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Correlation with other documents within the project

- D8.4 Business Plan Draft
- D8.5 Business Plan Final
- D3.2 Data services design report

Summary

The deliverable at hand is the **re-submission of D8.2 Exploitation Plan final**, including a more focused analysis on the exploitation scenarios, and the activities to be undertaken to achieve the ones identified as more likely and suitable.

The relevant **background** of this document includes a review of the PSI-related policy, and reuse business models, documented in D8.1; a better acknowledgement of our positioning, also in light of a comparison with three other platforms (Socrata OD portal, CKAN, ENGAGE); the Open-DAI potential business logic; some lessons-learned from hackathons and the like.

As far as exploitation scenarios are concerned, two complementary ones are finally assumed to be the ones that will be actually implemented: the release of Open-DAI as **Open Source software**; and a **market exploitation** based on services around Open-DAI, by CSI Piemonte and Sampas (amongst the project partners), with the public administrations that participate as partners as the first potential adopters.

A **roadmap** to achieve a reasonable level of exploitation for the project, including specific actions and responsibilities, is presented. The plan encompasses a baseline set of activities (Open-DAI public release and documentation) and more specific exploitation actions ('G2G' and towards developers).

Individual plans, as complementary to the overall exploitation plan, including reference to the service pilots, are also discussed. CSI Piemonte, and probably Sampas, are going to propose market offerings designed around Open-DAI. The Public Administrations participating in the project are interested in evaluating them, and will arguably be able to maintain the service pilots even beyond the project life-cycle (with the exception of Barcelona, with an internal discussion still ongoing).

Background

During the 1st year review of the Open-DAI project, it was asked by the Project Officer to re-submit D8.2 Exploitation plan final by the next review, so to provide a more focused analysis on the **exploitation scenarios**, and the activities to be undertaken to achieve the ones identified as more likely and suitable. The deliverable at hand is the updated D8.2, and includes a more specific discussion on future scenarios, a general exploitation plan, and indication on individual exploitation plans (if any) by the project partners.

The activities and analysis so far performed within WP8 can be summarised as follows:

- a review of the **PSI-related policy** (and underlying research), at European and national levels, as well as emerging **reuse business models**, documented in D8.1;

- as far as Open-DAI is concerned, and especially within the second year of the project:

  ○ a **better acknowledgement of our positioning**, e.g. with respect to other platforms, has been reached. In fact, Open-DAI can be conceived as a 'bus' that, by federating governmental data repository, breaks silos existing among governmental agencies making data available for a twofold goal: on one hand, Open-DAI becomes a propellant for a fluid flow of data (even in case of confidential data not bound to be published) among public bodies and, on the other hand, allows the exposure of Open Government Data to the outside world. The process under which data are extracted from legacy DBs is arguably one of the distinctive features of Open-DAI. In fact, others, such as Socrata OD Portal, CKAN and ENGAGE, enable data exposure in a 'push' mode, i.e. using "publish" APIs. Open-DAI is not designed to encompass any full-fledged user-friendly interface, and its integration with a front-end is arguably one of its most promising exploitation opportunities[1];

  ○ a more advanced awareness of the Open-DAI potential **business logic**, discussed in D8.4 Business plan final (useful also for the elaboration of individual exploitation plans, as briefly presented in page 11 and ff.). Possible sources of revenue are identified as being mainly related with (i) start-up and integration of the platform, and (ii) supply of Open-DAI as a service (with reusers served in a "freemium" mode. Realistic cost and demand scenarios make Open-DAI economically sustainable even at the level of a single European country and with a single software maintainer. In any case, the incentive to offer Open-DAI to public administrations, even if barely reaching break-even, would be strong;

  ○ actual interactions with **interested parties,** especially local public administrations (in particular as an initiative of CSI Piemonte);

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[1]   A comparison between Open-DAI and three other existing open data platforms is formalised in Iemma, R., Morando, F. and Osella, M., "Breaking public administrations' data silos. The case of Open-DAI, and a comparison between open data platforms.", accepted for presentation at the CeDEM Conference 2014. The table is attached to the deliverable at hand (Annex I, page 20).

- ○ 'hands-on' workshops and **hackathons** (organised by POLITO[2], IMIAL[3] and Netport[4]) showed significant potential for Open-DAI[5], but also that thoroughly exposing and documenting its APIs, as well as further experimenting reuses of real time data exposure, is particularly important for our exploitation ambitions.

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[2]   http://nexa.polito.it/lunch-13

[3]   http://bcn.gdgdevfest.com/hackathon/; http://www.gdglleida.com/2013/10/hackathon-open-data-open-dai-de-la.htm

[4]   http://wiki.opendataday.org/Karlshamn2013

[5]   2 developments in Nexa &PoliTO hackathon in Turin-IT (Jul 2013); 3 developments (Power, Beer Round, ninjapi) in Netport/ Karlshamn –SW (Feb 2013); 7 apps were developed in DevFest in Barcelona-SP (Nov 2013): 4 apps /web mashups were developed in Open-DAI Hackaton in Lleida-SP (Nov 2013). Being their quality a "hackathon" level, some of these apps were not officially published.

Exploitation scenarios

In the first version of the deliverable at hand, four exploitation scenarios were presented (see Annex 2, page 25, for the complete discussions). In Table 1, we shortly update this review, by highlighting whether the main requirements for each scenario to apply have been fulfilled in the meantime, and whether the likeliness for each scenario to occur has changed.

	1 – Partial reuse of components	2 – Open Source platform	3 – Data cloud standard offering	4 – Market exploitation
Opportunity	Easily achievable.	Decent exploitation.	Open-DAI as a benchmark.	
Critical issue	Sub-optimal.	Long-term sustainability.	Applicability to PP standards, and competition.	Potential conflict with scenario 3; underestimation of the overall social value of the 'data cloud' model.
Requirement (as of M13)	Achieve DoW.	Willingness of at least one partner.	PP call issued by GPO.	Interest of at least one partner.
Requirement fulfilled yet? (as of M25)	Yes.	CSI is willing to maintain, use, and release Open-DAI in its latest version in a GitHub repository.	No.	Yes.
Likeliness (as of M13)	Low.	Fair.	Low.	Fair.
Likeliness (as of M25)	Low.	High.	Low (but to be further assessed, with potential opportunities).	High.

Table 1: Exploitation scenarios (updated)

It emerges that **scenario 2** is reasonably feasible: Open-DAI will be maintained, used, and released in its latest version in a GitHub repository. Scenario 3 is possibly granting a higher chance of internalising externalities deriving from a standardised adoption of Open-DAI. However, it is weak in terms of its autonomy from decisions of external stakeholders. Discussion on this scenario did not progress during Year 2, mainly because of the ongoing reorganisation

of DigitPA[6] (one of the key partners that could contribute in the achievement of this scenario). However, the participation in the project of Agenzia per l'Italia Digitale (as already indicated at Year2 start time, and in the recent DoW amendment) might set the stage for interesting developments in this respect (as specific action is foreseen in the exploitation roadmap to further assess scenario 3 feasibility). Finally, the **market exploitation** by some of the partners, e.g. interested in providing services around Open-DAI, is also to be considered as **arguably likely,** with CSI Piemonte (and probably also Sampas) formulating market offers, initially addressed to the project members (see section "**Errore. L'origine riferimento non è stata trovata.**", from page **Errore. Il segnalibro non è definito.**).

The Open-DAI consortium also extensively discussed the potential role of Open-DAI pilots in the exploitation scenarios for Open-DAI. To date, CSI Piemonte and Sampas acknowledged the fact that when a new customer adopts Open-DAI as a platform it also becomes a potential customer of value added services based on the data exposed as services through Open-DAI, however this opportunity seems too uncertain and undefined to consider it in the commercial offers concerning Open-DAI as a platform. That said, this kind of positive externality –i.e., the possibility of selling Open-DAI based value added services/applications– is an additional reason concurring to the sustainability of maintaining Open-DAI as an open source platform.

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[6]   DigitPA has been transformed into Agenzia Digitale by the Italian government; since DigitPA was involved also in other European projects their juridical status change has been recorded in the European commission systems at central level and this has been reflected in Open-DAI project without affecting the project work estimates and funding.

