Towards the e-Infrastructure Commons 2020:

A marketplace for e-Infrastructure services

A concrete step towards e-Infrastructure services integration

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The term e-Infrastructure Commons as introduced in the e-IRG documents[1] refers to an ecosystem of interoperable and gradually integrated services easily accessible for use through a single interface for European academia, research and scientific communities. The e-Infrastructure Commons should thus become by 2020 a one-stop-shop service for European researchers, being able to select not only research e-Infrastructure services, but also industrial ones, especially such as computing and storage ones.

In order to achieve this ambitious goal, a concrete step would be to create a marketplace of e-Infrastructure services, i.e. a central marketplace where basic e-Infrastructure services from the networking, computing and data components would become available for European users through a common authentication and authorization scheme. Examples of such marketplaces are the UK Gov Digital Marketplace https://www.digitalmarketplace.service.gov.uk/ that replaces the CloudStore and that includes the G-Cloud services, as well as the recently announced Microsoft Azure Marketplace https://azure.microsoft.com/en-us/marketplace/ that includes not only Microsoft-certified computing, web, storage and data products but also open-source ones and provides a nice view of how services can be visualised.

The basic features and components of an e-Infrastructure services marketplace are the following:

- A **single point** where e-Infrastructure services will be visualized and will be easily accessible for users, who can register for specific services of their interest.
- Use of a common **identity, authentication and authorisation,** supporting eduGAIN and STORK federated access. The marketplace can allow the use of guest identities and alternative methods of identification (e.g. social media identities) in order to allow public access at large.
- A **catalogue** of all services, with metadata for each service based on a common agreed metadata schema, providing a central point for registering all the services that will be available on the platform. The catalogue will support the definition of **compliance profiles for providers and services**, which can include legal, technical and operational requirements.
- A **search** facility for easily finding relevant services.
- The marketplace will include both **research** e-Infrastructure services starting from the ones from major e-Infrastructures initiatives and **industrial** ones. Foundation e-Infrastructure initiatives include the GÉANT association, EGI and PRACE, EUDAT and OpenAIRE, while industrial ones may include Cloud or storage services such as Amazon, Azure, Dropbox, Google, etc.
- Research e-Infrastructure services may be **free of charge** for end-users, while commercial ones will **come with a fee**. Different **business models** will be tested, from individual researchers paying for commercial services to institutes buying wholesale services issuing tokens to their users or even entities acting as brokers aggregating and serving the demand.
- In order payments to be able to be supported, a **payment framework** may need to be developed, especially for the more complex business models, being able to collect payments among parties and issue invoices.
- Finally, the services need to be bound to a certain minimum level, based on **Service Level Agreements**, where parameters such as the availability, reliability and performance will be

[1] e-IRG Roadmap 2012 http://e-irg.eu/documents/10920/12353/e-irg_roadmap_2012-final.pdf and e-IRG White Paper 2013 http://e-irg.eu/documents/10920/11274/e-irg_white_paper_2013_-_final_version.pdf

recorded, monitored and published every month. The users should be able to monitor the level of service they receive and that it is inside the boundaries of their SLA.

Some first ideas on the technical architecture and advanced features are given below.

(A) The basic technical architecture should be based on an **open modular services framework**, offering a **multi-purpose** interface towards users and service providers., Service providers will be able to add services to the marketplace through a standard (or de-facto standard) interface (if available) or after appropriate adaptation.

1. **Open API** for the service providers to register and manage their services on the market place
2. **Open platform** (non-proprietary), so that any service can be adapted to the given interface
3. **Modular**, so that new functionality can be easily added or swapped
4. **Horizontally-scalable architecture**, so that it can handle large number of entities (service providers, services and users)

(B) Other features that may be considered in the future or can be added gradually are:

1. **Multi-lingual** user interfaces or possible translation widgets
2. On-line **accounting**, **analytics** and **visual monitoring** of the services
3. Named **rating** of the services (e.g. anonymous may not be allowed)
4. **Social media features** (e.g. "share this", "like" or "comment" buttons to social media outlets) or **infographics** on the use of the services
5. Besides the standard EU marketplace, **national or regional views** or linked national-regional instances of the marketplace can be implemented (multi-purpose capability), featuring a sub-set of the EU services, possibly based on national laws and restrictions on commercial services, with additional national or regional services (extra services available only at the national or regional levels).

The e-Infrastructure services ecosystem should be gradually built, in a multi-phased approach. Indicative phases include:

- A first version of the marketplace with basic underlying technologies developed in place and basic services features
- A second version of the marketplace, taking into account users' feedback and further users' requirements analysis for new services
- A full-featured version of the marketplace towards 2020

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