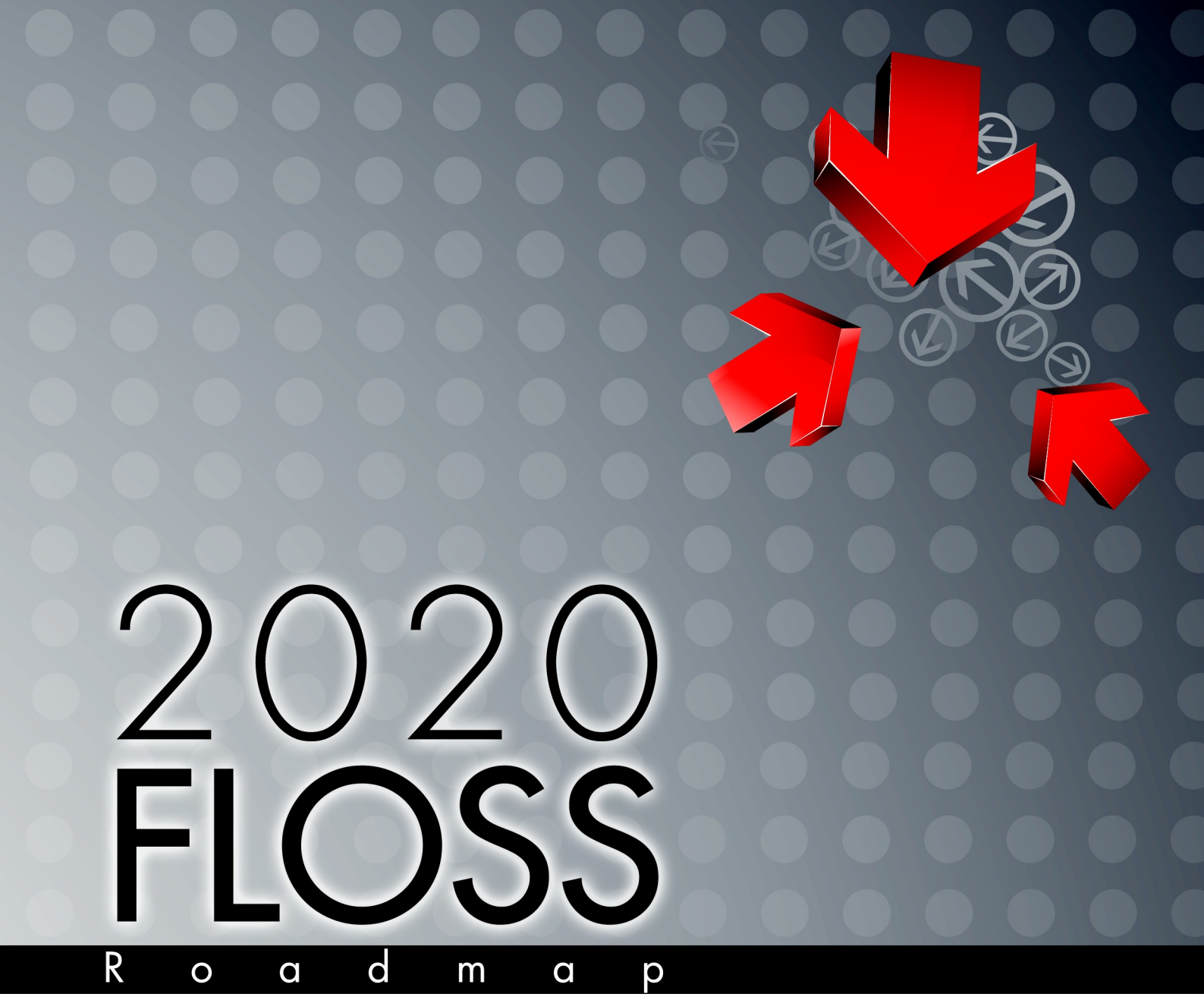
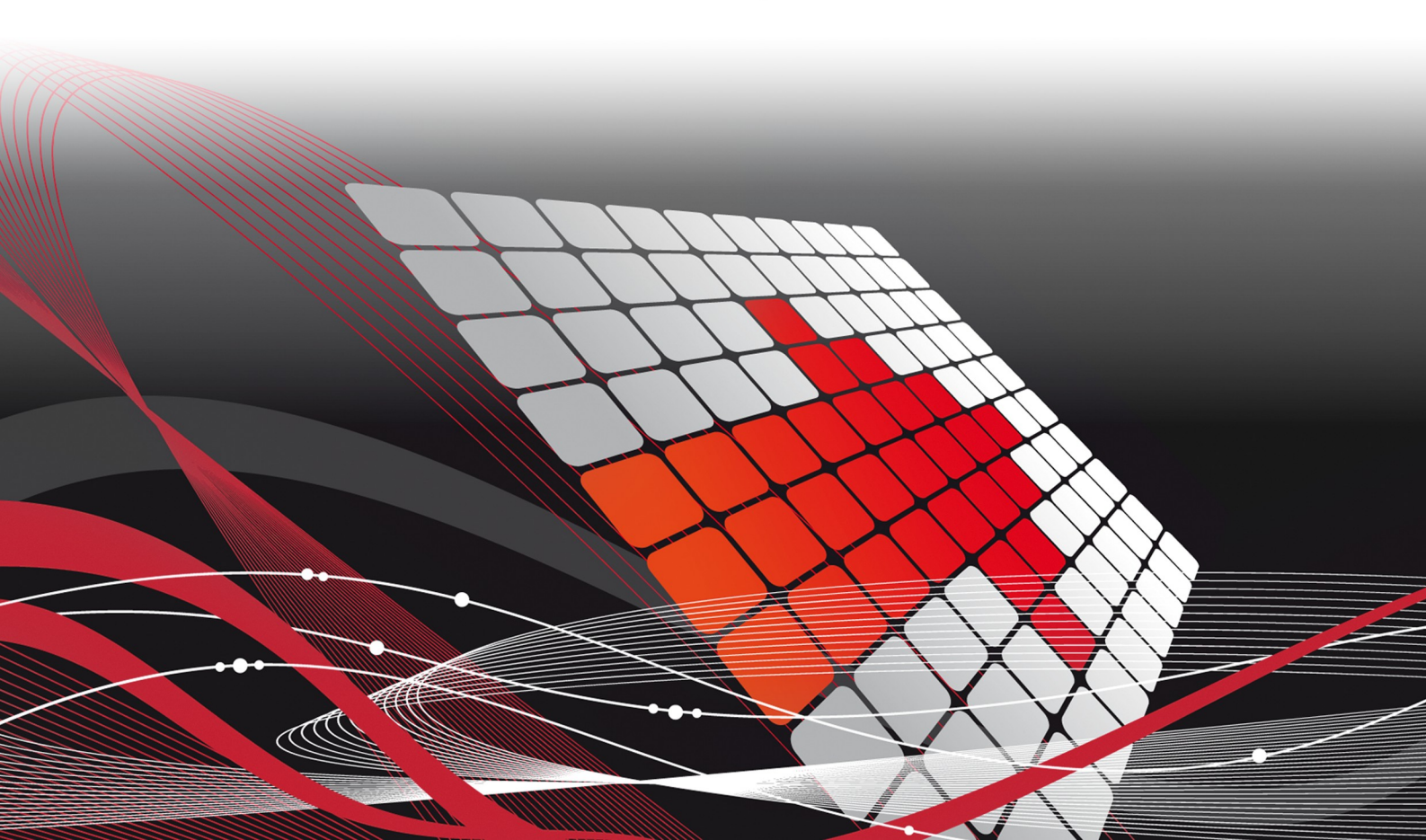


2020 FLOSS Roadmap



Why do we need a 2020 FLOSS[1] Roadmap?

Based in Paris, Open World Forum (openworldforum.org) is a forum dedicated to FLOSS, its players and projects. OWF offers all contributors this open space in which they can express their own vision of FLOSS.

2020 FLOSS Roadmap is the Open World Forum's main manifesto, and is designed to support discussions taking place during the different OWF seminars and forums. This is a prospective Roadmap, and a projection of the influences that will affect FLOSS between now (2008) and 2020, with descriptions of all FLOSS-related trends as anticipated by OWF contributors over this period of time. It also highlights all sectors that will, potentially, be impacted by FLOSS, from the economy to the Information Society.

It is easy to find a wealth of writings on the subject of FLOSS contributed by various analysts, but this study represents a first, not just because of its inward looking vision of the future of the FLOSS Community itself, but also because it is the result of a collaborative effort by all OWF contributors. This first version of 2020 Roadmap is open to comment, and will be re-assessed annually during the OWF.

Studies have been carried out in seven key areas:

Theme 1: Public policies: promoting sustainable development of shared resources
Theme 2: FLOSS: the key to future innovation and competitive differentiation?
Theme 3: Ensuring sustainability for FLOSS developer communities and business ecosystems
Theme 4: Technological and economic breakthroughs: challenge or opportunity for FLOSS?
Theme 5: IT 3.0: towards new governance for information systems?
Theme 6: FLOSS: a lever for employment and careers
Theme 7: FLOSS in an Open World: Innovations and best practices from Brazil

In the first section, we have summarized the discussions that took place during the study period, and this is followed by a special focus on Cloud Computing. Finally, we develop each of these themes individually.

1 FLOSS: Free Libre Open Source Software

2020 FLOSS Roadmap

version 2.16

Credits

Coordination and Synthesis

Mr Jean-Pierre Laisné *(Bull)*

Directors of Theme

Public policies: promoting sustainable development of shared resources
Ms Alix Cazenave *(April)*

FLOSS: the key to future innovation and competitive differentiation?
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Ensuring the sustainability of FLOSS developer communities and business ecosystems
Mr Cedric Thomas *(OW2)*

Technological and economic breakthroughs: challenge or opportunity for FLOSS?
Mr Eric Mahé *(Silicon Sentier)*

IT 3.0: towards new governance for information systems?
Mr Philippe Montarges *(Groupe Alter Way)*
Mr Jean-Christophe Spilmont *(Bull)*

FLOSS: a lever for employment and careers
Mr Cyril Pierre De Geyer *(Anaska Groupe Alter Way)*
Prof. Roberto Di Cosmo *(University Paris VII)*

FLOSS in an Open World: Innovations and best practices from Brazil
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Many thanks to all other participants for their help and support.

Table

What does the future hold for new technologies?

Predicting the future of Information and Communications Technologies (ICT) over the next twelve years is not an easy task. However, drawing on a variety of expertise (analysts, think tanks, etc.) and looking at existing technologies, certain trends do seem to stand out as being relatively certain to arrive at maturity in a more or less definitive timescale. And we don't need a crystal ball to anticipate that in the years to come, transformational technologies will emerge – these are the technologies that will have an impact on how our society evolves, and include:

"Cloud Computing"
delivering computing power, storage and applications via Internet (Software as a Service – SaaS).

"Green IT"
optimum and sustainable usage of IT resources for organizations and their supply chains, for hardware, energy or applications.

"Ambient Computing" or "Internet of Things"
the capacity of simple objects to communicate between themselves and with other systems.

Virtual organizations
from 'tele-working' to the world of avatars, and the application of social networking practices to the enterprise or to teaching.

Heightened reality
the capacity to enrich human senses with additional information.

Mobile robots
from functional objects to autonomous behaviour profiles.

Looking at the various FLOSS components that exist already, and taking into account projects being formulated in relation to a range of technological developments, we can then forecast how FLOSS will be adopted against this backdrop (this first diagram - Fig. 1 - served as the outline structure informing our analyses on the subject of the 2020 FLOSS RoadMap).

The lower part of this diagram describes some emerging technologies and general trends in IT. The upper part of the diagram describes how we anticipate FLOSS will be adopted by a large number of end-users (companies, public sector bodies, individuals) over the next 12 years. All of the above trends go hand in hand with, and are made possible by, the availability of increasing Internet bandwidth.