Overall exploitation plan

The Open-DAI exploitation plan, mainly related with the aforementioned scenario 2 ('Open Source platform') aims at maximising the impact of the project, i.e., reaching a reasonable level of awareness amongst civil servants, developers and practitioners, and fully enable future adoptions. To draft this plan, we considered as starting points:

- the current (and future) release of the Open-DAI platform, as indicated at http://open-dai.eu/?page_id=98 and hosted at https://github.com/open-dai;
- the current version of the Open-DAI pilots (as in the "Pilots" section of the project website, and in the GitHub repository above);
- the API documentation to be released by WP6.

The items presented in Table 2: Exploitation plan are not additional deliverables, but instead internal milestones and action whose results will be reported in the Exploitation report final, to be delivered in M32.

We identify three complementary sets of activities to be completed between M25 (March 2014) and M32 (September 2014).

The first one (whose sub-tasks are labelled as "1.X" in Table 2) is to be considered as "exploitation-oriented" support to the work of WP6.

The second set of activities (whose sub-tasks are labelled as "2.X" in Table 2) more specifically relates with an actual exploitation, and entails a cooperation with WP7 – as far as 'G2G' opportunities of dissemination are concerned – and WP6 – e.g., in conceptual support to hackathons and 'hands-on' workshops, so that archetipal use cases of Open-DAI are well taken into account.

The third set of activities (whose sub-tasks are labelled as "2.X" in Table 2) is related with the assessment of the aforementioned scenarios 2 and 3.

ID	Through	Action	Description	Dependency	In charge	Other
1.1	M30 (internal draft) – M32 (final version)	Exploitation-driven documentation	User-friendly and exploitation-driven documentation, e.g. identifying specific user needs and how Open-DAI addresses them.	Documentation released by WP6 (T6.1, M30)	POLITO	SAMPAS (as WP6 leader)
1.2	M30	Usability test	A test is performed to verify that basic requirements in terms of clarity, usability and exhaustiveness of documentation are fulfilled (and to suggest improvements for the final release).	Documentation released by WP6	POLITO	CSI

ID	Through	Action	Description	Dependency	In charge	Other
2.1	M28 - M32	G2G networking	Identification of, and participation in one or more G2G events that are particularly meaningful for exploitation opportunities.		POLITO	ALL
2.2	M27 - M32	Contact list	A form is made available on the project website so that interested parties can provide us with their contact details and receive updates (e.g., documentation released; presentation events).		POLITO	NETPORT
2.3	M29	Open-DAI use cases	Identification of Open-DAI archetipal use cases.		POLITO	
2.4	M28 - M32	Exploitation-oriented requirements for hackathons	Ex-ante preparation and ex-post analysis of project hackathons (WP6) consistently with the Open-DAI use cases identified in point 2.3		POLITO / CSI	NETPORT / LLEIDA / BDIGITAL / SAMPAS
2.5	M29 (draft) – M32 (final)	Open-DAI benchmarking	Benchmarking analysis with similar solutions to highlight the more relevant profiles of potential adopters.		POLITO	CSI
3.1	M29	Scenario 3 assessment	Internal call to discuss Scenario 3 feasibility (and further steps to undertake)		POLITO	DIGITPA, CSI, SAMPAS
3.2	M32	Final release preparation	Interaction with CSI Piemonte and Sampas to gather further information about their expected contribution to the Open-DAI open-source community.		POLITO	DIGITPA, CSI, SAMPAS
4.1	M32	Exploitation report	Review of the activities performed, and related impact assessment, including the results of 1.2, 2.3, 2.5, 3.1, 3.2.		POLITO	ALL

Table 2: Exploitation plan

Individual exploitation plans

This section shortly describes the current individual exploitation plans by the Open-DAI partners, which mainly relate with the aforementioned scenario 4 ('Market exploitation').

CSI Piemonte

Description

CSI Piemonte aims at becoming the supplier of specific services around Open-DAI, offered as a SAAS services, mainly addressed to public administrations (some of which already served by CSI Piemonte) interested in using it within their open data pipeline.

In a nutshell, the market offering from CSI Piemonte to public administration will encompass:

- a subscription fee (*una tantum*), to cover fixed costs related with the supply of the service;
- annual usage fees depending on the number of API calls by the user (typically, having to chose between 2 or 3 combinations);
- add-ons.

Ongoing contacts

- Partners in Open-DAI: Regione Piemonte, Lleida / Barcelona, Karlshamn Municipality.
- Other public administrations (including some PA already using the open data portal behind dati.piemonte.it and managed by CSI Piemonte): Emilia-Romagna Region; Sicilia Region; Alessandria Municipality; Milan Municipality.
- Others: University of Turin, in the framework of a forthcoming hackathon.

Expected impact

Market positioning as suppliers of an open data solution "powered" by Open-DAI in Italy (and possibly in other countries).

Main actions to be undertaken

Commercial exploitation of the knowledge and skills developed within the project.

Regione Piemonte

Description

Interested in evaluating the commercial offer by CSI Piemonte.

Ongoing contacts

- Partners in Open-DAI: CSI Piemonte.

Expected impact

Adopting Open-DAI as Open Data services platform and back end of the regional open data portal dati.piemonte.it

Main actions to be undertaken

Cost / benefit analysis.

Pilot service(s)

It is planned to maintain it/them beyond the Open-DAI life-cycle as a funded project.

The Piedmont Region pilot corresponding to the accident collection smartphone application (*Accident*) has been already adopted and evolved by a private company (as the project released the source code with a permissive BSD open source license).

Sampas

Description

Metropolitan and other municipalities in Turkey are Sampas' targeted adopters. Sampas' target of a commercial offer around Open-DAI is the more than 400 municipalities already served, including Ordu.

In this respect, two options are currently under scrutiny, the first one being providing the Open-DAI platorm and service development facilities 'on premise', and the second one being providing the use of Open-DAI as SaaS, including service development facilities also in this case.

Ongoing contacts

A share of the Turkish public administrations already served by Sampas.

Expected impact

Market positioning as suppliers of an open data solution "powered" by Open-DAI in Turkey (and possibly in other countries)..

Main actions to be undertaken

Commercial exploitation of the knowledge and skills developed within the project.

Ordu Municipality

Description

Interested in evaluating a commercial offer by Sampas.

Ongoing contacts

- Partners in Open-DAI: Sampas.

Expected impact

Adopting Open-DAI as tool within the municipal open data strategy.

Main actions to be undertaken

Cost / benefit analysis.

Pilot service(s)

It is planned to maintain it/them beyond the Open-DAI life-cycle as a funded project.

Bdigital / IMIBCN

Description

Several requests for open data from the private sector have been acknowledged. Therefore, IMBICN is considering, with the support of Bdigital, whether to adopt Open-DAI to fullfill these (and future) requests.

Ongoing contacts

- Partners in Open-DAI: CSI Piemonte; Sampas.

Expected impact

To be defined.

Main actions to be undertaken

Internal assessment of future exploitation strategy.

Pilot service(s)

Future maintenance framework still to be assessed. The Sports Department of the Barcelona Municipality would be the first potential adopter / maintainer, as pilot app owner, but no specific commitment has been formalised so far.

Lleida Municipality

Description

Interested in evaluating commercial offers by CSI Piemonte and Sampas. Moreover, the Lleida Municipality is focusing its exploitation plans on E-Accesible, a local crowdsourced project aimed at gathering information about physical accessibility to points of interest in Lleida. The crowdsourced info will come from a web-based form, available through an Android application. Information directly feeds a local database, connected to Open-DAI. The idea is therefore to supply developers with this data to enable services creation.

Ongoing contacts

- Partners in Open-DAI: CSI Piemonte; Sampas.

Expected impact

Adopting Open-DAI as tool within the municipal open data strategy.

Main actions to be undertaken

Cost / benefit analysis.

Pilot service(s)

It is planned to maintain it/them beyond the Open-DAI life-cycle as a funded project.

Netport / Karlshamn Municipality

Description

Interested in evaluating the commercial offer by CSI Piemonte.

Ongoing contacts

- Partners in Open-DAI: CSI Piemonte.

- Other public administations in the Region, potentially willing to use Open-DAI. On a national and regional level the interest in OpenDAI-like products and services ought to be of interest, since there is an ongoing discourse on open data and innovation in Sweden. On a local level, though, there is arguably a long way to go, even to start this discourse.

Expected impact

Adopting Open-DAI as a 'back-end' of the regional open data portal dati.piemonte.it

Main actions to be undertaken

Cost / benefit analysis.

Pilot service(s)

It is planned to maintain it/them beyond the Open-DAI life-cycle as a funded project.

