

# Census Flow Data

New API-Driven Platform and Data  
Retrieval with LLMs

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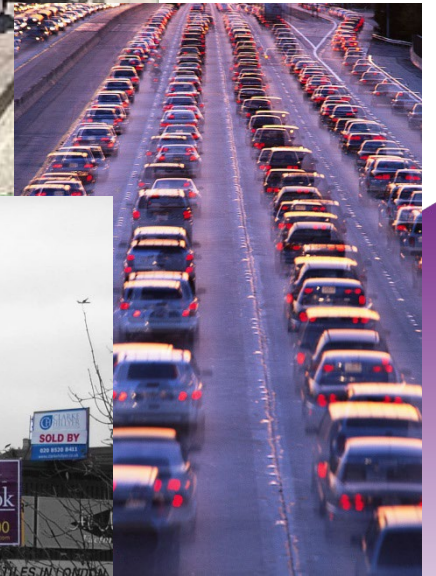
[v.routsis@ucl.ac.uk](mailto:v.routsis@ucl.ac.uk)



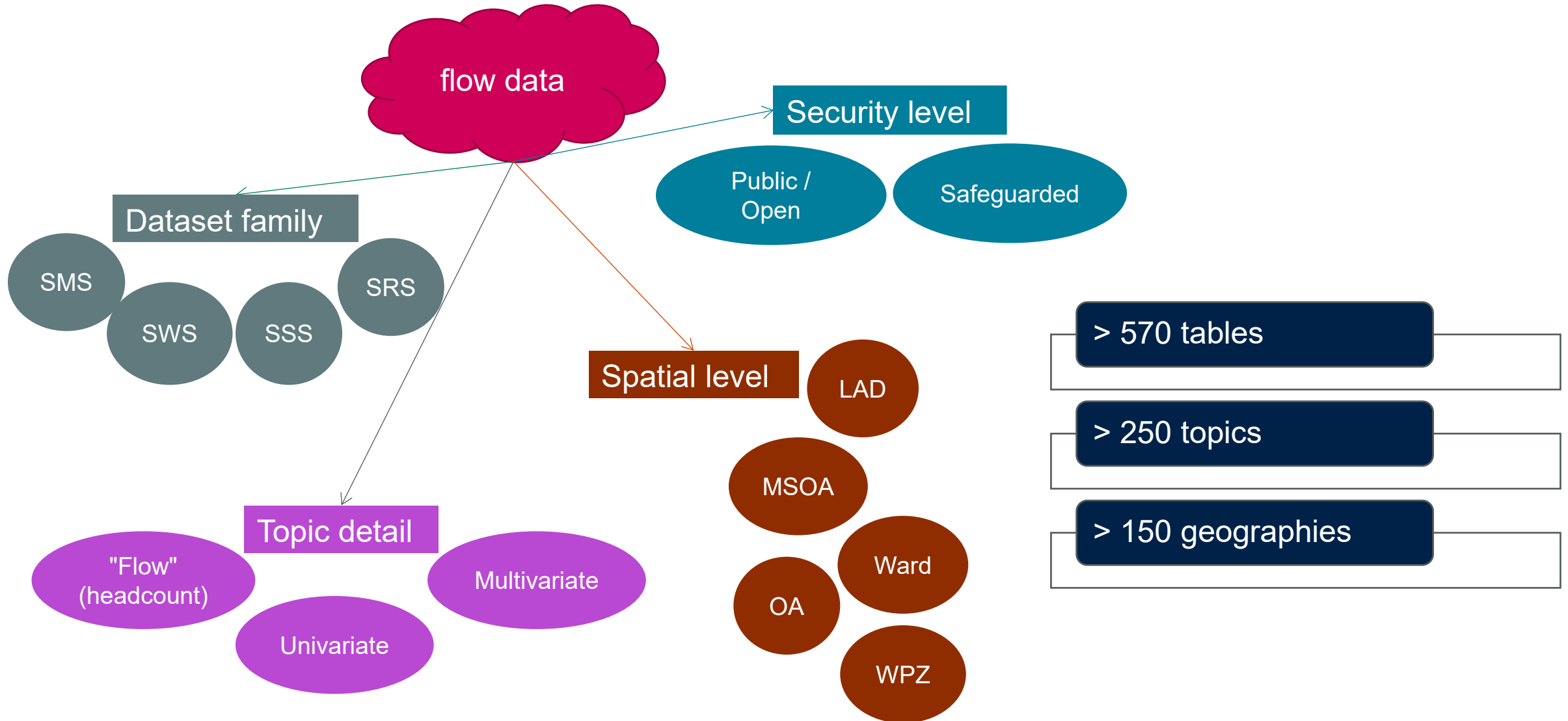
# Flow data

Flow data enumerate movements of people from one place to another. They include migration, journeys to schools or work, and travel to second residences. These data are characterised by their complexity, volume, and sparsity.

Data are available from censuses from 1981 onwards. Data from 2011 and 2021 have different levels of access.



# Census flow data: Layers of complexity



# Current legacy system - WICID

wicid WICID -> Query -> Data -> Select by table (Select table) Help

Logged in as: guest Customise Logout now

[ Census links ] [ WICID project ] [ WICID query ] [ Current query ] [ Save / restore queries ]

0 data items currently selected Unselect all Edit list

Table 1 All migrants: age (5 broad age groups) by sex  
Table 2 Wholly Moving Households and residents in Wholly Moving Households: counts  
Table 3 All migrants: age (5 year groups) by sex  
Table 4 All migrants: marital status by sex  
Table 5 All migrants: ethnic group  
Table 6 All migrants: whether resident in households by whether suffering from limiting long term illness  
Table 7 All migrants aged 16+: economic position  
Table 8 Wholly Moving Households: tenure  
Table 8S Wholly Moving Households: tenure  
Table 9 Wholly Moving Households: sex and economic position of head  
Table 10 Residents in Wholly Moving Households: sex and economic position of head  
Table 11S All migrants: Gaelic speakers  
Table 11W All migrants: Welsh speakers

## What now?

You must select some data before you can produce any output!