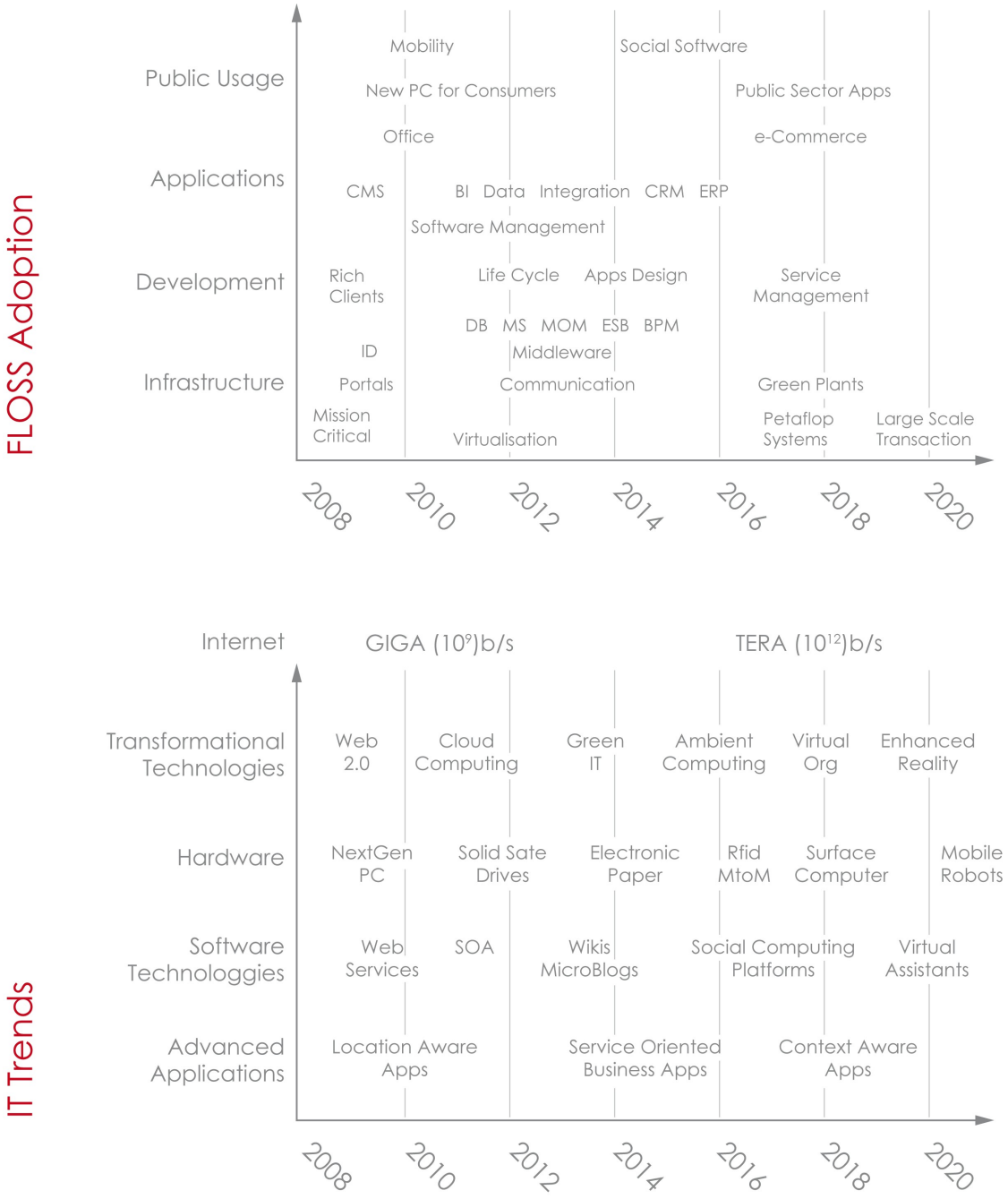


Fig. 1: IT trends, Internet Bandwidth and FLOSS Adoption over the next 12 years

All of the above appears quite logical given the current state of scientific and technological knowledge, assuming, that is, we don't need to include other events that might affect the way human society evolves. However, in 2008, we are seeing a departure from this purely logical forecast.

2008: a milestone for change

In 2008, the future appears more uncertain than ever. We are living through a truly historic period in the sense that nothing will ever be as it was before. This break with the past can be seen to be the result of two factors converging: energy resources needed by economic development becoming scarcer and the impact of the recent crisis in the world's financial system (amply confirming the ineffectiveness of its regulatory systems). The result of this convergence is a systemic crisis, on a global scale, that is destabilizing both the real economy (commerce, industry, transport, work, etc.) and the virtual one: in real terms, it is not just the speculative financial bubble that is at issue here, but also Web 2.0 and its energy requirements. For example, a virtual Second Life avatar would consume 1,752 kWh of real electrical power annually, or as much as one Brazilian person[2]; and according to certain calculations performed recently, Google would consume 2.1 tera-watt-hours in a year, which is equivalent to the energy consumption of two nuclear reactors[3]. Since Information and Communication Technology industries will in no way be spared the effects of this crisis, technology providers must now take ethical and environmental considerations on board when planning the development of their activities and products.

Though it may seem paradoxical, this period of transformation also has certain advantages: it is leading to reform, and bringing about change. The period of uncertainty that followed the events of 11 September 2001 forced companies to put in place restrictive measures, and notably to curtail staff mobility, but is it not the case that this in turn encouraged the creation and use of remote conferencing collaborative tools and networks? Today, lower budgets will force organizations to reassess their investments, and to try, as a result, to optimize their development projects. This should have the result of favoring "low cost" solutions and in particular, the development of FLOSS applications. When considering any prospective work, then, we must absolutely take this analysis into account. Fast developing countries in the South such as China, India, or Brazil have fully grasped the significance of this and are developing a strong industrial and public policy around FLOSS applications so as to reduce the digital divide that separates them from Northern countries.

Finally, 2008 also brings hope. The message for change radiating from the USA rings out as a strident and symbolic call for openness and equality. In the same way, we are seeing widespread acknowledgement of the urgent need to preserve our environmental heritage. So this is a turning point at which we can envisage a different kind of future, one built upon the basis of a new, more just social contract, with ecologically acceptable development programs, and more open international relationships.

2 Nicholas Carr (December 5, 2006) in "Avatars consume as much electricity as Brazilians
3Charlotte Houang (June 14, 2007) "Les fermes "cachées" de Google, grosses consommatrices d'énergie" in Le Monde.fr

Going forward from GNU/Linux?

FLOSS applications are already present in many of our new technologies. Digital and virtual objects are literally packed full of FLOSS applications, whether embedded in GPS navigators, ADSL connectors or sensors, or even infrastructure applications for enterprises in their servers or networks, or whether, again, it is a question of products destined for the wider public like smart phones, netbooks, or even virtual worlds, social networks or on-line encyclopedias. We can also now confirm that FLOSS applications are an integral part of the components used by the Industry (see Theme 2 as regards FLOSS and Innovation). These have certain intrinsic qualities – for example, their adaptability - when it comes to designing complex architectures and Information Systems. Meanwhile, to be fully effective in the service of Information Systems, new principles for information system governance are also required (see Theme 5 on this subject).

In the recent past, the "Linux adventure" set in motion by Linus Torvalds at the University of Helsinki in 1991 constructed on foundations set up by Richard Stallman in 1984 with the GNU project, and more particularly with the GPL license guaranteeing toll-free source code, and offering a legal framework for collaborative development, has had huge repercussions on the Industry. This has brought other FLOSS applications under the spotlight (from Apache Server to OpenOffice.org), and enabled other start-ups to hit the ground running (from Red Hat to MySQL), enterprises to prosper (from Internet access providers to IBM) and developers to add value to their experience, legal experts to expand their expertise, and researchers to communicate the results of their research or improve their tools, etc. Linux has literally been a catalyst in encouraging the appearance of veritable and fertile ecosystems. It really has been a momentous turning point, and has changed the way we do things in the industry (as much in the development models cited as in the corresponding business models) and has also helped new markets to flourish.

Now is the moment when we need to examine the question of sustainability for FLOSS, or again look at the influence they could have on tomorrow's technologies. Will FLOSS always be part of the industrial landscape in 2020? What part will they play in the Information Society of the future?

FLOSS post-2008: FLOSS Roadmap for 2020

At a time when history is challenging us, with market self-regulation under the microscope once more, and with our obligation to reinvent a more sustainable, cleaner economy in which we must plan for a future that is very different from expert predictions, the model developed by the FLOSS communities in the widest sense of the term (i.e. communities bringing together individuals, enterprises, researchers and users) in the course of these last 25 years, offers a remarkable example of the creation of wealth based on open collaborations and innovative projects. Mobilized in the quest to find innovative technological solutions, a large number of members of these FLOSS Communities adhere to ethical values such as citizenship, equality or again transparency. Eager to develop as many useful technologies as possible, they aim to contribute more actively to a more equitable, and more open, future.

It seems to us that taking industrial resources, market acceptance and technological progress together, conditions are conducive to launching initiatives that could lead to widespread economic development, and that this would in turn have a significant impact on a large number of activities, enterprises, and as a result, on employment. According to analysts[4], FLOSS could represent from 26 to 32% of software and IT services investment by 2012, which is equivalent to 2% of GDP for a country like France. This would mean that FLOSS would become the driver for the information technologies industry, and the main growth vector (with green industries) for our economies. And with this is mind, should we take the (economical) step of affording closer scrutiny of this subject? This is our aim, and hopefully one we can share with others using this study as a vehicle to reach players likely to move things forward.

The contributors to this study have tried to identify how FLOSS applications will affect our society in the future. Together, we have studied different domains such as public policies, research and innovation, ecosystems, and employment to identify the resources to uphold this model that so closely mirrors our concerns today, in the hope that it could contribute to the "rebooting" of the economy. The following diagram (cf. Figure 2) summarizes our predictions: this, then, is the FLOSS Roadmap for the 12 years to come.

Looking ahead to the future, we have given infrastructures priority in our approach, given the strong power infrastructure investments have to bring with them significant development in numerous domains. And to build a solid Information Society, we need to start with firm foundations: FLOSS could play a fundamental role in the deployment of infrastructures for all players in this future society. This diagram subdivides into three successive layers. The first layer describes FLOSS R&D as we imagine it could be in the future. In the second layer, we can see the impact these developments will have on businesses and other usages. Finally, the third layer shows the repercussions that these developments and new usages will have on the future Information Society.

