

## November 2024

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# Introduction

After seven years of experimentation, Open Ownership has [decided to retire the Open Ownership Register \(OO Register\)](#), our prototype transnational, open, and public beneficial ownership (BO) register.

Launched in April 2017, the OO Register has helped users search, explore, and [visualise BO data from Armenia, Denmark, Slovakia, Ukraine, and the United Kingdom \(UK\)](#) by transforming national datasets in line with Open Ownership's [Beneficial Ownership Data Standard \(BODS\)](#).

To improve the data quality and make it globally usable, Open Ownership [reconciled and enriched](#) these datasets, adding in identifiers and information from [OpenCorporates](#) and the [Global Legal Entity Identifier Foundation](#).

International conversations about access to BO data have [moved beyond full public access in the years](#) since the OO Register was launched, highlighting the need to find better, more nuanced solutions to delivering the access that a range of actors need to BO data, while appropriately protecting other rights.

As we see greater adoption of [BODS](#) and the publishing of data produced in line with the standard, Open Ownership will be changing how we work with users of BO data around the world. We have [launched version 0.4 of BODS](#) and are currently working to [update our open-source technology tools](#) to support users of the latest version.

We know that sharing the lessons from our work to use and combine high-quality, international BO data is crucial. This report collates and shares the technical and implementation lessons that we have learned over the last seven years of development on the OO Register.

Going forward, Open Ownership will continue to [demonstrate the value of standardising data in line with BODS](#) by supporting [countries](#) and [technology companies](#) to collect and use BO data, including showing how to

combine it with [procurement data](#), [sanctions data](#), and politically exposed person data, as well as how to use it in graph-database formats like [Neo4J](#) and [RDF](#).

All the code which powered the OO Register will remain publicly available via the [Open Ownership GitHub account](#) for anyone to reuse under a number of open-source licences (see [Appendix](#)).



# Background

A beneficial owner is a person who ultimately has the right to some share of a corporate entity's income or assets, or the ability to control its activities. Often, the ownership structure of companies and other corporate vehicles, such as trusts, can be complex and opaque. This means that the individuals who own, control, or benefit from corporate vehicles can remain hidden.

Beneficial ownership transparency (BOT) refers to authorities putting in place requirements for corporate vehicles to collect and disclose information about their beneficial owners in a register. Increasingly, governments collate this information in central registers and make it available to a range of actors, including law enforcement, procurement agencies, tax authorities, the private sector, and civil society.

Seventy percent of grand corruption cases from recent decades have involved anonymously owned companies. In this context, the value of beneficial ownership information (BOI) as an anti-corruption and anti-money laundering tool has been recognised by international standard-setting bodies such as the Financial Action Task Force (FATF) and the Organisation for Economic Co-operation and Development (OECD).

The past decade has seen exponential growth in the number of states committing to support the collection and use of BOI for a number of aims, including promoting a healthy business environment, protecting national security, and combatting financial crime, money laundering, tax evasion, and corruption.

In 2013, the UK became the first country in the world to commit to making BOI transparent, as part of measures to tackle economic crime and corruption. In April 2016, the UK launched the People with Significant Control (PSC) register, making it the first country in the G20 to create a public register of the beneficial owners of companies.

One month later, the UK government hosted an International Anti-Corruption Summit in London, securing solid commitments from many of the 43 attending countries with the official communique calling for “firm collective action on increasing beneficial ownership transparency”.

There was a clear need to take a globally focused, transparent approach to collecting and publishing BO data to tackle issues linked to anonymous companies. Thanks to funding from the UK's Department for International Development, which has since been replaced by the Foreign, Commonwealth & Development Office, a small team started work on Open Ownership's first project: the OO Register.

# Launch

The plan to build what was first called the Global Beneficial Ownership Register, or GBOR, was [first unveiled](#) on 4 April 2016 in a blog post on the [Open Contracting Partnership website](#). Featuring quotes from a coalition of organisations which would go on to form Open Ownership's [Steering Group](#), the announcement was published the day after the [first stories](#) based on the [Panama Papers leaks](#) were released by the [International Consortium of Investigative Journalists \(ICIJ\)](#), highlighting how anonymous and offshore companies were facilitating corruption across the globe.

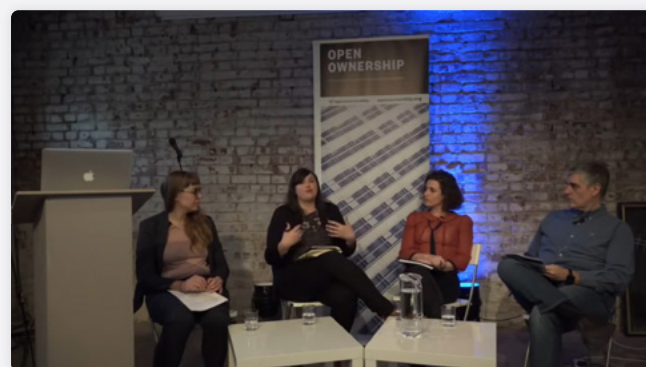
The drive behind the initiative came from the team at [OpenCorporates](#), which has created the largest open database of legal entities in the world. Starting in December 2014, the OpenCorporates team [announced](#) they had started work on WhoControlsIt, a proof-of-concept beneficial ownership register. A [website](#) was launched and [open source code](#) released. A hack day [followed](#) in early 2015.

In October 2016, at the [fourth International Open Data Conference](#) in Madrid, Chris Taggart and Hera Hussain of OpenCorporates participated in a [session](#) to discuss how open company data helps shed light on corruption and anonymous companies.