Politecnico di Torino

Description

Exploiting Open-DAI as a relevant example for research- and policy-support oriented endeavours. (Possibly building on this technology for future pilot/research projects.)

Ongoing contacts

- Partners in Open-DAI: all.

- Open Data practitioners, researchers, and public administrations implementing an open data strategy.

Expected impact

Encompassing Open-DAI amongst the examples of open data platform, for research and policy support purposes.

Main actions to be undertaken

Comparative analysis between existing open data platforms, so to inform public debate on this subject, and support public administrations' choices in this respect.

Pilot service(s)

N/A.

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Annex 1 – Open data platforms benchmarking table

Requirement	Open-DAI	Socrata OD Portal	CKAN	ENGAGE
A1. Uses an automatic process to expose data stored in legacy databases.	Yes. The platform pulls data (virtually in real time) from legacy DBs, with standard connectors available (for most Dbs).	Automatable, using 'Publish' APIs made available to data holders.	Automatable, using 'Publish' APIs made available to data holders.	Automatable, using 'Publish' APIs made available to data holders.
A2. Uses APIs at the data level (e.g., transformations).	Yes (e.g., CSV to JSON), and data filtering.	Yes (e.g., CSV to JSON).	Yes, with its 'Data storer' plugin.	No.
A3. Promotes the use of standard metadata.	Under development, with the aim of following the same approach as CKAN in this respect.	Yes, in the 'Community' edition, using standard vocabularies such as DCAT (W3C).	Yes , using standard vocabularies such as DCAT (W3C).	Yes, three-layer metadata architecture: discovery (e.g., Dublin Core, eGMS, CKAN), context (e.g., CERIF), detail (i.e., subject-specific or topic-specific).

Requirement	Open-DAI	Socrata OD Portal	CKAN	ENGAGE
A4. Enables catalogue federation (with CKAN-API as de facto standard).	Not yet, ongoing development.	It allows federation, using CKAN metadata (but not the API) as a standard.	Yes (trivially).	Yes, using CKAN-API as standard.
A5. Allows to perform a data quality check (and related data refinement).	Not directly.	Not directly, but it enables quality check, e.g. identifying data types for values.	Not as embedded functionality, basic integration with OpenRefine through an extension.	Not as embedded functionality, but ENGAGE provides a strong integration with OpenRefine). Besides, data curation by the community is encouraged.
A6. Is designed to be integrated with (or includes) a front-end / open data portal.	Yes, i.e. it is planned to integrate Open-DAI as a back-end of the Open Data portal of the Piedmont Region.	Yes, but poorly customizable. Ongoing attempts by third parties, e.g. an integration point with Drupal is being developed , still in Alpha mode.	Yes. On top of the standard front-end, there are well experimented modules for Drupal and Wordpress.	Yes. A full-fledged front-end is included.

Requirement	Open-DAI	Socrata OD Portal	CKAN	ENGAGE
A7. Releases APIs to reuse data.	Yes, RESTful APIs.	Yes, RESTful APIs.	Yes, with its 'Data storer' plugin.	No. RESTful APIs are implemented only at metadata level.
A.8 Enables browsing at the data level.	Yes.	Yes.	Yes, with its 'Data storer' plugin.	Yes.
B1. Designed to expose Open Data.	Yes.	Yes.	Yes.	Yes.
B2. Designed to publish dynamic data.	Yes.	Yes.	No, only static files.	Yes.
B3. Designed to expose geo-referenceable data.	Yes.	Yes.	No, but allows to expose georeferenced metadata.	Yes.
B4. Designed to expose Linked Open Data (meaning at least RDF triple store+SPARQL endpoint+other features, e.g., ontology mapping).	Yes.	No. The 'Community edition' allows data exposure as RDF, but with no triple store, nor SPARQL endpoint.	No, just linked metadata.	Yes.

Requirement	Open-DAI	Socrata OD Portal	CKAN	ENGAGE
B5. Presents prototypes of data reuse.	Yes, e.g., Open-DAI pilot services.	Yes.	Yes, e.g., tabular previews.	Yes, derived datasets .
C1. Released as open-source software.	Yes.	Not the standard edition (Yes, in case of the 'Community Edition').	Yes.	Not yet. However, the consortium is inclined to release the basic engine under the MIT License.
C2. Available in a cloud environment.	Yes, at all levels of abstraction.	Yes, SaaS.	No.	Yes, SaaS.
C3. Available "on premise" by the data holder (i.e., as a DB independent from the provider's API).	Yes.	No.	Yes (but has a 'hosted' option).	Yes.
D1. Allows to gather feedback on data (also in terms of 'forked' datasets).	Yes, in the case of service pilots that enable data flow in both directions.	Yes, users can manipulate files and save their edits.	Yes (through the 'datahub.io' portal).	Yes. Derived datasets are welcome and are tracked by the system.

Requirement	Open-DAI	Socrata OD Portal	CKAN	ENGAGE
D2. Encompasses a ticketing system.	No.	No.	No.	Yes, the issue tracking system covers bug, license issues and general questions/suggestions. Moreover, users may place a new request for data not available on the portal.

Annex 2 – Exploitation plan 2 (excerpts from previous version)

Exploitation items

Open-DAI is producing different items to be exploited:

- datasets made available (as Open Data, when legally feasible) by the consortium members (PAs) and exposed via web services (WS or REST);

- the "Data Cloud" model, as explained in Deliverable D3.2;

- the pilots/services that the project is delivering, which can be easily portable to the objectives/needs of other PAs, by adapting them to their legacy DBs;

- Open-DAI as a platform.

Datasets / data services

The main aspects that will raise the chances of wide usage and adoption of the data sets that the PA will release within the project are:

- clearly defining and communicating the standard supply model that will be applied (e.g. terms of service, expected QoS), providing with reliable information about the frequency of update of the datasets;

- defining clear terms of reuse by adopting licensing schemes that states what end users can actually do with the datasets;

- identifying the data process owner, as a contact point for third-parties reusing the datasets.

In particular, the user-driven approach foreseen for WP6 will allow to specify and validate those items.

Addressing suitably those points will guarantee to end users that they can invest in developing services also in the medium and long run. A key issue is ensuring third parties that partner public administrations are using those datasets also for internal purposes and as the result of a strategic decision, rather than pointlessly following an "IT hype".

Datasets will be available both through the Open-DAI platform and in the Open Data portals established, run and maintained by public administrations (as in the case of the project partners Regione Piemonte and Barcelona municipality). Given the relatively broad awareness of users about the latter, this approach is supposed to enable a richer dissemination and raise the exploitation chances of Open-DAI.

On top of providing an EII, an additional benefit, which is admittedly "to be developed", concerns an increasing standardization of the way in which information is represented, i.e. the adoption of a standard record layout and possibly the use of standard ontologies/taxonomies/vocabularies. (As described in D3.2, this is easier and achievable as far as the description of the datasets is concerned, e.g. using standard vocabularies as Dublin Core, but it would be very valuable to

further standardize the representation of data themselves and across data providers.) During the second year of the Open-DAI project, the partners will explore this domain further, also looking for similar datasets which could be opened by more than one partner PA, in order to increase semantic interoperability (also see D3.2 § 3 Semantic Data Integration).

Data Cloud model

The cloud model proposed by the Open-DAI project is founded on the following principles/requirements:

- PAs have specific needs on data treatment that require particular approach;

- PAs need an environment suitable for deployment, rather than dedicated to development (as in a PaaS), since software development is not assumed to represent a typical activity for PAs;

- PAs need to rationalise and control their spending patterns on services supply;

- PAs need to monitor resource consumption and, accordingly, to periodically review the resource allocation;

- the cloud provider must not be able to access directly the data resources of PAs;

- it should be possible to externalize the environment, which could also be procured from the market (and, to do that, it is necessary to precisely state a set of requirements).

The Open-DAI data cloud model thus proposes an integrated architecture of components ready to both deliver and exploit services. PAs maintain the control over those components and over the resources allocated.

This approach grants a significant freedom in further development, still within the constraints of the adopted SOA, therefore preserving standards and interoperability between PAs.

Pilot/services

Pilot are designed to be reusable (both within an environment similar to Open-DAI or as reuse on premise by other PAs).

The fact that Open-DAI adopts EII tools enables to link the defined output from the pilots to a different legacy DB source with reasonable ease. This is particularly true, for instance, for the Air Quality pilot from Regione Piemonte, that produces an XML document that complies with a EU standard (so that also semantic interoperability at the level of data is easier to achieve).

