API discoverability and REST API profile for the public sector

APIdays Helsinki

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Bogdan Dumitriu
Project officer at DG DIGIT, European Commission
Lorenzino Vaccari
Consultant, Fincons group

Joint
Research
Centre

APIs for the digital transformation of Governments

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Why APIs in government?

APIs support Digital Government objectives to:

- **Control and monitor** digital environments and enhance ***Policy Making innovation*** *by:*
  - **Optimize information flows** to support decision-making and monitoring of processes
- **Transform** them into robust digital ecosystems. APIs ***enable Public Administration*** *to be:*
  - **flexible** to adapt to the advances in technology
  - able to **rewire** the **interactions** with public sector, business, and ultimately with **citizens**

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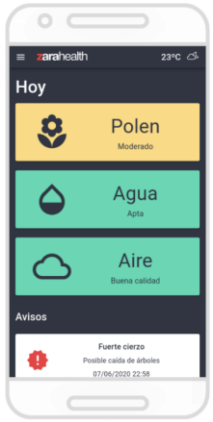
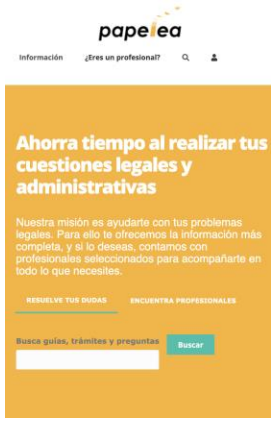
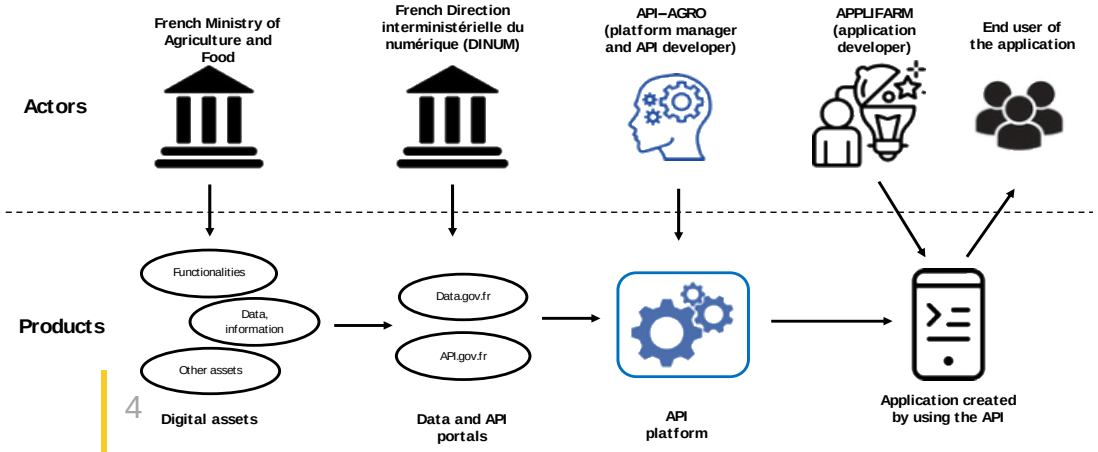
X-Road





Zaragoza



API-Agro

Public Sector opportunities

- Enablement of digital ecosystems
- Fostering innovation in the public sector
- Economic opportunities
  - Help SMEs reducing costs of establishing and running business
  - Easier access to Open Data can further stimulate new economic development

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APIs are technical enablers of the ***Digital Transformation*** *of Governments*

Recommended actions

- Explicitly **adopt APIs** in governments
- Create and improve the '**API culture**' in governments
- Become **digital ecosystem aware** by engaging both public governments actors and the private sector
- Utilize and validate our **API framework**

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Current focus on API essentials

API LIFECYCLE MANAGAMENT ASPECTS

- **Discoverability**
- Specifications
- Security
- Traceability

LEGAL & ORGANIZATIONAL ASPECTS

- Privacy, GDPR
- Legal frameworks
- Service Level Agreements, Terms of Service
- Analysis of API-driven ecosystems (Financial Sector, PSD2)

APIs for the public sector

Multi-stakeholder events on API essentials

Workshop I. API technical essentials	Workshop II. API technical essentials	Workshop III. API legal & organizational essentials
		