4 Rishab Ayeb Gosh, MERIT (2007) in Floss Impact www.flossimpact.eu

Bob Igou, GARTNER (20 March 2008) in "Open Source Software Impact on IT Services Purchasing Patterns, 2008"

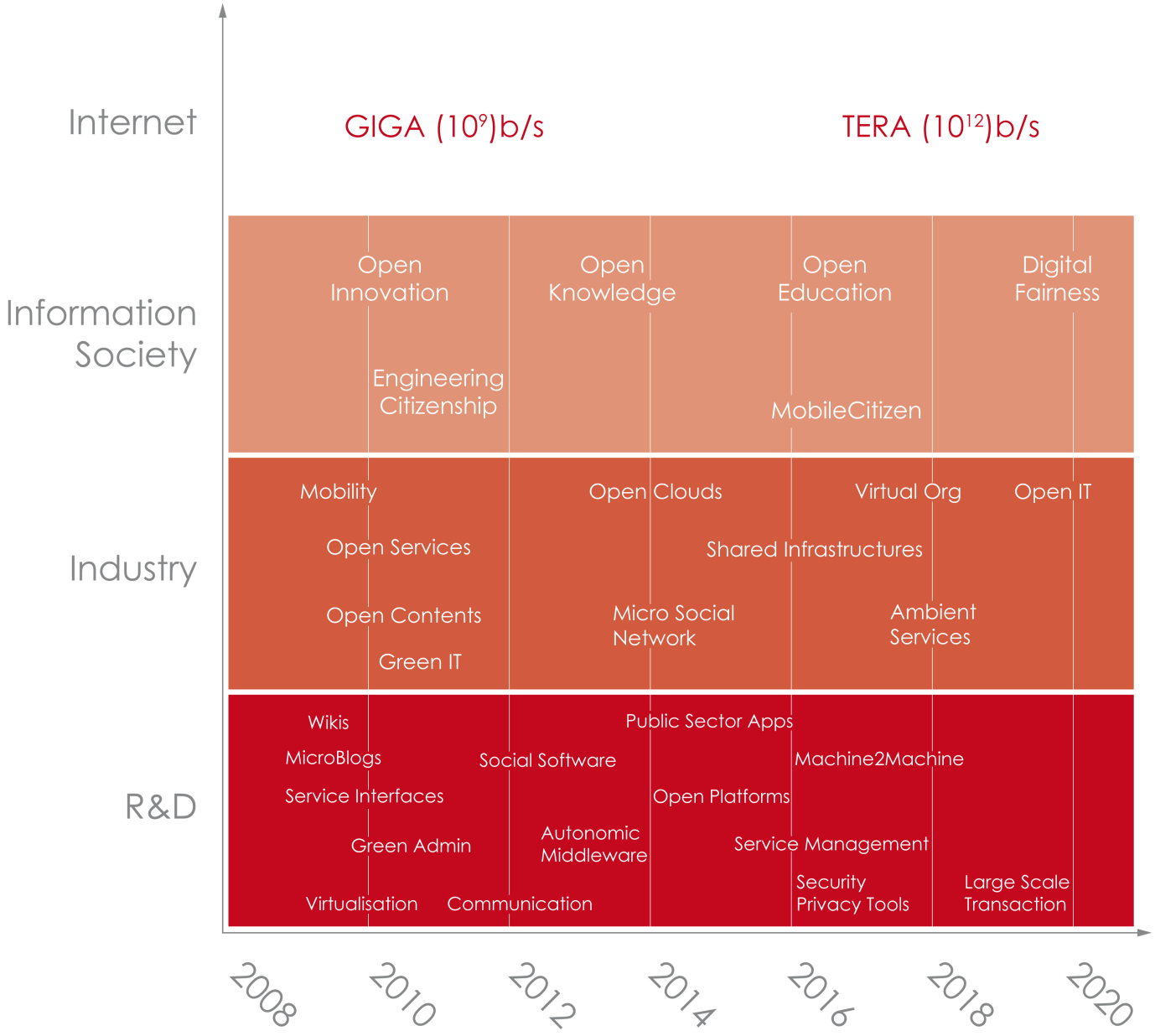


Figure 2: 2020 FLOSS ROADMAP *(as at December 2008)*

Seven predictions for FLOSS in 2020

Prediction #1

Global Digital Divide reduced thanks to FLOSS

FLOSS is considered as key to the sustainable development of a common asset. The IT Industry is actively contributing to, and working towards, digital fairness vs. digital divide.
Global legal environments protecting collaborative developments now exist, based on common sense and common interests.

Prediction #2

FLOSS is now mainstream

FLOSS has become the *de facto* standard for IT Industry segments such as infrastructure, development tools, scientific computing and some embedded applications. Investment and resources are shared by Industry players to facilitate lower R&D costs and energy savings.

FLOSS development models are adopted by both IT Industry and IT departments. Most IT domains have their own FLOSS communities.

Most commercial Software Vendors have their own open source effort.

Industry makes significant use of global platforms based on FLOSS models to develop innovative technologies and implement Open Standards and Interoperable Open Services. FLOSS Policies for the Enterprise are in place in most companies in order to define FLOSS governance within the Enterprise and capitalize on the value of their contributions to FLOSS.

Prediction #3

FLOSS Communities are enablers of Business Ecosystems

These business ecosystems are based on a combination of FLOSS and proprietary models. Forges are now the developer's ERP, and FLOSS forges are FLOSS market places. Specialized forges exist which are dedicated to specific themes, technologies and companies.

Prediction #4

Cloud Computing is ubiquitous

Social networks are the main way to interact and communicate, and fulfil governmental, commercial and individual requirements.
Enterprises are implementing Cloud Computing based on Open Clouds to support major sections of their Information Systems.
Mobile devices, ambient computing and smart objects rely on Open Cloud Services to provide a seamless digital existence.

Prediction #5

The IT industry is the champion of eco-responsibility

From Green Datacenters to ecological networks via optic fibers, IT is developing Green technologies and methods.
Green IT and Green Clouds are the next industrial revolution, giving rise to new Services and Business Models with low ecological impacts.

Prediction #6

FLOSS is a strategic tool for Enterprise IT 3.0, i.e. Open IT

A new generation of CIOs are highly conscious of the risks of vendor lock-in.
They are considering FLOSS as a vaccine against the risk of abusive behavior from a commercial vendor.
FLOSS enables a mix of Open Services and companies' business logic.

Prediction #7

40% of jobs in IT are FLOSS related

Assuming 2% growth in IT employment annually, this translates directly into 1.5 million jobs in Europe i.e. the creation of 1.2 million completely new jobs.
In addition, thousands of jobs are created as a spin-off from other IT jobs and activities impacted by FLOSS usage.
FLOSS engineering is considered as a truly professional segment.
FLOSS engineers and contributors have become a highly skilled, open minded and flexible resource.
Educating new FLOSS engineers is seen as a priority by educational institutions all around the world, and corresponding curricula are supported by universities.
FLOSS means a cultural shift in Human Resources Management for Open IT.

Eight Recommendations for success

These recommendations have been formulated in the hope that these predictions may come true.

Recommendation #1

Define a stable, clear and neutral legal context

From patents to public procurement and interoperability, this context is instrumental for FLOSS to enable creation of wealth, be it in public or private domains (most of these recommendations are detailed in Theme 1 focusing on public policies).
Under the influence of Cloud Computing and SaaS, the need for consolidation in the domain of FLOSS licenses is mandatory in order to clarify the stakes.
Due to the proliferation of new services, it is also highly recommended that Open Standards and Open Services are defined and regulated by Governments in order to avoid new service monopolies.
Finally, international regulating bodies are needed to oversee and enforce contractual commitments concerning safety, privacy and security according to corresponding Industry standards for these highly critical aspects.

Recommendation #2

Invest in FLOSS R&D for strategic technologies and services

In technological domains such as distributed computing, virtualization, autonomic computing and mobility, software sharing that facilitates technology transfer and a lower entry barriers will enable the development of new business areas capable of delivering global and large scale services. More precisely, in domains which are highly critical for public sector administrative bodies, companies and citizens, such as safety, security and privacy, the development of FLOSS resources should be considered as strategic.
Incentives in term of funding, facilities, open infrastructures, scientific foundations, etc. should be put in place to encourage academic R&D and private research establishments to collaborate and develop these critical technologies. Since the timeframe for technology transfer from academia to industry is quite lengthy, we highly recommend opening FLOSS-specific research centers as soon as possible.
Efforts must also be made to encourage, and make it simpler for Communities of FLOSS developers to participate in R&D programs. Furthermore we recommend the creation of Venture Funds specifically focusing on FLOSS to help entrepreneurs set up their FLOSS businesses.

Recommendation #3

Develop FLOSS education, skill and employment

To facilitate access to knowledge and reduce the digital divide, FLOSS awareness needs to be developed in universities and other educational centers. Specifically tailored Curricula for FLOSS in IT Higher Education should be developed to produce highly skilled professionals which are necessary for the future Knowledge Economy.

Companies consuming or producing FLOSS should also have a clear FLOSS policy concerning usage of FLOSS within their core Business or within their operations. In this perspective, voluntary work in FLOSS projects should be considered as a plus for employers.
Validation of FLOSS professional experience and FLOSS Professional certification are needed to establish a trustworthy relationship between employers and FLOSS professional developers.

Recommendation #4

Create Open Platforms based on Open Standards and Open Services

These open infrastructures will enable new networks and new markets to be developed thanks to new open interfaces supporting new services (public or private). Demonstrating a real opportunity for new business and facilitating innovative R&D, these platforms will reinforce competition and promote the need for interoperability of different platforms. These platforms will be instrumental in innovation by enabling a mix of different skills and knowledge sharing. Finally, by supporting social networks and social software, these platforms will promote usage of FLOSS in the mass consumer market.

Recommendation #5

Establish Openness as a standard for Innovation and Business

Openness when applied in high scale, has proved to be efficient in terms of innovation and creation of wealth (cf. Internet, Web, FLOSS, etc.). The massive adoption of Open Standards by Public Administrations and Large Organizations will facilitate market education about the value of Openness (Open Standards, Open Interfaces, Open Platforms, Open Services, Open Processes, etc.) as a lever for Innovation, not only for R&D but also for all kind of business and related processes.
Clarification of business models is also highly critical in order for markets to understand the value of Openness and FLOSS. Consequently we recommend that Companies going into business with FLOSS have a clear, replicable and readable business model. The same recommendation applies for FLOSS Communities.

Recommendation #6

Promote FLOSS adoption and usage

Clear and unambiguous messages are needed from governments for their administrations in their invitations to tender, from public sector bodies when they publish their best practices, and from large companies through the publication of reference test cases about usage in the field. All organizations reaping the advantages of using FLOSS should consider contributing to FLOSS sustainability, and this promotional effort should be considered as the very least that should be offered to compensate for the availability of FLOSS software.
Specific effort should be envisaged by Industry to encourage the usage of FLOSS tools in all engineering cycles.
On the other hand, we recommend that FLOSS developers themselves use all necessary tools to build a trustworthy relationship with users of their code e.g. life cycle management, quality assurance, IPR tracking, automatic certification of code, etc. in order to ensure quality according to Industry level standards.

Recommendation #7

Encourage FLOSS users to contribute to FLOSS

While some companies are still reluctant to transfer code they have developed to FLOSS projects, there is also a clear need to encourage contributions from FLOSS users (from Public Adminsitrations to Industry and Research). This is a key element in what we call the “Ecology of FLOSS”. FLOSS code bases are shared: we need to manage and maintain these code bases as rare and precious resources, because the future Information Society depends on them. Every means must be put in place to educate FLOSS users to contribute as well as consume. For instance, FLOSS developments should be considered as R&D effort. In this respect, incentives such as tax relief may help. Active collaborations and interactions between FLOSS Communities and all potential contributors must also be encouraged and facilitated.
This issue is critical, and has been explored during different debates concerning the way public sector administrations might contribute to FLOSS, the commitment of Researchers to FLOSS, or the sustainability of FLOSS ecosystems.

Recommendation #8

Develop inter-actions between FLOSS Communities

More cross fertilization between different FLOSS communities of developers should be encouraged. To facilitate code sharing and interoperability of infrastructures, making shared infrastructures available could be envisaged through national or international programs. All existing infrastructures such as SourceForge.net or code.google.com which have offered to host projects, are not focused enough in term of technologies or not “business neutral” enough to guarantee fairness and autonomy to hosted projects. Independent shared infrastructures are needed to facilitate open contributions and ease adoption from the user's point of view by simplifying the relationships between projects, communities and users and by guaranteeing that there is no hidden agenda. Shared infrastructures would also leverage the operating costs of communities and consequently would help their sustainability.
To encourage adoption of their code base, FLOSS Communities should also take care of interoperability within their projects. Furthermore, they should ensure interoperability with other code bases.

High potential (and inevitably, high risk…)

It would be naive to ignore the fact that there are significant risks which could prevent these opportunities from ever seeing the light of day.

Firstly, on the part of industry, the danger is that this vision is not shared.

Certain technological domains such as security, for example, are considered to be domains reserved exclusively for the proprietary approach, so these divergences from agendas can prevent the different parties from converging to arrive at a single viewpoint, or at the very least, they hinder such a convergence.

Next, the length of time authorities as organizations take to develop is quite different to that taken by enterprises, communities, or internet users.

From this, indeed, stems the difficulty of synchronizing large-scale projects and collaborative ventures that are both effective and iterative. Not including the market "ideology" and non-interventionist rules public policies can impose on economic activities (although these have been wielded wrongfully in recent times, these rules are still the order of the day in Europe, if nowhere else).

On the part of FLOSS Communities, the "Top Down" approach is not appropriate since contributors must above all be motivated.

In this way, the "organic" character so closely associated with the success of FLOSS projects is not automatic, and in fact depends on a large number of factors, among them the inherent interest the project has, and the capacity of its developers to attract participation.

