

Towards Knowledge/Technology Transfer U-GOV Research achievements and new challenges

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Summary

U-GOV Research is a CRIS that supports about 40 different Italian universities to handle the research life cycle by managing research processes and entities and providing full interoperability with various external systems. Recently the CRIS has been extended with new functionalities that allow university to face the knowledge/technology transfer process and its outcomes spreading.

This paper aims to describe the current U-GOV Research state of the art focusing on two main aspects: the U-GOV Research interoperability tools and the new “U-GOV Research Asset Management” module.

1 Setting the context

1.1 Background

CINECA is an Italian Consortium made up of 54 members (51 Italian universities, 1 research institute, the National Research Council and the Italian Ministry of University and Research). Its mission includes high-performance scientific computing, telematic networks and services management and information systems development.

Since the 1990's CINECA has supported Italian universities developing management information systems and in 2005 has set in motion a new integrated system called U-GOV, which channels into a single systemic vision the CINECA software solutions so far offered.

In the new competitive context, universities are called to act with increasing efficiency in defining and realizing strategies, in planning and controlling resources, and lastly in complying with the aims and orientations set by governing authorities. Yet, they also must safeguard effectively the institutional aims and social role belonging to the traditional university system. In such evolutionary process, the U-GOV project was developed to address some needs such as enabling university governance, extending organization management, simplifying services development, improving core university processes, reducing complexity of technological and applicative infrastructures.

CINECA designed U-GOV taking on an alternative approach based on these fundamental principles: system-wide shared information structure, process management structure, service oriented architecture (SOA), web services and open standards.

1.2 Ongoing development

U-GOV consolidates and increases coverage of human resource, account and student management, and has been extending the field of action by proposing solutions in new strategic areas, such as university research and KPI management.

The U-GOV research system, named U-GOV Research, supports university's research life cycle by managing the processes in which are involved the main research entities such as project, outcome, infrastructure, equipment but also skill and competence: a new challenge for CINECA will be indeed to define solutions to respond to the knowledge/technology transfer process.

Currently, about 40 different Italian universities run U-GOV Research in order to improve data management and analysis. Of course, this has led the CRIS to provide full interoperability with various external systems many of which are Open Access repositories, but also digital libraries, human resource, accountability and evaluating systems, etc.

1.3 Conclusion

Even if a number of national and international initiative have been advocating and promoting the importance of Open Access for scientific publications, the Open Data philosophy is actually extending the Open Access concept to a wide set of entities: not just research outcomes or research entities any more. With regard to knowledge/technology transfer process, for example, the outcomes spreading is absolutely essential: universities need to build a bridge between research and the world of industry and public administration. For this reason, in addition to interoperability tools and open standard compliance, U-GOV Research provides a set of functions that help university to collect, manage and public data about research resources such as groups, infrastructures, equipments, etc. In this definitely new context, CINECA started a pilot project with University of Naples Federico II, Turin Politecnico and University of Rome Sapienza that has been leading towards the implementation of a shared common model.

2 U-GOV Research Achievements

2.1 University and change in progress

Universities are operating in a new research context that is becoming more complex and competitive year by year, mainly due to socio-economic changes such as reduced public funding.

This situation leads universities to have their research resources easily accessible on the web, as far till today the most has not been worrying about that. The spreading of research resources is essential nowadays, mainly because it allows universities to:

- make financial agreements with the world of industry and public administration;
- set up collaborations with other actors within the academic-research world;
- became attractive to new local and foreign students;
- despite the above, remember and point out that the chief role of university is not a broker of technology or a commercial competitor but an educator and a provider of public domain research.

If we think about “knowledge/technology transfer” in terms of “who is doing the transfer and how, what is being transferred and to whom”, each one of the point mentioned above is referred to “a sort of” knowledge/technology transfer process.

For the first point we would say “universities make, industry takes” because generally industry needs a resource (competences, infrastructures, etc.) that only university or research institute may provide.