Public administration & private sector API co-design	**API Lifecycle management, Security & Specifications**	**API Legal context**
https://joinup.ec.europa.eu/collection/api4dt/event/workshop-i-25092020-api-technical-essentials-public-administration-private-sector-apis-co-design	https://joinup.ec.europa.eu/collection/api4dt/event/workshop-ii-27102020-api-technical-essentials-public-administration-private-sector-apis-co-design	https://joinup.ec.europa.eu/collection/api4dt/event/workshop-iii-unfolding-opportunities-use-apis-europe-regulatory-perspective-eu-data-strategy-gdpr

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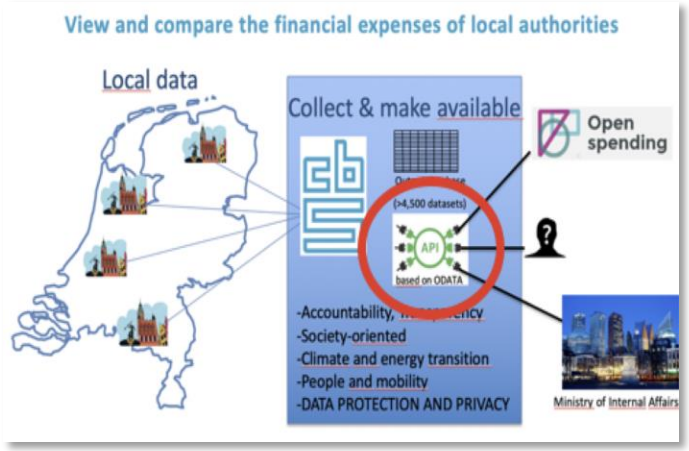
API discoverability typical cases

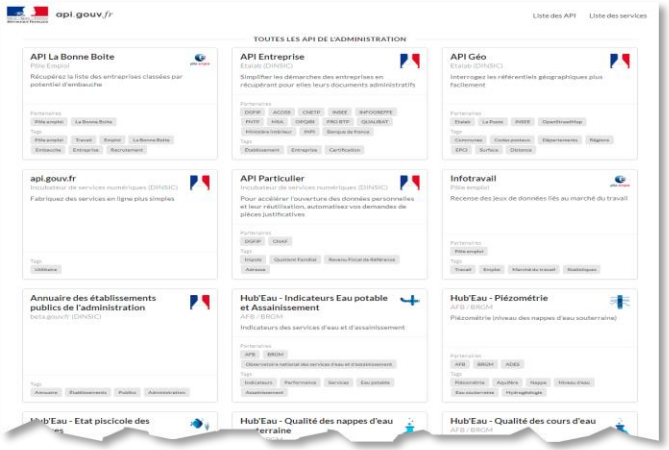
From single APIs to digital ecosystems

API as a product developer sites



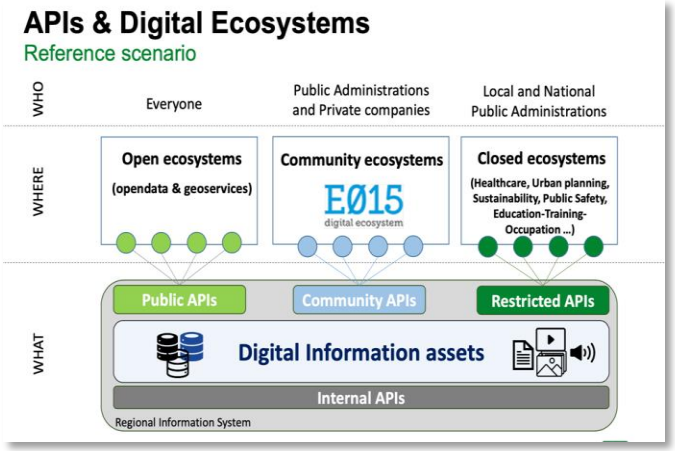
The Netherlands statistical office API

API catalogues (API focused or with open data)