Finally, as far as the marketplace is concerned, the effects of networks are already making themselves felt, and notably to do with Cloud Computing, for example.

The power this commands even now to attract users and developers also means that some platforms are in an extremely dominant position – and can even pose a threat to some players that in the past themselves dominated the market. Their dominance is amplified to the extent that their financial prowess can be huge, enabling them to make very diverse investments in R&D, or in mergers or acquisitions.

Small steps, and a major voyage

Taking as read the example of what FLOSS Communities' have achieved in twenty years, and how they have transformed the industrial landscape of Information Technologies and the global Community, we are convinced that the goals and perspectives our researches have highlighted are achievable.

In the same way as numerous FLOSS have come into existence, only a handful of contributors are needed to undertake major projects on condition that they can collaborate effectively. Only a few pioneers are needed to make great discoveries on condition that they have a common aim. Any major voyage starts with a simple step forward, on condition that the step is taken in the right direction.

Head in the Clouds

Concerning the different analyses undertaken in the course of our research for this study, if we try to identify the phenomenon of the technological and economic disruption that could throw our predictions out, and within which FLOSS will be instrumental, there is one trend all the contributors to this study are unanimous about: "Cloud Computing". Although we are well aware that it does not cover all the possible development avenues open to FLOSS in the future (for example, a subject such as "Internet of Things" could be an equally interesting tack to pursue for the future) we are jointly convinced that this tendency potentially represents an important driver for their development, and that eventually this new tendency risks disrupting the Industry in general, and provoking profound restructurings of the marketplace, with some players disappearing and new ones appearing. In addition, when it comes to FLOSS in particular, FLOSS eco-systems and enterprises producing FLOSS such as we have known them these last two decades are in real danger. We found it useful, moreover, to complement the detailed study you will find on this subject under Theme 4 and devote a large part of our study to this subject. Nevertheless, it seems reasonable to us to concede that in the future a compromise will doubtless be established between everything being "internalized" and everything being "cloud".

Cloud Computing: the next great challenge?

What are the reasons behind "cloud computing" being the next great technological phenomenon of the years to come? And why should it represent a special challenge that will confront FLOSS developers? The four main reasons why Cloud will be the "next big thing" are: the technologies are ripe, the bandwidth exists, the user demand is there, and finally, the economic context for the next few years are conducive to it.

• The technologies are ripe

- FLOSS exist for "social" deployment, or as Social Applications Software. These are already widely used by internet users, for example on-line office suites, content management systems (CMS), wikis, blogs, shared calendars etc.

- FLOSS for infrastructures such as server farms that need them, already exist e.g. FLOSS tools for Cloud: virtualization, file systems, administration and deployment tools, autonomous middleware, distributed operating systems, etc.

These applications and tools are freely available, and are already widely exploited by providers of on-line platforms and services, keen to limit the costs of their infrastructures to strict minimum and to maximize their margin on services offered at low prices but distributed in huge numbers.

• The bandwidth exists

The ample bandwidths that are already widely available mean users can use these services on-line at will. The assessment of the bandwidth requirement is constantly being raised, and the next major evolution that symmetrical bandwidth will bring about (100 Mbs in upload) may well revolutionize the way the network is used as a whole. There is a well-justified fear, however, that drastic reductions in investments are yet to come, and there is no doubt that this reduction will compromise the progress expected and anticipated for.

- Users want it

The success of Social Networks (Social Network) of the Facebook and LinkedIn type have led to a large number of Internet users becoming familiar with the use of on-line services, with their efficiency, their interaction, and with the trivial aspect of Web 2.0 interfaces. The faculty of having access to their current applications and to their data via the Web is today a must, from where the success announced of On Demand Services, and services type applications like SaaS.

- The financial and economic crisis is boosting adoption of Cloud and Services (SaaS)

While computing requirements may continue to grow because of ongoing work to optimize operational performance, the budgets enterprises and public sector bodies are allocating are getting smaller. If providers can offer less costly solutions (without any costs directly attributable to hardware or to system administration), adapted to requirements (collaborative applications, content management, ERP, etc.) and all just as secure, most organizations (whether SMEs, divisions of a major group, or departments within public sector) will be seduced by these opportunities to externalize a large portion of their information systems. Also, organizations aiming to develop tele-working so as to limit staff mobility for cost reasons (housing costs and general expenses, etc.) or because of environmental considerations (transport, or office space availability for example, etc.), will view such solutions favorably. And so in the end it will fall to them to express the last reservations about FLOSS being "good enough", as opposed to "made-to-measure", or as opposed to insisting on more sophisticated functionalities ("Good enough is enough"). Also, we can foresee that a "Cloud" market will appear and mature over the next three to five years, largely made up of technologies delivered by FLOSS, and hugely profitable. This market will bring new business opportunities, and we will see new, user-centered services emerge. It will facilitate the emergence of innovative ecosystems, and will attract numerous investments that will encourage an environment favorable to innovation, and so a period of creative research and development. Naturally this kind of evolution allows us to significantly re-assess our road map predictions.

Is FLOSS becoming diluted within Cloud?

FLOSS is instrumental in building this market, and the low cost economic model "Clouds" presents. But while FLOSS is a major contributor to this market, should one also count on this market to contribute actively to developing FLOSS applications? In the affirmative we could reckon on a strong growth in FLOSS developments as needed by this market, and by extension, strong growth for the developer organizations themselves. But if the reverse is true, might we not see FLOSS vanish altogether? If the value to the user of the software is replaced by the value of the equivalent service offered at lowest possible cost, the user might be tempted to only worry about the financial aspect, and to overlook the fact that the software is free. SaaS providers could, for their part, be tempted to behave like "free riders". At this point, might we not see a total collapse of FLOSS ecosystems, and their resources "stacked away" by their predators who don't have the resources to renew them?

In this mindset, we must develop the idea of the "ecology of Free Software". The FLOSS code bases are a shared asset which only become un-useable if they are not properly maintained: we need to learn how to manage them for the best, and treat them like the rare resource they are, a resource that is all the more precious to society at large.

Another important point is the legal protection that guarantees freedom of the services delivered by the "Cloud". And what of the FLOSS licenses guaranteeing availability of the code in case of

redistribution in a new world where software is available in the form of a service? Would existing licenses continue to guarantee the basic qualities of FLOSS? Could new licenses of the Afero GPL type guarantee free/open services?

Finally, we have to acknowledge that only a small number of players is capable of offering these "Clouds" and services. Users don't have any choice. What will it be in the future? Will the market be open, or the property of a limited number of players?

This first draft of our study attempts to offer first elements of answers to these open questions, to which, we believe it is absolutely essential that in the months and the years to come, sustainable answers are given. If we don't respond, we take the risk of seeing the promise opened up by the FLOSS - of an equitable Information Society and a sustainable Knowledge Economy such as those that are ideally profiled for the dawning of 2020 – disappear altogether. Certain technologies are necessary which will have to be developed in common and be usable by everyone, not just for economic reasons (optimization of resources, reductions in R&D costs, emergence of new markets) but for the well-being of our society, (equitable access, transparent and non-discriminating to the technologies upholding the Information Society and contributing to the development of the Knowledge Economy).

Open Cloud vs. Closed Cloud

We are today facing a sea change just as transformational as that caused by Linux not long ago. We think that "Cloud Computing" could serve as a catalyst enabling communities, enterprises, and ecosystems to develop twice as fast as they did during this first wave of FLOSS, symbolized by Linux, and which has taken ten years (from 1990 to 2000) to really gather momentum. The possibility of FLOSS dissolving within "Cloud" and being 'diluted' as a result is not negligible, and could also trigger a salutary shock wave for communities, adversely affecting their dynamism.

The risk of finding ourselves once again faced with a monopoly around a dominant proprietary platform thanks to the 'network effect' and (almost ironically) thanks to the opening up of its interfaces, seems to us sufficiently probable that we strongly believe an unprecedented reaction is needed from FLOSS Communities, but also from Industry and regular users.

"Cloud" opens new horizons for creating wealth for enterprises thanks to the development of a range of new marketing and sales services, but also for public organizations, associations, NGO's seeking to improve the services they deliver to users, as well as for certain Internet users whose "entrepreneurial" spirit drives them to be service providers. Must we resign ourselves to failing to seize this opportunity for development, and relinquish it for the exclusive profit of a single brilliant and visionary player – however formidable a player that may turn out to be?

Open Platforms for a world of Open Services

So it is the risk of a new monopoly appearing and jeopardizing all these opportunities that leads us to predict over the next five years the appearance of Open Platforms delivering Open Services (paid or toll-free). These are veritable collective initiatives, built around shared infrastructures deployed thanks to the collaboration between different players in our Information Society (among which one could find administrations, local authorities, telco operators, FAI, FLOS Communities, NGO's, federations, etc.), for which they will guarantee transparency, security and availability.

Put at the disposition of any service creator, these free platforms favor the blossoming of different ecosystems, and the inter-relationships between the numerous players in these different ecosystems as required by their activities or their 'sociology'. Using roads infrastructures as analogy, these platforms will be the A-roads and motorways which will bring the members of the Information Society together, and will facilitate exchanges of goods and virtual services for enterprises, access to virtual learning sessions for scholars, and access to e-administration for citizens.
Finally, such platforms will be able to serve as a model for any enterprise wanting to implement a similar infrastructure at the center of a private network so as to benefit from all the advantages "Cloud Computing" offers (optimization of resources, and knowledge of the enterprise through setting up the relevant networks) without having to suffer any of the disadvantages (vendor lock-in, externalization of data, etc.).

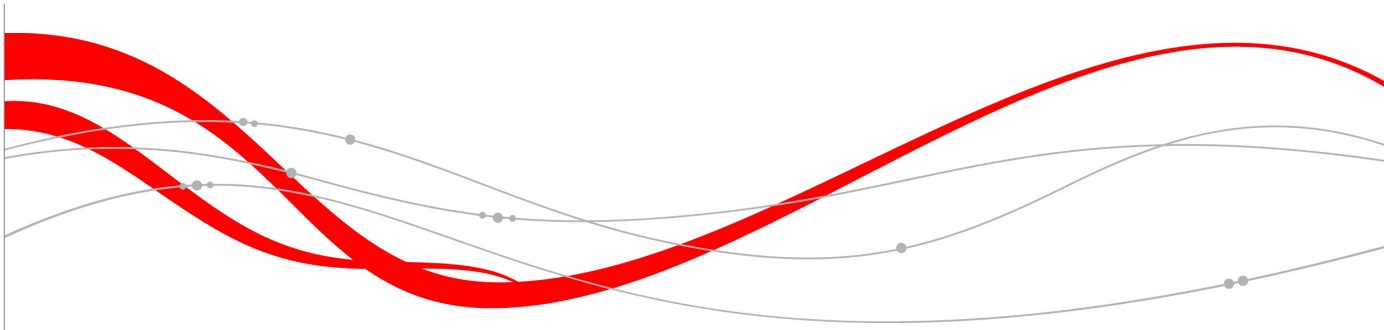
What recommendations can we offer for open and free platforms?

Industry alone cannot resolve every problem. So we would like to send out our hope and wish that FLOSS players all over the world, in the interests of equitable sharing of knowledge and technologies, will join forces and share resources so as to favor the emergence of open platforms and alternative open and toll-free services, taking as their model existing free content sites such as Wikipedia. This would also encourage the development and use of alternative technologies such as Peer-to-Peer for example, for knowledge management (cf. Semantic Web) and the storage of open data.

These efforts will only be effective with:

- strong commitment from public sector bodies and a legal environment that regulates creation of wealth fairly,
- an alignment of R&D investments at the supranational level via financing programs, competitiveness centers and administrations,
- a voluntary effort from the industry in general, and in collaboration with research and the communities, with the objective of creating sustainable ecosystems,
- closer and more efficient joint working between the different FLOSS communities and their projects,
- active participation from the main FLOSS users
- deployment of an open infrastructure that is shared, and available for the benefit of everyone.