The second and the third points mainly regard the capability to highlight and make understandable on the web the university research competences and the subjects in which the institution is focused on. This will be useful in order to get new students or to find out strategic partnerships.

At least but not last, the fourth point reminds the role of the university as information provider: all the public domain research data have to be legally and freely accessible on the web.

The logic of all those objectives clearly depends on the ability to transfer the academic “knowledge/technology offer” to many different web users.

From U-GOV Research point of view, the central issue consists in allowing universities to manage all the research resources in order to public them on the web providing a sort of “showcase”, a public catalogue that must be accessible from any search engine.

2.2 Facing knowledge/technology transfer process

Anyone studying “knowledge/technology transfer” understands how complicated it can be. First, putting a boundary on “knowledge” and “technology” is not so easy. Second, outlining the knowledge/technology transfer process is virtually impossible because are involved so many current processes and entities. Third, the impacts are usually numerous and they are almost always difficult to separate from other parts of organizational life in order to measure them.

In addition, as CINECA usually deals with many different universities, it must be taken in account other two factors:

- a road issue in characteristics of the knowledge/technology transfer process is the nature of the institution and its history. The institutional culture actually affects the ability to conduct the process, including resistance to some of the pre-requisites of proprietary work (in such cases, some organizational and political changes will probably enable closer academic and industry collaboration);
- universities and research institutes usually devote their activity to produce scientific and humanistic outcomes, patents, licences, algorithms, etc. because the reward system is largely based on research outputs rather than commercial or Open Data related activity.

It stands out that, in Italy, knowledge/technology transfer process is an emerging issue that has not been completely faced by universities yet. Therefore, taking advantage of the relatively calm situation, two years ago CINECA initiated a pilot project with the aim to collect and analyze university requirements in this context.

The idea was to have completed the whole U-GOV Research system as soon as possible adding to the “Research Repository and Assessment” and the “Project Management” modules the still missing section U-GOV “Research Asset Management”.

U-GOV Research aspires to offer universities the control of the entire research life cycle. Starting from the research entity registry (assets, funding, human resources, etc), passing off strategy and

objective planning, project management, outputs cataloguing and getting to the dissemination step, in order to start again with the new gained resources (Bertazzoni & Luglio 2010).

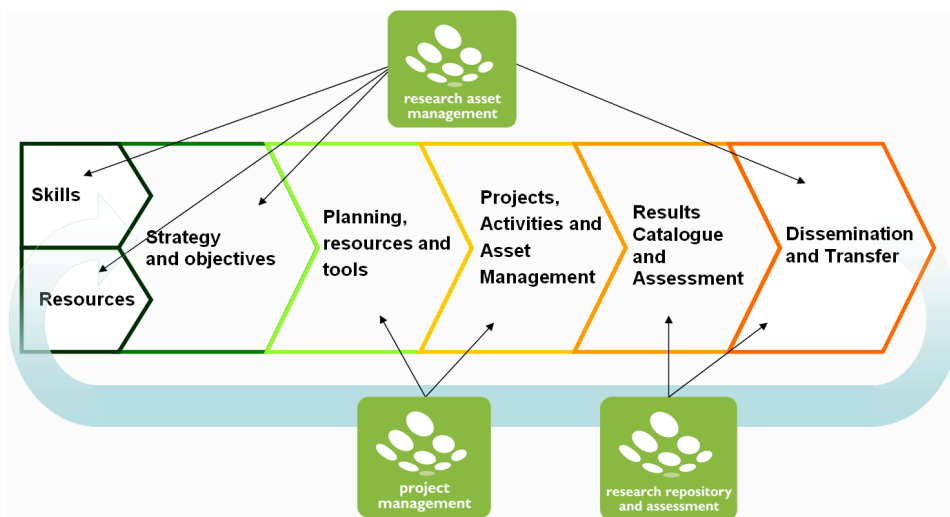


Figure 1: U-GOV Research

As shown in Figure 1, the U-GOV “Research Asset Management” module aims to:

- provide a repository for collecting and managing all the internal research resources;
- spread and enhance the academic research offers: universities must make available their research resources patrimony in order to improve relationships and knowledge/technology transfer towards the territory and the industry;
- offer the functionalities to make strategy and objective planning.