French government public API registry

API-enabled digital ecosystems



The E015 system in Lombardia, Italy

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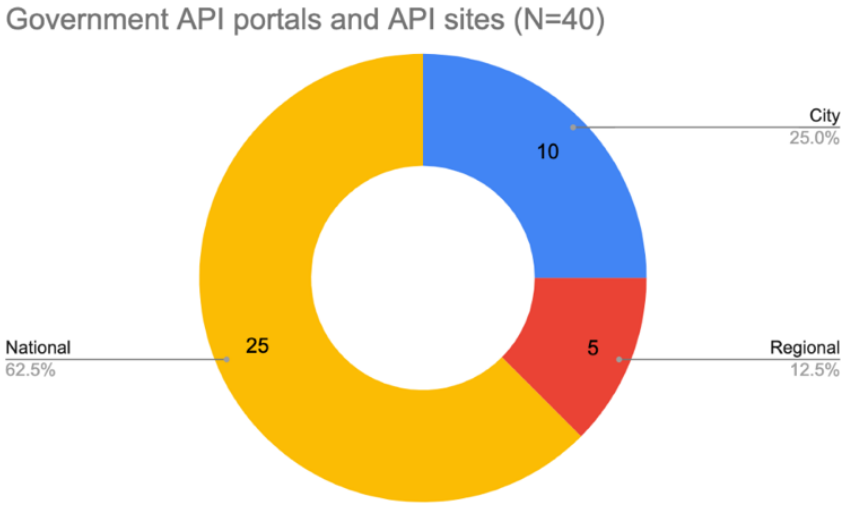
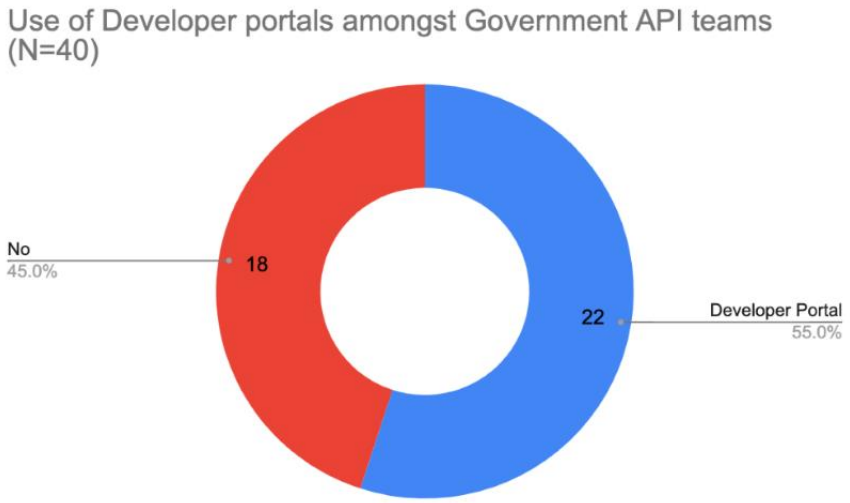
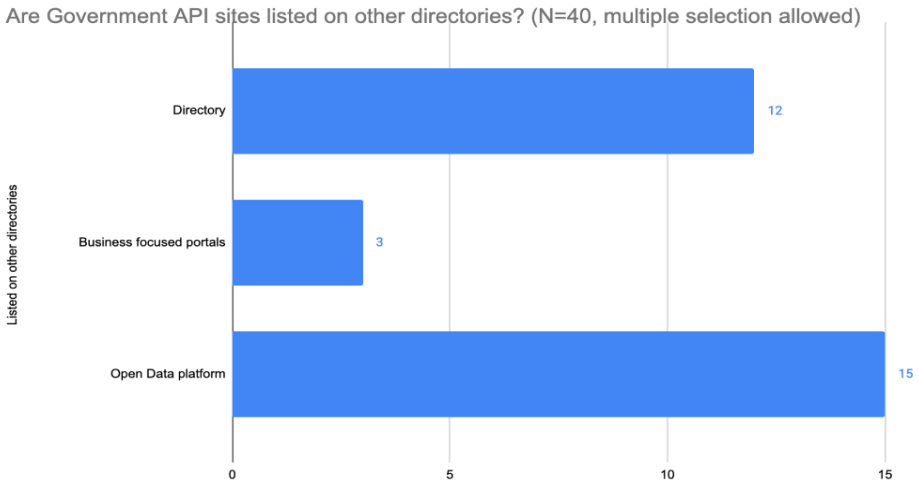
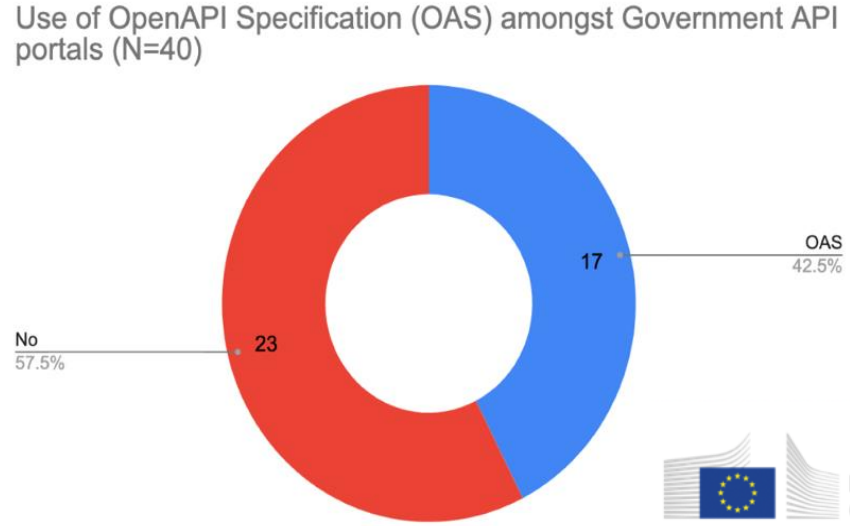
API discoverability in government