- Select one of the above tables
- OR go back to the [dataset selection](#) list to choose a different data set
- OR go back to the general [data selection](#) page
- OR go back to the general [query](#) interface

UK Data Service  
Census Support



Flow Data

Flow data links  
Flow data home  
Information and Publications  
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Downloads  
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News  
FAQs  
Credits

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Help

## Census Support: Flow Data

Flow Data is part of UK Data Service Census Support, providing data and user support for anyone interested in using flow data from the [Census](#).

Census flow data (also referred to as *interaction data*) relate to the movement of people between places. These can be regular short distance moves such as the daily commute to work, or less frequent - and sometimes longer distance - moves such as migration to a new home or an extended stay in a second address.

Flow data differ from other Census data in that they link two locations - an origin and a destination. With two geographies, flow datasets can be much larger than other Census data products.

### Getting the data

There are three principal ways of getting to the data. In order to use most of the data sets, it is necessary to be registered.

WICID - the flexible query builder

WICID Downloads - flow data tables ready to be downloaded

WICID Flow Summaries - a quick summary of the most significant flows associated with a chosen area

### New data for un-registered users

Un-registered users and interested registered users can now access a time series of UK inter-district migration estimates, which have been produced by CIDER. These data are available directly from the Office for National Statistics - for more information about the dataset and how to gain access, click [here](#).

### About the data

Currently migration and commuting data from the 1981, 1991, 2001 and 2011 Censuses are available through WICID. Additional non-census datasets are also available from the system.

[Detailed information](#) about our data sets  
[Tutorial information](#) is available describing how to use the interface

Online since 2000

Received significant upgrades over the years

Still the only web tool to provide bespoke data of four decades data

<https://wicid.ukdataservice.ac.uk/>



# Why a new platform is needed

## Modernisation and future-proof design

- A platform using the latest technologies and best-practice principles designed to last for many years in the future.
- Decoupling of backend and frontend allows flexibility on the interface design, quicker adaptability to changing requirements and advanced modularity as components can be customised, extended, and implemented as needed.

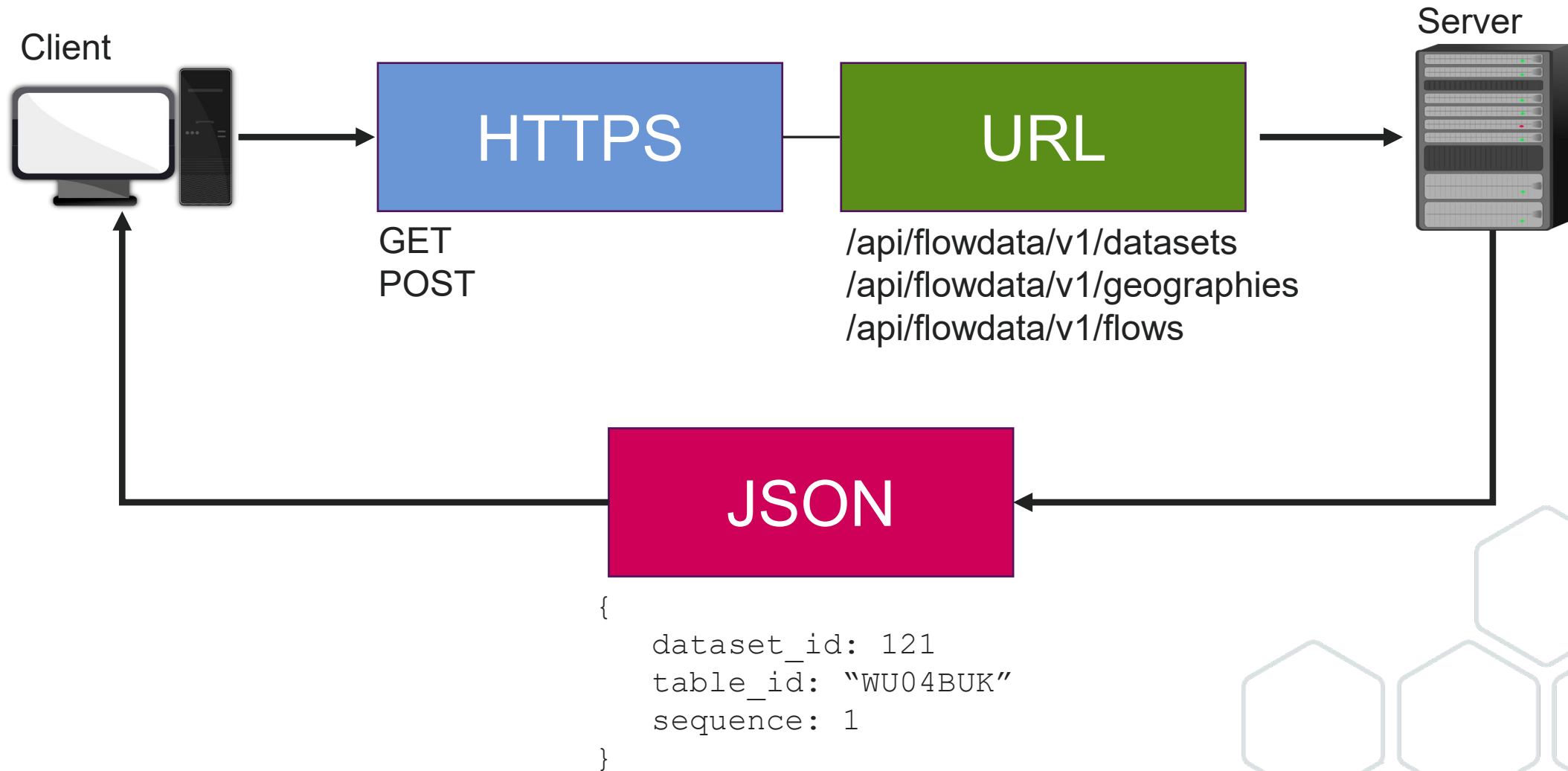
## Interoperability

- A dedicated fully-functional API allows the exchange of information with other systems – whether internal or external.