While points one and two refer to gather and publish research entities, the third one is more related to data analyzing and decision making.

The pilot project is currently focusing on the firsts two points.

2.3 U-GOV Research Asset Management

“U-GOV Research Asset Management” brings together, organizes and presents all the information relative to any research activity conducted within the institution:

- groups, researchers and other personnel involved in the research domain, included their skills, competences and expertises;
- laboratories and equipments useful for any research activity;
- intangible resources, such as research outcomes but also resources owned, produced or used by a group or a researcher (data bases, piece of software, methodologies, etc.);

- static information about research projects and activities (just the relevant data such as disciplinary aspects, scheduling, resources involved, costs, logistics, etc.);
- academic research offers supplied by the university to the world.

“U-GOV Research Asset Management” just takes some “static” information from the other U-GOV Research modules, in order to set useful links between entities. For example, it could be helpful know the projects in which a group is involved with their relative deliverables, catalogued as research outcomes.

In order to define the “research resource” and agree on a shared a common model, the universities involved in the pilot project worked hard on the specification of:

- research player;
- research group;
- research infrastructure;
- research asset, included equipment and intangible resource;
- research knowledge and technology offer (KTO);
- research skill, competence and expertise (SCE).

The research knowledge and technology offer (KTO) is currently defined as “a service that may be delivered from the university to any requester in order to meet a need”. It represents the instrument through which the academic offer is published on the web.

According to the collected requirements, the KTO should be described as follows:

- name;
- short description;
- provider, must be one or more groups or one research player;
- object, could be a research outcome (such as a patent), an intangible resource (such as a methodology), a research infrastructure (such as laboratory), etc.;
- state;
- referring person, with contacts;
- organizational unit, at least one;
- a set of technical and descriptive attributes such as abstract, innovation aspects, special features, pro and contra, potential applications, target, state of development;
- keywords;
- taxonomy;
- photos and documentation (e.g. technical manuals, regulations);
- type (project management, consulting, etc.);
- terms and conditions;
- copyright, if applicable.

Presently there is one key aspect about KTO that is still under discussion: the provider research skill, competence and expertise (SCE).

As mentioned above, the KTO provider is represented by one or more groups or one player. In order to exist as “entities” they have to be active actors in the domain of research so, according to

universities involved in the pilot project, they must have their SCE set. For example a group should be composed by a set of players with their own SCE, that had joined together in order to reach an objective. Of course, the group itself features SCE, some of which will be different other probably equal to the ones set by its members.

However, the point is that the KTO provider must have at least on of his/her/its SCE set. But what does “SCE” mean?

SCE modelling is about identifying the critical success factors driving performance in organizations and, of course, it is not an easy task. The currently common shared definition on which university agree (that is still an open issue) is divided into three parts, as described below.

Till today, it has been assumed that SCE includes:

- scientific/humanistic and professional knowledge (professional SCE);
- the capability to use research assets (technical SCE);
- the contacts and relationships with any actor involved the research domain (relational SCE).

The professional SCE just regards the group or the player training and their professional experiences. The technical SCE focuses more on the actor’s technical capability to use a research asset, while the relational SCE on his/her/its contacts.

All this because concentrating separately on the abstract skill or on the mere asset, it is not sufficient to achieve the knowledge/technology transfer. In addition, having a strategic address book may be useful, for example, to act the research offer positioning or to get a collaboration.

To insert a SCE, the “U-GOV Research Asset Management” module provides the function illustrated in Figure 2.