Distilled web search









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Case studies

Selected interviews

Owner	Description	Highlights
Antwerp, Belgium	The Antwerp City as a **Platform portal** aims to provide a single portal for all government digital services components. This includes APIs.	Use of **AI Natural Language Processing** to discover APIs
Zaragoza, Spain	Zaragoza **open data portal has been built with an API** for the complete open data catalogue and encourages consumers ("re-utilizers") of the city's data to **consume data sets via the API**	A **community of practice** is promoted: reuse of APIs, documentation and FAQ, discoverability of apps
New York, US	An **API product page** that stands as an individual API product portal for potential users of the Benefits Screening API.	**Clearly definition of intended audience**, list of current partners and describe API features also in non-technical language
Lombardy, Italy	The Lombardy region of Italy has developed an **open digital ecosystem to share** APIs that external parties can use to design new products and services	**Ecosystem oriented**, user-friendly interface for searching among domains
Denmark	DAWA Denmark Addresses **web API portal**, Denmark discoverability strategies describes some of the discoverability components of Denmark's API portal,	**Single product (addresses) oriented**, API documentation include guides with use case description
France	A **whole-of-government API catalogue** targeting both internal government users that may require reusable government APIs to build their next digital government services, and external consumers looking for open APIs	**User-friendly, clear and guided API catalogue**
Netherlands	The Netherland Government **Developer portal** is an initiative created out of the cross-government IT standards group in order to encourage reuse of APIs by departments	Not just across national government but **drawing on regional and city APIs as well**
Victoria, Australia	The Victorian government of Australia has developed a **developer portal** for **publishing all government APIs in a single site**.	Initially internally oriented, **clear and user-friendly interface**

Main conclusions on discoverability

Developer portals are the **most widely used** discoverability mechanism

Currently, API discoverability in government is **mostly targeting internal audiences**, but:

- API **discoverability** is acknowledged as **enabler** of **organizations interoperability**
- API discoverability processes are **growing** to ensure Government APIs use to **support Digital ecosystems**
- API discoverability **AI innovative practices** are starting to be used

CEF Building Blocks

The **building blocks of the Connecting Europe Facility** promote the adoption of the same **open standards and technical specifications**, by the **different sectors** of the Union, for the most basic & common functionalities of any sectorial project/ platform.

These core commonalities will enable interoperability across borders and sectors.