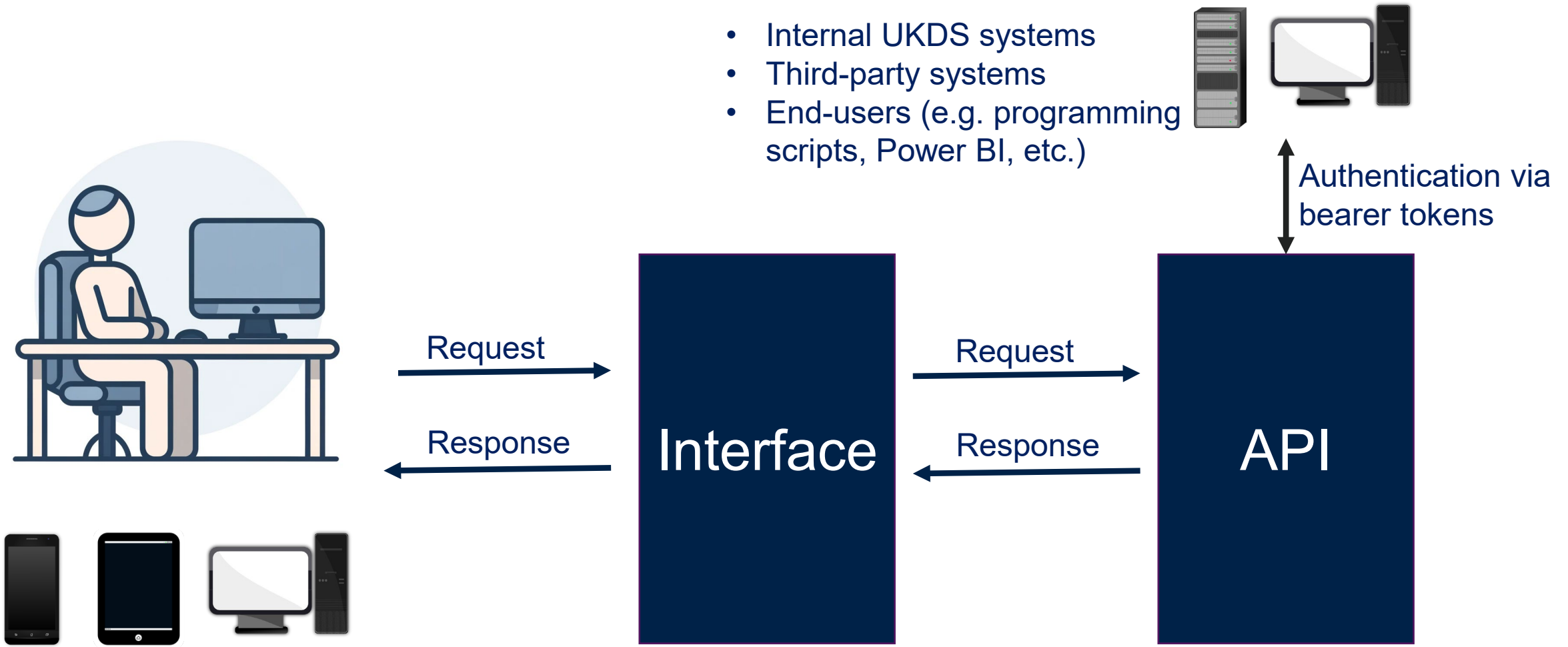
## Increase impact

- Increase the visibility, reach and usability of the data.

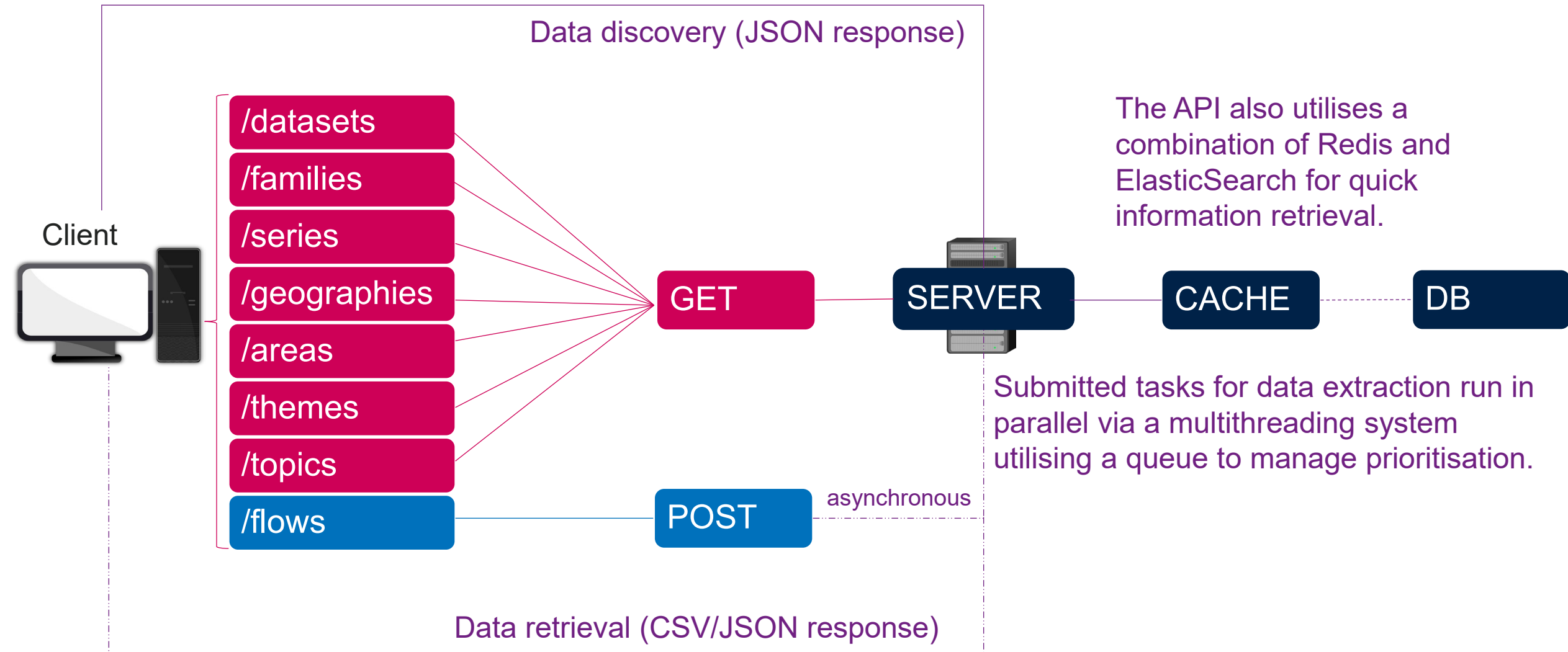
# REST API (OpenAPI 3)



