VAT scheme for SME partial solution v.1.0

APIs comparison

EUROPEAN COMMISSION DIGIT D2

Directorate-General for Informatics (DIGIT)

Project Officer: Dr. Raul Abril

APIs comparison

SPECIFICATION	EIF PRINCIPLES SETTING THE CONTEXT FOR EU ACTIONS ON INTEROPERABILITY	EIF CORE INTEROPERABILITY PRINCIPLES	EIF PRINCIPLES RELATED TO GENERIC USER NEEDS AND EXPECTATIONS	EIF FOUNDATION PRINCIPLES FOR COOPERATION AMONG PUBLIC ADMINISTRATIONS	EIF INTEROPERABILITY LAYERS
SOAP • *Language and platform agnostic* • *Bound to a variety of transport protocol* • *Built-in error handling* • *Security extensions*	The specification is used by several European initiatives to provide API service. However, the specification is becoming outdated as the IT technologies and services are moving forwards to approaches more related to implementation of REST and GraphQL	SOAP is independent of any specific technology and/or platform and is designed to foster data portability between systems and applications. The specification is publicly available for implementation and use for free on W3C's webpage and is a business domain agonistic specification	The specification can help to implement the OOP. However, there are no specific disclosures regarding multilingualism, privacy or security. Additionally, approaches on Service Oriented Architectures (SOA) are changing and going towards microservices (specific and encapsulated between them). This goes in favor of other technologies such as REST, OData and GraphQL.	The specification supports the creation, maintenance and delivery of DPS. This is a key aspect for reducing administrative burden, by reusing data and removing physical and digital barriers. In terms of efficiency and effectiveness, the specification is used in several cross-border projects. However, again the new approach of SOA is limiting the scope or outcomes of implementing SOAP.	Even though, the specification can impact the different IoP layers positively as the other specifications (compared) do, a key aspect is SOA and the new approaches towards microservices.
ODATA • *Based on REST architecture. Supports HTTP, Atom Pub, JSON* • *No need for proxy service object* • *Lightweight; fast interaction between server and client*	It has been recommended by different MS, because its open approach and the capacity to reuse data. However, there was no cross-border initiative implementing it	OData increases the shared value of data. Apart from being used by a large community of users, OData services use a common data model, which allows any client to interact with the service in a well-defined way. As an example, all open data portals in the EU using the Windows Azure server have implemented OData in their server clients. However, as other protocols, OData is tied up to RESTful APIs communication. RESTful APIs may be platform-agnostic or platform/technology-dependent, implying dependency on the environment or programming language being used. This might hamper interoperability depending on the use case	The specification does not focus/provide inputs on multilingualism. Nonetheless, the specification addresses security and privacy as protocol for data exchange, ensuring its secure and trustworthy exchange.	The specification, as a protocol for querying, the spec can help and enforce the provision of digital public services, removing barriers and simplifying	**Semantic Interoperability OData promotes the sharing of data and results, and is actively accelerating its use in different domains, particularly within government agencies. In this sense, the specification encourages both the creation of communities and the sharing of their data and results on national platforms. **Organisational interoperability: By allowing a comprehensive, coordinated and secured, OData can impact positively the organizational interoperability
REST • *Decoupled client and server* • *Discoverability* • *Cache friendly. Reuse of HTTP tools.* • *Multiple formats support*	The specification is used by several cross-border initiatives to present and provide API services.	Being an architectural style, REST is compatible with any software and can be implemented in any platform as long as their constraints are followed, moreover, one of its most significant properties is its scalability and modifiability of components to meet changing needs. Being a software architectural style based on http methods, REST principles can be applied in any case, and therefore, is a resource not subject to royalties or any kind of proprietary restrictions.	Security can be added on top of the web services as part of the "layered system" architectural constraint, separating business logic from security logic. Adding security as a separate layer enforces security policies.	REST highly supports the digital transformation of public administrations through the implementation of DPS. In addition, it is relevant to remark that REST is one of the widest-used architectural style for client-server applications	**Organisational interoperability: REST can impact positively in the creation of organisational interoperability agreements
GRAPHQL • *Typed schema* • *Good fit of graph-like data* • *No versioning* • *Use of a single evolving version* • *Detailed error messages* • *Flexible permissions*	The specification is being included gradually to the public digital services according to the potential that it presents. Nonetheless, it is widely implemented on front-end solutions for fetching data. A huge and relevant amount of implementations endorse its use and implementation.	GraphQL is an open-source query language, it is developed by its own working group. GraphQL can be used as a single endpoint for retrieving data from different sources. The query language as already mentioned, is open and technology and platform-agnostic. There are an increasing number of tools for managing the implementation of GraphQL interfaces. Since it is a generic and flexible engine that defines a schema syntax, query syntax, and query execution is business agnostic ensuring its reusability in any domain that requires the implementation of its functionalities.	The user dimension of GraphQL is complex in terms of data query services, GraphQL has been used in the SmartM2M and European Student Card11 initiatives as an enabler to facilitate mapping capabilities and interworking among different applications and servers. The specification aggregates data from multiple UI components in order to not repeat code or queries to get the desired data. Furthermore, GraphQL includes reusable units called fragments which let you construct sets of fields, and then include them in queries where you need to. The specification explicitly details the use of HTTP protocol, ensuring the security of its methods. GraphQL also provides some guidelines to how to make the specification more secure. It ensures the secure exchange of data as it realizes queries towards the API and it gets back secure information to be processed.	GraphQL can simplify the delivery of European public services. A clear example of its applicability is the SmartM2M initiative and the TestBed14 adaptation service to validate GraphQL queries against GraphQL schemas. With the aim of expanding its use, TestBed offers support for projects using GraphQL by launching a new GraphQL validator, which is totally based on the GraphQL reference implementation and expects as input the query to validate as well as the target schema. The GraphQL specification preserves the information as long as the user maintain the API where the information is maintained. If it gets deleted so will the data in it. GraphQL clients can use HTTP caching to easily avoid refetching resources, and for identifying when two resources are the same.	**Organisational interoperability: The specification actively promotes and supports comprehensibility of data models, easing the modelling of business processes. With GraphQL, the business domain can be modelled as a graph by defining a schema; within the schema, it defines different types of nodes and how they connect/relate to one another. **Legal interoperability: Even though the specification is not a European Standard, its adoption and implementation are increasing as well as the tooling ecosystem, making it a good resource to ensure cooperation while ensuring legal compliance.

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DIGIT-INTEROPERABILITY@ec.europa.eu

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