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The personal research portal: web 2.0 driven individual commitment with open access

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Abstract

We here propose the concept of the Personal Research Portal (PRP) – a mesh of social software applications to manage knowledge acquisition and diffusion – as a means to create a digital identity for the researcher – tied to their digital public notebook and personal repository – and a virtual network of colleagues working in the same field. Complementary to formal publishing or taking part in congresses, and based on the concept of the e-portfolio, the PRP is a knowledge management system that enhances reading, storing and creating at both the private and public levels. Relying heavily on Web 2.0 applications – easy to use, freely available – the PRP automatically implies a public exposure and a digital presence that enables conversations and network weaving without time and space boundaries.

Introduction

In a *Knowledge* Society, the main problem knowledge workers[i] have is invisibility: if people don't know that you know, and people are not aware of what you know, you are not. In a *Network* Society, the main problem that nodes have is being kicked off the network: you are worth what you contribute, if you don't contribute, you are not worth a dime.

Digital technologies have forever changed the way knowledge is disseminated and accessed, in at least two crucial ways. First, diffusion procedures (publishing, broadcasting, etc.) have been getting infinitely easier and cheaper for those digitally initiated (the 'digerati'), but still remain surprisingly arcane for the ones on the dark side of the digital divide, less digitally literate and, thus, less prone to benefit from all the advantages of '*online casting'*. Second, intellectual property rights – and their trade – have seen their basements dynamited by the fact that a digital copy has certain characteristics of a public good insofar as it is a copy and as such can be duplicated and disseminated. Under this approach, the tension between 'coffee for all' and private property has caused an increasing strengthening of copyrights with a parallel adoption of new licenses aimed for the maximum spreading and sharing of content.

In view of this scenario, researchers, scholars and civil society organizations from developed and developing countries[ii], are pressing governments and institutions to foster Open Access (OA) for their documentation: this means that documents are 'digital, online, free of charge, and free of most copyright and licensing restrictions' (Suber 2005a). OA can be considered a way to achieve universal reach of research diffusion at

inexpensive and immediate levels[iii]. Most OA efforts have been aimed at the institutional level, devoting little energy to what the individual can do to contribute to this goal. Even though there are some valid reasons for this imbalance, there is ample opportunity for the individual to make a difference.

The philosophy and tools around the web 2.0 seem to bring clear opportunities so that these people, acting as individuals, can also contribute, to build a broader personal presence on the Internet and a better diffusion for their work, interests or publications. A Personal Research Portal, fostered and built individually, with the help of Web 2.0 applications and services, helps bringing into the spotlight underrepresented researchers and subjects, such as researchers from developing countries, junior experts or vanguard disciplines and topics not yet into the mainstream scholarly landscape and academic publishing systems. Indeed, the nature of ICTs – and the Internet in particular – do open a new landscape for knowledge exchange not necessarily mediated alone by institutions.

This paper aims to explore how individuals can contribute to the diffusion of research in the OA paradigm by means of social software and web 2.0 technologies. The example of the Personal Research Portal – a concept more than an artifact – can contribute to making knowledge more accessible to other researchers, but also provides a model by which international research networks might be fostered. In detail, the paper analyzes how the PRP can contribute to creating an 'online identity', how this identity can help to create a network and how digital publishing is the currency of this network.

A Background Note on the Open Access paradigm and Open Access for development

Before entering the core of our article, we would like to expand a little bit the fact that access to knowledge is crucial for the development of research and, hence, for the progress of the society. In 2002 the Open Society Institute initiated the Budapest Declaration, supported by a group of scholars and seconded since then by thousands of signatories. The Declaration states:

> *Open access to peer-reviewed journal literature is the goal. Open access to peer-reviewed journal literature is the goal. Self-archiving (I.) and a new generation of open-access journals (II.) are the ways to attain this goal*
> (Budapest Open Access Initiative 2002).

This set the basis of OA was later complemented by the Bethesda Statement on Open Access Publishing (2003) and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003), with the aim to both give some definitions and commitments related to the OA paradigm. The transposition to a developing world framework took place in Brazil more than three years later with the Salvador Declaration on Open Access: the developing world perspective (2005) and was revisited at the Bangalore Declaration: A National Open Access Policy for Developing Countries (2006). As stated by Suber and Arunachalam (2005) "[f]or researchers in developing countries, OA solves two problems at once: making their own research more visible to researchers

elsewhere, and making research elsewhere more accessible to them". Of course, this statement does not only apply to developing countries.