# New API-driven platform - Access

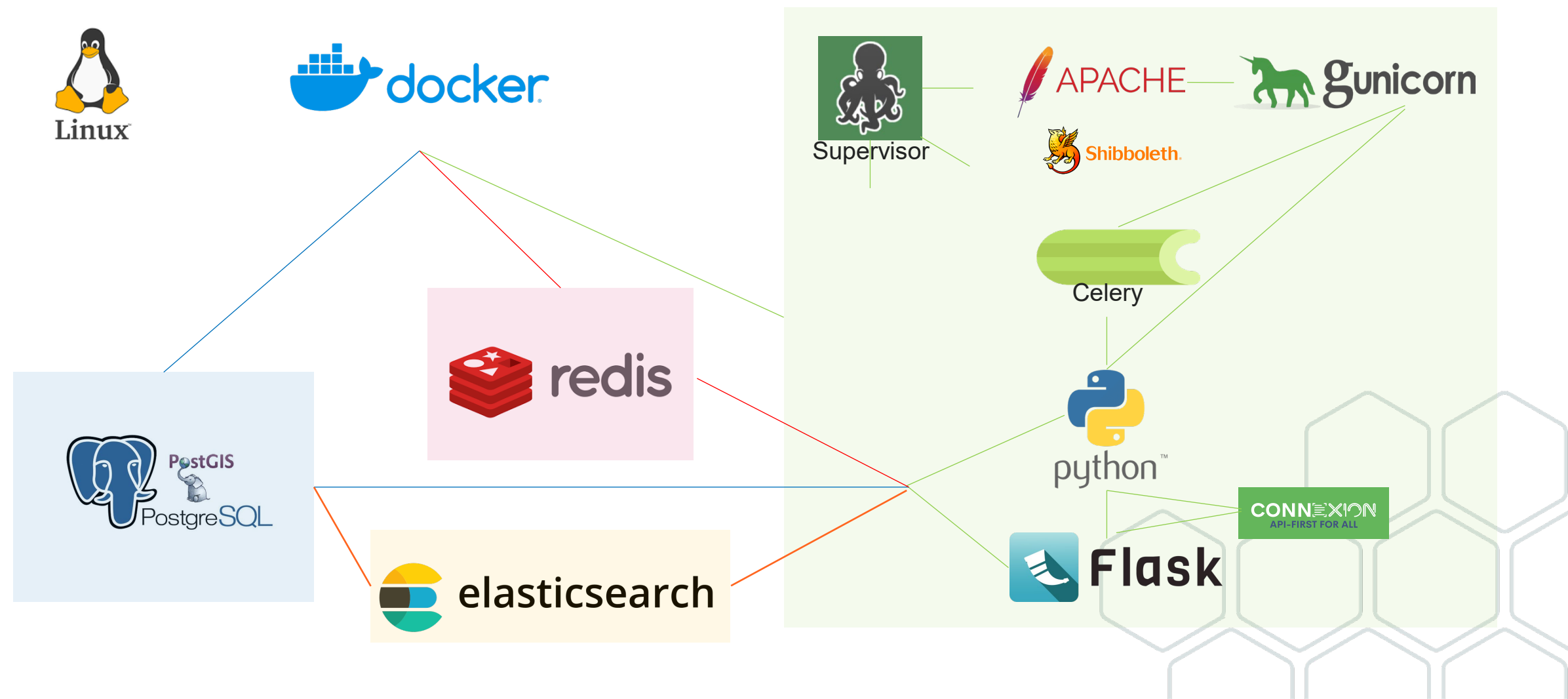


# Flow data API endpoints



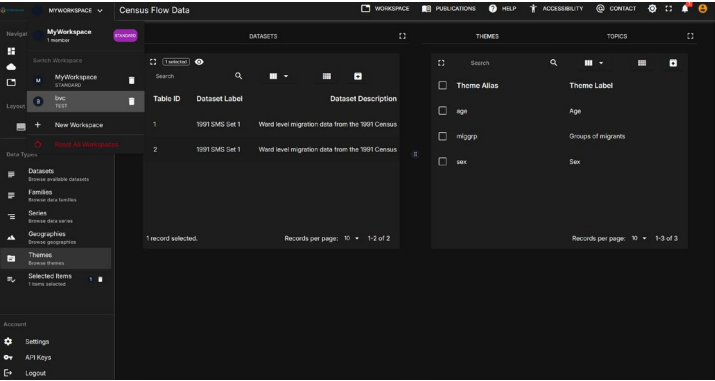
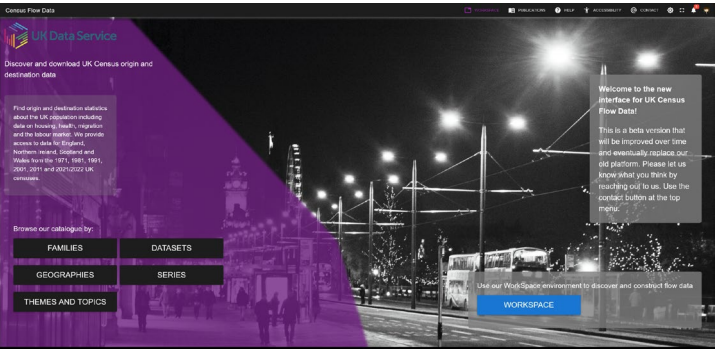
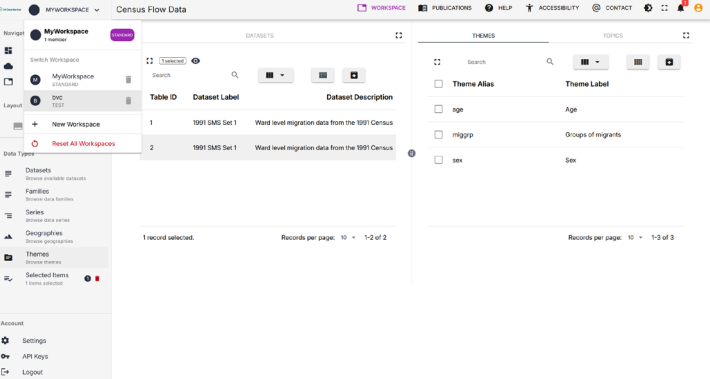
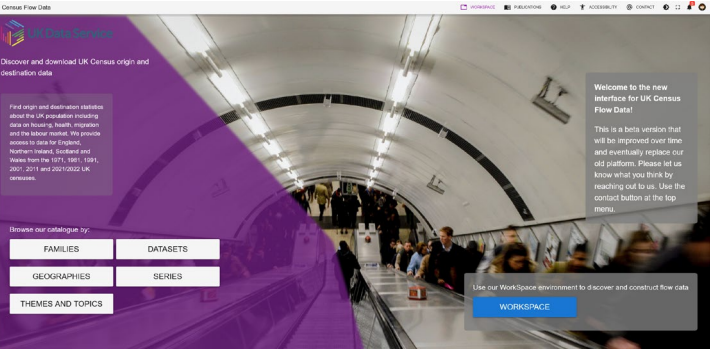


# Open-source technology stack - API

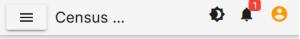


# Interface

## Accessibility and Personalisation



## Responsive design



### API Access Keys

+ CREATE NEW KEY

#### Manage Your API Access Keys

API keys allow external applications to access data on your behalf through our API.

Important security information:

- Your secret key will only be shown once when you create it. Make sure to copy it somewhere safe.
- If you lose your secret key, you'll need to create a new one.
- You can have a maximum of 5 active API keys at any time.
- Each key can be assigned specific permissions to limit what it can access.

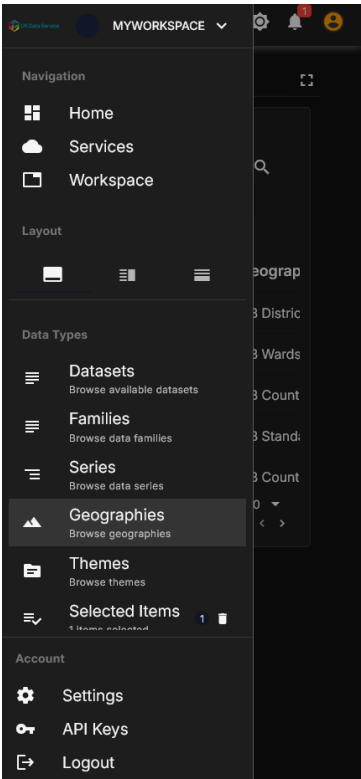
#### Your API Keys



You don't have any API keys yet

Create your first API key to access the API.

+ CREATE YOUR FIRST KEY



# Interface - Workspace

UK Data Service

MYWORKSPACE

Census Flow Data

WORKSPACE

PUBLICATIONS

HELP

ACCESSIBILITY

CONTACT

1

MyWorkspace

1 member

STANDARD

Switch Workspace

M

MyWorkspace

STANDARD

B

bvc

TEST

+

New Workspace

Reset All Workspaces

Datasets

Browse available datasets

Families

Browse data families

Series

Browse data series

Geographies

Browse geographies

Themes

Browse themes

Selected Items

1 items selected

1

Account

Settings

API Keys

Logout

DATASETS

1 selected

Search