Not all the project pilots build on standardized output, but this does not preclude usage 'as is' or with slight modifications by PAs willing to reuse them. The choice of the project to adopt open source tools (including the development on open platforms such as GitHub, at least in some cases, see D5.1 §7.1.1) actually increases such reuse potential.

Depending on the possible success of the single pilots these could raise to a proper open source managed solution and specific communities could be promoted. The development process itself can contribute to the evolution of the Open-DAI platform toward an open platform used by various communities, including independent (possibly open source) third party developers. For instance, the Karlshamn municipality pilot (and, possibly, other pilots) will be published to the developer community using the social developer network Github, so that it can

become an applied example of how to work with open frameworks and components when developing applications which are complementary to the Open-DAI platform.

Open-DAI platform

The Open-DAI platform itself can be exploited as a potential hub for further PAs willing to share datasets and services under the same paradigm. In fact, other PAs could adopt/join the cloud platform, enabling to increase the pan-European features of the cloud infrastructure.

To pursue this option, a need will emerge to carefully monitor resource usage and, more generally, to properly assess the cost model for the platform, including the additional cost for each new dataset published or service deployed.

Moreover, and even if the direct use of the Open-DAI platform is arguably the scenario providing the greatest benefits to PAs, Open-DAI as a service and its code can represent a reference standard implementation of a "data cloud" service. In other words, any PA wanting to procure services which are analogous to the ones offered by Open-DAI will be able to make reference to a standard open source project, with documented performances, capabilities and costs. This will benefit not only the PA directly using Open-DAI, but also those which prefer, for any reason, to acquire similar services from third parties.

Taxonomy of potentially interested stakeholders

The following target groups are identified as strategic for the exploitation of Open-DAI:

- the **Open-DAI partners** themselves, to the extent that:
  - ❍ public administrations will adopt a model allowing to make (former) information silos interoperable, more accessible for the public at large;
  - ❍ IT providers and in-house companies will develop a specific expertise in handling government data and related infrastructures, so to credibly be able to tackle similar needs also in the future.

- other **public administrations** that can access to data otherwise unreachable and, in general, adopt the solutions developed by Open-DAI, under the different scenarios illustrated in the following section;

- **central governments** or governmental agencies at national / local level, able to represent the interests of an adequate critical mass of PAs, so to perceive and internalise the overall value of increased interoperability, data exchange opportunities and standardisation amongst public administrations;

- **communities of developers**, potentially interested in further developing Open-DAI and/or in creating new services based on its infrastructure (e.g. using the Open-DAI pilots as benchmark); this aspect is particularly relevant for Scenarios 1 and 2, discussed in the following section;

- **private businesses** that can build on open datasets, and the Open-DAI platform itself, to create value-added services; for-profit users of the platform, and data markets integrating upstream with Open-DAI, are two relevant examples of that kind;

- **society at large**, benefiting from the availability of Open Government Data and related services.

Competition concerns

As discussed in detail in the Open-DAI business plan (see D8.4), the Open-DAI platform can be seen as a full fledged product with its own market. Even if no other product satisfy exactly the same needs, it is fair to argue that Open-DAI also has some competitors offering (imperfect) substitutes on the same or adjacent markets, e.g. the Seattle-based cloud software company Socrata, whose business focuses on helping PAs to "efficiently delivering data to citizens" and those customers include the World Bank and many US instituions (e.g. Medicare, Data.gov, New York City, Chicago, San Francisco). Moreover, several new and/or smaller companies are kick-starting projects in this domain (e.g. Evodevo s.r.l in Italy, which is currently offering http://www.opendataground.it).

It is therefore natural and appropriate to ask oneself which is the impact on competition of the EU funding of a project such as Open-DAI. (One could also argue that this question is solved by the fact that European funding schemes themselves embed competition policy concerns, for instance using competitive processes to allocate funding and/or requiring different levels of co-funding. This answer is arguably sufficient, but we think that additional and even more compelling considerations can be used to reach the same conclusion.)

The Open-DAI partners submit that competition concerns raised by public funding are greatly reduced, in not completely solved, by the decision of releasing the outputs of the Open-DAI project as open source software. Such a decision, which was already discussed as likely and potentially beneficial in the Description of Work, has been confirmed during various project meetings and is currently embedded as a standard feature in the Open-DAI exploitation documents, including the report at hand and the Open-DAI draft business plan (D8.4).

In fact, Open-DAI does not only intend to publish all the developed code as open source. Also the project deliverables are virtually all publicly accessible (at least in their final version), so that the blueprint for building and integrating the software components will be available, together with the raw code.

In conclusion, the only competitive advantage of Open-DAI partners over competitors in re-using the Open-DAI platform will consist in their intangible know-how and experience, but also this advantage is reduced by the fact that conveying as much of this know-how in the project deliverables will be one of the key factors of success of the Open-DAI project itself, therefore providing an incentive for the project partners to effectively make efforts in this direction.

At most, one could argue that the existence of public funding sustaining the development of an open source project has implications in terms of its licensing. For instance, Schmidt & Schnitzer (2003) conclude that "publicly-sponsored software should be put in the public domain or protected by liberal licenses such as BSD. Support for projects that are licensed under the GPL is unsuitable in this respect. Because of the viral nature of the GPL, proprietary software cannot use GPL software without turning itself into GPL software. This encourages the development of two incompatible networks with significant welfare losses for consumers." This recommendation is indeed consistent with the idea of providing a neutral and pre-competitive tool, available to all

market player on an equal basis. That said, the (legal) feasibility of a very liberal licensing of a project re-using other open source components should be carefully checked (about this, see "Licensing" box, p. 31).

One the same vein, one could also discuss the effect on competition of a general preference of PAs for open source solutions. Indeed, such a preference could also be part of some of the exploitation scenarios that will be discussed in the report at hand (see, in particular, Scenario 3 below). This choice, for instance, has been done by at least one Open-DAI partner, Regione Piemonte, through its Regional law n. 9 of March 26 2009.

On the one hand, preferring open source software and open standards likely reduces vendor lock-in and fosters competition downstream, on the other hand, this could arguably exclude some providers from the market.

About this debate, the Italian Attorney General raised a question of legitimacy against the law of the Piedmont Region which aims to promote the use of free software and open standards. On 22 March 2010, the Italian Constitutional Court ruled against the Government's appeal. In its Decision no. 122, the Court "*emphasize[d] again that the concepts of free software and open source code do not refer to a particular technology, brand or product, but rather express a legal feature. In essence, what distinguishes free software from proprietary one is the different content of the license governing the usage rights of the program; and the choice about adopting one or the other contractual scheme belongs to the user.*

It follows that the damage to competition, feared by the Attorney General of the State in relation to the legislation in question, is not well grounded."

Exploitation scenarios

Each scenario is illustrated by capturing the following fields:

- a brief **description**;
- the **opportunities / benefits** deriving from the adoption of the scenario;
- the **main requirements** to be fulfilled in order to ensure the overall feasibility of the scenario;
- the most significant **critical issues** related with the scenario;
- the **actions to be taken** by the Open-DAI consortium (beyond the ones already expected according to the Description of Work) to make the scenario effective;
- the main **sustainability drivers**, i.e. the conditions (or actions) that increase the probability that the scenario can be pursued also in the medium/long run;
- a **SWOT analysis**, covering a short description of the main Strengths, Weaknesses, Opportunities and Threats (the latter two having an external origin) of the scenario.

Scenario 1: Partial re-use of project outputs as components

Description

When Open-DAI ends as a EU-funded project, nobody maintains it as a unique platform and the various exploitation items become reused in other contexts.

The Open-DAI project is based on the assumption that the overall value of Open-DAI is higher than the value of its individual components. The data (which are open data or, in any case, data which become easily reusable by other PAs), the cloud SOA infrastructure and the pilots complement each other and show each other's potential. That said, it is arguably fair to depict a worst-case scenario, in which just the individual Open-DAI exploitation items get reused after the end of Open-DAI as an EU-funded project.