Most of these manifestos emphasized the role of institutions in fostering OA, being the main target scientific journals. But, in Peter Suber's words (2005) "OA archiving is even more promising than OA journals. It is less expensive, allows faster turnaround, and is compatible with publishing in conventional journals". Hence, OA archiving's "key benefit for developing country scientists is that global participation could take place without further delay" (Chan and Kirsop, 2001). As some literature shows[iv], open archiving usually happens at the institutional level, at "'Institutional archives', administered by universities or research institutes for members of their community" (Chan et al. 2005). The initially identified benefits of open archiving – cost, immediacy, flexibility – can play havoc with by the institutional procedures, where dedicating personnel to new initiatives is expensive, tempos are slow and bureaucracy inflexible. Indeed, institutional repositories might still be isolated, not contributing to a researcher's visibility or content availability.

Ironically, even having gone open the problem might persist: researchers still need broad access to knowledge, high visibility and network weaving at low costs and highest flexibility to cope with the speed of times.

The personal research portal

The approach we here want to present is closely related to the concept of e-portfolio, but not from the learner's point of view but the researcher's:

> *An e-portfolio is a digitized collection of artifacts, including demonstrations, resources, and accomplishments that represent an individual […]. This collection can be comprised of text-based, graphic, or multimedia elements archived on a Web site or on other electronic media.* (Lorenzo and Ittelson, 2005).

As e-portfolios are usually associated with students and teaching, we here propose the term "personal research portal" (PRP) to avoid confusion.

E-portfolios are usually associated with students and teaching rather than with researchers, their main goal being for students to gather and present their work for assessment; therefore the term 'personal research portal' (PRP) is introduced here as an alternative, whereby its main goal is to act as a knowledge 'gatherer', contributing to

1. Increased access to international research output
2. Enhanced access to research generated by non-mainstream disciplines or experts
3. Promotion of institutional research output
4. Improved citation and research impact
5. Improved access to subsidiary data, and
6. A strongly facilitated peer review[v]

To achieve this, the PRP should be a low cost, highly flexible virtual space, which supports:

- Hosting a repository for personal production, with public aim, with past and present (work in progress) information and documentation, being everything linked to and fro;
- Gathering digital resources, news, general information and materials on the same platform, accessible from each and every computer with an Internet connection;
- Self-archiving and self-publishing research results, including the ongoing research, reflections, doubts, findings – avoiding waits and delays;
- Informing what one knows and that one knows
- Increase one's visibility, enable networking and knowledge sharing

(Peña-López et al., 2006)

All in all, the PRP tracks the 'read-think-write' routine performed by scholars and scientists involved in research. The big difference with publishing is that the PRP should not only keep record of stock knowledge –formal knowledge that lasts or should last – but also keep record of flow knowledge – non-structured knowledge that is not intended to stay for long because it is devoted to foster exchange[vi].

As it happens with Personal Learning Environments, there is not such a thing as *the* PRP, but *many* PRPs could potentially be built from a mesh of different applications to fit the concept. We nevertheless believe that the core set of applications of a PRP are as follows:

- A static web site with personal and professional information, drawing the researcher's profile;
- A blog, where to note news, reflections and most 'flow' knowledge arising from readings, research results and hypotheses;
- A blogroll, understood as both a live reader for the researcher and a live bibliography of bookmarks for the community;
- A wiki, where 'stock' knowledge is stored but allowing it to evolve along time and with the collaboration of third parties;
- A bibliographic manager, with online access to all or most records;
- A personal repository to (self-archivee) published papers and (self-published) preprints, working papers, presentations, syllabuses, etc.;
- Other tools such as social bookmarking tools, file stores (image, sound, video), and so forth; and.
- RSS feeds for each and every dynamic page

In other words, the PRP can be imagined as a lifetime personal web space "magnificiently equipped (with software, communication, search, and multimedia tools), beehive[ly]-configured […] that possesses sufficient organizational plasticity to accommodate the user's developmental capacities and needs across a lifetime" (Cohn & Hibbits, 2004). From a researcher's point of view, these capacities and needs are related with their inputs (readings, conversations), transformation processes (reflections, peer reviews), and outputs (communications, preprints, papers).