At the top of our list of priorities, therefore, we need:
- Open Platforms that are interoperable, and that offer services with interfaces based on open standards and implemented in the FLOSS framework so as to guarantee their free deployment so they are free of any adverse effects, or susceptibility to break-in. At the same time data integrity, and respect for the private life of individuals and sovereignty rights must be granted.
- Open Platforms designed expressly to host the next "social applications" (CMS, Wikis, micro Blogs, etc.), these being indispensable to public sector bodies, but also to enterprises and to citizens.
- to establish clear, unambiguous legal documents defining what Open Services are, and how they are to be used and reused.
- to nurture an open and fair dialogue at global level with the various partner providers of platforms and services, Industry and public sector bodies, but also with the world of research, and not forgetting users themselves, so they can jointly agree to build these Open Services Platforms in which commercial and public services can live comfortably alongside one another.



Theme 1

Public policies: promoting sustainable development of shared resources

Abstract

The FLOSS arena is where new applications serving citizens needs are designed, experimented and matured. Innovative applications that would never have been developed in a proprietary software world, because the immediate business models were not clear, have been developed and deployed as FLOSS. This happened for the Internet itself, the Web, or in the fields of democracy, co-operation, access to knowledge and culture and collaborative media. These applications have in turn enabled significant economic growth. Public policies are a key tool for realizing the potential of FLOSS, for existing organizations and companies as well as for society and the economy as a whole.

State of the Art

Public authorities from countries all over the world are taking notice of FLOSS and its many advantages. Brazil, Russia, India and China are showing a strong desire to realize the potential of FLOSS, through their innovation policies, public procurement and the development of FLOSS usage both in professional and domestic uses.

The Brazilian authorities, for example, consider FLOSS to be a driver for their current social projects : since 2003, they have developed FLOSS ecosystems for public administrations, for businesses as well as for digital inclusion and e-citizenship. They foster the development of FLOSS models and communities, and encourage the adoption of FLOSS by public and private organizations and by individual users. The benefits of this public policy already include the significant reduction of government costs and the development of national products and services supporting the country´s economic progress.

Another example is India, where FLOSS is increasingly used in both public and private sectors. While a comprehensive public policy on FLOSS has still to be unveiled in India, the government there has been working on it, and it should be in place very soon, providing strong incentives for using FLOSS in the public applications arena. Public authorities are indeed aware of the potential of FLOSS for India. That is why they funded in 2005 the National Resource Center for Free/Open Source Software (NRCFOSS), with the double mission of making India competitive

in the IT sector, and promoting digital inclusion. NRCFOSS is now planning to explore ways to foster innovation through education and training on the tools, techniques and methodology of the FLOSS Movement, jointly with the Indian FLOSS Community, the Academic and R&D Community, etc.

In Europe, several states and major local authorities have shown their commitment to FLOSS and open standards. In Spain for example, several regions have developed their own FLOSS distributions, which are now widely used in schools and public administrations, but also on home computers for private uses. Another example is the Netherlands, with their « Open Connection » program, which aims at using FLOSS and open standards in Dutch public administrations.

Unfortunately, too many public authorities tend to neglect the potential of FLOSS and often pass laws that could threaten its development. Preventing discrimination against FLOSS developers and users is a good start. But only a voluntary policy, taking FLOSS into account and developing it for the benefit of the society, the state and its economy, can realize its potential.

Targets to attain

To realize the potential of FLOSS, a voluntary policy needs to set four main objectives:

- establish a clear, stable legal context supporting interoperability and free competition in the software & services industry ;
- encourage mutualization, the use of shared resources and interoperability in public procurement and e-administration ;
- acknowledge and support FLOSS innovation, and use innovation policies as a lever for the development of the FLOSS economic sector ;
- promote the active participation of citizens in the information society through the widespread use of FLOSS.

Recommendations

1. Legislation – establish a stable and neutral legal context

The first thing FLOSS requires for its development is a stable and neutral legal context, as it relies on licenses that provide four basic areas of freedom:

- the right to use the software ;
- the right to study it thanks to its open sources ;
- the right to distribute copies of the software ;
- and the right to modify it (to enhance it or adapt it to personal uses) and publish the modifications.

FLOSS cannot develop if these four freedoms cannot be guaranteed by the license alone.

The main threat to FLOSS currently in the area of legislation is software patentability. Software patents make innovation more rigid, reinforce dominant positions, and work against the four freedoms. In the United States, where the principle of software patentability was validated in 1998 by the software law, software patents have generated many costly procedures and trials, and

the system actually turns out to be prejudicial to the software industry. The « Patent trolls » companies cost even the biggest software publishers (both of proprietary software and FLOSS) vast sums of money. In order to prevent any risk of trial, FLOSS-user companies have created consortia to pool their defensive patents and free-license each other. In any case, software patentability is currently being questioned both by companies and the US Patent and Trademark Office (USPTO).

In Europe though, the debate is still open. A community directive aimed at legalizing software patenting was rejected in 2005, but software patents defenders continue to fight for this legislation. The US situation could throw some light on the debate and, if software patentability is repealed soon enough, enable the European Union to make a decision favourable to the development of the software industry in general, and FLOSS in particular.

Recommendation #1

Clearly exclude the patentability of software, and have the patent offices apply the subsequent doctrine: software may be part of an invention but shall not constitute the inventive step of the patented invention.

Interoperability is a fundamental issue for FLOSS and free competition on the software market. FLOSS developers need to be able to legally 'reverse-engineer' any software or format, so as to create independent software that can interact with other solutions, and offer alternatives to their users.

Establishing a right to interoperability is a good way to both legally secure FLOSS development and encourage free competition. The right to interoperability can be implemented thanks to three main elements:

a. the right to reverse engineer proprietary software for interoperability purposes;

b. a definition that acknowledges as « open standard » any communication, interconnection or exchange format and any interoperable data format which has technical specifications that are public, and without any restriction to access or implementation. Such a definition is also very important regarding web services, and the right for users to access and use their personal data;

c. an obligation for software publishers to provide third parties with their software's application programming interface (API) and documentation needed for interoperability, without any counterpart but the cost of the support and its transport if appropriate. 'Reveal API' does not mean 'reveal the software', and thus does not violate the publisher's copyright; but it enables competitors to create independent, compatible software, and thus encourages competition and innovation.

Without a right to interoperability, the use of proprietary formats acts as a vendor lock-in and restrains users from trying other equivalent solutions. Proprietary formats imprison the users' data; they threaten data durability and favor the emergence and perpetuation of dominant positions.

Recommendation #2

Establish the right to interoperability, including the right to reverse engineering, a definition of open standards and an obligation of non-commercial cooperation for interoperability for all software publishers.

A major hindrance to the popular adoption of FLOSS is bundled sales of computers and software. Not only are they contrary to free competition, they also obscure FLOSS to the general public by enabling dominant proprietary editors to preempt the software supply. They represent a first step into vendor lock-in mechanisms that prevent users from knowing about and switching to alternative solutions – among which FLOSS. Moreover, they artificially increase the cost of household equipment, and result in a poor supply in quality and diversity. This is true for operating systems as well as for common applications such as web browsers, media players or office tools.

Recommendation #3

Firmly support competition in the arena of operating systems and mass distribution application software (avoid bundled sales and other monopolistic mechanisms) to enable diversity, quality improvement and lower prices for household equipment, and popular adoption of FLOSS.

Web services and cloud computing are an important present and future issue. End users and companies have recourse to web services and cloud computing solutions in order to outsource their information system administration. Without an effective right for all users to migrate their data from one solution to another, it will create new vendor lock-ins similar to the ones that emerged in the 1990's. The most effective solution is the use of open standards, that will give the users back their right to administrate their data and enable free competition.

Recommendation #4

Require Web service providers to offer their customers open-standard based solutions with practical and effective solutions for exporting data, and encourage the open accessibility of FLOSS solutions and open access data infrastructures (for instance for geographical information) needed to instill true competition in the field of Web services.

Free and Open Source licenses are the basis for the four freedoms conveyed by FLOSS. That is why legislation should also include protection for free-licensed software in the same way as for proprietary software. This would guarantee the four freedoms for all users, and respect for the software developers' intentions or aims.

Recommendation #5

Legally acknowledge any license that FULLY recognizes the rights of users, including those licenses that protect FLOSS against re-proprietarization.

Public authorities should also set up legislative measures to favor the use of FLOSS in public administrations, by obliging public administrations to give preference to FLOSS rather than proprietary software fulfilling a similar function. Beyond the financial, technical and independence advantages, this will encourage local industry, and propagate FLOSS usage.

Recommendation #6

Introduce FLOSS preferment in public administrations procurement.

Finally and in general, public authorities should take FLOSS into account when creating new legislation, especially at the international level. FLOSS economic actors as well as civil

advocacy groups should be consulted before new legislation is drawn up. International treaties, as well as national laws, should not discriminate against FLOSS and thus unfairly penalize their individual, business and public users and developers.

Recommendation #7

Elaborate IT-related legislation taking care to protect the legal ecosystem of FLOSS.

A clear and stable legal context is an essential condition to the development of FLOSS communities and market. This sohuld be the first step in establishing FLOSS public policies.

2. Procurement and e-administration – encourage mutualization, the use of shared resources and interoperability

Public procurement and electronic administration are major levers for developing FLOSS. Public administrations are the first entities concerned by FLOSS-related stakes, from the control of cost to data durability and technological independence. Moreover, its inherent transparency gives FLOSS an advantage for security issues. This is why FLOSS is used by the French national defense for very sensitive applications. And the advantages of FLOSS in general convinced the French National Assembly, as well as the Gendarmerie, to switch to full-FLOSS environments for their desktop computers.

The use of FLOSS in public administrations makes it possible to pool resources. It contributes to the development of sustainability, and favors data durability thanks to open standards.

Open standards are a major issue for public administrations. Indeed, public administrations are in charge of data destined to last for several decades. They therefore need to ensure that their present data will still be accessible when their software's publisher does not exist any more. Only open standards (or, failing that, open formats) can guarantee the durability of data.

FLOSS also enables public administrations' technological independence. Some essential software tools can be used by proprietary software vendors for their network effect. Lock-in mechanisms can also be used to discourage users from switching to a rival solution. This is the case with Microsoft's Office Suite, that uses proprietary, closed formats: formats are not compatible from one version to another; users need a specific version of the software to read their old data; and their partners need to use a compatible version of the software to read the documents they produce. The integration of such software is an aggravating factor in the propagation of lock-in mechanisms, because it obliges users to call upon the services of a specific, licensed supplier. This also leads to discrimination against FLOSS in procurement, since public administration specify the proprietary technology they use. It perpetuates their dependency and blocks competition.

Recommendation #8

Avoid any discrimination against FLOSS in public procurement.

Thanks to FLOSS, public administrations can access a wider range of suppliers. The openness of technologies enables free competition. Moreover, they can more easily switch from one technology to another and migrate their data to a new information system.

FLOSS and open standards are also the means to guarantee access by all citizens to electronic administration services. The use of proprietary technologies in e-administration often results in social and technological discrimination, excluding users because of the cost of proprietary software and their possible incompatibility with FLOSS environments.

Recommendation #9

Give priority to FLOSS and open standards in procurement procedures.

However, public administrations need to know that they can specifically request FLOSS in procurement. They should be guided in their procedures by documentation such as that published by the French Ministry for the Budget and the European Open Source Observatory and Repository (OSOR) in 2007 and 2008.

Recommendation #10

Publish guides and recommendations to help public administrations specify a demand for FLOSS in procurement procedures.

In order to pool resources and make procurement more cost-effective, public administrations should consider group buying. This enables new applications to be designed specifically for public administration needs.

Recommendation #11

Encourage group purchasing in public procurement.

When FLOSS projects are used by public administrations or local authorities, a technical or financial contribution to the projects should be considered. FLOSS ecosystems work on a collaborative and contributive basis, and public administrations may remunerate FLOSS by contributing to the projects they use. Contributions help enhance the software, and users benefit from one another's contributions.

Recommendation #12

Encourage public administrations and local authorities to contribute to the FLOSS projects they exploit for their own use.