In synthesis, in this first worst-case scenario, Open-DAI outputs get reused piece by piece by various players (including, but not limited to the Open-DAI project partners). As we described in § 2 (Exploitation items) above, there are several distinct (but complementary) exploitation items:

- datasets made available (possibly as open data) by the consortium members (PAs) and exposed via web services (WS or REST);
- the cloud model, as explained in Deliverable 3.2:
  - parts of this model can be implemented even without the rest of Open-DAI as a project or platform; for instance, some parts can be integrated in existing open data portals, etc.;
    - ❐ some scripts and groups of software modules can be individually re-used or contribute to the existing open source communities maintaining third party software reused by Open-DAI: this is possible and useful even without an active maintainer after the end of the EU project;
    - ❐ most existing open data portal do not have the capabilities of connecting with legacy databases or exposing dynamic data that Open-DAI is developing;
- the pilots/services that the project is delivering, which can be easily portable to the objectives/needs of other PAs, by adapting them to their legacy DBs:
  - even in the worst-case scenario, were Open-DAI as a platform and available service is discontinued, the pilots are designed to be reusable directly on premise by the same partners or other PAs (or their service providers);
- the Open-DAI platform itself will in any case be available as open source software:
  - in this worst-case scenario, it will be an unmaintained piece of code, but it is based on software components which are maintained by third parties and the code, together with a rich body of documentation which is being produced should enable third parties to appropriate this work or become themselves the maintainers of Open-DAI.

Opportunities / benefits

Being a worst-case scenario, the main advantage of the scenario at hand is that it is easily achievable. (Of course, the other side of the coins is that most of the main opportunities offered by Open-DAI cannot be achieved in this scenario.)

With respect to the current state of the art, the reuse of some Open-DAI modules or components could, for instance, improve the quality of open data portals, creating direct connections with legacy databases and providing tools to expose dynamic data as services.

This scenario is built on the overall hypothesis that Open-DAI reaches its objectives as a project, at least in terms of technical deliverables. However, being a worst-case scenario, it remains relevant even if Open-DAI just partially achieves its goals (to be sure, even in their current state at about mid-project, the Open-DAI exploitation items could be re-used as described in this scenario).

Main requirements

This scenario just requires the fulfilment of the core obligations described in the Open-DAI Description of Work. Actually, even a partial success on some key Open-DAI deliverables and key performance indicators (including some failures to fully achieve some of the project goals) is compatible with this scenario.

Critical issues

Because of the aforementioned reasons, there are no critical issues, apart from a large set of missed opportunities, which will emerge from the description of the other exploitation scenarios.

Actions to be taken

Once again, as a worst-case scenario, this first scenario does not require specific actions. The Data Cloud model and the Open-DAI platform code will in any case be published and documented. To exploit datasets, they should also be made available on standard existing open data portals. To exploit pilots, as soon as they will be published and usable by third parties (starting from citizens) a more or less explicit commitment of PAs to maintain them after the end of the EU-funded life of the Open-DAI project will be required (also to increase adoption). However, we consider this kind of commitment (and/or the need for a planned and managed obsolescence) as an implicit commitment of any PA when it offers a service to its citizens (in other words, we consider that this requirement will be automatically fulfilled because of the standard best practices followed by Open-DAI partner PAs).

Main sustainability drivers

Even if this scenario is easily sustainable, several conditions (or actions) are likely to increase the overall value of the achievable results. In particular, we identify the following ones:

- today, connecting legacy databases to Open-DAI encourages a minimal level of harmonization of data schema: it is possible to do more in this domain, in particular proposing some unified semantic schemata (possibly just for some selected set of data) as a driver to increase the value of Open-DAI.

- the development of pilots will deliver open source code, but we can do more to maximize the exchanges with existing communities of developers and document the entire

process: some partners, for instance, are planning a completely open development process, using GitHub;

- ideally, the Open-DAI platform code could be maintained actively, coordinating and supporting an active open source community:
  - this scenario is sufficiently relevant and complex to be described as a separate scenario (Scenario 2), instead of simply expanding it here.

SWOT analysis

Strengths	Weaknesses
- Easily achievable scenario; - several Open-DAI exploitation items represent a significant progress with respect to the state of the art of PSI/open data portals; - even a partial success of Open-DAI as a EU-funded project would deliver exploitation items sufficient to implement this scenario.	The potential of Open-DAI is not fully exploited.
Opportunities	Threats
- A third party maintainer for the Open-DAI open source code may emerge; - private firms making commercial offers based on the Open-DAI code (and know-how described in the deliverables) may emerge; (public) open data portals may implement (parts of) the Open-DAI platform.	Other solutions may emerge, which make the Open-DAI exploitation items obsolete (notice that this is not a major threat: if these solutions are open source, the social welfare is just increased; if they are not, Open-DAI remains available as an open source basic solution, putting some competitive pressure on the newcomers, to the benefits of PAs).

A model for the interoperability of Open-Dai e Italia.gov.it

As mentioned above, in the first scenario, but also in all the following ones, Open-DAI as a whole or as a collection of components and best practices may be integrated with existing open data portals or other portals of public administrations. These are some preliminary notes concerning the potential interoperability between Open-DAI and the Italian national portal Italia.gov.it.

Italia.gov.it is a strategic national project of the Agency for Digital Italy. Its goal is using open data and public information to build the Knowledge base and the search engine of the Italian digital administration. Its technology engine implements powerful data correlation solutions, based on information retrieval and natural language processing solutions. Italia.gov.it improves e-government related open data with information coming external sources, like national databases and archives or web sites of the public administrations.

In the value chain of PSI, Italia.gov.it ranks with the leading role of "institutional re-user" of public data and brokerage platform between public and potential re-users of data released by the former.

Dati.gov.it is the Italian catalogue of the open datasets published by public administrations. It is managed by the Agency in collaboration with FormezPA, another public entity.

In this section we sketch a model of interoperability among Open-DAI, Dati.gov.it and Italia.gov.it that foster the added value of each initiatives in a unique system.

The integration of the three initiative results in a more powerful enabling platform for open data re-users, offering the following services:

- directory services to the public datasets catalogue;
- service based access to open data;
- service based access to linked or aggregated open data.

Scenario 2: Open-DAI available and maintained as an open source platform

Description

As a preparatory action, a robust maintenance framework is defined and adopted by the identified process owner. In this respect, several important sources can be acknowledged, being them codified standards, theoretical analyses, or good practices emerging from case studies. For instance, de facto standardisation of software life-cycle processes is specified in ISO/IEC 14764:2006 (Software Engineering -- Software Life Cycle Processes -- Maintenance)[1]. Building on this standard, Koponen and Hotti (2005) propose a specific maintenance process framework for Open Source software. It encompasses three main subsequent stages. The first one is process implementation, and it includes the development of maintenance plans and procedures, including modification requests, and the implementation of configuration management process. A second group of activities are aimed at managing problem modification and analysis, modification implementation and reviews/ acceptances. A third set of activities deals with the definition of migration and retirement plans, if any are foreseen.

The Open-DAI maintainer applies good practices to the software maintenance activity, building on internal knowledge and learning from relevant examples of comparable cases. The Open-DAI source code is openly available to third parties through one of the most used collaborative repositories / platforms (e.g. GitHub, SourceForge). An adequate (pre-existing) Open Source license is applied to the project and its components. Documentation (both auto- and manually-generated) is produced and released. The documentation includes 'Getting Started' information explaining the Open-DAI background, purposes and architecture. Beyond a 'contributing' document to track collective work, specific tools for community-management are adopted, also including a wiki, and a mailing list.

To some extent, this scenario overcomes the 'private' vs 'collective' dichotomy often mentioned when discussing incentives to undertake innovative projects (as in von Hippel & von Krogh, 2002). In fact, as many other Open Source projects, this scenario encompasses both, since private incentives (by definition) for the maintainer and a collective action model (in principle) can be acknowledged at the same time.Open-DAI becomes an Open Source project, publicly available and maintained by one of the partners.

Opportunities / benefits

Under this scenario, benefits can be experienced at different levels, and in particular, (i) under the viewpoint of the Open-DAI project; (ii) for third parties reusing it; (iii) for the platform maintainer.

In particular, Open-DAI continues existing and being available beyond its end as a EU-funded project, distinguishing itself from the frequent case of European projects whose legacy (for the public as a whole) is hardly perceivable once the funding period has expired. Moreover, the knowledge acquired, and the lessons learned during the lifespan of the project will be used by the Open-DAI maintainer when designing the most adequate maintenance framework.

As a second set of potential benefits, third parties will have the chance to offer and distribute Open-DAI - as a stand-alone product, or embedded in a broader offering - even if no one of the Open-DAI partners will decide to undertake this activity. Customisations and further

developments will be therefore possible independently from the Open-DAI consortium and the willingness of its single participants. Moreover, being Open-DAI a documented Open Source platform already used by PAs during the project, the adoption costs for interested PAs (or other kinds of organisations) is supposed to be reasonably low if compared with market offerings[2].