There are notwithstanding two caveats to be made. First, this individual reporting alternative is in no way a substitute to the stated ways of institutional OA publishing, but a complementary one that has some exclusive characteristics only attainable by this means. Second, along the same line, this is in no way a substitute for mainstream ways of publishing and validating scientific outcome but, again, a complementary one. We will deal about this issue later on.

A Background Note on Social software, the Web 2.0 and DIY web technologies

In the last years new, user-friendly web tools have appeared which moreover are often interconnected in such a way that communication and collaboration can take place. 'Social software' – blogs and content management systems, wikis, message boards – actually finds itself embedded in a wider concept, the Web 2.0, based on contribution enhanced by and taking place in the World Wide Web, easiest online publishing and simultaneously creating a creation a network of both content and authors.

Another important feature of these 'do-it-yourself' web technologies is that they are usually licensed under free software licenses – so they can be installed and used for free – or/and are hosted by a provider that allows free use – often sponsoring the service through advertising. In either case, the cost for the user is restricted to a personal computer connected to the network, while the benefits are significant.

These cheap and accessible technologies:

- Provide a way for researchers and experts to easily share, make public, diffuse their findings;
- Make all information published this way easily available to anyone;
- Help tracking the author of a specific content or an idea;
- Enhance the creation of communities, where the more everyone joins a community, the richest it becomes.

The high level of economic sustainability of the PRP model is one of the main highlights. Besides the required tools, the cost of hosting services for those aiming to install free software applications to be run under their own domain is constantly decreasing. In fact, some of these services are even free, hosted in institutions (e.g. universities) or supported by advertising. Being one of the major problems that researchers face is lack of necessary funding (Brooks et al., 2005), decentralized web 2.0 tools as described above can contribute to alleviating this aspect, by providing an alternative means for researchers to circumvent costly infrastructures and formal institutions, yet allowing them join international research communities, access relevant information and make results known..

Three barriers stand in the way of widespread usage of this model in a development context. First, infrastructure: while affordable and easy access to ICTs and the Internet are pending issues around the globe, public libraries or civic centers increasingly provide free or low cost access, as do private telecentres. Although an in-depth analysis of these issues goes beyond the scope of this paper, it is worth stressing that web 2.0 technologies demand relatively low computing power (in terms of both hardware and software). A second major barrier is user capacity, which is often limited in some countries and age

segments, in part due to the limited exposure to ICTs as described above. Computer skills are however increasingly addressed in political programmes, and moreover, web 2.0 applications and social software are designed for non-technological users. Thus, even with a relatively low level of digital, technological and informational literacy can a user achieve interesting results and foster a 'conversation' (Levine et al.,1999) among peers and scholars. Third, dissimilar cultural backgrounds and different mother tongues affect the ease of knowledge flow on online fora, but this aspect extends beyond ICT-enabled interaction; moreover, precisely the adaptability of web 2.0 technologies can stimulate the formation of local communities, providing a way by which this problem can be circumvented.

A PRP prototype

So what does a PRP look like? What does it involve? The underlying principle is that "instead of building new applications from scratch, […] it makes sense to concentrate in the future on systematic combinations of existing Open Source tools for learning and competency development" (Kalz, 2005). In this light, the design and implementation process is as interesting as the goal:

> *The combination of e-portfolios, social networks and weblogs may have immense benefits for the learner. These tools and the ethos behind them enhance the prospect for deep learning. Creation of a learning landscape where learners engage in the whole process both academically and socially should increase the opportunity to build one's learning instead of just being the recipients of information* (Tosh & Werdmuller, 2004).