More generally, whenever software is produced with public money – except when security requires secrecy, as for national defense applications – it should be released under a FLOSS license. FLOSS licenses enable software to be published for the common good while protecting it from exclusive appropriation.

The Brazilian government creates public software with public money thanks to their Public Software Portal. Initially designed for public administrations to pool resources and find suppliers, this portal is now used by private users that can thus benefit from the developments

and enhancements realized thanks to public procurement.

Recommendation #13

publish software developments realized with public financing under a FLOSS license.

By applying such a policy, public administrations can thus contribute to FLOSS while benefiting from the many advantages it offers. This is the case in the Netherlands, with their « Open Connection » program, and what Sardinia Region (Italy), with a recently approved law, are trying to implement.

3. Innovation policy – acknowledge and support free software innovation

To fully realize the potential of FLOSS, a voluntary public policy also needs to take FLOSS into account in innovation policies, in order to develop and support a high potential economic sector, promote interoperability and free competition, and encourage local companies.

First of all, public authorities should set about changing innovation evaluating criteria, so as to incite private actors to change their views too. They can set an example by acknowledging the interest of free/libre licenses and FLOSS business models.

A first point concerns public research. Researchers in public laboratories are often incited to publish their works under proprietary licenses, that are considered to be a means of hallmarking the value of these works. They are actually the main privatizing agents for publicly funded research made by publicly employed researchers. This system restrains the contribution of public laboratories to commons in general and FLOSS in particular. This is why public research laboratories should be encouraged to publish their works under licenses that guarantee the four freedoms, to enable the constitution of commons through collaborative work and knowledge sharing.

Recommendation #14

Promote the use of free/libre licenses for the publication of public research projects.

Another point concerns supporting FLOSS R&D. R&D incentives or public funding often exist to encourage investment and innovation. But the criteria are rarely compatible with FLOSS collaborative development and FLOSS companies' business models. Whereas proprietary software companies can benefit from fiscal advantages for investment, private investment in FLOSS projects is rarely acknowledged as a contribution to innovation. It thus creates discrimination that penalizes FLOSS in comparison to more classical economic sectors.

Recommendation #15

Create or adapt fiscal R&D incentives for FLOSS companies. Grant FLOSS financing the same advantages as patronage or business investment. Use FLOSS-compatible criteria for public R&D funding.

Attracting private investment can turn out to be very challenging for FLOSS businesses, as the RoI-based business models for FLOSS do not really exist yet. However, FLOSS entrepreneurship can be fostered by a public fund dedicated to help young entrepreneurs to set up SMEs that supply and support FLOSS solutions and applications in the regions nearby.

Recommendation #16

Create a FLOSS Promotion Venture Fund that can be accessed by young entrepreneurs to set up their own FLOSS businesses.

In addition, public authorities can support FLOSS innovation while using it for public interest.

FLOSS can indeed be a lever for improving IT usage. For example, SMEs lack proportionate software solutions for customer relationship management (CRM), enterprise resource planning (ERP) and more generally all applications that large companies have computerized for a very long time. FLOSS projects matching these needs can be supported by public investment; it would support SME IT equipment and usage and thus contribute to improving SME competitiveness. In the meantime, this public investment would help create new services complementary to the software itself, and help local companies develop and strengthen.

Recommendation #17

Support public interest FLOSS projects, software and services, and thus support the development of both IT usage and the « digital economy ».

FLOSS projects bring together different kinds of contributors and users. For public interest FLOSS projects, public authorities may encourage partnerships between all the constituent groups of the ecosystem: the public sector, companies, communities and professional users.

Recommendation #18

Encourage partnerships between the public sector, professional suppliers and users, and communities.

FLOSS should also be used to enable SME's to compete on new, emerging markets, and enable them to innovate independently from the dominant actors. Public authorities should anticipate IT market evolutions and provide, together with the private sectors concerned, open-standard-based public platforms and infrastructures. Competitiveness clusters can be the vehicle for such initiatives. This helps guide new markets towards free competition and contributes to data durability and the preservation of users' rights with respect to their data. The « cloud computing » service development and its consequent threats of major lock-ins should encourage public authorities to actively promote competition and the emergence of open-standard-compliant services.

Recommendation #19

Create open-standard-based public platforms and infrastructures for new markets so they develop in a way that fosters competition and preserves users' rights.

The development of « Internet of things » shall likewise be guided by public authorities in order to ensure that interconnection, interoperability and free competition will remain possible.

Recommendation #20

Impose the use of open standards for the development of « ambient computing » network infrastructure and services.

A voluntary innovation policy is essential to develop the economic aspect of FLOSS. But the social aspect must be taken into account, as the greater benefit of FLOSS is for society and the individuals within that society.

4. Society – *Liberté, égalité, fraternité*: promote an active participation of citizens in the information society

FLOSS is software that gives the user the freedom to share, study and modify it. It embodies and conveys the values of basic freedom in an information society. It fosters a healthy informational infrastructure, favoring the sharing of knowledge, know-how and progress within the whole of society.

To promote FLOSS is to make a political and ethical choice asserting the right to learn, and share what we learn with others. Free software has become the foundation of a digital earning society where we share our knowledge in a way that others can build upon and enjoy.

FLOSS licenses use copyright laws cleverly in order to share software with all human beings while protecting them against any attempt at appropriation. Eben Moglen, one of the authors of the most popular FLOSS license – the GNU GPL – often declared that this license allows "the creation of a common resource to which anybody can add and from which nobody can remove". The other author, Richard Stallman, likes to remind us that Free Software can be defined by three words: "Liberty, Equality, Fraternity".

Free Software can be copied legally by anybody, and can almost always be downloaded from the Internet. This free of charge access, allows the less privileged populations to avoid resorting to illegal copying of software in order to benefit from technological progress. Free software is intrinsically a tool that reduces the "digital divide". That is why the Brazilian authorities have decided to use FLOSS as reference for government programs for digital inclusion. Some public Internet workspaces have also chosen FLOSS for their training courses: it enables the trainers to deliver media containing the software they use, so that trainees can continue using it at home.

Recommendation #21

Promote FLOSS for popular access to IT, especially in educational and training structures.

Education is a major issue for the information society. FLOSS values include the fact that all users are empowered to master information technologies, which implies they must possess a basic knowledge of computer science in order to be a full citizen in the information society. However, children are too often taught how to use a computer and browse the Internet, instead of being taught what a computer is, what software is, and how all this works. All pupils should also learn basic programing techniques to better understand and use information technologies and become autonomous users.

Recommendation #22

Provide basic computer science teaching in schools for all pupils.

FLOSS empowers users to control their personal data and avoid lock-in mechanisms. Beyond computer science teaching, being a full – and free – citizen in the information society indeed requires the individual to be aware of fundamental issues like personal data protection, open standards and vendor lock-in prevention.

Recommendation #23

Use popular education to raise citizens' awareness about their rights and freedoms in the digital world.

FLOSS's inherent multi-lingualism is an advantage to exploit for emerging and developing countries. IT users in these countries rarely have at their disposal software in their native languages because these are not considered profitable enough for a classical, proprietary software market. On the contrary, FLOSS's multi-lingualism makes it possible to publish software in the languages of the populations who will use them. It is thus a lever for the development of IT usage and the reduction of the digital divide to which public funding can easily contribute.

Recommendation #24

Contribute to FLOSS's multi-lingualism to develop IT usage in emerging and developing countries and reduce the digital divide.

FLOSS is also a tool dedicated to acquiring computing skills. Since it is shared along with its source code, this code can be studied to understand the techniques it implements so they can be reused and transmitted, even outside the usual training and educational fields. In school and university courses, the use of FLOSS is thus obviously profitable for the gain and transmission of computing skills. Moreover, it favors a teaching that conveys adaptability to the student, in contrast to the « black-box » approach conveyed by proprietary, closed-source software.

Recommendation #25

Use FLOSS in school and university courses. Create specific FLOSS courses in addition to general computer science courses.

The way free software developers cooperate through the Internet simplifies the transfers of expertise beyond borders. The collaborative development model of FLOSS enables students to acquire experience in programing and participating in a project.

Recommendation #26

Encourage students to take part to FLOSS projects.

Increasingly, "author-user" teachers produce quality educational resources in cooperative approaches similar to those of FLOSS developers. They choose free/libre licenses for their achievements, which may give rise to co-publications with both public and private publishers. From these points of view, the example of the association Sésamath, a group of teachers who create and maintain free/libre mathematics textbooks, is exemplary.

Recommendation #27

Encourage the creation and use of free/libre teaching resources by teachers themselves.

Free Software is not a merchandise, and those who develop it are contributing to the transmission to many people of scientific knowledge, technical expertise and technologies providing them with access to Knowledge. Moreover, the GNU project – a key project for Free Software – has been classified by UNESCO as a “World Treasure”. An application was filed to register the GNU project into UNESCO's « Memory of the World » program, which aims at preserving and disseminating valuable archive holdings and library collections worldwide.

Recommendation #28

Support the registration of the GNU project into UNESCO's Memory of the World program.

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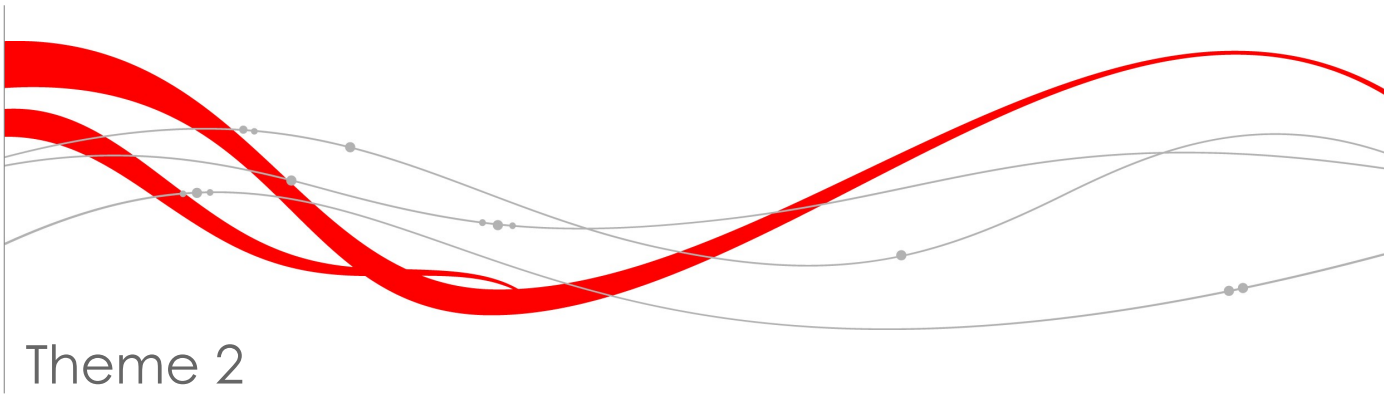


Theme 2

FLOSS: the key to future innovation and competitive differentiation?

Today, from 25-40% of R&D business costs relate – in one way or another – to software. This confirms the vital importance of software in today's and tomorrow's digital world. It also highlights the crucial impact FLOSS could have on the whole innovation process and the economy. Thanks to its open and collaborative approach, the promotion of standards and interoperability, FLOSS have a strong potential to accelerate innovation, by favoring and accelerating technology transfers between research, academics and business, from SMEs to giant corporations. By involving end users in the innovation process, they also offer a key lever for innovation, accelerating the development of tomorrow's digital services: telecom, e-government, online services, healthcare.... Leveraging this potential will have a strong impact on the economy.

State of the Art

In 2008, the power of FLOSS for innovation is beginning to be widely recognized. FLOSS not only helps corporations by providing them with reliable, low cost, modular software to invent new solutions and services. FLOSS drives innovation by enabling pioneers to invent new business models based on publicity, subscription, and services; FLOSS helps early adopters boost their competitiveness to open new markets and target new customers with dual licensing or appliances models; FLOSS reshapes methodology and costs for mass marketers to create new services, POCs, and to differentiate themselves.

Recognized advantages of FLOSS include reduced time to market, leveraged R&D capabilities to complement existing offerings and create technological, market differentiation and fair value.