Reflecting on this event and progress on commitments to end anonymous company ownership, Hussain later [elaborated](#) on plans to create the GBOR as well as the first steps towards creating BODS, an open standard providing guidance for collecting, sharing, and using high-quality data on beneficial ownership.

After months of work, the unveiling of the first version of the OO Register took place on 3 April 2017, the one-year anniversary of the Panama Papers leaks. A [video recording of the launch](#) was uploaded to the Open Ownership YouTube channel.

**YouTube Video** Open Ownership Register launch: Building a culture of corporate transparency



Initially, the OO Register contained BOI on 1.9 million companies spanning 26 jurisdictions thanks to data from the UK PSC Register, [Slovakia's Public Sector Partners Register](#) (*Register partnerov verejného sektora*, RPVS), the [Extractive Industries Transparency Initiative \(EITI\)](#), and self-reported data from a small number of companies.

The priorities for the initial OO Register were twofold:

1. Make a one-stop shop for BO investigations.
2. Gain insights into the best model for an international data standard.



# Iteration

Over the seven years since its launch, the OO Register grew to encompass [data](#) explaining more than 33 million BO relationships between over 11 million companies and 10 million beneficial owners. This data was republished from [Armenia](#), [Denmark](#), [Slovakia](#), and the [UK](#), in line with BODS, and updated each month. Thousands of users visited the site each month, arriving mainly via Google searches, and Open Ownership explored a wide variety of ways that international, structured data could be put to work to generate insights into BO networks.

A timeline for the development of the OO Register is outlined below, plotting the addition of new data sources and features alongside the lessons learned from this work.

## Adding Ukraine data (January 2018)



In May 2017, Ukraine became the first country to [commit](#) to integrating its BO data into the OO Register as part of the [Open Ownership pilot programme](#). This achievement was made possible thanks to the tireless work by our partners at [Transparency International Ukraine](#).

Throughout 2017, Open Ownership worked to create [code](#) to convert the XML data from Ukraine's Unified States Register so it could be included in the OO Register. The completion of this work was [announced](#) in January 2018.

As an outcome of this integration work, the Open Ownership team undertook a [holistic review](#) of Ukraine's BO regime. Ukraine's BO data was offered and regularly updated in the OO Register [until September 2020](#), where certain technical challenges meant new data could not be processed.

## Adding Denmark data (August 2018)

BO data from around 300,000 companies in the Central Business Register (*Det Centrale Virksomhedsregister*, CVR) was [added to the Register](#) in August 2018. The CVR contains information on companies from Denmark as well as Greenland.

At that time, Denmark was one of the few European countries that had implemented a public BO register with the CVR, which was created in 2017. [Data from the CVR](#) was made accessible for approved users to reuse via an application programming interface (API) using Elasticsearch as well as via the [Data Distributor \(Datafordeler\)](#) platform (see [documentation](#)).

Our [latest research on Denmark](#) – published in 2023 – lays out how the country's BOI has been extensively used by businesses and investigative journalists, the financial and real estate sectors, corporate data service providers, and government agencies, and how this was enabled by the comprehensive reforms that Denmark passed to ensure the information is useful, usable, and used.

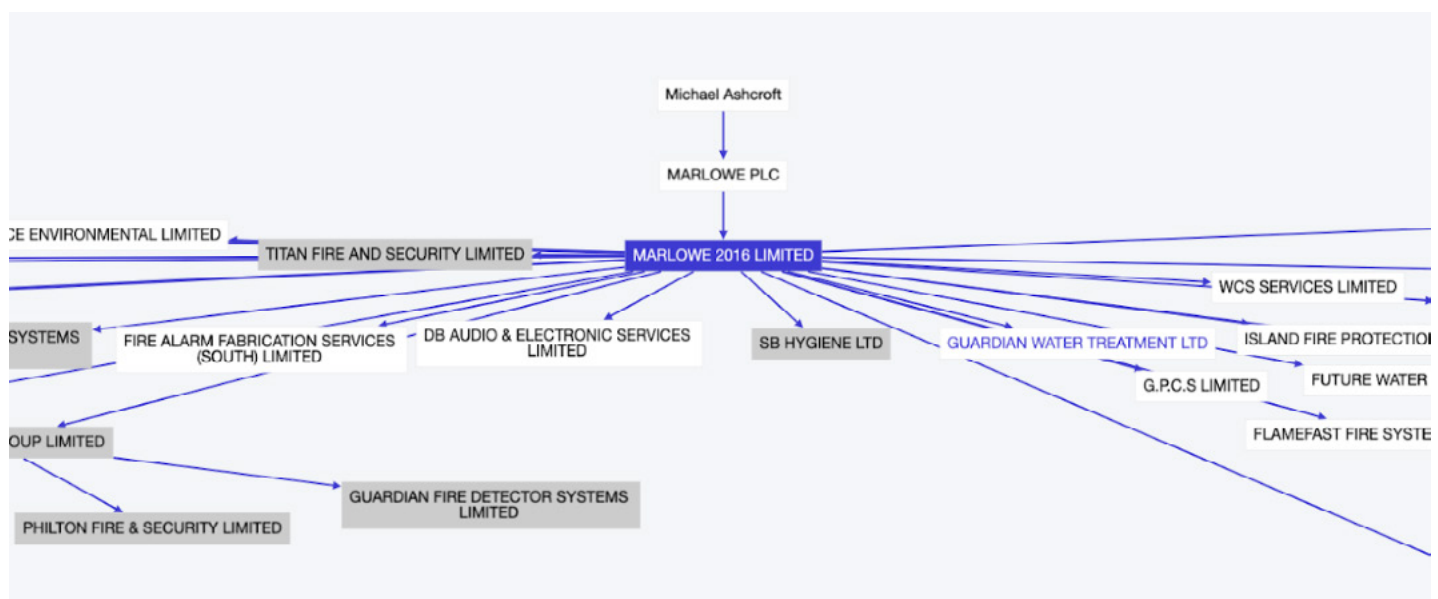
## Enhanced graph visualisation features (July 2019)

After launching the Register with basic visualisation functionality, Laurence Bascle, the then Product Owner, carried out discovery sessions with BO data users which led to a technical sprint that introduced [enhanced features](#).