Table ID	Dataset Label	Dataset Description
1	1991 SMS Set 1	Ward level migration data from the 1991 Census
2	1991 SMS Set 1	Ward level migration data from the 1991 Census

1 record selected.

Records per page: 10 1-2 of 2

THEMES

TOPICS

Search

Theme Alias	Theme Label
<input type="checkbox"/> age	Age
<input type="checkbox"/> miggrp	Groups of migrants
<input type="checkbox"/> sex	Sex

Records per page: 10 1-3 of 3

# Interface - API keys for data access

Custom API keys with tailored access permissions

**Create New API Key**

Key Name  
test-key

**Assign Individual Policies**

Select what this key can access:

Search and select policies

**Or Assign Policy Groups**

Select pre-defined groups of policies:

Search and select policy groups

<b>Basic Access</b> Basic read-only access to datasets and geographies <i>Includes: Read Datasets, Read Geographies</i>	<input type="checkbox"/>
<b>Full Read Access</b> Full read-only access to all data <i>Includes: Read Datasets, Read Geographies, Read Families, Read Series, Read Themes, Read Topics, Search</i>	<input type="checkbox"/>
<b>Open Datasets Generation Access</b> Data generation access to open datasets only <i>Includes: Generate Flows (open data)</i>	<input checked="" type="checkbox"/>
<b>Full Generation Access</b> Full data generation access to open and safeguarded datasets <i>Includes: Generate Flows (open data), Generate Flows (safeguarded data)</i>	<input type="checkbox"/>

CANCEL CREATE API KEY

# Interface - User access

Census Flow Data

WORKSPACE PUBLICATIONS HELP ACCESSIBILITY CONTACT

## Welcome Back

Sign in to be able to save your work.

