ACADEMIC NETWORK TANGIBILIZING UNIVERSITY LEGACY

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Abstract

Universities are huge and rarely ordinary people know what is being produced there. How can society identify who knows what in a University? Where are the experts? Where are the researchers with the same scientific interest? How can someone map the knowledge produced in University? Those are some questions that motivated the development of ActivUFRJ, an Academic Network that supports university activities.
ActivUFRJ is an academic network developed by undergraduate and graduate students supervised by researchers to support social and academic activities. It is always incorporating new services and tools required by users. Design using cutting-edge technology used in Facebook, it can have thousands of active users connected in the same time.
ActivUFRJ supports many activities: disciplines, supervision, projects, events, team labs, etc. Focusing on the interaction and communication between the users there is chat, blog, microblog, messages, forum and news. Its design allows the collective construction of knowledge through wikis, blogs, file sharing, favorite websites and many other tools. The intellectual property of the students is available to the students of the next classes. Allowing disciplines to have a spiraling construction of knowledge. The intellectual heritage of the university is intangible. However, ActivUFRJ makes the University Legacy tangible.
ActivUFRJ is an official social network of Federal University of Rio de Janeiro since 2011. Anyone of the academic community can have a profile. Undergraduate students do their final graduation work developing new services as a recommender system to recommend opportunities (Professional internships, scientific initiation) to users. Graduated students develop their thesis working a reputation model. ActivUFRJ has dynamic construction by students that direct its future.
In this paper we will describe different aspects of ActivUFRJ utilization showing how this academic network can change the university pedagogy, how it gradually is mapping academic knowledge and how this utilization allow that academic legacy can be explicit.

Keywords: social network, academic network, computer supported collaborative work, collective intelligence

1 INTRODUCTION

Universities are traditional institutions where academic formation is given on a background of state of art research. University activities should then rest on the balance of its solid standing tradition and the cutting edge of new science discoveries. The challenge resides in preserving the well established education and simultaneously changing it to conform with the advent of new unfolding knowledge. Teaching being one of the most conspicuous outcomes listed in the roles of academic chores, nonetheless it is just the front end in a hole range of other activities that sustain the quality of a university. Conventionally, orchestration of all those activities rely on personal initiative of students and staff alike. However, the current exponential grow of knowledge frontiers may encumber an already difficult task of keeping the university in one piece. Seemingly, this accelerated pace of evolution affects also society as a whole. Society, in its turn, has elected electronic social network to cement human interaction and keep apace with this ever changing world. Following this successful intervenience in the broad society, social networks next mission falls to harmonize the diverting forces straining relations in the academic world.
In this paper we will describe an Academic Network - ActivUFRJ[1] - that can support academic community to improve their activities and help teachers to change their pedagogy. ActivUFRJ is

[1] http://activufrj.nce.ufrj.br

allowing academics to explicit their knowledge - the university legacy - at the same time that it is gradually mapping everything that is being studied.
ActivUFRJ is an official academic network at Federal University of Rio de Janeiro, Brazil. The university has 52 units and supplementary organs, each linked to one of the six centers. Its student body is comprised of 48,454 undergraduate students with active enrollment in 157 undergraduate courses and 7,333 distance learning courses with 5,381 graduates / year; Already in the postgraduate are 5,389 students of academic masters, 615 of professional masters and 5,538 of doctorate. Of a total of 3,735 active teaching staff, 2,982 are Ph.Ds, 78 Ph.Ds, 575 Masters and 48 Specialists. In addition, the College of Application has about 760 students enrolled. UFRJ has 508 postgraduate courses, being 326 *lato sensu* (specialization) and 182 *stricto sensu* (M.Sc. and Ph.D. degree). Similar to undergraduate courses, each postgraduate program is linked to an academic unit. [2]