These visualisations offered drag and drop functionality so that users could rearrange the nodes as well as allowing people to zoom in and out to expand or magnify their view.

- Although the BO data in the Register was direct ownership information reported to authorities in Denmark, Slovakia, and the UK about the individual or corporate owners one layer up in the chains, the transformation into BODS allowed Open Ownership to link all of this data together to represent full ownership chains in the observable data.

Before enhanced graph visualisation features





After announcing these changes, Bascle set out in a [later blog post](#) how such visualisation can be a powerful tool for policy makers and implementers, and can display in a “very visual way the pros and cons of different beneficial ownership data collection models”.

### Structured bulk data offered (February 2020)

From February 2020, Open Ownership [introduced](#) the ability for anyone to download the entire OO Register dataset as a bulk data file.

To start with, over 20 million records were available in the database: every company, person, and ownership or control relationship. Initially, this dataset was formatted in line with [version 0.1](#) of BODS (see [example data](#)) and was offered as a large BODS JSON file in the [JSONLines](#) format, meaning each BODS statement was a JSON object on a single line of the file.

The download file was regularly republished on a monthly basis, and from August 2023 it was formatted in line with [version 0.2](#) of BODS (see [example data](#)).

### Impact

Ownership structure and beneficial owners of Savaro Ltd.

**Key**

- Jurisdiction/Citizenship: United Kingdom, Russia, USA, Ukraine, Lithuania, Cyprus, Syria, UAE, Panama
- MP: Marina Psyllou appears on 'Change of Address' forms
- Sanctions: Currently or previously sanctioned (OFAC/EU)

On 4 August 2020, there was an explosion in a warehouse in the port of Beirut. Described as “one of the largest non-nuclear explosions in history”, [it resulted](#) in the deaths of 211 people, injured 5,000, and made over 300,000 people homeless. Following the explosion, financial crime investigators Graham Barrow and Ray Blake [sought to understand](#) the people behind the abandoned ship and its cargo. Using data from the UK

PSC Register and Ukraine data, accessed through the OO Register, the investigators were able to trace direct links between the UK registered company that bought the ammonium nitrate, Savaro Ltd, to a number of other companies, and sanctioned individuals through the company’s registered beneficial owner (see Open Ownership’s [Early impacts of public beneficial ownership registers: United Kingdom](#) for full case study).





## Thematic guides to how the Register worked (2020)

Starting in July 2020, Open Ownership's then Technology Lead, Steve Day, documented lessons learned in a series of blog posts about working with BO data. These were intended to share the Open Ownership team's experiences with data users and publishers in the public and private sectors, and covered the following topics:

- [modelling BO data](#);
- [reconciling BO data](#);
- [merging and de-duplicating BO data](#).

## Launch of BODS data analysis tools (March 2022)

To make the most of available BO data, users are often best supported if publishers offer data for download and reuse in a range of formats. In early 2022, Open Ownership already offered the OO Register data in JSON format but knew that some users were not used to working with JSON data.

Harnessing [a range of open-source tools and libraries](#), Open Ownership launched the [BODS data analysis tools](#) as an [open-source service](#) where users could download open datasets published in line with BODS in a range of formats released using open licences.

Open Ownership still advocates that BO data should be collected, stored, and shared as [structured data](#) and standardised in line with a standard such as BODS. Doing so allows the data to be more easily analysed and linked with other datasets, as well supporting its conversion into open formats.

Data from the [OO Register](#) and an initial dataset released by [Latvia](#) were the first to be made available via the BODS data analysis tools. By flattening and reformatting BODS JSON data, we were able to offer these datasets in the open CSV, SQLite, and PostgreSQL formats as well as creating files to analyse via Google's [Big Query](#) or [Datasette](#).

This work was made possible by [Flutterer](#), an opinionated JSON converter which tries to make a useful relational output for data analysis, created by our technical partners at [Open Data Services](#). Learn more about Flutterer by looking at the [launch post](#), [documentation](#), or [code](#).

## New analysis notebook (August 2022)

### YouTube Video Introducing Open Ownership's first data analysis notebook

**Beneficial ownership data analysis tools**

Register of Enterprises of the Republic of Latvia

Downloads and links to hosted databases

CSV Download SQLite Download PostgreSQL Dump (gzip) Big Query Datasette

**Tables**

**person\_statement**

Field Name	Field Type	Field Count	Sample 1	Sample 2	Sample 3
_id	int	135,191	10344	40302	22813
statementID	int	135,191	3451027-1810-473-Wed-430457113454	57144633-9520-4228-Wed-43189887418	426485469-525
statementType	int	135,191	personStatement	personStatement	personStatement
statementDate	date	135,191	1542812200000	1542812200000	1542710800000
isComponent	boolean	135,191	False	False	False
personType	int	135,191	knownPerson	knownPerson	knownPerson
birthDate	int	135,187	1983-07	1949-05	1959-12
publicationDetails_publicationDate	date	135,191	1612620000000	1612620000000	1612620000000

To show how data from the [BODS data analysis tools](#) could be harnessed to understand and swiftly gain insights from data about who owns and controls companies, Open Ownership unveiled our [first data analysis notebook](#).