You can also continue as a guest. For safeguarded data, please use the SSO Login.


Email

Password

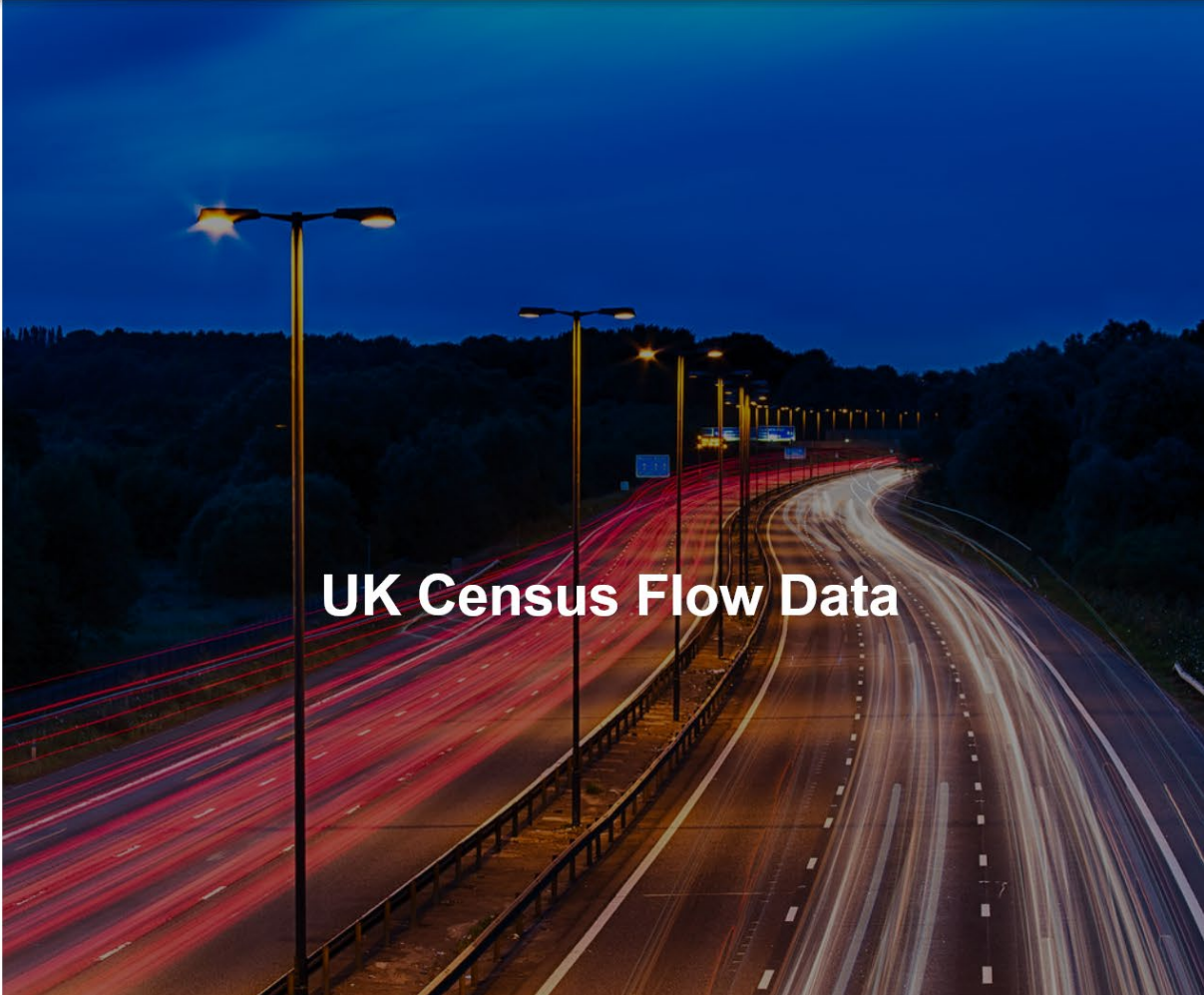
[Forgot password?](#)

SIGN IN

SIGN IN WITH AZURE / SHIBBOLETH

 CONTINUE AS GUEST

Don't have an account? [Create one](#)