2 ACTIVUFRJ

2.1 Virtual Learning Environments or Social Network Sites

Virtual Learning Environments are computer-based environments that allow *course management*, *content delivery*, *online collaboration* and *student tracking and assessment*. It leads to *knowledge sharing between the actors inside a course*.
Usually a VLE allows the implementation of courses based on constructivist principles encouraging the publication and the communication among the actors involved in the process. Although this model has been used successfully, within its proposal, there are some aspects to consider:
First of all, the purpose of a VLE is to maintain interaction with students during a course, ceasing to exist at the end of the course and not worrying about the "outside of the classroom environment". As a consequence, the material produced by the students in a course is generally not reused in subsequent classes.
Secondly, Universities produce knowledge through numerous processes beyond their teaching and learning relationships, such as: research projects, extension activities, etc. It would be desirable that this knowledge could be shared through a platform with more open characteristics than a VLE, which could favor the interaction between students, researchers and teachers, according to their interests, making this sharing more flexible outside the course environment itself.
According to Boyd and Ellison [1], "A Social Network Site is a web-based service that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system."
In this sense, it is considered that Social Network Sites are more suitable tools for this purpose, because they enable a profile management, creating connections between any users and knowledge sharing with anyone, supporting the collective Intelligence [2].
Although the SNS model has been used successfully for social, professional, and business connections, it would be interesting for the researchers at a University to establish their relationships based on their academic interests and knowledge they produce. Academic Social Network Sites (ASNS) [3] are Social Network Sites designed for *managing academic production.* It also can be able to *manage user's skills and competences* eventually allowing *social endorsing of these skills and competences*. An ASNS should provide *research dissemination* through *document management capabilities* and recommendation of such documents as well as provide some *research impact measurement*.
To fit the current needs of the University, a mix of VLE and SNS environments could be more appropriate. In this paper we call this alternative environment a "Collaborative Learning Social Network" (CLSN). A CLSN can work as a VLE supporting the courses offered by the University, allowing the dissemination of the knowledge built by students of these courses, acting as a SNS. In addition, it could work as an ASNS registering and mapping the academic knowledge produced within University itself and, at the same time, as a SNS allowing match of peers according to their interests. Considering all these scenarios, it can be said that a CLSN extends the academic daily activities to the virtual world.
In order to compare related works to ActivUFRJ a framework with the main characteristics of the presented models is shown in Section 4.

[2] http://www.ufrj.br

2.2 Defining ActivUFRJ

The ActivUFRJ (Integrated and Virtual Cooperative Work Environment) is a system developed by Tércio Pacitti Institute for Computational Applications and Research (NCE) at the Federal University of Rio de Janeiro (UFRJ). It can be considered a Virtual Learning Environment (VLE), and is used as an educational platform already recognized by the institution itself. On the other hand, ActivUFRJ also brings together students, teachers and researchers with similar interests, who can share documents and information, such as classes, articles and presentations, like in a Social Network Site (SNS) system.

Online since 2011, the ActivUFRJ platform has already been used by several professors / classes in several undergraduate and postgraduate courses at UFRJ, and is recognized by NEAD (UFRJ Distance Education Centre) as one of the official distance learning platforms of UFRJ. As a social network, the platform also works by supporting councils and working groups, facilitating the interaction between researchers and managers of UFRJ.

The ActivUFRJ development team maintains its active development with an average of one new version per month, meeting, as far as possible, the demands of new implementations produced by its own user community.

The tools developed for ActivUFRJ will allow UFRJ to be mapped and connected in the future so that anyone can discover their peers within their areas of interest and share their productions.

2.3 ActivUFRJ's tools and services

The ActivUFRJ is able to manage user's profiles (Fig. 1) and the relationships between users, grouping them in communities (Fig. 2) that may represent classes, working groups, councils, etc. This environment offers the following services and tools: an online document editor (wiki), a file repository, blogs and microblogs, a personal schedule, message boards, instant and email messages, a glossary, a social bookmark, a project management tool, plus a perception mechanism that allows users to know what their peers are doing. Also, in order to support classes like a learning environment, there are video lessons, evaluations and surveys and a task accomplish workflow tool.

Modification of all community services are collaborative by default granting users to contribute to knowledge construction, or may be private as desired. Those services also use collaborative tagging of content, creating a folksonomy system that helps the retrieval of those contents.