This [free, open-source notebook](#) helps any user get immediate answers to questions relating to the detail, coverage, and timeliness of data published in line with BODS. The structure of this notebook – and of the example feedback report – aligns with the [Open Ownership Principles for effective beneficial ownership disclosure](#).

In order to create the notebook, we developed two main components in the [underlying code](#):

- a Python module, [qbods.py](#), which contains a set of functions for reading, summarising, and analysing BODS data;
- an iPython notebook, [latvia\\_demo.ipynb](#), which contains code to run a subset of the functions on an [initial dataset](#) released by the Register of Enterprises of the Republic of Latvia, with accompanying text.

Following this technical development, our Data Analyst Lewis Spurgin created [a sample report on Latvian data with findings and visualisations](#) using the [Deepnote](#) collaborative data notebook platform. The analyses presented in this sample report are a subset of [a full set of queries](#), which can be used to analyse any BODS dataset. The notebook code can also be run locally or by using Google Colab.



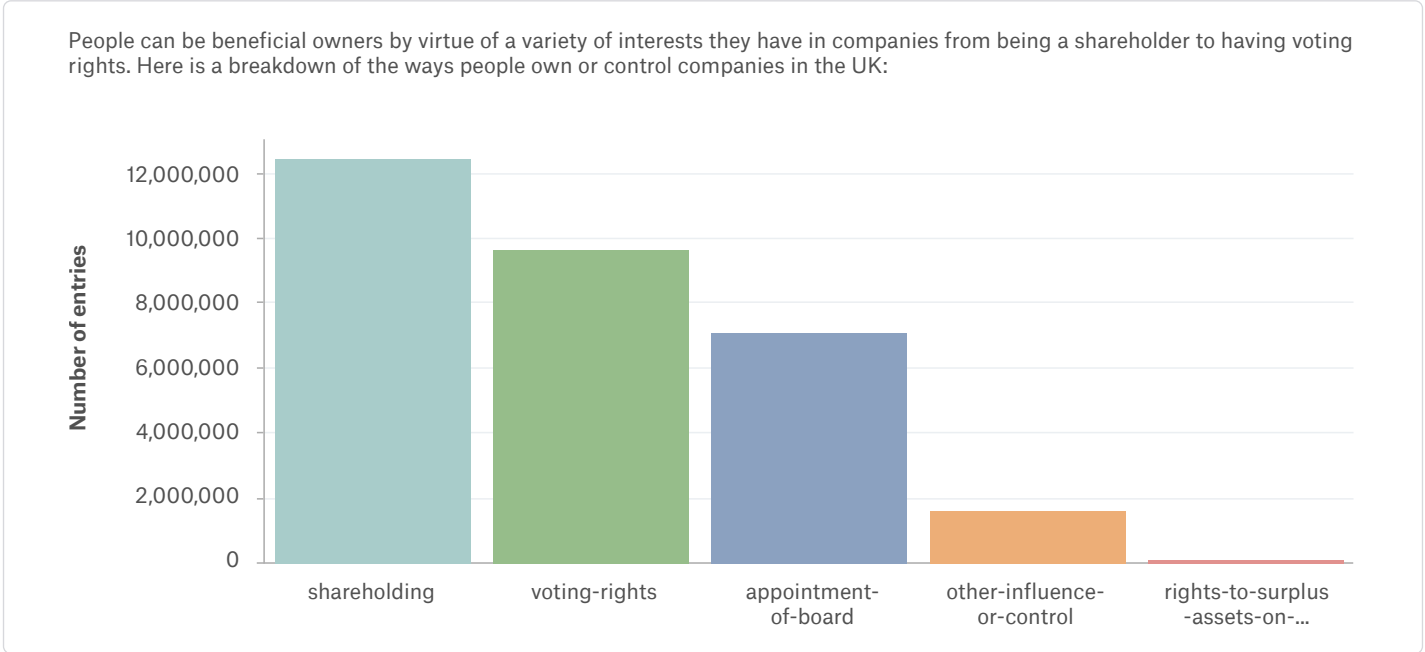
## BODS data analysis tools updated, dashboards launched (December 2022)

As part of the work to redevelop the OO Register backend code (see below), we started republishing data in line with version 0.2 of BODS rather than version 0.1. This allowed us to take advantage of the `publicationDetails` property added in version 0.2 to split up the OO Register dataset into separate BODS datasets for [Denmark](#),