A 'one minute handbook' on how to build a Personal Research Portal would include the following components:

- *Domain and hosting*: A domain name is automatically associated with specific content and its managers and contributes to the 'digital identity' of the owner, as discussed above. Hosting allows autonomous tools to be integrated into the portal, in terms of services, shape, contents and so forth; it also helps to retain autonomy and even property rights on what is uploaded to the site.
- *Content management*: Static pages and most of the dynamic ones can be built using a content management system (CMS). Drupal or Joomla are open source varieties of such systems, with the advantage that they also feature blogs. Reversely, WordPress is a blog engine that can also be used as CMS. Alternative tools are e-portfolio applications such as Elgg and OSPI.
- *Collaborative tools*: In terms of collaborative tools, the options are clear: if the expected output is content, a wiki is probably the best option. If the goal is the process, the debate itself, then discussion fora are required. Appropriate applications might include Mediawiki or TikiWiki – for the wiki – and phpBB – for the message board.
- *Bibliographical tools*: While different bibliographic managers are available, there is little consensus in terms of the best bet. However, Refbase and BibCiter fit the

PRP purpose: both are web based and have RSS output. EPrints and Open Journal Systems work well for self-archiving and self-publishing, respectively.

- *Social software*: Many other applications exist to share bookmarks, photos and slideshows, podcasts, vodcasts, etc. Most of them are online services provided – and hosted – by third parties. An important consideration when choosing such tools is their capacity to import and export a user's data and the ease by which they can be linked in a PRP.
- RSS: 'Really Simple Syndication' (RSS) is an alternative means of accessing the vast amount of information that now exists on the World Wide Web. Instead of the user browsing websites for information of interest, the information is sent directly to the user (source: epolitix.com). In any case, RSS output, as the glue of such portals (Kalz, 2005) is a must.

When connectivity is not available and a user intends to work predominantly 'locally', XAMPP[vii] makes it possible to (re)install all these social software applications – in fact the whole PRP – on a hard drive or a USB pen drive. Indeed, it can work as a backup for our PRP and/or make it portable across different operating systems.

We suggest visiting the experiences of George Siemens[viii], Stephen Downes[ix], Helen Barrett[x] or the authors'[xi] to see what we consider good examples of a PRP.

Digital Identity

As we have already said, one of the main problems that researchers is invisibility. This invisibility has at least two major consequences:

- Minimum awareness and recognition of their findings, fields of work, interests even existence
- Difficult access to mainstream publishing circuits, in part due to the former point

In order for researchers and their work to be recognized in academic and practitioner circles at the international level, their visibility needs to be enhanced. Setting up a PRP can thus be understood, at a primary level, as the creation of a personal home page that builds "a virtual identity insofar as it flags topics, stances and people regarded by the author as significant" (Chandler, 1998). Notwithstanding, this digital identity – or the researcher's presence in the Net – is juxtaposed to the identity shown by authorship in paper journals and conference speeches, complementing each one the other one. While the later is strongly tied to a handful of concepts exposed in a determinate paper, the digital identity should give further information on the following aspects:

- The owner's identity (who am I);
- The owner's activities and interests (what do
- The owner's achievements (what have I done);
- The owner's contact details (where am I).

If mainstream systems – congresses, journals, seminars – act as diffusion hubs for offline identities, search engines, portals, third parties' blogs and institutional pages, signature

files in e-mails (specially when placed in discussion lists and message boards) act as diffusion hubs for online identities.

Nevertheless, there are, in our opinion, two main differences among both channels:

- The higher potential reach of online media;
- The *always* up to date information provided by PRPs: If managed properly, PRPs can show the latest news about a researcher's institutional affiliation, can include recent research trends and so on. In fact, if updated pages use RSS feeds and are correctly meta-tagged, human intervention is not necessary for the changes to be echoed in specific search engines and feed aggregators.

Overall, the main component of a PRP should be evolving, up-to-date information of one's own. Search engines, are web 2.0-friendly and award high rankings to dynamic pages with rich and focused content. Descriptions about one's research and interests, side-by-side to documents and other materials – as we will now see – and links to and from other people with similar interests enhances the possibility of being found under specific keywords. This information can be created through static pages by means of simple HTML documents or, better, using a CMS – or CMS-like features from other applications such as blogs. The blogroll can play a significant part in terms of linking and networking.