IDENTIFY *with*

eID

SIGN *with*

eSignature

EXCHANGE *with*

eDelivery

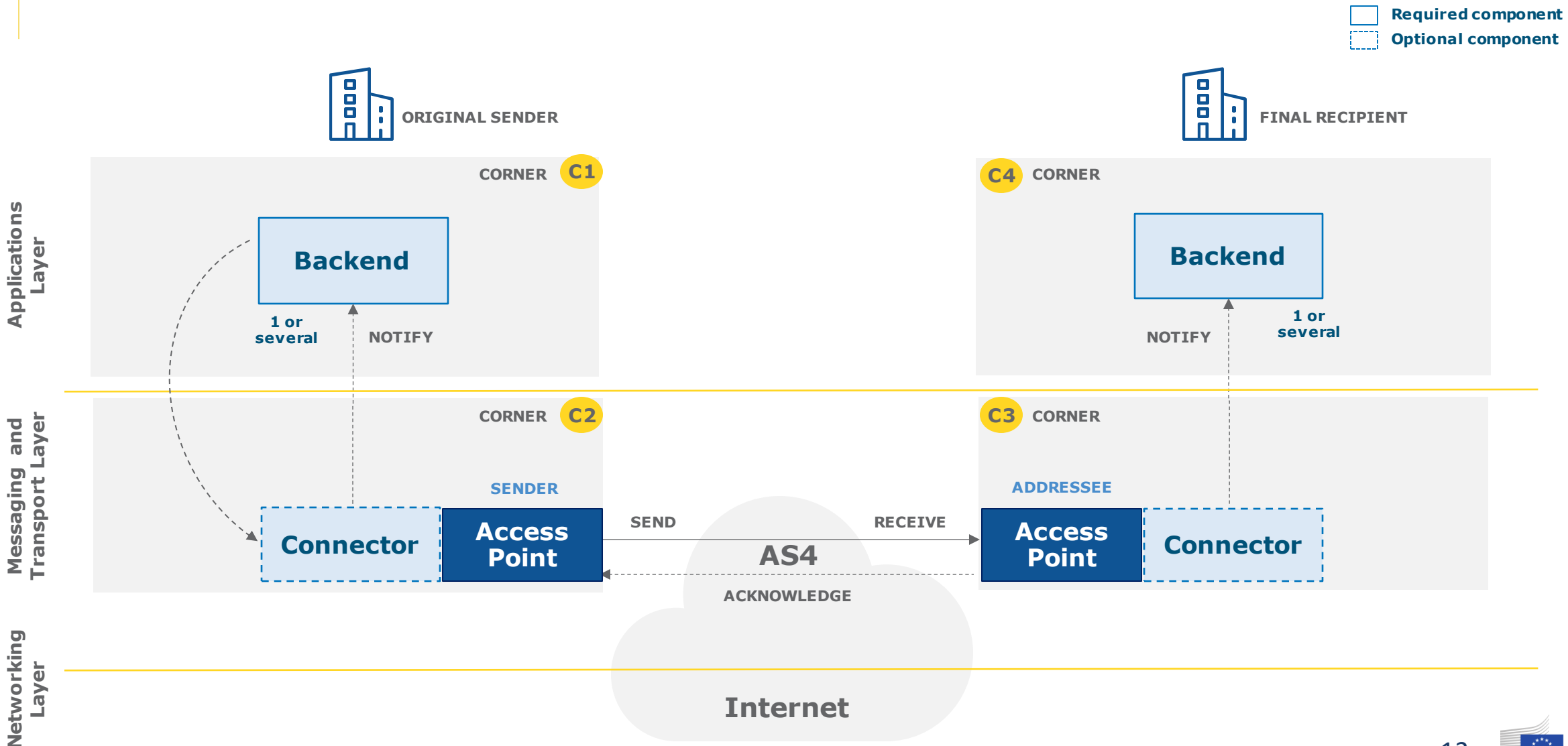
INVOICE *with*

eInvoicing

TRANSLATE *with*

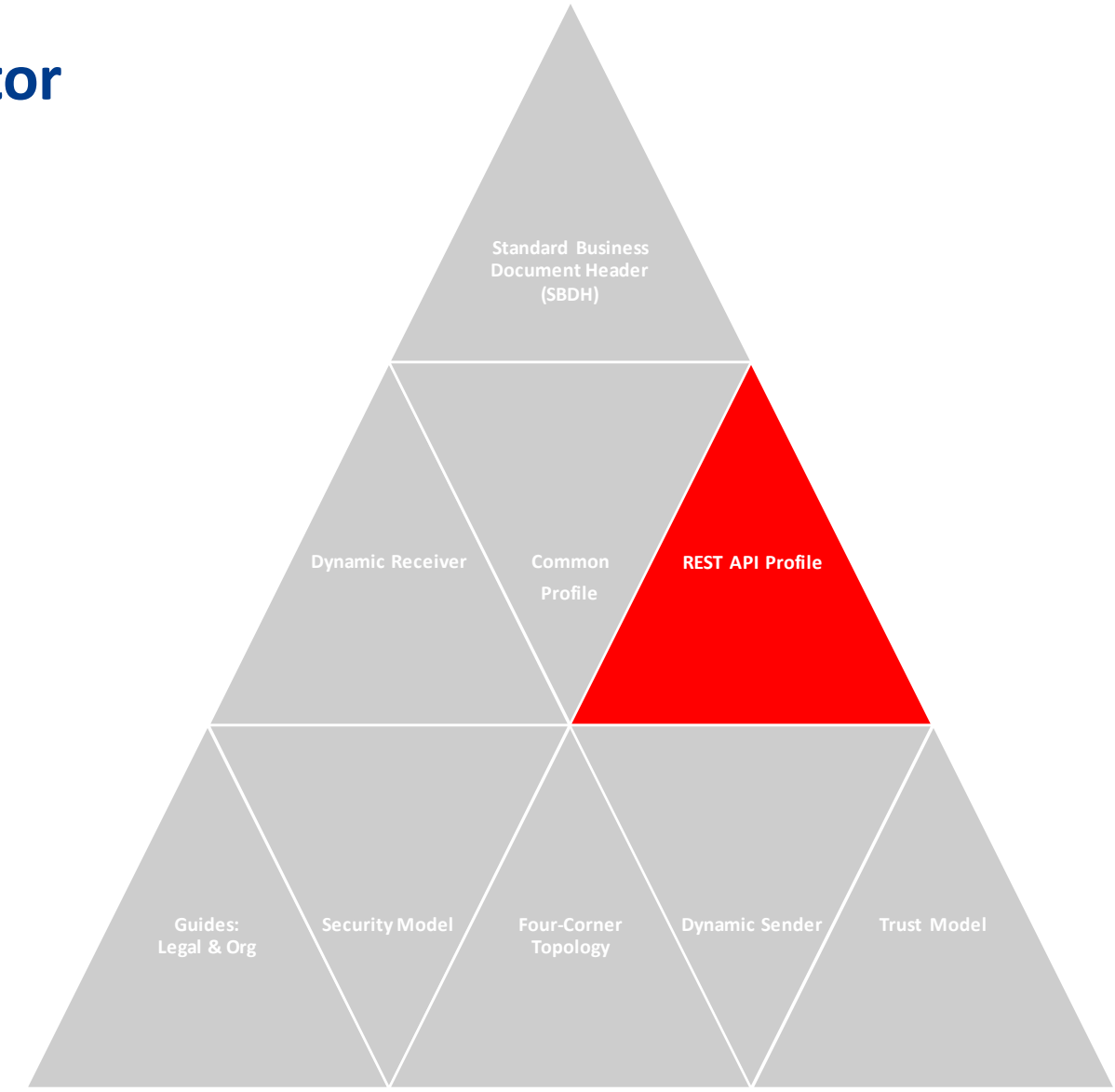
eTranslation

eDelivery Four-Corner Model



A REST API profile for the public sector

- How could we expand the eDelivery concept to enable additional **communication patterns** using **REST APIs**?
- Which technological choices can be agreed **across business domains**, to arrive at interoperable, secure, reliable and trusted APIs?
- Goal: Introduce a REST API profile as a **new profile** that enriches the eDelivery building block with new patterns of data access and data sharing.



The eDelivery AS4 Profile

Server 2 server

Message exchange optimized for large volume of messages, large message size, large number of concurrent users

Secure delivery

By enforcing payload encryption and party identification with digital certificates

Reliable and non-repudiable delivery

By defining several retry strategies and mandating a signed receipt

Enterprise

It supports enterprise environments and service oriented architectures

Business-agnostic

It can transfer any payload

SOAP and WS-Security

AS4, which eDelivery profiles, is SOAP and WS-Security.

It is a SOAP API, bringing the web to EDI.

The REST API profile should respond to different needs

Light context

The REST API profile should primarily address **different architectures** and **communication patterns** than those already supported by the eDelivery AS4 profile.

The profile is applicable to projects where at least one party to the data exchange would operate in a **light context.**

Organisational

Insufficient resources to cover installation and maintenance

Hardware and IT infrastructure

Scarcity of CPU, memory, storage, physical security or (electrical) power, etc.

"Low throughput" scenarios

One side to the communication is a single individual rather than an organisation.

Sandbox environments

At least one of the parties can only run as an HTTP client.

Putting it all together

The new profile would aim to bring **new technological options to the eDelivery** building block while maintaining the eDelivery goals of:

Standardised data exchange

Business-agnostic data exchange

Secure data exchange

The new specification would enable the implementation of eDelivery-compliant data exchange **benefiting** from:

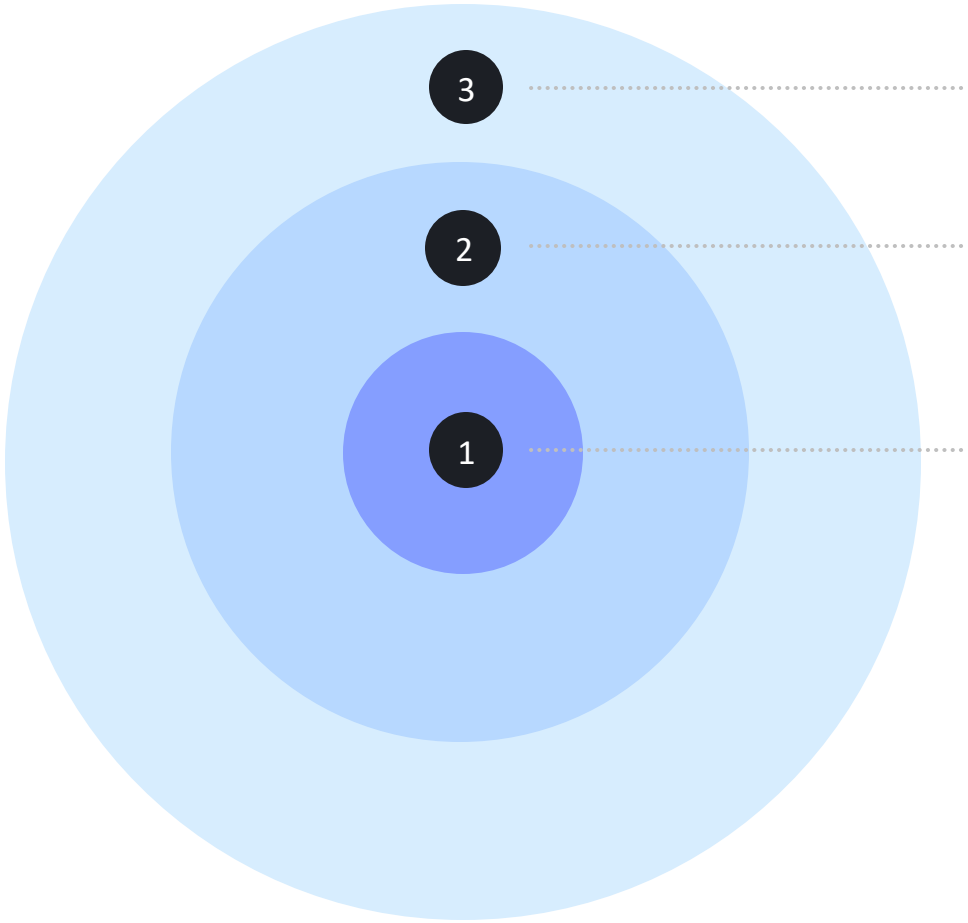
✓ **Ease of deployment / installation**

✓ **Economy of resources on the client side**

✓ **Operation on mobile / personal environments**

✓ **Updated options for the data exchange patterns**

Structure of the ISA² IPS REST API profile



Messaging API Specification

Level 2: OpenAPI Specification v3 Profile

Level 1: Core Profile

Profile enhancement

- ✓ High security enhancement
- ✓ Discoverability enhancement
- ✓ Reliability enhancement

Level 1: Core Profile

Overview

- ✓ Authentication and Authorization (OAuth 2.0, OpenID Connect)
- ✓ Security (transport, message, payload)
- ✓ Lifecycle management (versioning, backward compatibility, deprecation, sunset)
- ✓ Common semantics (vocabularies, use of HTTP verbs and status codes, common resource patterns)
- ✓ Documentation
- ✓ Discoverability

Level 1: Core Profile

Lifecycle management

- ✓ Versioning & backward compatibility guidelines
- ✓ Specific HTTP headers (Deprecation Response Header Internet-Draft and Sunset HTTP Response Header)
- ✓ OpenAPI specification property extension for capturing lifecycle events

```
OpenAPI:
  ...
  info:
    ...
    x-edel-lifecycle:
        maturity: "deprecated"
        deprecated_at: 2020-12-01
        sunset_at: 2021-01-01
```

Level 1: Core Profile

Discoverability

- ✓ Provide the proper mechanisms to become discoverable both in terms of its structure and operations
- ✓ To facilitate Discoverability the API MUST:
  - ✓ Have a complete OpenAPI v3 document accessible at its base URL
  - ✓ Include information in the **`servers`** property of the OpenAPI document (all the known deployed instances)
  - ✓ Use OpenAPI info attribute extensions as defined in the profile (e.g., **`info.x-edel-publisher`**, **`info.x-edel-lifecycle`**) that can be used as metadata by repositories

Level 2: OpenAPI Specification v3 Profile

Versioning and Lifecycle

Ruleset

- ✓ **Versioning:** `info.version` MUST be present and follow the semantic version formatting of `Major.Minor.Patch`
- ✓ **Lifecycle:** **info.x-edel-lifecycle MUST** be present denoting the current maturity of the API.
- ✓ **URL Versioning:** The **servers.url MUST** be present, declared in HTTPS and providing a base URL with the MAJOR Version Present