FLOSS supports excellence, differentiation and the emergence of talent through communities and social networking. FLOSS are particularly scalable because of a simplified licenses management policy which accelerates the transfer of technology from research to industry.

They accelerate the emergence of innovations in IT infrastructures, software, tools and application adoptions through the creation of ecosystems bringing together developers, users, partners and customers, oriented to engineering and business development. The IT industry has been the first one to leverage the potential of FLOSS. Examples range from operating systems (Apple MacOSX, based on FreeBSD) to low cost information access devices (mobile phones,

netbooks or Amazon Kindle) to very high value added solutions (such as supercomputers, 85% of which as based on Linux in the Top500 worldwide). However, the true innovative value of FLOSS doesn't just depend on its low cost and reusability. It depends on its principle of collaborative innovation, facilitating technology transfer within a whole ecosystem. Internet infrastructures, Java environments, the Eclipse development platform or Android are recent manifestations of this dynamic. Last but not least, a fundamental power of Open Source for innovation is its capacity to favor user-driven innovation. Examples range from technology to business processes (Google, Yahoo or eBay online services were made possible thanks to low-cost Open Source infrastructure solutions)...

As a result, FLOSS are not just 'up-and-coming', from IT infrastructure (OS, Web2.0) and development tools (Wiki, collaborative tools) to business applications (CMS, ECM, ERP, eBusiness). They are beginning to be widely used in embedded solutions, from cars and planes to industrial devices, and becoming one of the mainstays – even the backbone, some might say - of the software industry.

Predictions and Recommendations

OUR VISION

Software openness was commonplace in the early days of computing. In the 1980-2000 decades, the model of proprietary software publishing became prevalent in the industry. This is rapidly changing, so that openness is now coming back as a major enabler of innovation. FLOSS is a proven example of 'open innovation' applied to software. In the coming decades, software innovation will come about acrossthe whole spectrum of models, in all of which FLOSS is likely to play a role. To some extent, the 'publisher' model is likely to become a special case scenario within a more general, ecosystem-based, innovation model relying on FLOSS.

In 2020, the impact of FLOSS could become prevalent. Our vision is that

- Floss will become the common standard for interactions with hardware, systems, applications through private and public networks;

- Floss will be developed on open standards published and owned by communities of users, customers and techno-providers, with clear governance rules and transparent sources. They will be free from patents revendication risks which will have been discussed and modified against a background of a worldwide industry and government pressure ;

- The Floss model will breathe life into global platforms so new technologies, services and companies can emerge. It will be recognized as the best way to accelerate the rhythm of technology acceptance with new business software and tools, and for strident infrastructure breakthroughs to take place in cloud computing platforms, Saas models, or embedded appliances development, while keeping a competitive and worldwide approach;

- Floss platforms will be chosen and used to share investments and resources to tackle the global issues facing IT like energy regulation, fair transfer of technologies and education, preservation of electronic individual property and ethical scientific computing...

To meet these objectives, we would like to highlight the following predictions and recommendations.

1. FLOSS will become a standard for innovation processes. this will lead to the appearance of open platforms enabling innovation

FLOSS will become the standard necessary to IT innovation differentiation, by encouraging the adoption of new technologies thanks to open APIs and methodologies, improved time to market, the emergence of new service models, more competitive technologies, and wider community acceptance...

More and more research, industry and government organizations will leverage FLOSS investments to answer their business or service requirements. In the future, FLOSS will be increasingly used to create open innovation platforms based on open standards and APIs. These platforms will favor innovation and value creation for whole ecosystems They will be supplied by early adopters needing to complete their technological offering and reduce their time to market, by public and private customers needing to preserve a sustainable technology alternative, by service companies willing to bring new offerings and services to the market. Even proprietary software vendors will increasingly create and distribute APIs and connectors using the Floss model to reach more partners and customers.

Recommendation #1

Enterprises and innovation centers (research centers, consortia, etc.) must leverage FLOSS as a key lever for collaborative innovation, and create / participate in building appropriate FLOSS platforms.

This is a reality for IT players, but also for banking, industry or defense sectors. The development of community sourcing should be one of the major outcomes of the development of the FLOSS industry, leveraging and extending first initiatives of this kind today in telecoms (Open Hanset Alliance, OpenMoko or LIMO in telecom,), in e-government (OSOR and ADULLACT), in manufacuring (use of FLOSS in cars, trains, etc.), etc.
Different platforms could appear like open services platforms, open mobility platforms (Androïd for example), open e-government platforms (see Osor recommendations) or open e-market platforms.

Recommendation #2

Interprofessional bodies must study the launch of FLOSS initiatives in their fields for new standards in the finance, automotive, transportation, etc sectors.

Following the adoption of these platforms and APIs, either methodologies and standards will adapt to these new technological models, or certifications will be provided by experts and software vendors like CMMI, ISOXXX, etc.

Recommendation #3

Suitable procedures and standards must be developed to manage and certify FLOSS-based open innovation

2. Dedicated ecosystems will develop to manage floss-based innovation processes, with specific governance rules and patents strategies

In order to leverage innovation based on openness, bridges should be built between communities with "grass roots" structures, academia and the business world. This may be achieved through non-profit organizations able to federate both individuals and organizations around innovative activities based on openness. Such structures should go beyond the first generation and second generation FLOSS communities (individuals, enterprises) to third and fourth generation communities, linking all stakeholders.

The FLOSS model will develop through collaborative platforms and forges, creating a new ecosystem based on social networking and common interest, and regulated by governance rules and FLOSS licenses. Specific networks such as Competitiveness clusters in France (such as System@tic Paris Region, the first cluster worldwide to have developed a specific FLOSS workgroup), should develop in the future.

Recommendation #4

The development of cross-industry foundations based on FLOSS principles and governance must be encouraged.

Beyond communities, it is also interesting to study the experiences gained from developing marketplaces for collaborative innovation. Going beyond IT, these innovative principals can be leveraged in domains such as Pharmacy, Aeronautics, etc. Organizations such as InnoCentive, Yet2Com or NineSigma are today pioneers interested by such structures. These principles should be developed and adapted for the FLOSS domain (with appropriate FLOSS licensing and IP management).

Recommendation #5

Encourage the development of open innovation marketplaces, either public or privately held.

The full potential of FLOSS can be leveraged only if the patent threat is removed. Software licenses are plagued today by the complexity of the international IP context, based on copyright law, which is often overlooked in innovation support cycles, where the bottom line is the need for protection by patents. Both licenses and regulations have room for improvement, so collaborative software innovation and engineering practices should become an easy choice for all parties involved, from research to final users.

Within a legal environment taking into account the specificity of FLOSS, industries and governments have to transform patents and IP governance: by mutualizing open defensive patents, by discussing European and Asian open standards, by organizing a worldwide conference on the subject.

Recommendation #6

Create an international conference on software and FLOSS IP, to favor the emergence of regulations favorable to FLOSS innovation.

3. FLOSS will be a key driver enabling new technologies and services to emerge, such as cloud and green computing, internet of objects, and ambient computing, social software, and security and privacy

With the emergence of open platforms based on common standards and interoperability rules, the commoditization of a large proportion of systems and infrastructure will transform the issues around innovation. This will bring new capabilities to invest in emerging technological domains. FLOSS development is especially useful in domains that require creation of a common framework for many players, a common ground for complexity management, and the avoidance of monopolies. FLOSS should therefore be of prime importance in the following domains:

New services emerge to deliver more resources

The global dematerialization and internationalization of uses will leverage technologies to manage higher volumes of data with greater efficiency. Structured and de-structured information searches, multimedia, proliferating sound and video resources will drive the implementation of semantic and correlation technologies.

This will in turn bring about more innovative services with proof of concept resources, hosting and performance management resources, collaborative and social networking bringing together an ecosystem including everyone from IT teams to customers, such as cloud platforms and SaaS model engines.

Next generation Cloud infrastructures and green Computing

The development of the digital economy and the reduction of the digital divide call for the emergence of new infrastructures, able to serve the needs of billions of people while respecting the environment. This calls for new IT infrastructure development to cope with enormous computing power and data storage challenges. FLOSS innovation can focus the world's intelligence to solve these complex issues, from mutualization of computing resources (virtualization, grid, HPC platforms, autonomic computing, etc.) to data management (structured and destructured information, multimedia and video resources, huge data volumes, semantic technologies) to the development of innovative services on top of these platforms (social networking, autonomic computing, etc.).

Recommendation #7

Create a FLOSS initiative on Cloud Computing to create Open cloud platforms

Devices for digital inclusion / Internet of Object

FLOSS will be key in extending technologies and their uses for new interfaces: APIs and interoperability, IHM, new devices (embedded, Netbooks, mobiles), MtoM (M2M web services), ambient computing technologies.

With the increase in volumes of data, contextual and profiling technologies will be a repository for big issues about preserving privacy and confidentiality.

Recommendation #8

Create FLOSS platforms to gather specifications and open components for MtoM and ambient computing.

Social and agile software.

Collaborative computing is at the heart of tomorrow's IT. FLOSS social software development is a key research axis that should be pursued if we are to halt the advance of closed solutions in this field.

Agile methods of development will also allow better flexibility, more reactivity in development and customization, and will enable the development of collaborative support access based on contribution and professional involvement, new reference software insurance models provided by publishers championing FLOSS.

Recommendation #9

Foster FLOSS initiatives on social software

Security and privacy

The need to protect privacy and safety in a more complex environment should drive innovations in security and privacy, Identity and role management, safety and secure computing, tracking of sessions and traceability to constitute proofs and responsibilities. More extended network environments will bring new issues, adding audit and control components to improve the security level, and information access traceability.

Security and privacy are among the key challenges for tomorrow. FLOSS can be instrumental to solve them with open and safe technologies in recovery technologies, maintenance capabilities like self adaptation, auto-testing and repairing systems.

Recommendation #10

Develop FLOSS initiatives and projects in security, and among all ID and privacy

4. FLOSS will have an impact on our society, and will contribute strongly to solving sustainble development challenges, and to creating new waves of enterpreneurship

Open Innovation will open new opportunities for growth, wealth, and entrepreneurship.

Developing open standards, common labels and cross standardization (private and public) will allow markets to become regulated in time for the next onslaught of global challenges: new models for global, fair distribution and energy consumption: green IT, technology sustainability, standard transparency for fair access, fair standard technologies on a global scale to reduce inequality...

2012 objectives are to give a 100% access to the Internet, 2020 objectives would be to give people access to an Internet public address,volume and resources...

Floss will provide the opportunity to reduce discrepancies worldwide in IT and education by preserving an open space for access to software and content resources; to leverage more technologies and markets, train more engineers, to appeal to entrepreneurs by giving them a window on the IT world...

Recommendation #11

Recognize the contribution FLOSS makes to society and sustain its development, with fiscal incentives, for both enterprises and the general public.

In 2020, energy regulations, interoperability and fair development will play a major rôle in IT development. Maintaining ever stronger FLOSS policies will be the only economic way to control standards on a worldwide scale o, and to set up regulations in combination with a structured policy for investment.

In particular, in a complex IT offering where access modes, infrastructures, software and content can be delivered by proprietary providers, the risk of a big IT crunch could materialize through players failing to take on board their individual responsibilities. Floss can only preserve transparency and individual safety in a worldwide network.

FLOSS will be necessary to prevent monopolies from forming, and to preserve competition in software and information access, and this throughout the ICT industry. It could help us find a competitive solution to neutralize the risk of shortfalls that might occur in investment in IT due to the 2008-2009 economic crisis. By lowering entry barriers, it is also a strong way to foster entrepreneurship in the IT market, and the best way to encourage startups and SMBs development.

Recommendation #12

Promote entrepreneurship in FLOSS, and create FLOSS workgroup in entrepreneur networks

RISKS ANALYSIS

Four main risks have been identified which could hinder Open Source becoming widespread in the market and the field of innovation. These risks would also affect the actors themselves.