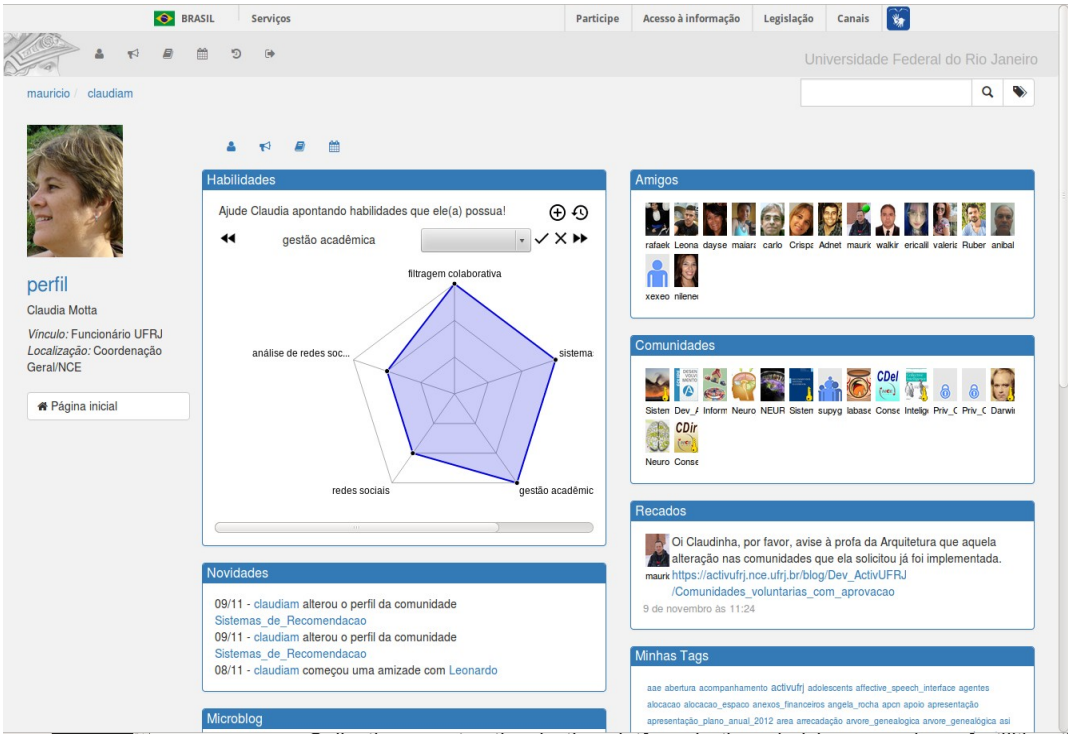


Fig. 1 - Main user profile

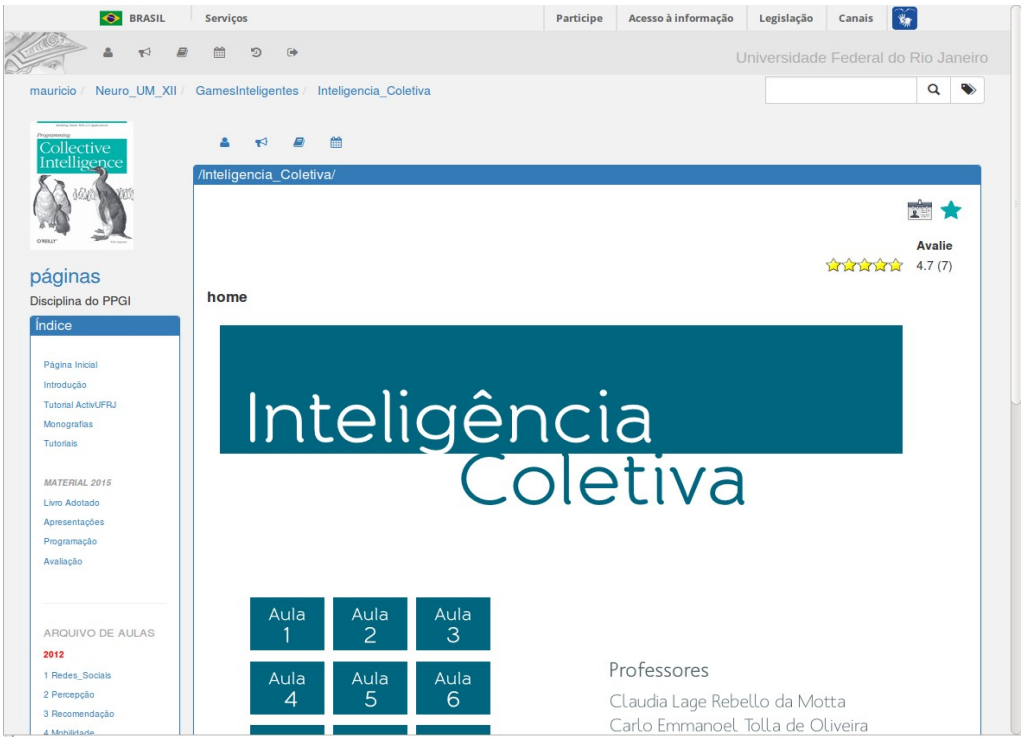


Fig. 2 - Community homepage

2.4 Academic activities

Universities are huge and rarely ordinary people know what is being produced there, the result of all activities. How can society identify who knows what in a University? Where can you find the experts? Where are the researchers with the same scientific interest? How can someone map the knowledge produced in University? Those are some questions that motivated the development of ActivUFRJ, an Academic Network that supports university activities.

There are several academic activities in a University. Some activities are related to supervisor or researcher and her/his team like researching and developing new technology or products; writing books or articles, following the final course project or scientific initiation work; discussing topics of a master dissertation or Ph.D. Thesis, coordinating a conference or workshop and so on. There are activities related to collegiate as congregations, councils and commissions. Each one needs specific functions and services.

The main activity of University known by society is related with courses: classes and disciplines. There are many systems already developed specifically for discipline's management. They are complex systems, as they must attend the specificities of each course. ActivUFRJ does not work with this approach. At UFRJ we have the **SIGA** (Integrated Academic Management System) developed specifically for this purpose. ActivUFRJ approaches is concerned with didactic, pedagogy, interaction, group memory, collective intelligence and collaborative learning.

ActivUFRJ developers are always including new functions and services in other to meet the new demands. As university community appropriates its features, new demands are requested.

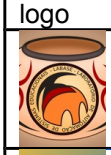
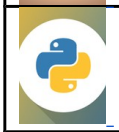
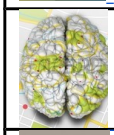
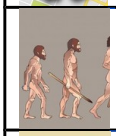
2.5 Collective knowledge construction

Knowledge in a university is worked in several instances, each one with its own environment. Courses, research projects, research laboratories, research groups, graduate and postgraduate programs are example of instances where knowledge is produced, mostly unaware of each other. The ActivUFRJ platform provides a working environment where those instances can build their knowledge and share with other instances.

Each instance is provided with an ActivUFRJ Community that holds all information and helps to coordinate efforts of the participants in building a coherent work. ActivUFRJ helps to keep track of all relevant work in each community and also helps them to intermingle and gather into larger and complex instances. Table 1 shows actual communities samples and their collaboration. Several ActivUFRJ support features used inside the community or shared across the platform enact the collective construction. Mostly, all information of each community is accessible by any registered

member. This allows easy linking and embedding across communities. One wiki page, archive or blog post in a community can be referenced and used by other communities.

