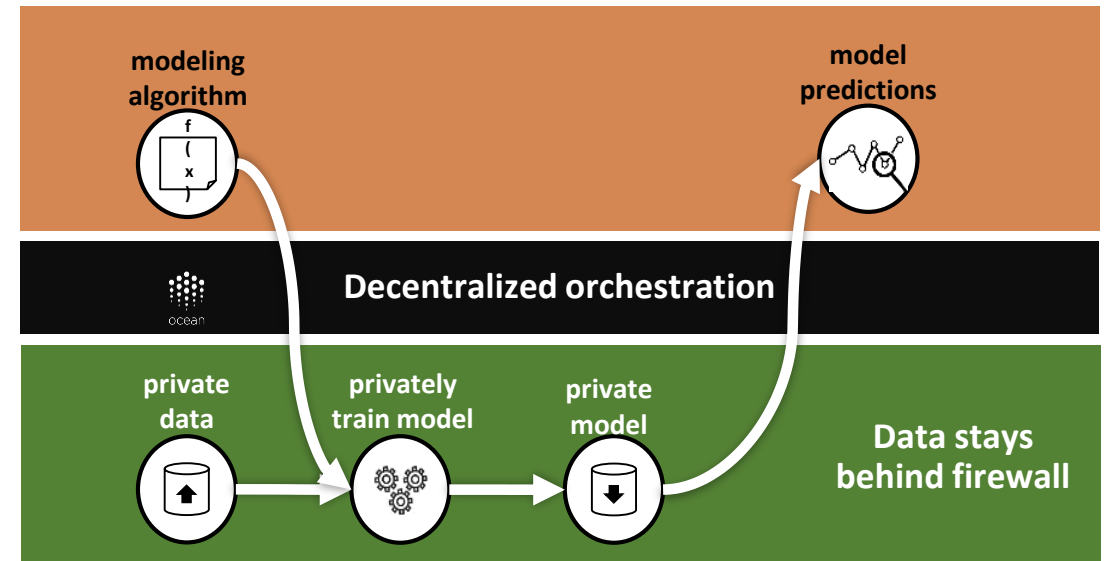
- Digital native case study. Estonia. Data + identity + payments
- Data & AI. Ocean!

# Ocean Protocol does access management for data

#1: Connect data-haves with data have-nots, via data marketplaces / commons



#2: Unlock benefits of more data without losing control or privacy, via compute to data



trent@oceanprotocol.com or @trentmc0