Reading, live storing and the public notebook: reinforcing the digital identity

The research process generally involves extensive note taking, as highlights of what has been read, reflections that arise after the reading or simply as a record of the fact that something has been read. Social software empowers researchers in such a way that their notes can be "published to the World Wide Web as a way to 'display and reflect on their learning' to an audience that is broader than just their classmates" (Ittelson, 2001). Moreover, "[knowledge] only works if each person makes links as he or she browses, so writing, link creation, and browsing must be totally integrated. If someone discovers a relationship but doesn't make the link, he or she is wiser but the group is not" (Berners-Lee 2000).

Such a digital notebook – in the shape of a blog, an important part of the PRP – allows the process of reading, writing, analysis, reflection and learning to be fully public: "Eventually, there will be publications in scholarly outlets, but there are both more immediate and more long lasting benefits. In the near term, ideas can be more readily implemented, data automatically collected" (Piccoli et al., 2000). Another immediate consequence of this way of working is that "less knowledge [is] left behind" (Cohn & Hibbits, 2001), as a live digital store is created each day, a store that is categorized, searchable and fully accessible.

The PRP here "represents a space where the relationship between memory and promise, the link between past and future is made possible", understood the past as Derrida's 'trace' and the future as Ricouer's 'promise'. Hence, a factual driven dynamic identity takes place by tracking the evolving researcher. To understand more about this dynamic

identity, we should go on with the way the researcher builds their own wengerian trajectory by creating new knowledge in the framework of their community[xii].

This identity is reinforced by the fact that content is categorized – tagged – according to specific keywords. And, besides the fact that categorization (and 'searchability', as everything is online) can be useful to the researcher, full accessibility is the key: not only data and information are accessible everywhere and everywhen to the owner or creator of the PRP, but also to other researchers. In view of enhancing accessibility to knowledge and visibility, this can make a difference. Through its inherent characteristic of immediacy, a PRPs provide access without filters and without waits: the PRP becomes a digital store of resources, news and current events, general information, academic materials and state of the art research. It should be noted that in some countries Internet censorship can obscure this aspect; however, this is a political problem rather than a technological or conceptual one, and so goes beyond the scope of this paper.

Joining the blog as a collector of 'flow' knowledge, 'stock' knowledge can be stored to the PRP by means of a wiki – allowing all sorts of content interlinking, tagging and categorizing – or uploading files to the server, being the aim increasing the information available as a whole and enabling collaboration: "personal skills and experience are just the sort of thing which need hypertext flexibility. People can be linked to projects they have worked on, which in turn can be linked to... [etc.]" (Berners-Lee, 2000).

In this context, bibliographic tools are also worth exploring. Their purpose is to organize one's references and to ease the task of citation. Some varieties of bibliographic tools are web applications, installed on a web server and run on web browsers. This allows not only managing but publishing one's references and bibliographies. This feature reinforces building one's digital identity by allowing cross-referencing in a body of knowledge which includes the owner of the PRP, and providing more rigour to the content shared on a PRP. A side effect is, indeed, and increased attraction for search engines which implies a better visibility on the Internet.

Writing and taking part in the conversation: network building

Social software is all about meeting colleagues, exchanging impressions and collaborating. Interconnecting PRPs capitalize on this capacity by taking advantage of automated linking methods.

Of the different software varieties and perhaps even more than search engines, RSS feeds are the ones that make really possible knowledge sharing in real time. RSS feeds allow subscription – that can be selective through tags –, syndication and aggregation to new knowledge created around the world. On the other hand, RSS fosters community building in many other ways: refbacks, pingbacks and trackbacks are surely the easiest – for they are mostly automatic – way to interconnect different PRPs. While these methods contain implicit technological linking, all linkback types require an explicit conceptual linking among different researchers that takes place when one writes about the work of another one that usually reads.

"Sometimes it feels as though the discussion concerns two different nodes. The 'eportfolio' used for final assessment / job seeking where the emphasis is on the product(s) and then the 'e-portfolio' used for reflection, deep learning, knowledge growth and social interaction where the emphasis lies on the process" (Tosh & Werdmuller, 2004). It is the latter that interests us over all: citation on a PRP using social software encourages social interaction, albeit driven by technology. Social networking can further be reinforced by comments on others' PRPs or the creation of 'Friend of a friend' (FOAF)[xiii] files and blogrolls. Specially these last two shape a virtual research network around the PRP and, actually, around its creator. And again, the extension of this behavior among other scholars enables the 'invisible' researchers being present in the relevant (virtual) fora, being known by other investigators and meeting for the first time investigators unknown to them. The PRP can, potentially, "seamlessly link individuals to larger communities, thereby facilitating interpersonal connectivity versus fostering social isolation" (Cohn & Hibbits, 2001).