Table 1 - Actual communities samples and their collaboration

logo	purpose	collaboration
	LABASE: Research lab for education software construction	Build software for Neuropedagogy and Jeppeto, develop courses for SuperpythonEM
	SuperPythonEM: Secondary students studying the Python programming language and producing games	Uses Jeppeto documentation and build games for Education + Cognition
	Neuropedagogy: Post Graduation level discipline working neurocognitive aspects of education	Uses games developed by LABASE and SuperPythonEM. Shares references with Evolution + Cognition
	Evolution + Cognition: Ms.C. research project about cognition and Darwin theory of evolution	Develop theoretical reference used in Neuropedagogy and refers to games in SuperpythonEM
	Jeppeto: Funded project to develop a game builder to be used by teachers	Provides Game engine to SuperpythonEM, Neuropedagogy and Evolution + Cognition

Although each community has many common platform resources, ActivUFRJ allows for customization on extra resources. For example Labase and Jeppeto have a resource to gather game assets as shown in Fig. 3. Neuropedagogy and SuperPythonEM as teaching communities have a forum where interest topics can be discussed. As required needs arise, ActivUFRJ has a responsive development team to fix, configure or design a new resource.

Fig. 3 - Game Assets Gallery

Collective construction in the platform is threaded by a number of utilities that match each level of interaction. Initial brainstorms can start in a collection of microblog posts, interactive chats or forum topic posts and replies. Commented links to references can be gathered in a favorites page. A higher level of information is registered in blogs, archives and wiki pages. Comments can be attached to these utilities as a form of interaction.

All interactions are time stamped and the author is marked as an active link. The progression of information so constructed constitutes an ethnographic record, tracing the historic timeline on how the

knowledge was obtained. Every participant is notified of any interaction, either by email or by a page that collects links to each update. Updates can also be sent on demand by explicit referencing a user or community.
Henceforth, academic information is mostly up to date within the platform. Students and staff can count on platform resources to keep up with the most state of art knowledge available to university members. Pristine information is published in the platform before it is published anywhere else, and is preserved there for years to come. This comprises a living corpus for the university, always changing and always standing as a dynamic knowledge.
Any instance of the platform resources is available to all participants, unless stated otherwise by the community leaders. Membership is permanent, even after conclusion of degrees. Any member can then collaborate with any instance by posting comments or requesting to join any community that is open for new members. Organization enhancements can make use of tags for better classification of knowledge. Searching with tags can bring focused results spanning all open information within the platform. Comments and membership inclusions are also time stamped enhancing the ethnographic timeline.
Instances with different profiles can collaborate to build up collectively a common knowledge. The most usual way is shared membership. Any participant in the platform can belong to as many communities as required. With full access to those communities, these shared members can convey information across community borders. In the example at Table 1, researchers at LABASE post blueprints of their proposed games at Neuropedagogy. Students in this course bring the blueprints to a fully-fledged specification. Interns at SuperpythonEM use the specification to develop a game based in neuroplasticity and install it within the platform. Finally the research student at Evolution + Cognition publishes the game and uses it as an experiment for her work. ActivUFRJ provides a REST API to its database, so the games can exchange data with the platform. Recorded game data is accessible by the same API in order to be analyzed by the researcher.
Any community can make use of published resources from others. Any work developed by university member is considered intellectual property of the university. Therefore, free interchanging of ideas suffers no hindrance from legal constraints. The platform just makes it simpler to make use of the knowledge that would be otherwise disperse and hard to access. Newcomers to the university have a link in the enrolment form to gain access to the platform. They can explore freely all the existing communities, representing research, training, development and taught courses. ActivUFRJ is already a thriving community with thousands of members and hundreds of academic instances.

2.6 Groups mapping

University premises spans into a wide diversity of individual and group requirements. ActivUFRJ attempts to provide likewise refinement for such a diversity. Groups being the construction block for the platform, they assume several roles fitting many academic standard instances. Groups and members can be decorated with a choice of capabilities that can be chosen from a given list. The combination of these capabilities provides the scope that matches the various present requirements. Furthermore, at group creation some standard combinations are offered to initialize the most ubiquitous needs in the university. The Table 2 shows some present configurations available to group customization. Some are already in the production version but the others are only partially implemented in the development version.