Finally, the maintainer can achieve a potentially high overall return, especially in terms of economies of scale and scope within its organisation[3]. In fact, several insights are reported in literature (e.g. in Bonaccorsi & Rossi, 2006) about the incentives of developing and maintaining Open Source solutions - instead of proprietary ones - for an organisation. These motivations encompass economic (such as avoiding external lock-in, or earning revenues from complementary services, or benefiting from community-building as a way to select IT specialists), social (e.g. in reputational terms) and technological ones (e.g. exploiting feedbacks from contributors). In the case of Open-DAI, it is worth reminding that the set-up costs - which are supposed to represent a significant item in the cost structure - have already been covered (and funded). Besides, the maintainer could also decide to market software related services (e.g. technical support), i.e. extracting a direct source of revenue from this approach.

Main requirements

The most important requirement that has to be fulfilled for the implementation of this scenario is the willingness and availability of an active maintainer to play this role. This decision may depend on several aspects, and in particular:

- the fact that tangible incentives/motivations actually exist for both the organisation that is supposed to maintain the project (Bonaccorsi & Rossi, 2006), and for the individual participants in this activity (Lakhani & Wolf, 2003); those motivations may include:

  - economic ones, especially in the case the maintainer is developing complementary products, and/or that economies of scope in developing the Open Source project can be identified within the organisation (e.g., Open-DAI can be profitably implemented internally, independently from external adoption);

  - technological ones, in particular in terms of enhancement of internal skills and increased knowledge of specific technologies;

  - social ones, e.g. in terms of external reputation and the benefits related with community-building (and the selection mechanisms the latter enables);

- the fact that this scenario represents a sustainable situation for the maintainer, so that the overall expected returns (including the intangible ones) overcome the maintenance costs.

At the current stage (M14 of the project) it is uncertain whether one of the Open-DAI partners will be satisfying the aforementioned requirement. However, CSI Piemonte represents one of the potential maintainers, in particular because it is the project coordinator, holds significant expertise in the fields of reference, and has already implemented strategies comparable with this scenario in the past (e.g. DoQui). In principle, other Open-DAI partners, such as NetPort and Sampas, could play the role of maintainer under this scenario.

Actions to be taken

- Adopting this exploitation approach entails the following actions to be undertaken (beyond the tasks already reported in the Description of Work of the project):

- taking a strategic decision about maintenance responsibilities (given that, in the medium/long run, keeping one of the pilots up and running can not represent a sufficient incentive in that sense);

- defining the maintenance process: to this end, (de facto) standards on software life-cycle process (e.g. derived from ISO / IEC 12207 and ISO/IEC 14764), as well as benchmarking examples, will be taken into account, also in order to identify (and timely address) potential constraints;

  ❍ such activity also encompasses the choice of the licensing schemes to be applied (see the Annex in page 30 _Scenario-1);

- estimating the overall amount of resources necessary to ensure maintenance in the long term, so that those resources can be allocated by the maintainer.

Main sustainability drivers

Several conditions (or actions) are supposed to increase the overall sustainability, i.e. the probability that this approach can be pursued also in the medium/long run, of this scenario. In particular, we identify the following:

- the **internal incentives** (briefly discussed above) for the maintainer to play this role remain significant also in the future;

  ❍ e.g. because economies of scope between breaking information silos internally and opening up datasets for the public get even stronger; such situation can be driven by endogenous trends, or by exogenous requirements (such as legislation mandating transparency of PAs);

- a **collaborative environment** actually emerges around Open-DAI, encompassing contributions, feedbacks, and actual reuse of the platform; this potentially involves the current Open-DAI partners, continuing using the platforms for their pilots or similar kinds of implementations;

  ❍ in that sense, the 'total cost of ownership' for adopting Public Administrations (some theory: Ellram, 1995; Ellram & Siferd 1998);

- an **effective dissemination activity** about background, scope and features of Open-DAI is performed by the project consortium;

- Open-DAI as a project reaches **specific results**, such as:

  ❍ *platform scalability*, so that the effort required for other PAs to adopt Open-DAI (e.g. virtualisation of legacy DBs) is minimised, exploiting the economies of scale driven by the adoption of cloud computing technologies, and SOA, by Open-DAI;

  ❍ by deploying web services (e.g. real time applications), ability to *clearly differentiate the Open-DAI model and pilots from Open Data portals exposing static datasets*;

❍ *fulfillment of the standard requirements*, e.g. identified by legislation, with respect to the Open Data strategy of PAs (including internal data exchange purposes).

SWOT analysis

Strengths	Weaknesses
- Expected positive balance benefits vs costs for the maintainer; reasonably low Total Cost of Ownership for the adopters; - widespread positive effects (community-based development; reuse of the platform by third parties); - consistent with project scope while ensuring sustainability and impact beyond the funded period, in front of a reasonable investment; - meeting emerging trends and needs of Public Administrations, e.g. re. Open Data.	- This scenario requires long run commitment by the maintainer of the Open Source repository; - to date, the maintainer has not been identified, and the maintenance process is not yet defined.
Opportunities	Threats
- increased potential of the Open-DAI platform through the work of third parties implementing new functionalities / pilots; - Open-DAI could become a standard platform for Public Administrations, enabling network externalities; - open data portals decide to implement some Open-DAI features and to contribute to the open source community.	- The incentives for the maintainer to play this role may get lower (or even expire) in the long run; - the external adoption and/or further contributions/implementations by third parties could be low or absent; - other solutions may emerge, which make the Open-DAI exploitation items obsolete (a threat for the Open-DAI project more than against social welfare).

Annex to Scenario 2: the choice of an Open Source license

As far as copyright related issues are concerned, the main constraint to the freedom of Open-DAI partners to adopt the licensing choices they prefer could come from the licensing of pre-existing (open source) software components used within the project.

- The first column ("**Open-DAI component**") lists the Open-DAI component making some use of third party software;

- the second column ("**Third party software package**") lists the pieces of software produced by third parties which are in some way used by the Open-DAI component;

- the third column ("**License**") includes the name of the copyright license associated with the piece of software of the second column (notice that multiple values are possible, in case of dual licensing);

- the fourth column ("**Relation**") assesses the "kind of use" of these pieces of software within Open-DAI, describing whether:
  - they simply go in bundle with the related Open-DAI component (value "Bundle" in column "relation"); a typical example of this kind of relation is when a piece of software is distributed together with an Operating System on which the former operates on; in any case, there are two distinct process in the computer memory;
    - the bundled pieces of software will typically interact through an "API", e.g. calling the public APIs of a platform (this is arguably a sub-case of bundling, which will be described as "**Bundle/API**";
  - (b) they are integrated with the related Open-DAI component at compilation time so that the latter can be considered a modified version of the same software (value "**Integrated**" in column "Relation"), or
  - (c) they are called as libraries by the related Open-DAI component at runtime (value "**Library**" in column "relation"); in some cases, the logical

relationship may actually be the opposite (i.e. the Open-DAI component logically works as a library within a broader framework), but this relationship will still be labeled "Library";

❐ in the case of code written in an object oriented language, inheritance is considered to works as a special case of traditional linking (e.g. the LGPL permits this type of derivative work in the same way as it permits function calls from an imported library).

- a fifth column (Notes) provides additional notes about the Relation between the Open-DAI component and the Third party software package.

Open-DAI component	Third party software package	License	Relation	Notes (e.g. used "as is" or modified?)	Constraints
…					

Before opening up the code of Open-DAI, the project partners will carefully fill in the previous table and proceed to a rights clearance of any piece of code raising doubts in terms of its licensing. (Obviously, this exercise has already been informally performed on an ongoing basis, selecting the third party packages used by any Open-DAI component, so we do not expect major obstacles to the open source licensing of Open-DAI as a whole. However, the choice of the final license(s) for Open-DAI has to be carefully scrutinized.)

The following table provides some additional information about some standard open source licenses (and it will be completed inserting all the appropriate licenses used by

any relevant third party package). In particular, these pieces of information will provide key elements useful to understand the content of the "Constraints" column of the previous table.