In fact, "web pages are a form of asynchronous communication, […]" and can "mediatively interact[] with other people in [one's] absence... " (Chandler, 1998). Indeed, collaboration can occur, "reducing contact time while also increasing the quality of contact time" (Roberts et al., 2005). From this perspective, PRPs "can help people to define their own success through reflection with evidence often *enhanced with peer or mentor commentary*" (Roberts et al., 2005, emphasis added). Of course, such a peer review is not the habitual double-blind review that most journals follow, and possibly lacks some of the goodness of this kind of system. On the other hand, this open peer accompanying boosts networking and collaboration far beyond anonymous readers. A higher exposure makes that:

> *hypotheses [can be] more easily tested, thus reducing the cost associated with research ventures and increasing productivity. Similarly new researchers can quickly be integrated into ongoing projects and make contributions to the research or production engines […]. In the long term, the external visibility of the web-based research engine will promote a shift in organizational culture toward a more open and cooperative environment where knowledge augmentation and sharing are instrumental to individual learning and organizational development. In such a culture research engine participants will benefit from increased collaboration with qualified colleagues both within and outside the institution.* (Piccoli et al., 2000)

Overall, to take part of the conversation one must speak: the blog is, probably, a perfect tool to make one's voice be heard. Mutatis mutandis, commenting and linking is the way to let others know they have been listened to. Even if collective blogs are widely used, for collaborative work wikis or online office suites might become better tools in the near future. Of course, no conversation takes place by only speaking, so a feedreader will also become a perfect companion to one's blog.

Self-archiving, self-publishing

"Whilst the fundamental technical difference between the medium of speech and that of writing is that writing is automatically recorded, web pages introduce another key feature: what is written on a web page (and stored on a web-server) is automatically published" (Chandler, 1998). As mentioned above, some researchers face tough barriers to do such publishing. A tool like the PRP can help address this problem in different ways.

First of all, self-archiving of preprints and published works in a personal repository is an evident purpose for the PRPs to fulfil. Of course this does not solve the problem of access to journal publishing itself, but it does solve access to published works, both the access for researchers to content of mainstream journals and access to unpublished or non-mainstream content, often out of literature databases and indices because of their nature. A PRP will act, then, as a repository for these papers, so the output of the PRP owner can easily be found at a glance and easily consulted. "This complete openness may be an anathema to archivists and cataloguers as it abandons all attempts to control the system, but it was suggested that such an approach could greatly facilitate short term uptake [of knowledge]" (Roberts et al., 2005).

"Anathemic" or not, self-publishing goes one step further still in terms of challenging the faculty establishment, because it avoids peer review. Even so, self-publishing has its value, providing an opportunity for publication of interesting work that might otherwise remain unpublished, including peer-reviewed that might never see the light[xiv]. In this train of thought, works that need no review – newsletters, bulletins, opinion columns, datasets – or works that have already been reviewed – working papers, theses and other kind of dissertations – can obtain formal identifiers (ISSN or ISBN) and be published on a PRP without violating academic standards or other publishing norms. Under an open license, their publishing will contribute to increase the visibility of the author, shaping a digital identity, enriching the content of the site, making it more appealing to users and search engines and, all in all, helping any kind of research to have its place in the academic arena.

In the long run, an increased legitimacy of open access science can be expected, as its openness implies higher exposure and higher transparency in the whole reviewing and publishing process. Also, self-archiving and self-publishing undoubtedly increase the amount of scholarly literature available. The fact that the content lies on a personal repository also contributes in the strengthening of the researcher identity and network.

State of the Situation and Future Trends

As White (2007) has recently shown, there is still little but already significant use of some tools – wikis, social bookmarking, social networking, file sharing, RSS feeds, discussion forums and blogs – that are used for study or work[xv], being the blog the most important among them. Even if there is an evident age divide, it seems to be diminishing among scholars and, indeed, new generations will bring along with them the mastering of these tools.