Table 2 – Groups Configuration

Configuration	Description
Vanilla	Basic group with no decorations for non-specified use.
Teaching	Group assigned to a teaching class. Students can be members at enrolment.
Research	Researching laboratory or research project. The leader assigns members.
Workshop	Hosts workshops or conferences. Candidates can sign up for membership.
Development	Production and development groups. Kanban resource for task assignment.
Department	Web site for academic units. Has public access and a direct URL.

A Vanilla deployment comes with wiki and microblog, any other resources must be configured afterwards. Teaching communities came with resources for teacher class management, construction and application of tests with graphic reports of grades. There is also a resource to manage individual and group assignment. Research groups give the leaders full control of participants' membership, which can be assigned or revoked at any time. Workshop communities open a public page for candidates. It provides personal data and space for abstracts. Workshop committee can work through

the candidate list and elect the accepted entries. Workshop groups have a video class resource where a presentation video and corresponding slide show are synchronized. Development groups have resources for tracking member task assignment and completion. Department groups are arranged in the form of a web site, published for access outside the platform. The unit can assign a URL to this site and the platform appearance can be changed through a CSS file.
In fact, customization offers options to turn any group setting into another or a combination of any settings. Capabilities can also be added to conform any participant to any management requirement needed. Each resource can be configured individually or in-group to any of the four levels of privacy settings for read or write permissions. Levels are individual, group, platform, and world. Wiki pages and archives can be grouped in directories for easier organization and access control. Participants can also be grouped for class assignments or teamwork division. Each piece of knowledge allows tuning for ready worldwide publishing or tight protection of sensitive information.

2.7 Mapping skills and discovering peers

ActivUFRJ allows the academic commmunity to define their profiles and also maintain information about their skills to make themselves known to other users. The mapping of these skills was the result of a thesis [4] and a final graduation research work [5] that was incorporated to ActivUFRJ as another tool.

To enable skills mapping, ActivUFRJ gather information from three different resources:

1 – Data provided by the users about skills developed during their academic and professional life, as well as information on their expertise;

2 – Suggestion and social validation of skills made by from their friends on the platform;

3 – Suggestion of skills based on information extracted from “Currículo Lattes”[3], a national standard in registration of researchers curricula, adopted by most of the development institutions, universities and research institutes in Brazil.

Also, in order to qualify these skills we used the definition of the Dreyfus skills acquisition model [6], where there are five levels of skill development: Novice, Competence, Proficiency, Expertise and Mastery.

Through the intersection of the information collected by the different methods above mentioned, it is possible to map the skills of the users, as illustrated in Fig. 4.