## UK Census Flow Data

# CORDIAL-AI

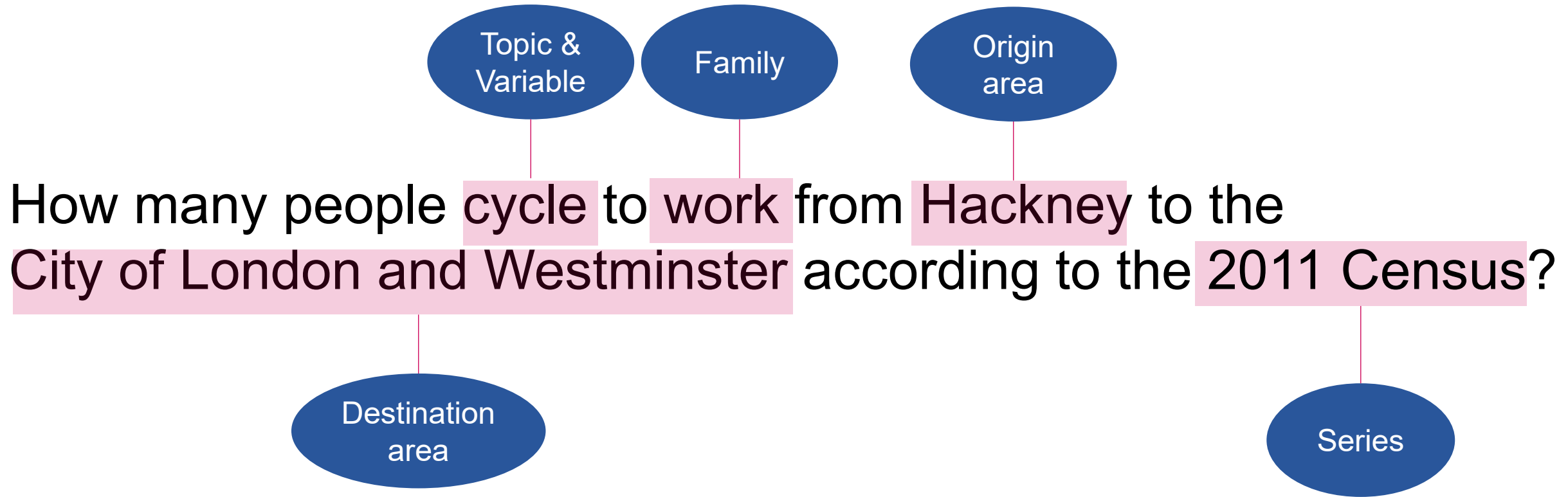
## Data retrieval with LLMs

- Project is led by the UCL Department of Information Studies
- Directly affiliated with the UK Data Service
- Funded by the ESRC Future Data Services scheme
- Project still under development





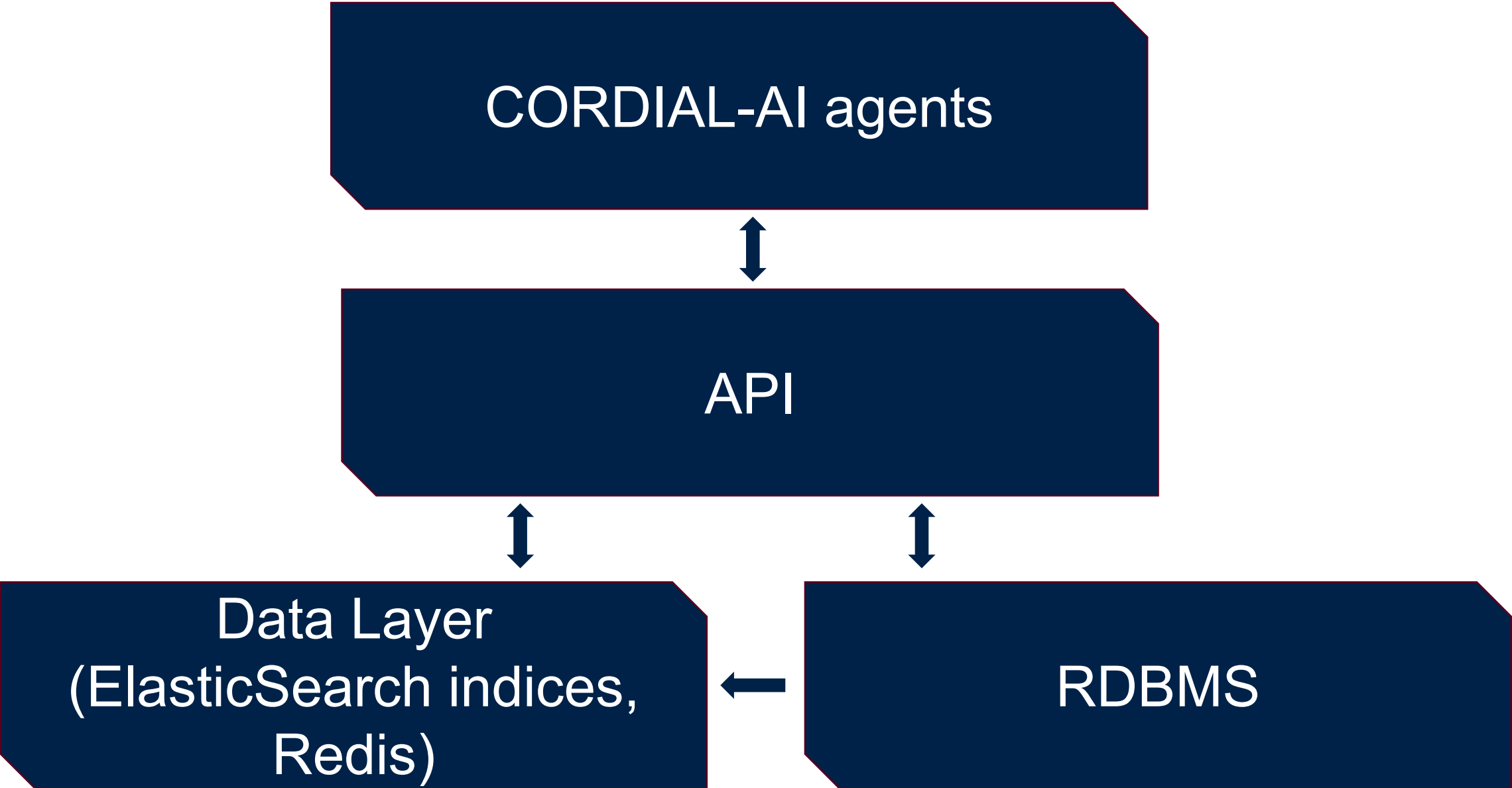
# Example of a natural language query



...but there's still some ambiguity left!

We can guess, but we are not entirely sure on the geography type the user wants the flows in.

# Information flow



# Text to census flow data - UI

CORDIAL-AI

Welcome, Vassilis

Model

gpt-4o

API Formatting Mode

In API mode, you can view and modify the API request before execution.

New Chat

Archived Chats

Active

2025-05-20 14:49:52

How many people who moved from.

gpt-4o

Logout

Starting new conversation.