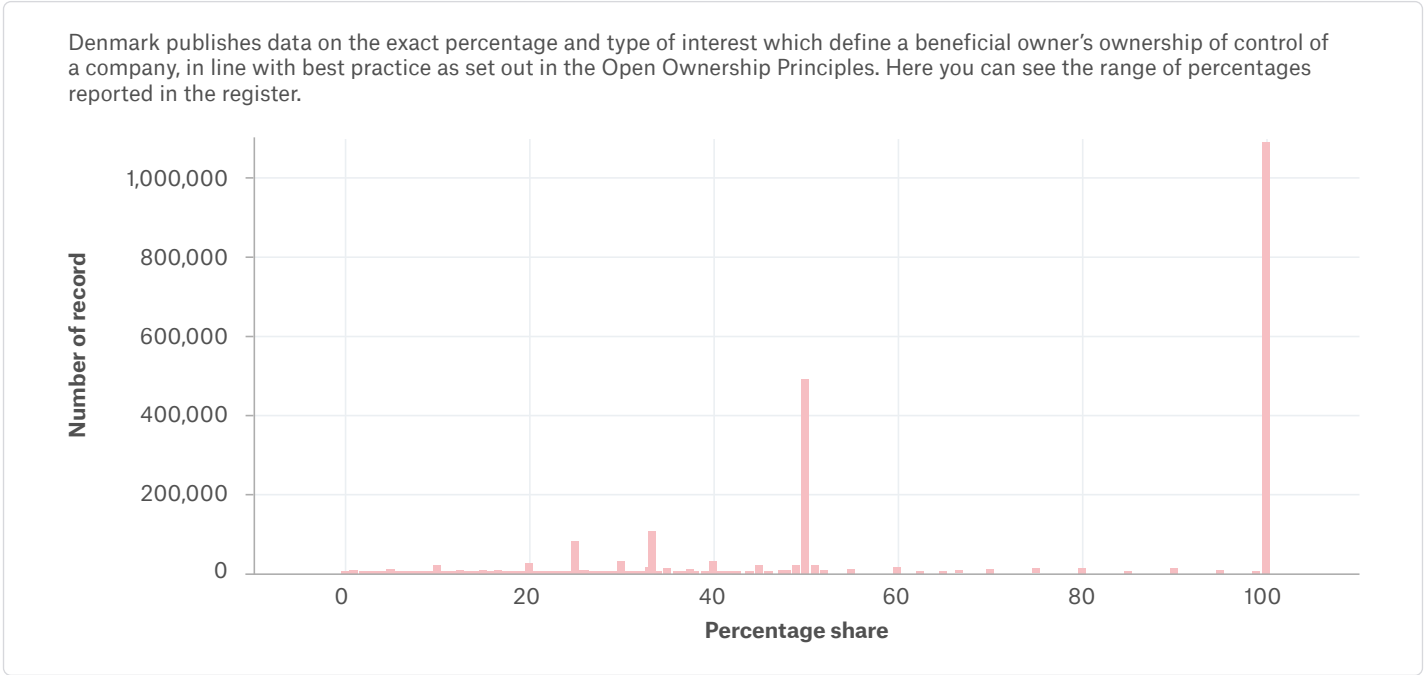
[Slovakia](#), and the [UK](#) to support country-based analysis or projects. We also introduced [Parquet](#) as an additional download format.

To provide insights into these national sources and to judge the quality of the BO data published, Open Ownership developed a set of [live analysis dashboards](#) which could be used to visualise data from [Denmark](#), [Slovakia](#), and the [UK](#).

What are the main ways that people own or control UK companies?



What are the most common percentages for interests that the beneficial owners have in the companies?





The code for ingesting, mapping, and transforming BO data from Denmark, Slovakia, and the UK in line with version 0.2 of BODS was separated into different GitHub repositories for each country:

- Denmark: [ingester](#) / [sources](#) / [transformer](#);
- Slovakia: [ingester](#) / [sources](#) / [transformer](#);
- UK PSC: [ingester](#) / [sources](#) / [transformer](#).

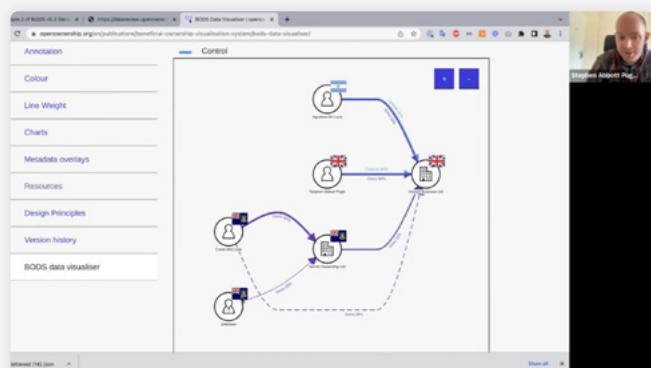
## Challenges with incorporating France data (June 2023)

During the first half of 2023, Open Ownership and our technical partners at [Open Data Services](#) worked to understand more about the nature and coverage of France's national public BO data published by the [National Institute of Industrial Property \(INPI\)](#). Our intention was to map the data to BODS and incorporate it into the Register. Unfortunately, our efforts did not pay off due to issues with accessing the data through the INPI API, as well as data quality issues we discovered within the data itself. [Read more about this work](#) and the challenges we faced.

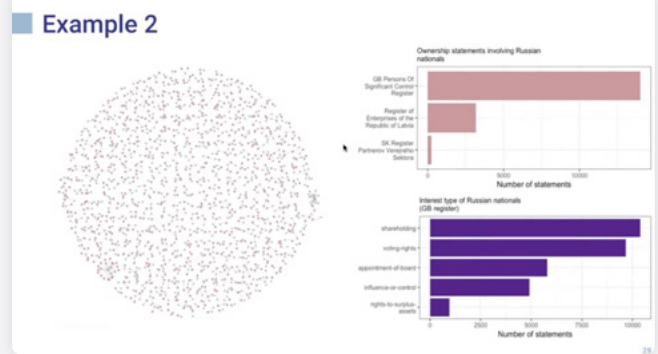
## Data use guide published and training sessions held (July 2023)

Publishing good documentation and engaging with users helps drive usage of [structured and interoperable BO data](#). To increase understanding of BODS datasets and Open Ownership's tools, including the OO Register, we produced a [step-by-step guide](#) for BO data users, explaining what each tool was designed to do and how to use them. We also ran a series of three training sessions for users, which were recorded and uploaded to YouTube.