License	Full name	URL	Copyleft (strong/weak/no)	Compatibility notes
modified BSD	The BSD 2-Clause License	http://opensource.org/licenses/bsd-license.php	no	broad compatibility; include an appropriate copyright notice and disclaimers for attribution purposes
MIT	The MIT License	http://opensource.org/licenses/mit-license.php	no	broad compatibility; include an appropriate copyright notice and disclaimers for attribution purposes
Apache 2.0	Apache License, Version 2.0	http://www.apache.org/licenses/LICENSE-2.0.html	no	include an appropriate copyright notice for attribution purposes (e.g. any NOTICE file from the underlying work); unidirectional compatibility toward most licenses, including the GPL 3 (according to FSF, not toward GPL 2)
EPL	Eclipse Public License 1.0	http://opensource.org/licenses/EPL-1.0	weak	broad compatibility if just linked: you need to include link to source code (and files such as LICENSE); LGPL incompatible (e.g. because of choice of law)
GPL 2	GNU General Public License 2.0	http://www.gnu.org/licenses/gpl-2.0.html	strong	derivative works, including software just linking to the code must be released under GPL; BUT see the following exceptions
GPL 2 + CPE	GNU GPL 2 with Classpath Exception	http://www.gnu.org/software/classpath/license.html	de facto, weak	additional permission to link this library with independent modules; if you modify the, you may or not propagate this exception;
GPL 2 + FLE	GNU GPL 2 with FOSS License Exception	http://www.mysql.com/about/legal/licensing/foss-exception/	strong (but see compatibility notes)	can mix with other libraries and applications licensed under certain other FOSS licenses [e.g. BSD, LGPL, Apache] without causing the entire derivative work to be subject to the GPL.
LGPL	GNU Lesser General Public License	http://www.gnu.org/copyleft/lesser.html	weak	broad compatibility if just linked: you need to include source code (and files such as LICENSE) for the library

Scenario 3: Data cloud standard offering (public procurement)

Description

A "data cloud" offer (essentially equivalent to the Open-DAI platform) is part of a major public procurement action, e.g. by a national / local public group purchasing organization (GPO) able to capture the significant scale and scope economies connected with several key technological aspects, such as cloud computing, and (semantic) interoperability between the various data silos.

For this scenario to apply, at a minimum, the Open-DAI platform should fulfill the technical and functional requirements for this hypothetical "data cloud" public procurement call. Actually, this prerequisite is likely to be met, since Open-DAI has been designed by and for PAs to achieve specific goals of data and services exposure via cloud computing.

Opportunities / benefits

Being a standard open source solution, available at a pre-competitive level, Open-DAI can become a benchmark or standard implementation within the aforementioned public procurement call[4]. In general terms, by potentially ensuring a critical mass of adoption of Open-DAI (in competition with similar solutions), this scenario allows to maximise scale and scope economies inherently related with cloud computing, SOA approach, and semantic interoperability. (From this point of view - which is connected with standardization - this scenario is even superior to the fourth and last market-based scenario.)

This scenario represents a potential opportunity also for the GPO. In fact, by showing that existing technical solutions fulfill the requirements of the call, and because relatively small technical providers can bid in the call, adopting Open-DAI as an open source solution can lower entry barriers, and also lower vendor lock-in the long-run (i.e., the use of an open source solution can be a requirement in the public procurement call).

As an extension of this scenario, a further set of opportunities for Open-DAI, but possibly also for the GPO and society as a whole, is related with the participation of an Open-DAI consortium member in the public procurement call. Not only, specific know-how deriving from the tasks achieved in the project could be exploited, but additional benefits would come from the fact that a bidder would be a Public Administration or its in-house company (e.g. CSI Piemonte) or long-term IT supplier (e.g. Sampas). Indeed, this could represent a tangible opportunity, mainly because the need to handle public data, possibly including personal and even sensitive data (and considering, besides, the risks related with the cloud environment) are arguably reduced if the bid comes from an experienced provider of ICT services to PAs.

Moreover, a centralised procurement and adoption of Open-DAI could entail further benefits related with the internalisation of some of the externalities generated by data exchange between PAs, and interoperability. In fact, such positive effects cannot be fully perceived by the single Public Administration, while a 'central planner' has this opportunity. In particular, cross-subsidies between bigger (and holding higher spending power) and smaller PAs could be foreseen, e.g. with governmental support allowing the latter to guarantee the same level of service of bigger administrations to their citizens (directly, but also making apps developed by third parties available with respect to the local public sector information).

Main requirements

As a prerequisite for the activation of this exploitation scenario, a public procurement call by a GPO (at the level of the Central government or at a lower level, e.g. a consortium/network of municipalities) has to be issued. Besides, this call should encompass functional requirements which are / can be fulfilled by the Open-DAI platform.

In order to achieve this prerequisite, the call should capture sufficiently standardised requirements (or, at least, comparable with other offers on objective grounds); those requirements should not only be technical, but rather functional and performance-oriented[5].

It is reasonable to expect that if and only if the Open-DAI platform will realize the full potential described in the Open-DAI Description of Work there will be a reasonable chance for Open-DAI to represent a standard reference and/or a good competitor in such a public procurement procedure. Therefore, not only this scenario heavily depends on decisions which involve third parties (e.g. national or local GPO), but it is also conditional on a full success of Open-DAI as a project.

Critical issues

The main critical issue identified for this scenario is related with the aforementioned requirements. Indeed, the requirements of a "data cloud" public procurement call are not only potentially difficult to achieve; to date, these requirement are also complex to define and evaluate (e.g. the definition of a "data cloud" service may tend to be subjective and changing with the context of reference), in opposition to standard services (or goods) purchased by PAs on a regular basis.

(Notice that a possible alternative to standard procurement in this scenario is represented by some form of pre-commercial public procurement pivoting around some additional innovative features of the data cloud offer, which remain to be defined. Assuming that Open-DAI manages to deliver all its expected results, however, this kind of alternative should not be necessary.)

Moreover, specific competition concerns may emerge in relation to the assignment through a call of this kind of data cloud service in a new and dynamic market. In fact, within this scenario, competition takes place between the call bidders, rather than in the market. However, some standard remedial/mitigation actions can be foreseen, especially in the way the call is defined, and in the rules of assignment (e.g., implement different solutions from the 'winner takes it all' approach). That said, the key critical issue from the competitive point of view may indeed consist in the very fact of defining in an excessively precise or static way the key characteristics of a new and innovative service (and the adoption of performance-based requirements may ease this problem, but can hardly solve it completely).

Actions to be taken

Several actions have to be taken to achieve the full potential of Open-DAI in order to credibly try to achieve this scenario. Indeed, these are the actions described in the Open-DAI DoW, but, under this scenario, their full and fully satisfactory implementation is not just a sustainability driver. In particular, unless Open-DAI can show that a completely successful implementation of a "data cloud" service is possible, it is hard to imagine a GPO issuing a public procurement call for this kind of service.

On top of achieving a full success from the point of view of technologies and processes, the likelihood of a public procurement call being issued for the provision of the "data cloud" service also depends on the degree of awareness of some key players, e.g., national government, the most innovative public administrations, etc. This is why it may be necessary to take several actions to ensure a high level of awareness amongst PAs in order to make this scenario possible. (Obviously, this also relates to a good implementation of the Dissemination WP of Open-DAI.)

Finally, it is legitimate to ask whether the Open-DAI partners can reasonably increase the chance that such a public procurement call is issued. In other words, can the Open-DAI partners influence the relevant decision makers?

The answer is arguably, yes, at least in part. And this influence is not mainly in the form of some kind of lobbying. In fact, the partner PAs, e.g., Regione Piemonte, have their own GPOs (together with other smaller PAs) and/or are partners of GPOs. Moreover, partners such as Agenzia per l'Italia Digitale (formerly DigitPA) are involved in the functioning of national GPOs, such as the Italian CONSIP.

Therefore, the project partners may take some actions to increase the likelihood of this scenario to become a concrete possibility.

Main sustainability drivers

The main sustainability drivers of this scenario are essentially the same aforementioned for the other scenarios. (Actually, the peculiarity of this scenario is that some elements which beforehand were "just" sustainability drivers, here become actual requirements or actions to be taken.)

Moreover, it becomes crucial to provide precise and objective metrics, which can increase the likelihood that a public procurement call can be issued and properly managed. Further efforts within Open-DAI to measure costs and generate various metrics and performance indicators will not only concur to the quality of the final project deliverables, but will also represent significant sustainability drivers for this scenario.

SWOT analysis

Strengths	Weaknesses
• full exploitation of the Open-DAI potential; • fosters standardization; • allows for the internalization of positive externalities (creating cross subsidies, e.g., from the central government to small municipalities).	• high requirements; • also depends on external decisions; • may raise competition/innovation policy concerns.