Correct Example

```
info:
  title: Example API
  description: Correct API example
  version: v1.5.10
  x-edel-lifecycle: deprecated
  deprecated_at: 2021-03-01
servers
  - url: https://ex.org/api/v1
```

Incorrect Example

```
info:
  title: Example API
  description: Incorrect API example
  version : v1.0-345-b

servers
  - url: http://ex.org/api/v1.3.4
```

Messaging API Specification

Overview

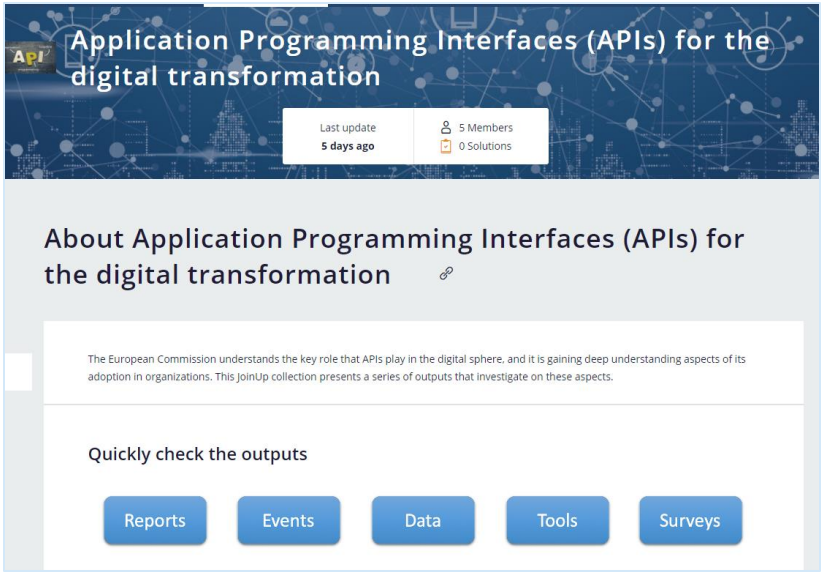
- ✓ The Messaging API Specification defines a way to securely and reliably exchanging multi-payload, payload-agnostic, messages between two parties.
- ✓ It takes into account the **light context** constraints, e.g. the client is not trusted.
- ✓ Supports commonly defined Message Exchange Patterns
- ✓ Follows the Core API specification
  - ✓ Use of delegated Authentication and Authorization
  - ✓ Message Level Security using JAdES
  - ✓ Documented Using OpenAPI Document
  - ✓ Error Signals using Problem+JSON and HTTP Codes

Messaging API Specification

Messaging Endpoints

- ✓ Message Submission
  POST /{service}/{action}/{mId}
- ✓ Message Submission with synchronous Response
  POST /{service}/{action}/{mId}/sync
- ✓ Response Message Submission
  POST /{service}/{action}/{mId}/response/{rService}/{rAction}/{rMid}
- ✓ Message Reference Pull
  GET /{service}/{action}
- ✓ Message Pull
  GET /{service}/{action}/{mId}
- ✓ Response Message Reference Pull
  GET /{service}/{action}/response/{rService}/{rAction}
- ✓ Response Message Pull
  GET /{service}/{action}/response/{rService}/{rAction}/{rMid}

API4DT joinup collection – stay tuned!



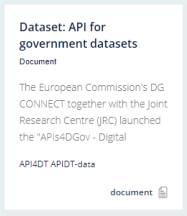
Join our community and stay tuned:

https://joinup.ec.europa.eu/collection/api4dt

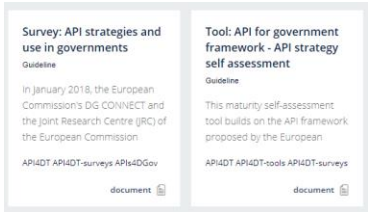
Contact us directly jrc-apis4dgov@ec.europa.eu

REPORTS

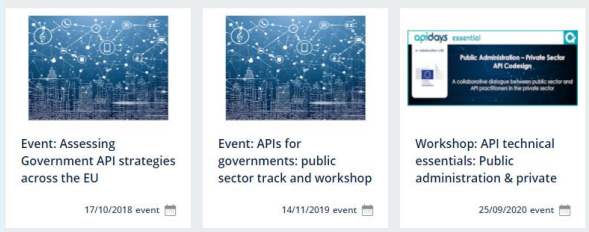
DATASETs



TOOLS & SURVEYS



EVENTS



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Thank you!

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