Despite the digital divide which still restrains researchers at the digital competences level from capitalizing fully on the possibilities provided by these tools, virtual communities

have demonstrated their potential for bridging capacity divides, whereby technology stewardship take place naturally, nonhierarchically yet nonchaotically. The philosophy of openness and contribution of the Web 2.0 paradigm is thus helping to bridge the same skills divide that it also contributed to create.

More than just a matter of being published, or participating in knowledge communities, it is a matter of empowering the individual with (digital) means to master their learning and research process, and the fruit of it. "Discourse technologies are among the principal means by which we reproduce the artefacts of our culture. Culture is built of contexts[.] Novel discourse technologies enabled by ICT […] are increasingly important components of the contexts of our culture" (Roberts, 2006).

The creation of a digital identity is a means of empowerment, contributing to gaining control over one's life, but also participating equally in a globalized knowledge society. "Through [a] paper, through its form, the activity of research is dominant. [The researcher] cannot stop there, however. The act of undertaking research cannot be disengaged from the subject of research, or from the beliefs of the researcher" (Roberts, 2006). As such, the PRP – or whatever construct we made up – is, overall, an e-inclusion device. Provided there are infrastructures and skills to use them – the essential preconditions to play the game – it is possible to create a constructivist Internet where, multidirectionally, everyone and everything contributes to create a vast and public knowledge for progress.

Conclusions

Besides institutional efforts, we absolutely believe that there is a place for individual initiatives to try and bridge the biases and unbalances in the weight that researchers and research topics have in the international arena. And these initiatives have a perfect companion on social software tools.

As we have tried to explain, the main benefits of the Personal Research Portal are as follows:

- Build a digital identity – or a digital presence on the World Wide Web – that relies on a 'live' curriculum, and that is shaped not explicitly but through the content that 'wraps' and shapes this identity. The openness of the whole process makes it also easy for the researcher to be better positioned before search engines.
- Improve the amount of information and explicit knowledge that is available to anyone. Indeed, not only the quantity is enhanced, but the accessibility of it all: digital technologies reduce publishing costs, make content easier to find and, if the information architecture is properly designed (e.g. provides RSS feeds), makes it possible that the information actively finds the correct person, and not the contrary.
- The Personal Research Portal improves the way knowledge is managed by their owner. On one hand, it constitutes a real and public e-portfolio where all output can be stored, categorized, searched through and retrieved from anywhere. On the other hand, technology makes it also possible that this content is interlinked in many ways, thus enriching the content itself.

- Last, but not least, the Personal Research Portal contributes in building a semantic web where people and content are related one to each other. This fact helps building the researcher's network as personal and professional relationships are made explicit, be it deliberately, by taking part in the 'conversation', or unintentionally, mediated by content and technology.

Among the main challenges that this model still faces, here are the most relevant ones:

- The digital divide at the infrastructures level makes it difficult for people with little resources to maintain the required hardware, software or connectivity quality to properly access or maintain a fully online construct as a Personal Research Portal.
- Likewise, the digital divide at the skills level is also an important barrier to overcome. And not only technological and informational illiteracies, that limit the actual access to Information and Communication Technologies, but also a minimum level of *e-awareness* to understand the possibilities and benefits of such technologies.
- Reputation and reviewing systems in the digital world still need some tweaking. While some initiatives have brought more transparency to the traditional reviewing system, and the so-called 'wisdom of crowds' have proven extraordinarily useful in specific communities (e.g. free software developers), the tested benefits of double-blind peer review has yet to find its transposition in the virtual arena.
- Tied to reputation systems, the 'infoxication' caused by the huge – and rising – amounts of information available does demand urgent solutions to distinguish relevant from irrelevant content. Even if social software has provided some interesting initiatives (e.g. social bookmarking), there still is a lot of work to be done.

Undoubtedly, the future will be digitally enhanced. Only by taking the best of both 'worlds' – the digital and the analogue one (if such a difference makes any sense) – can science respond to the requirements of society. Knowledge workers need to understand the possibilities of new technologies to increase their research output, make it broadly available, connect with other experts and, over all, bring the knowledge back to the society. Challenges are many, but they can only be overridden by looking behind with yesterday's learnings.