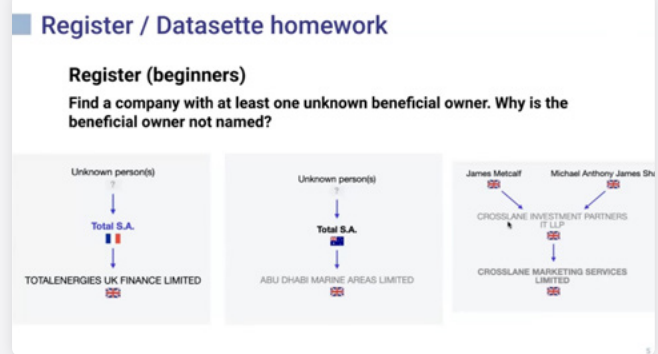
**YouTube Video** The benefits and advantages of structured and interoperable beneficial ownership data



**YouTube Video** The Open Ownership Register and tools to work with its data



**YouTube Video** Visualising and telling stories with beneficial ownership data



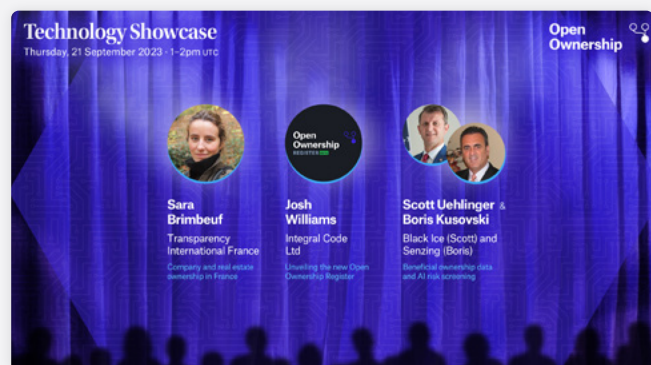
## New Register backend (August 2023)

After a technical project lasting more than a year, the technology behind the OO Register was [updated](#) to be faster, leaner, and more efficient, as well as publishing more detailed and up-to-date BO data. By moving to a new technology stack, a new approach to streaming and fully storing data in BODS format, the OO Register was now able to export data 100 times faster and for a fraction of the previous cost.

This was achieved by leveraging a range of services from [Amazon Web Services](#), such as [Kinesis](#) and [S3](#), as well as making use of [Elasticsearch](#) to capture both raw data and transformed BODS version 0.2 data. This was thanks to free credits granted to us via Elastic's philanthropic work (see the [code](#) or [video recording](#) to learn more).



### YouTube Video Open Ownership technology showcase 5



## Legal Entity Identifiers added to Register (September 2023)

Having [reliable identifiers](#) present in multiple datasets is the best way to be certain that the same entity is being referred to, and to link together a range of information about the entity and its activities. Since its launch, the OO Register has offered OpenCorporates IDs for companies alongside other national identifiers where their company numbers had already been linked to an OpenCorporates ID.

Thanks to an [existing mapping process](#) between OpenCorporates IDs and the [Legal Entity Identifier \(LEI\)](#) from the [Global Legal Entity Identifier Foundation](#), Open Ownership was able to [add LEIs](#) for more than 160,000 companies to enrich our BODS datasets, enabling [greater connectivity](#) between international BO and corporate ownership datasets.

## Nigeria Data Challenge (September 2023)

To encourage data enthusiasts to explore available sources of BO data and create visual representations to explain their findings to the public, Open Ownership launched a [Nigeria Data Challenge](#) which solicited a number of exceptional responses. Two submissions describing how public access and data quality influence investigations were [later published](#) on the Open Ownership website.

## Adding Armenia's EITI BODS data (December 2023)

First launched in 2020, Armenia's Multi-Sector Register started capturing BO data in line with version 0.2 of BODS later the following year. This followed [significant support](#) from Open Ownership to the Armenian government

agencies overseeing the country's BO reform process during 2019 and 2020. Armenia also made use of the open-source [BODS visualisation library](#) to create automatic [diagrams](#) of BO networks.

To demonstrate how the collection of standardised BO data in line with BODS helps countries leverage [a range of open-source tools](#), Open Ownership [incorporated data](#) disclosed by a number of extractive-industry companies listed by the EITI team in Armenia into the OO Register. This involved creating a new process by which [static sources](#) of BODS data could be added to the OO Register in the future.

Likewise, to support Armenia's innovative use of the alternateNames field in version 0.2 of BODS, Open Ownership also [expanded the functionality](#) of the OO Register so that people could find these Armenian companies, as well as millions of other companies, by searching for their alternative names.

## Closure of OO Register public website (November 2024)

During 2024, more than seven years since its launch, the Open Ownership team decided to [close the OO Register public website](#), instead choosing to focus our expertise in supporting partners and others to standardise and structure data by accelerating our work on the Beneficial Ownership Data Standard rather than running the OO Register.

From 29 November 2024, users will no longer be able to visit [register.openownership.org](https://register.openownership.org). The main Open Ownership website, our [bulk datasets](#), and all our other [technology products](#) will remain available as normal.



## Data partnerships and experiments

As well as developing the OO Register to make best use of publicly available BODS data, Open Ownership has leveraged the data powering it to pursue a range of partnerships and experiments to [showcase](#) how structured and interoperable BODS data can be used in multiple ways, which are outlined below.