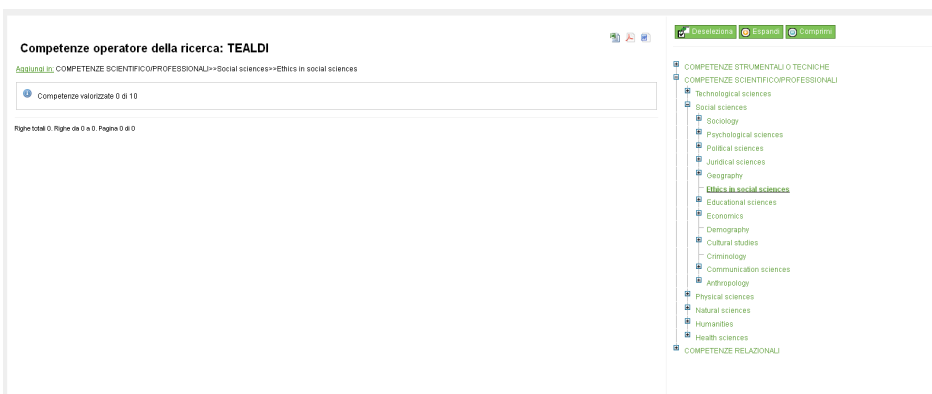


Figure 2: Setting a SCE

On the left side of the page the system loads the skill types tree that had been previously configured by the university. The user must choose the leaf on which he/she wants to set his SCE and the system loads a form. The user fills a text area specifying the characteristics of his SCE, defines its visibility (public or private) and adds keywords. Additionally, he/she may flag secondary taxonomy leaves.

With respect to the skill types tree, the secondary taxonomy represents an alternative classification that could be linked to the SCE. Such connection results helpful especially when the skill types tree is represented by a particular academic classification that may hardly be understood from non-academic actors (such as the Italian SSD, the ISI-CRUI taxonomy, etc). If the link with an appropriate secondary taxonomy is set, the SCE will be easily searchable and understandable for the target web user.

As the skill types tree, the secondary taxonomy ones have to be configured by the institution.

In conclusion a KTO is:

- a service provided by a group or a player with particular SCE¹,
- that is described through many different attributes (included keywords and secondary taxonomies),
- that may be related to a particular object,
- that is provided under particular terms and conditions.

Examples of KTO are sale of patent, rent labs, consultancy services, etc.

2.4 Results

As already stated, one of the main objective of the university is the internal research offer spreading. In response, “U-GOV Research Asset Management” module facilitates the research resource management and the “showcase” establishment, in order to promote collaboration with companies and organizations simplifying the work of the ILO’s (Industrial Liaison Office). Of course, as a part of an ERP system, “U-GOV Research Asset Management” provides private functionalities to manage entities and web services to export data to institutional portals and other applications.

As far as concerned spreading of knowledge, U-GOV Research provides by now full interoperability with various external systems such as institutional repository, digital library, etc. In particular the U-GOV “Research Repository and Assessment” module, already OAI-PMH compliant by means of “Dublin Core” and “MODS” metadata formats, has recently been extended to “MPEG-21 DIDL” too. This in order to provide compliance also with the Italian National Service that harvests data and metadata of doctoral thesis.

The Rome and Firenze National Libraries and the Conference of the Italian University Rectors (CRUI), indeed, worked together to set up a service that allows Italian universities to accomplish the legal PhD thesis filing, automatically and paperless².

The service exploits OAI-PMH protocol, harvesting all the doctoral dissertations stored in an open access repository registered to the service. Whether the harvesting succeeds or not, a notification is sent to the university.

The automatic harvesting of PhD thesis actually improves the bibliographic service efficiency, reducing time-cataloguing and increasing their visibility (they will be available also through the National Library Service).

¹ As mentioned before the SCE is intended as a principal taxonomy textual extension, provided with keywords and linked to secondary taxonomies.