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Key Terms and Their Definitions

Open Science and Open Research: often treated as synonyms, Open Science is a movement that promotes open access to content by digital means, the use of free software / open source applications to conduct research and the free availability of data sets (open data) used in this research. Besides philosophical considerations, many authors have stated evidence of better performance and more benefits for researchers being 'open'. The PRP is fully in line with this way of thinking, as it promotes maximum transparency and sharing.

Blogroll: Is the list of blogs that a *blogger* usually reads or specially likes. A dynamic list – as tastes and subjects change along time – it can be understood as an explicit representation of one's personal network of colleagues (reciprocal or not) and interests.

Linkbacks, pingbacks, trackbacks and refbacks: Linkbacks (general term for three methods: pingbacks, trackbacks and refbacks) help website owners to be aware of who has linked to their site. In our case, these methods are relevant to engage in the 'conversation' and discover people interested in the subjects dealt with in a PRP.

Comments: in this chapter, with *comments* we refer to the feature that some blogs and news sites have to write your reflections on a piece of content. In formal frameworks, these comments are usually signed and include a link to the commenter's web site. In the *blogosphere*, post-to-post and comment-to-post are rich ways in which exchange of ideas and debate take place.

RSS: usually based in XML technologies (though not only), an RSS feed is a content format that, among other things, tells machines – not humans – when a website was updated and what the new content is.

Feed readers: are applications that, from a user's point of view, work in very similar ways as e-mail readers do. They 'ask' a (subscribed) web site for new content and display it to the user if new content is found. The main benefit is that the user needs not browsing each and every web site and guess what the new content is.

Web/remote vs. local technologies: Web 2.0 applications are, by definition, hosted in web servers (i.e. not in a desktop) that are remotely accessed through a web browser. This usually implies permanent connection to the Internet. Nevertheless, some of these applications can be used locally (i.e. in a desktop or laptop) by replicating the installed setup of a web server (this is what XAMPP does – see note vii). This allows content being accessible without an Internet connection and, in some cases, to synchronized it with the remote database once the connection is re-established.

e-Awareness: a part of digital literacy, we think of e-awareness as the most conceptual and strategic of digital skills. It can be defined as the ability to understand the *real* impact of the changes brought by the Information Society in one's context. At another level, e-Awareness would also imply foreseeing and anticipating such changes, either to avoid or smooth their impact, or to benefit from them by adapting one's behaviour.

[i] For both an introduction about knowledge workers and the distinction between information, knowledge and the different kinds of knowledge being, please see Patton (2005). In our case, we will be using most times information and knowledge as quite synonyms,

[ii] A very interesting summary on OA for Development can be found in Chan et al. (2005).

[iii] See for instance Chan et al. 2005

[iv] For an interesting overview, see, for instance, Kirsop and Chan (2005)

[v] Adapted from Chan et al. (2005).

[vi] These definitions adapted from Peña-López (2006).

[vii] XAMPP is an Apache distribution that can be installed in one's desktop. In other words, this means that web applications – such as blogs, wikis and other Web 2.0 applications – can be run offline in a web browser.

[viii] http://elearnspace.org

[ix] http://downes.ca

[x] http://electronicportfolios.com

[xi] http://ICTlogy.net

[xii] These quotations and more about the concepts by Derrida, Ricoeur and Wegner can be found at Rossi et al. (2006).

[xiii] "Friend Of A Friend (FOAF) is an XML standard that allows website owners to define who they are as well as their relationships with other website owners – effectively creating a wide area social network" (Tosh & Werdmuller, 2004). Again, the point is not technology but the social networking uses.

[xiv] Think, for instance, of working papers or drafts for research projects that actually went through a peer review that, institutionally, lack of publishing interest, but that can provide useful insight about the reflections and making off that, later on, ended coming up with interesing results.

[xv] It is relevant to notice that, as the sample of the survey mostly belonged to Oxford University, it is probably not wrong to understand "work" as "academic work" or "work performed by scholars". Even if this work is not research, what is relevant in this case is not the use but the user, and the fact that he or she is skilled in these tools.