### Using BODS data in graph database or linked data formats

#### OpenScreening (February 2023)

**YouTube Video** OpenScreening: A Neo4J-Powered Free Compliance Investigation Tool

	ICIJ Offshore DB	OpenSanctions	OpenOwnership
<b>Description</b>	Data from leaks investigated by the ICIJ (e.g. Panama Papers)	Data covering international sanctions lists, politically exposed persons, criminal interest	Data from public registries that describe corporate beneficial ownership
<b>Type of entities</b>	People, Addresses, Companies	People, Addresses, Companies, Vehicles, Passports, Sanctions, etc	People, Addresses, Companies
<b>Volume</b>	1.6M+ entities	1.3M+ entities	60M+ entities

To demonstrate how to uncover hidden relationships between beneficial owners, politicians, sanction targets, and networks of companies, we collaborated with [OpenSanctions](#) and [Linkurious](#) to launch [OpenScreening](#). This proof-of-concept tool takes BO data from the OO Register and creates a graph database to match beneficial owners to names appearing in [sanctions data](#) from OpenSanctions, or in [leaked BO data](#) from the [ICIJ](#). This database was then uploaded and made available to explore via [Linkurious](#) thanks to its [Neo4J graph database format](#). Check out a [webinar](#) from Linkurious to learn more.

#### Black Ice's SARA (July 2023)



We collaborated with [Black Ice AI](#) to [showcase](#) how to analyse BODS data using their Suspicious Activity Risk Awareness (SARA) tool. This used [Senzing's](#) entity resolution technology to bring together data from multiple sources (including the OO Register) to resolve entities and relationships. SARA's platform can incorporate databases such as [the ICIJ's Offshore Leaks](#), the [Dow Jones Watchlist](#), [Moody's Orbis](#), [OpenCorporates](#), and [AuthID](#). This collaboration also generated important insights for the Open Ownership Technology Team into the number of duplicate and related records in the BODS data.





The value of resolving Open Ownership data inside SARA

### Improving matching accuracy

Improve business value by linking more Open Ownership beneficial owner records together. Immediate linking – Black Ice SARA resolves and re-resolves entities upon receipt of refreshed Open Ownership data

### Smarter investigations

Identify hidden connections  
Find companies across multiple jurisdictions  
Find officers with ownership across jurisdictions

### Enhanced data management

Identify dirty data preventing entities from resolution  
Identify synthetic IDs  
Identify hidden relationships

Records loaded	Records	Entities	Compression %	Singletons	Duplicates	Ambiguous	Possibly and related
OO Companies	8.86 Million	8.81 Million	0.62%	8.78 Million	87,240	8,104	255,587
OO Officers	9.75 Million	7.48 Million	23.27%	6.10 Million	3.65 Million	185	1.26 Million

87,240 companies that are the same across jurisdictions

3.65 million ultimate beneficial owners that are the same across jurisdictions – with ownership in multiple companies

Source: <https://www.openownership.org/en/blog/connecting-hidden-relationships-in-shell-companies-using-the-open-ownership-register-and-black-ices-sara/>

BODS risk detection (September 2023)

### YouTube Video

Learning which companies have been awarded public contracts

Combining high-quality BO data with other datasets can be crucial to help detect potential risks during customer due diligence, know-your-customer checks, and sanctions screening processes. To demonstrate the value of our [BODS RDF vocabulary](#), we showed how once in this format BODS data can be combined with public procurement data published in line with the [Open Contracting Data Standard](#) as well as with sanctions data published by [OpenSanctions](#) using the [FollowTheMoney](#) data model and the [Offshore Leaks](#) database from the [ICIJ](#). The resulting data was then queried using [RDF/SPARQL](#) (a query language used to express queries across diverse

data sources) to leverage its graph nature for a series of risk and compliance use cases. Both individuals and companies can be treated as targets.

GraphAware webinar (May 2024)

### YouTube Video

Unlocking Complex Ultimate Beneficial Ownership Investigation

During a [joint webinar](#), the [GraphAware](#) team loaded BODS data from the [OO Register](#) into [Hume](#), its graph data visualisation and exploration tool. This information was then combined with sanctions data and enhanced using entity resolution to demonstrate how it can support detailed investigations by law enforcement or analysts.





## Data analysis and querying BODS data

As well as partnering with external organisations, Open Ownership worked with [Open Data Services](#) to demonstrate the range of data analysis approaches which can be used to generate deeper insights from BODS data.

Leveraging the BODS data analysis tools, we created a [reproducible notebook](#) with UK PSC Register data to demonstrate how to write queries to spot a number of red flags using BODS data.

The questions we sought to answer were:

- How many entities declare that they have no beneficial owners or that their beneficial owners are unknown?
- How many entities have ownership networks which involve natural persons or entities in countries on the European Union list of non-cooperative tax jurisdictions?
- How many entities have complex ownership chains? (Defined here as five or more observable layers of ownership.)
- How many entities were founded and subsequently dissolved within a year?

For example, we learned that there were 71,774 companies with ownership chains involving five or more levels that could be observed in the UK data at that time.

Increasingly, tools are being created to make it easier to use, query, and process data files in formats such as Parquet without the need to download data or install a database. One such tool is [DuckDB](#), a fast and efficient online analytical processing structured query language (SQL) database management system, which only requires minimal setup.

To demonstrate the capabilities of [DuckDB](#) for querying BO datasets hosted by Open Ownership – once we had added the Parquet export format to our BODS data analysis tools – we [created a reproducible notebook](#) showing a number of queries which create data samples or list people who have direct BO interests in a company.



## Conclusion

The world needs transnational approaches to collecting, combining, and using BO data now more than ever.

Globally, only 9% of countries effectively implement BO legislation, according to a [2022 stocktake](#) by the [FATF](#), while the OECD Global Forum [reports](#) that only 5% of countries have been rated compliant with their Element A.1, which assesses the BO requirements on legal entities and arrangements.