How many people who moved from Colchester to the region of London, rent their home based on the 2021 census?

This API retrieves data from the Census 2021 about people aged 1 and older in England and Wales who lived at a different address one year prior. It specifically focuses on the movement of these individuals between different areas, classified by their housing situation (either social rented, private rented, or living rent-free). The data provides insights into the migration patterns from Colchester to London, detailing how many people moved between these areas and their housing tenure.

Data retrieved for table **ODMG07EW**. Origin: **Colchester**. Destination: **London**.

Hide Preview

Download

API Details

Chain of Thought

ext\_42936f07337d4527\_349.csv

Showing 1 of 1 rows

Origin Lower Tier Local A...	Destination Region name	Origin Geography Label	Destination Geography L...	Social rented; Persons [34...	Private rented or lives ren...
Colchester	London	2021 E&W LTLAs	2021 E&W Regions	230	502

Type your message here... (Shift+Enter for new line, Enter to send)

Send

# Explainability – Reference validation

How many males aged 16-34 from international origins moved to Camden according to the 2021 Census?

This API retrieves data from the Census 2021 about people aged 1 and older in England and Wales who lived at a different address one year prior. It specifically focuses on migrants moving to Camden, detailing their age and sex. The dataset includes information on males aged 16 to 24 and 25 to 34. It also identifies whether these individuals originated from outside the UK. The data helps understand migration patterns into Camden, categorized by age and gender.

Data retrieved for table **\*\*ODMG10EW\*\***. Origin: **\*\*Person with migrant origin outside the UK\*\***. Destination: **\*\*Camden\*\***.

[Preview CSV](#)

Download Data

Hide API Details

**datasets:** [

0: {

dataset id: 355.



table id:	ODMG10EW
-----------	----------

**variables:** [

## 2021 SMS TLA [Origin and destination of migrants by age and sex] - ODMG10EW - Open

Dataset ID: 355    Table ID: ODMG10EW

**Description**

Provides Census 2021 estimates on usual residents aged 1+ in E&W living at a different address 1 year before. Classifies residents in each TLA by age, sex and previous TLA. Residents outside UK are counted as "Outside UK".

**Geographies**    **Topics & Themes**    **Variables**    **Metadata**

### Supported Geography Types

**Legend**

- Origin - Intrinsic
- Origin - Aggregated
- Destination - Intrinsic
- Destination - Aggregated

#### Origin Geographies

Intrinsic	Aggregated
2021 England and Wales Lower Tier Local Authorities (TLA)	2021 England and Wales Local Authority Districts (LAD)
2014 Northern Ireland Local Government Districts (Compatible with 2021 E&W data)	2021 England and Wales Upper Tier Local Authorities (UTLA)
2019 Scottish Council Areas	2021 England and Wales Regions
2021 England and Wales SMS (Migration) special codes	2021 England Local Enterprise Partnerships (LEP)
2021 England and Wales Does Not Apply special code	2021 England Inner and Outer London
	2021 United Kingdom Countries
	2021 England and Wales
	2021 Rest of the UK regions/countries (Northern Ireland and Scotland) except England and Wales

#### Destination Geographies

Intrinsic	Aggregated
2021 England and Wales Lower Tier Local Authorities (TLA)	2021 England and Wales Local Authority Districts (LAD)
	2021 England and Wales Upper Tier Local Authorities (UTLA)
	2021 England and Wales Regions
	2021 England Local Enterprise Partnerships (LEP)
	2021 England Inner and Outer London
	2021 United Kingdom Countries
	2021 England and Wales

### Geography Details

2021 England and Wales Lower Tier Local Authorities (TLA)

ID: 137

331 areas

2021 England and Wales Local Authority Districts (LAD)

ID: 138

318 areas

# Explainability - Chain of Thought

How many people with managerial jobs moved to London as region at UTLA level based on the 2021 census?

This API retrieves data from the 2021 Census about people aged 16 and over in England and Wales who moved to a different address within the past year. It classifies these individuals based on their socio-economic status (NS-SEC) and the area they moved from, specifically focusing on those in higher and lower managerial and administrative occupations. The data covers all Upper Tier Local Authorities (UTLA) in England and Wales, and includes people who moved from outside the UK, categorized as 'Outside UK'.

Preview CSV

Download

API Details

Chain of Thought

Step 1: Filtered IDs after series and families selection

Based on the series and families criteria, these dataset IDs were filtered:

330331332333334335336337338339340341342343344345346347348349350351352353354355356

↓

Step 2: Filtered IDs after geography selection

After applying geography filters, these dataset IDs remained:

345346347348330331332334335

↓

Step 3: Final Dataset IDs

The final dataset IDs determined by the system:

345346347348330331332334335

↓

Unselected Dataset IDs

These dataset IDs were available but not selected:

345347348



↓










Step 4: Selected Dataset IDs

These dataset IDs were selected for the final API request:


346


# Integration of CORDIAL-AI to the new platform


 MYWORKSPACE 

Cens... WORKSPACE PUBLICATIONS HELP ACCESSIBILITY CONTACT


Navigation


 Home


 Services

 Workspace


Account


 Settings

 API Keys

 Logout


Dashboard

 ACCOUNT PRIVILEGES


 MANAGE ACCESS KEYS

This is the main area from where you can start exploring census flow data.


You can explore or download full or subsetting data.

**Census Flow Data Workspace →**


Use the workspace to build your own data subsets and download them.

**Explore Census-Related Data →**

Use this to explore census-related data such as geographical areas, variable data, and more.

**Use Generative AI to retrieve Flow Data →**

Use our experimental generative AI tool to retrieve census flow data.

**Use the API to retrieve Flow Data →**

Discover and download census flow data using the API.



Thank you.

Vassilis Routsis, [v.routsis@ucl.ac.uk](mailto:v.routsis@ucl.ac.uk)