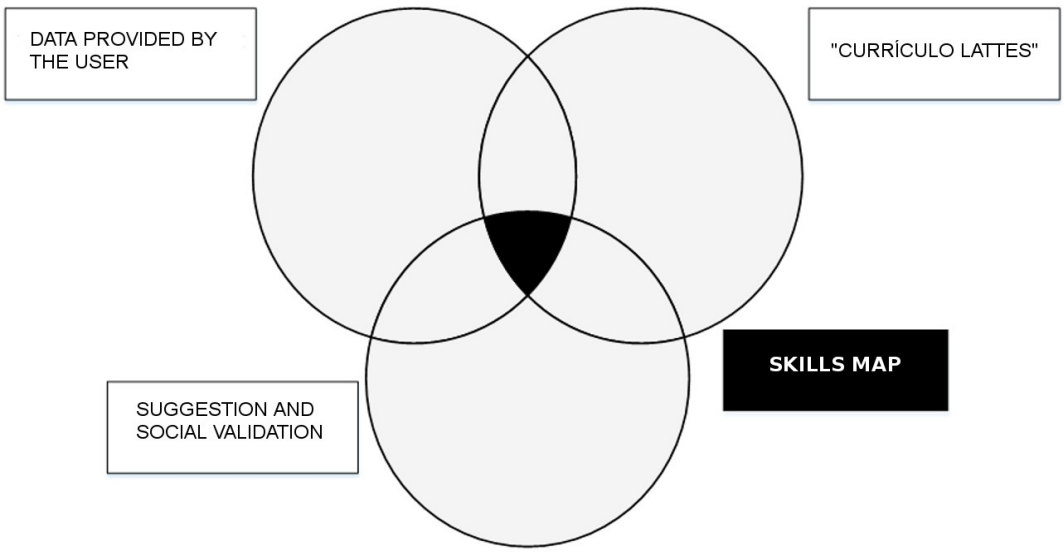


Fig. 4 - Mapping skills model

[3] http://lattes.cnpq.br/

This kind of mapping of the skills allowed the development of a recommender system. Currently ActivUFRJ is able to recommend opportunities such as professional internships and scientific initiation. This mapping is also used in a social matching module where the users can find their peers based on their skills. There are three methods that can be used to find people on the platform:

- Using the search field to find users who have a certain skill;
- Visiting another user profile page where is displayed a graphical representation based on a radar type graph with information about his skills. This graph allows the comparison with the visitor's own chart as shown in Fig. 5;
- Enabling the recommender system and beginning to receive daily suggestions of possible friends based on the similarity of their skills and the number of common friends.

In the future, this system will be able to be used in order to recommend any artifact of the platform such as documents, files, video lessons, blog posts and so on.