A huge amount of work is still needed across the world to make effective use of BO data. Grand corruption tends to involve transnational money flows and therefore calls for cross-border investigations. To do this effectively, BO data must not only be [available in different countries](#), but must also be [interoperable](#) so that it can be linked and analysed with other relevant datasets. This includes using [reliable identifiers](#) for people and companies in the datasets as well as [reliable and comprehensive dates](#) so that data users or analysts can determine who owned or controlled what and when.

Over seven years, Open Ownership has sought to show how to [operationalise](#) and iterate on the usage of standardised and interoperable BO data. Combined with the insights gleaned from our work supporting the [implementation](#) of BO reforms across the globe, the OO Register helped drive forward the development of our [data standard](#) as well as our [research](#) and other [technology](#) efforts.

Open Ownership's goal remains the same – to help people collect high-quality BO data and make sure it is well used. However, we are shifting how we do this: moving away from running the OO Register, we are instead investing more time and resources to scale up our work in other areas – driving adoption of [BODS](#), conducting [data analysis](#), and supporting others to harness the power of BO data.



# Appendix

## Open-source code and open data

### Data

#### Transformed BODS 0.2 data

The following data have been transformed in line with version 0.2 of BODS.

Denmark CVR data	<a href="https://bods-data.openownership.org/source/denmark/">https://bods-data.openownership.org/source/denmark/</a>
Slovakia RPVS data	<a href="https://bods-data.openownership.org/source/slovakia/">https://bods-data.openownership.org/source/slovakia/</a>
UK PSC Register data	<a href="https://bods-data.openownership.org/source/UK_PSC/">https://bods-data.openownership.org/source/UK_PSC/</a>

#### Live analysis dashboards

To provide insights into these new sources and to judge the quality of the BO data published, Open Ownership developed a set of live analysis dashboards which can be used to inspect data from Denmark, Slovakia, and the UK.

Denmark CVR data dashboard	<a href="https://deepnote.com/app/open-ownership/Denmark-CVR-dashboard-9c2835e6-cecb-4d70-9e6f-bde86f6dfdd7">https://deepnote.com/app/open-ownership/Denmark-CVR-dashboard-9c2835e6-cecb-4d70-9e6f-bde86f6dfdd7</a>
Slovakia RPVS data dashboard	<a href="https://deepnote.com/app/open-ownership/Slovakia-RPVS-dashboard-fb4b6afa-2b39-4261-baaf-887071a2d62d">https://deepnote.com/app/open-ownership/Slovakia-RPVS-dashboard-fb4b6afa-2b39-4261-baaf-887071a2d62d</a>
UK PSC Register data dashboard	<a href="https://deepnote.com/app/open-ownership/UK-PSC-dashboard-2a4e8e4e-492e-48cb-891c-34b1d852dbfd">https://deepnote.com/app/open-ownership/UK-PSC-dashboard-2a4e8e4e-492e-48cb-891c-34b1d852dbfd</a>

#### Ingesting, mapping and transforming

As part of this work, the code for ingesting, mapping, and transforming BO data from Denmark, Slovakia, and the UK in line with version 0.2 of BODS was also separated into different GitHub repositories:

- Ingester repositories contain code for adding discovered source records to Elasticsearch.
- Sources repositories contain code for reading/writing source records in Elasticsearch.
- Transformers repositories contain code for consuming new source records and transforming these to statements produced in line with version 0.2 of BODS.

Denmark CVR code	Ingester	<a href="https://github.com/openownership/register-ingester-dk">https://github.com/openownership/register-ingester-dk</a>
	Sources	<a href="https://github.com/openownership/register-sources-dk">https://github.com/openownership/register-sources-dk</a>
	Transformer	<a href="https://github.com/openownership/register-transformer-dk">https://github.com/openownership/register-transformer-dk</a>
Slovakia RPVS code	Ingester	<a href="https://github.com/openownership/register-sources-sk">https://github.com/openownership/register-sources-sk</a>
	Sources	<a href="https://github.com/openownership/register-transformer-sk">https://github.com/openownership/register-transformer-sk</a>
	Transformer	<a href="https://github.com/openownership/register-ingester-psc">https://github.com/openownership/register-ingester-psc</a>



UK PSC Register code	Ingester	<a href="https://github.com/openownership/register-ingester-psc">https://github.com/openownership/register-ingester-psc</a>
	Sources	<a href="https://github.com/openownership/register-sources-psc">https://github.com/openownership/register-sources-psc</a>
	Transformer	<a href="https://github.com/openownership/register-transformer-psc">https://github.com/openownership/register-transformer-psc</a>

## Register codebase

Full code for the OO Register can be found at <https://github.com/openownership/register>.

Other related GitHub repositories include:

Read/write records in BODS version 0.2 format	<a href="https://github.com/openownership/register-sources-bods">https://github.com/openownership/register-sources-bods</a>
Python-only transformation of data into version 0.2 of BODS without deduplication or reconciliation with OpenCorporates bulk data	<a href="https://github.com/openownership/bodspipelines">https://github.com/openownership/bodspipelines</a>
Ingester for OpenCorporates bulk data into Elasticsearch	<a href="https://github.com/openownership/register-ingester-oc">https://github.com/openownership/register-ingester-oc</a>
OO Register ingestion and searching of OpenCorporates data	<a href="https://github.com/openownership/register-sources-oc">https://github.com/openownership/register-sources-oc</a>
Notebooks and code for analysing data published to BODS	<a href="https://github.com/openownership/bodsanalysis">https://github.com/openownership/bodsanalysis</a>

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