Opportunities	Threats
• fully achieve SOA, EII and cloud potential thanks to a significant number of PA adopters; • third parties (i.e. developers) start developing apps and solutions leveraging on Open-DAI SOA, EII and cloud solutions, fostering additional PA adopters.	• (potential or actual) competitors and/or independent authorities may try to use competition (or public procurement) law to obstacle the "data cloud" call; • other solutions may emerge, which make the Open-DAI exploitation items obsolete (a threat for the Open-DAI project more than against social welfare).

Scenario 4: Market approach

This scenario is discussed in Deliverable D8.4 Business Plan Draft, and finalised in D8.5 Business Plan Final, fully devoted to the exploration of this potential approach.

Discussion

The table below provides a snapshot of the aforementioned items. For each scenario, the main fields of analysis are reported.

The four exploitation scenarios identified diverge from each other from several points of view, and in particular:

- their actual **feasibility**:

    - Scenario 1 is feasible by definition, as a normal implementation of the project goals coupled with the decision to expose its outputs as open (source code and data, whenever feasible);

    - Scenario 2 is reasonably feasible, but dependent on the willingness of one of the project partners to take the role of maintainer;

    - Scenario 3 is to be considered not trivially feasible, and implementable only in the medium run at least (since it involves several complex decisions);

    - to assess the feasibility of Scenario 4, further insights about the financial viability of a market-oriented approach have to be produced (foreseen in Deliverable D8.5 Business Plan Final);

- the degree under which Open-DAI is exploited in its full **potential**:

    - Scenario 1 is described as a 'worst-case scenario', therefore missing relevant opportunities in terms of full exploitation of Open-DAI;

- Scenario 2 allows a fair exploitation of the project outcomes and results, although not internalising relevant externalities deriving from a standardised adoption of Open-DAI (which, in any case, remains possible);

- Scenario 3 arguably requires a successful achievement of the Open-DAI goals and facilitates the achievement of its full potential;

- if financially sustainable and achieved, Scenario 4 implies by definition a successful market-oriented translation of Open-DAI;

- the **level of autonomy** from decisions of external stakeholders:

  - the level of autonomy is high in the cases of Scenario 1, 2, and 4, while it is limited in the case of Scenario 3, that requires a strategic decision by a GPO and/or a major Public Administration (e.g., a national government or a regional government that is able to influence other PAs).

Table 2 summarizes those observations. What seems interesting to notice is that clear trade-offs emerge, especially between feasibility and degree of exploitation of Open-DAI.

Scenario	Feasibility (Low, Medium, High)	Degree of exploitation (Low, Medium, High)	Level of autonomy (Low, Medium, High)
1 (components)	H	L	H
2 (maintained OS project)	M	M/H	H
3 (standard offering)	L	H	L
4 (market approach)	M	M/H	M

Comparison between Open-DAI exploitation scenarios

The four main scenarios described in the report at hand just represent four paradigmatic examples. One could easily imagine more scenarios, which can be described as intermediate scenarios, combining some features of the previous clear cut situations.

For instance, it may happen that the Open-DAI code becomes available as open source and without a strong commitment to maintenance, as in Scenario 1. In the meantime, with or without and active role of project partners, a "data cloud" major public procurement call can be published, as in Scenario 3. Then, one or more of the Open-DAI partners may decide to bid. Finally, depending on the results, the winner of the bid can (or not) become the maintainer of an open source development community, as in Scenario 2.

Actually, the maintenance of an open source community for the further development of the platform, as in Scenario 2, could be one of the items procured using the call described in Scenario 3.

In another intermediate scenario, the maintainer of the open source community of Scenario 2 can offer some products on the market, following the principles described in Scenario 4. But it is also possible that a third party does that (contributing or not to the maintenance of the community edition of the platform).

In sum, it is easy to imagine additional intermediate scenarios, but we submit that the main opportunities and benefits, requirements, critical issues, actions to be taken and sustainability drivers would be combinations of the same elements that we discussed for the paradigmatic scenarios.

In fact, as far as the relationships between scenarios is concerned, no one is mutually exclusive from the other. Quite to the opposite, it is fair to say that Scenario 2 is an evolution of Scenario 1, while Scenario 3 and 4 are two alternative (but not completely mutually exclusive) evolutions of Scenario 1 and, possibly, of Scenario 2 (in the sense that Scenarios 3 and 4 may or not be coupled with the existence of an actively maintained open source community). At the same time, the coexistence between some scenarios may be troublesome. In particular, if Open-DAI is offered on the market as in Scenario 4, the emergence of a situation such as in Scenario 3 would be perfectly compatible with the participation of the Open-DAI provider in the big public procurement call, but - in case of failure - it could be difficult to go on offering Open-DAI as a standard market offer, since other PAs would tend (or even be forced by norms) to purchase a "data cloud" service through the GPO. Therefore, providing a "data cloud" service directly on the market would require a lower cost and/or an offer which is sufficiently differentiated as to be hardly comparable with the solution offered through the GPO.

In terms of their likelihood, some of the discussed scenarios can be easily ranked:

- Scenario 1, being a worst-case scenario, can be easily achieved: in other words, it could be very likely, but the Open-DAI partners are taking actions to do better than this and increase the likelihood of other scenarios;

- Scenario 2 is arguably the most likely alternative to Scenario 1: the presence of an active maintainer of the Open-DAI code depends on some strategic decisions of the PAs involved in Open-DAI as well as on strategic decisions of their ICT providers; to date, these decisions have not been formally taken, but a substantial fulfillment of the project goals would make them quite likely;

- Scenario 3 is admittedly not very likely: it depends both on the fulfillment of the project goals and on decisions from third parties, which could be influenced by hardly predictable external economic and political variables;

- Scenario 4 arguably has an intermediate likelihood (between the one of Scenario 2 and Scenario 3): with respect to Scenario 2, it is less likely, since it has additional requirements in terms of the characteristics of the demand for the Open-DAI platform (e.g., it requires a positive willingness to pay and some appropriation mechanisms); with respect to Scenario 3, it is more likely, since it is less dependent on the delicate equilibrium required to actually witness the publication of a major public procurement call for the provision of a "data cloud" service. The final version of the Open-DAI business

plan (D8.5) will collect and organize additional pieces of quantitative and qualitative information useful to provide a better assessment of the likelihood of Scenario 4.

[1] This document provides which "the framework within which generic and specific software maintenance plans may be executed, evaluated, and tailored to the maintenance scope and magnitude of given software products. It provides the framework, precise terminology and processes to allow the consistent application of technology (tools, techniques and methods) to software maintenance.", source: http://www.iso.org/iso/catalogue_detail.htm?csnumber=39064

[2] In fact, even in the cases of 'simple' Open Data portals, several Public Administrations have reused Open Source platforms and data registries previously developed by other PAs, or by activists (e.g., the Emilia Romagna region has reused the www.dati.piemonte.it, and several PAs use CKAN, http://ckan.org/, as software for data release).

[3] The case of DoQui (http://www.doqui.it/) may represent an interesting example in that sense. DoQui is an open source software for internal knowledge management developed and maintained by CSI Piemonte. Initially developed for a specific application, the organisation noticed that reusing it also in other segments of the administration would have entailed significant savings and increase efficiency.

[4] As an interesting (although not directly comparable) example, specific requirements also mentioning open source state-of-the-art solutions (e.g. data registries) were explicited by the EC when issuing a call for tenders to release a European Open Data portal (http://ec.europa.eu/information_society/policy/psi/open_data_portal/call_tenders/index_en.htm) . In this case, the CKAN software (http://ckan.org/) represented a kind of reference implementation (in fact, a CKAN-based solution is currently under implementation, although other technical solutions could have been accepted in response to the call for tender).

[5] Both the Directives 2004/17/EC and 2004/18/EC introduce new policy tools aimed at promoting new models in the Public Procurement domains, leaving to the State members the task to implement them, also setting important conditions for a pan-European Public Procurement framework grounded on ICT platforms (electronic bids, dynamic purchasing systems). Among the innovation-oriented Public Procurement measures contained in the Directives, it is worth to mention the *competitive dialogue* procedures, the updated definition of *technical specifications*, which not only encompass quality standards, but also *performance-based requirements*, in order to better meet the purposes of the tender and the possibility to set *framework agreements* allowing contracting authorities to require technological modifications without calling a new tender.