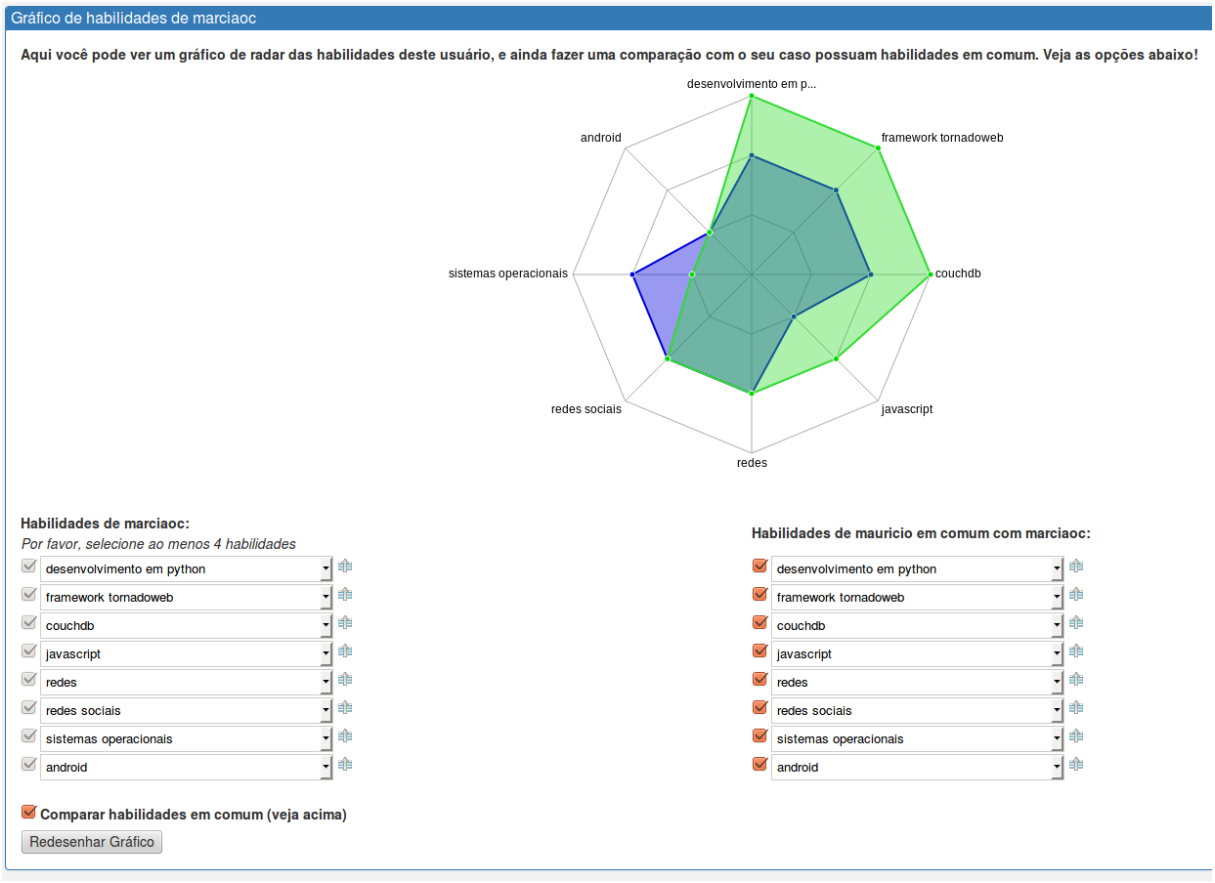


Fig. 5 - User's skills comparison

3 UNIVERSITY LEGACY

ActivUFRJ supports many activities: disciplines, supervision, projects, events, team labs, etc. Focusing on the interaction and communication between the users there is chat, blog, microblog, messages, forum, and news. Its design allows the collective construction of knowledge through wikis, blogs, file sharing, favorite websites and many other tools. The intellectual property of the students is available to the students of the next classes. Allowing disciplines to have a spiraling construction of knowledge. The intellectual heritage of the university is intangible. However, ActivUFRJ makes the University Legacy tangible.

ActivUFRJ allows that academic production not only be saved for future work but it also can be shared with other groups or be widespread on Internet. It offers tools and services to explicit and register the process not only the product.

4 RELATED WORKS

The following comparative table (Table 3) shows a framework with the main characteristics of the presented models. To make this comparison, some products were chosen according to their popularity and their proposals of performance. Thus, as a representative of a VLE, Moodle[4] was chosen; Academia.edu[5] and Researchgate[6] and LinkedIn[7] also were chosen, as SNS products. Finally, as a representative of the CLSN category, the ActivUFRJ was included, as it has totally or partially the requirements of all models presented.

Table 3 - Comparison of some VLE, ASNS e CLSN examples

		Product	Moodle	Academia.edu	Research Gate	LinkedIn	ActivUFRJ
Collaborative Learning Social Network	**Virtual Learning Environments**	Course management	X				X
		Content delivery	X				X
		Online collaboration	X	X	X		X
		Students tracking/assessment	X				X
		Knowledge sharing inside the course	X				X
	Social Networks	Profile management	X	X	X	X	X
		Manage connections between any users		X	X	X	X
		Knowledge sharing with anyone		X	X	X	X
		Supports collective Intelligence		?	?	?	X
	Academic Social Networks	Manage user's skills/competences				X	X
		Social endorsing of user's skills/competences				X	X
		Manage academic production		X	X	X	(*)
		Document management capabilities	X	X		X	(*)
		Supports research dissemination		X	X	X	(*)
		Research impact measurement		X	X		(*)

(*) Partially implemented

5 CONCLUSIONS AND FUTURE WORK

Universities underpin the whole fabric of knowledge necessary to keep the world evolving. This solemn responsibility widens at every new step science takes in conquering the future. All those endeavors in the academic institutions to stay put with this mission are a deserving cultural accomplishment on its own. A platform such as the ActivUFRJ enables the transcription of every contribution to the construction and dissemination of knowledge, leveraging each act to the better of its effectiveness.

The platform resources improves organization, fostering collaboration and widening the outreach of new studies and discoveries. The interchange between education and research is a hallmark of ActivUFRJ in which students, teachers, researchers and all members of staff are assigned with the same level of consideration and are entitled to the freedom to collaborate. The platform takes into consideration any piece of work, assigning the due credit to its author. Information and knowledge are then free to flow whistle being protected and preserved from misuse and tampering.

Insofar, ActivUFRJ is coincidentally the nurture and the product of academic activity fully-fledged. Innovation from research studies in the university are readily considered to improve the platform productivity. With an operational developing team, new services and tools are added tho the platform every week. Current research in the fields of recommender systems [7], reputation [8] and social matching [9] are impending additions in the near future.

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[4] http://moodle.org

[5] https://www.academia.edu/

[6] https://www.researchgate.net/

[7] https://www.linkedin.com/

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