² <http://www.crui.it/homepage.aspx?ref=1891>

In order to comply with statutory requirements, the dissertations subjected to an embargo are collected too. Under current governing rules.

In addition, the U-GOV “Research Repository and Assessment” module has been extended implementing the OpenAIRE Guidelines³.

Figure 3 shows the human readable interface of U-GOV Research OAI-PMH service. It stands out that the “getRecord” method returns the requested OpenAIRE metadata “relation” and “rights”.

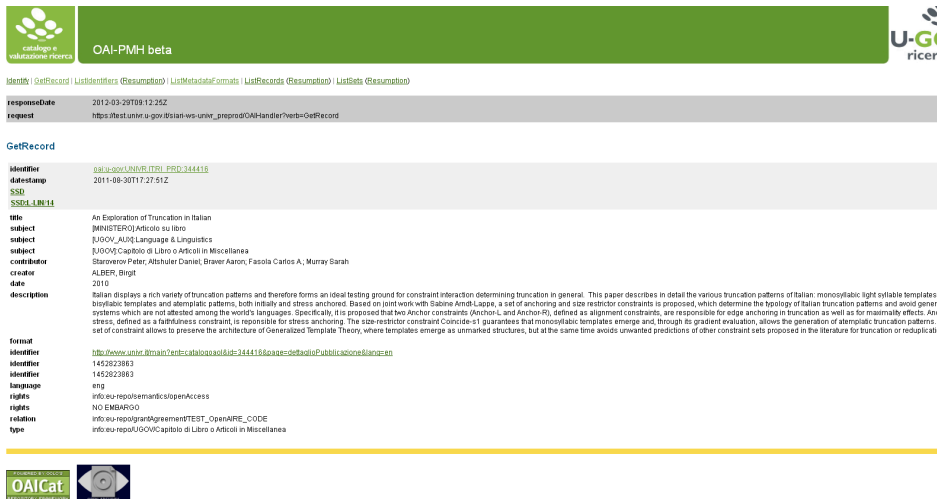


Figure 3: The human readable interface of U-GOV Research OAI-PMH service.

3 U-GOV Research new challenges

Besides making up the university research resource “showcase”, the information patrimony managed by “U-GOV Research Asset Management” is also designed as a base for initiating a process of research governance. Using this centralized archive, the university will establish at any time the activity state of advance, down to the detail of the involved resources. The integration and cross references analysis of the information collected (also originating from the other applications of U-GOV) will enable a research activity complete overview from different analytic prospective: on a university level, by structure, by individual lecturer and researcher.

This rationalization process requires both a systemic vision of the principal strategic research areas and an ability to enhance the single special research features of the university. It must safeguard effectively the institutional research aims and social role belonging to the university system. For this reason CINECA as designer, developer and supplier of information systems plays a key

³ <http://www.openaire.eu/component/content/article/207>

role. The constant challenge is not just about providing system support but also acting as glue between different university realities, sometimes establishing efficient processes sometimes simplifying or homogenizing the ones in place.

A relatively new task is the U-GOV Research adoption of CERIF data model and semantics.

As a CRIS, the system should be based on a common model or at least agree on a common dataset, rather than provide ad hoc integration and interoperability services. At any rate, the task has not been started yet because the universities, who are actually the CINECA owners and the U-GOV road-map makers, do not consider it as a priority. In fact, in Italy it is currently running the National Research Assessment Exercise and it was recently approved a legislation that forces universities to switch the accounting system from financial to general ledger no later than 2014. It means that CINECA commits to put in production the U-GOV Accounting modules in 50 universities within the next two years. It is therefore obvious that Italian universities have currently neither time nor resources to face a new challenge such as their CRIS conversion to CERIF. Also because they feel as they do not need it. In this sense would be very useful to examine and show them a real working case study.

However, as well as for the knowledge/technology transfer process, a pilot project should be initiated and the case study might regard the automatic transmission of metadata project from OpenAIRE systems to U-GOV “Project Management” module.

References

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