1. A standardized patents system or other legal regulations

would first drive a lot of publishers and SMBs to the wall, and then the global non-US IT ecosystem would be penalized due to a lack of patents experience through a big legal war for proprietarization of European and Asian technologies. After that, software entrepreneurship

would be dependent on goodwill, and payment, from big license providers.

2. The eradication of IT publishers

the emergence of new massive models (Cloud computing and SaaS distribution models) would prevent the emergence of competition between entrepreneurships and SMEs in technology development. (See Theme 4: new models)

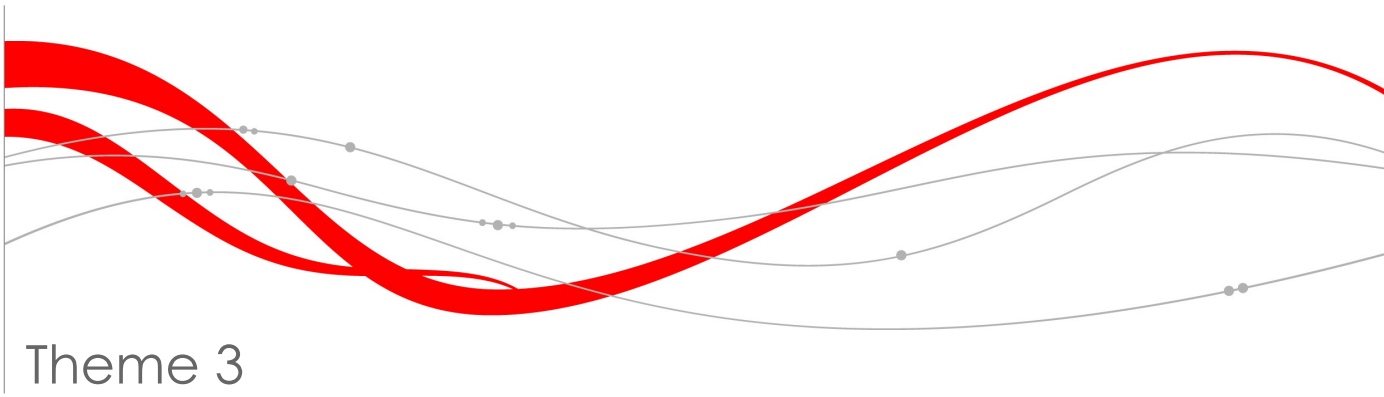
3. The proprietarization of accesses to networks and ressources

due to the concentration of software publishers, the explosion of mass market models through cloud computing or SaaS offerings leading to a concentration of resources, and the development of embedded proprietary offers on network access and hosting resources could occur, leading to an exclusion of FLOSS from the development landscape. This would promote a new concentration of Capital and an explosion in the cost of access to IT resources for most people, with a risk of a computing bubble due to an absence of control of the technologies chain.

4. Strong differences in the education between continents and cultures

as a result of the increasing cost and global proprietarization of network and computing resources.

The application of the above recommendations is the way to mitigate these risks.



Theme 3

Ensuring the sustainability of FLOSS developer communities and business ecosystems

Introduction

FLOSS is essentially based on sharing code, ideas, expectations, behaviours, value, etc.. The FLOSS trend on both the industry side (offerings) and on the part of the market (demand) is supported by developer communities and business ecosystems. The question we want to answer is: "To what extent are FLOSS communities and business ecosystems sustainable?" FLOSS is not a unified, monolithic topic. We cover these issues from four perspectives: Demand, Industry, Governance and Public Environment.

Demand

State of the Art

- Currently: three major segments, a) those with a pro-active FLOSS strategy are early adopters, the majority of users are either b) opportunistic, i.e. they use FLOSS on a case by case basis (Apache server, Eclipse tools, chosen by rank and file IT professionals) and do not have a FLOSS strategy, or c) below-the-radar users who will not pay for software licenses, some of them never and others as long as software usage is not critical to their organizations.

- However, the extent of FLOSS usage is growing fast enough that it is now sufficiently mainstream for organizations and individuals to consider using it.

- FLOSS is growing in mass-consumer markets: for example, almost 30% of machines in Germany use Firefox to access the web; HP, Dell, and others market Ubuntu and SuSE-based netbooks, embedded FLOSS is increasingly used in consumer devices.

Predictions – Most probable evolution between now and 2020

- There will be no software technology which will not have its FLOSS implementation. There will be no enterprise need normally addressed by software which will not be addressed by FLOSS.

- Even for the more conservative users, FLOSS will represent at least 10% of their IT spending as a protection against risks of abusive behavior by proprietary software vendors.

- FLOSS becomes well accepted if not dominant in some segments: infrastructure, development tools, scientific computing and some embedded applications.

- The vast majority of mobile phones will be built on FLOSS software.

Risks – Main risk factors against sustainability

- FLOSS demand will go to those commercial vendors having developed an OSS offering or combined FLOSS and proprietary value proposals.

- Since we have examples of commercial vendors refusing to support their software if running in a FLOSS environment, such FUD strategies could hamper FLOSS demand.

Recommendation #1

Communication-push to build widespread awareness about FLOSS in all categories of users.

Recommendation #2

Government procurement must require FLOSS alternative offering in all their calls.

Recommendation #3

Use social networks to help build FLOSS awareness in mass consumer markets.

Recommendation #4

Help develop best practices of FLOSS policies for end-users.

Recommendation #5

Develop benchmark of excellence and reference use case to promote usage of open standards and interoperable solutions.

Software Industry

State of the Art

- FLOSS is pervasive. There is no such thing as a FLOSS industry. The impact of FLOSS goes way beyond pure play open source companies; for example, virtually all of the enterprise class middleware products such as IBM Websphere, Lotus Notes, Oracle WebLogic, etc. base a significant portion of their implementations on open source components such as Apache HTTP Server and Eclipse Equinox.

- Few successful pure play open source companies, but more than 200 open source start-ups whose long-term future is somehow uncertain.

- No real pure play leaders except perhaps Red Hat. Leading open source companies are attractive to established companies: MySQL acquired by Sun, JBoss acquired by RedHat, Zimbra acquired by Yahoo.

Predictions – Most probable evolution between now and 2020

- All software, FLOSS and proprietary, delivered as software packages or as SaaS, incorporate FLOSS code.

- FLOSS has definitively become a pervasive part of the software industry; it has a broad impact but does not radically change its business model.

- Commercial vendors play a major role in many leading non-commercial open source projects. Most commercial vendors will launch their own open source efforts.

- Many promising pure play open source companies to be acquired by commercial vendors.

- SaaS sales model is validated by leading companies such as Salesforce.com and Google and other vendors follow suit. SaaS business model has the greatest impact on the software industry.

Risks – Main risk factors against sustainability

- Many FLOSS start-ups aim at being acquired by larger companies, but will acquired companies retain their FLOSS models?

- Many vendors develop hybrid models with a proprietary offering based upon FLOSS components of a FLOSS platform. Will these models define the limitations of FLOSS, will they "poison" FLOSS?

- SaaS providers rely on FLOSS without contributing back and they could gradually kill the FLOSS software package model.

- Many FLOSS companies delivering "fake" open source will stumble; for example those marketing "crippleware", under Community/Enterprise licensing duals, which is widely not accepted as open source and therefore compared to proprietary software with all their strategic disadvantages,.

Recommendation #6

No irrational belief: foster pragmatic analysis of the relationship between FLOSS communities and the business ecosystems they enable.

Recommendation #7

Vendors must clearly identify where is their FLOSS interest (cooperating on commodity components) and where is their proprietary added value (business process and integration / customization / aggregation of FLOSS components.

Communities and Governance

State of the Art

- FLOSS communities are generally fragmented; with new technologies (eg, PHP, Ruby, Drupal, etc.) come new communities.

- Communities are typically the result of bottom-up efforts but some communities are more organized than others. Non-profit organizations are set-up to help drive the communities, with the goal of providing governance to the proverbial FLOSS bazaar.

- As far as FLOSS organizations go, the current benchmarks are the Eclipse, Mozilla and Apache Foundations.

- FLOSS communities use state-of-the-art tools (see Apache, Eclipse, Tigris) and have proven they are very efficient at developing state-of-the-art software.

- FLOSS licenses proliferate and, although there is no official authority to approve open source licenses, OSI is on its way to becoming this authority de facto.

Predictions – Most probable evolution between now and 2020

- Communities can be FLOSS pure play whereas business ecosystems are necessarily based on some proprietary model or at least on a combination of FLOSS and proprietary models. Communities are enablers of business ecosystems.

- Companies get involved in open source, because FLOSS communities provide the legal, governance and process frameworks needed to create industry collaborations. What are now passive consumers of FLOSS will become participants and contributors.

- FLOSS communities keep emerging and all IT domains eventually end-up with their own FLOSS communities.

- Communities supported by IT professionals keep growing: contributing to FLOSS is good for professional career; moreover, students are more and more familiar with FLOSS and participate in FLOSS communities.

- Some FLOSS organizations prevail: Linux Foundation, Apache Foundation, Eclipse Foundation, OW2, Mozilla Foundation, and others.

- An official authority whose role is to validate FLOSS licenses is established.

- Foundations and other non-profit FLOSS organizations see their model validated. Some non-profit organizations even evaluate the opportunity of becoming "for-profit" organizations.

- As FLOSS becomes mainstream and more and more visible in the software industry, the legal relationship evolves from gentleman's agreement (few real court cases) to enforceability.

- FLOSS code is available from publicly accessible forges. Forges have become the developer's ERP and FLOSS forges become FLOSS market places. Specialized forges emerge dedicated to specific themes, technologies and companies.

Risks – Main risk factors against sustainability

- Communities should thrive, there is no particular risk because there will always be voluntary work on exciting technologies. However, employers who perceive the value of community contribution are still a minority and the risk of conflict between voluntary work and employers remains real.

- As the number of communities and non-profit organizations grow, companies will reconsider the opportunity to participate in too many organizations. Membership proliferation is not an attractive perspective.

- If license proliferation continues, the risk of incompatibilities between FLOSS licenses will be greater. These incompatibilities would be revealed by the trend toward a more brutal enforceability of FLOSS licenses, they will make some software unusable and deter CIOs.

  – With the proliferation of communities and organizations comes the proliferation of Forges. Forge fragmentations and incompatibility as well as proliferation of software with unproven quality might reduce confidence in FLOSS.

Recommendation #8

Develop FLOSS awareness in schools and universities.

Recommendation #9

FLOSS voluntary work should be a real plus for employers.

Recommendation #10

Encourage participation of communities in the development of FLOSS cloud computing technologies.

Recommendation #11

Help analyze the impact of SaaS on FLOSS and help develop FLOSS models compatible with the SaaS delivery and business models.

Recommendation #12

Against FLOSS license proliferation: need for a consolidation effort to be driven by a recognized body such as OSI, FSF or SFLC, for example.

Recommendation #13

Against forge fragmentation: develop inter-forge exchange standard protocols and best practices as well as best practices for software quality testing.

Public Environment

State of the Art

- Despite some recent progress, there is still limited government awareness regarding FLOSS. The commercial model is dominant and FLOSS is a cultural exception.

- Moreover, government procurement balances commercial and FLOSS solutions.

- On the education side, FLOSS is rapidly expanding in IT research and IT teaching use FLOSS more and more frequently.

- Developing countries are falling behind in their grasp of FLOSS because their IT markets are largely controlled by established proprietary vendors.

Predictions – Most probable evolution between now and 2020

- Developing countries will start to systematically evaluate FLOSS as lever of public welfare improvement.

- Governments, increasingly lobbied by both FLOSS and proprietary interests, will be pushed to adopt FLOSS procurement policies.

- More gateways between industry, research and education as careers become less linear and IT job mobility increases.

- Broader use of FLOSS in the education and the public domain. The FLOSS model is not limited to IT, and more usage areas are involved (eg, services, content).

Risks – Main risk factors against sustainability

- Government support for FLOSS efforts and communities reduced because of FUD and lobbying campaign by anti-FLOSS vendors.

- Confusion between business (short-term) and public research (long-term) priorities because of proprietary software vendors cutting prices and sponsoring universities to gain momentum.

- Because of confusion and lack of expertise and clear analysis, public policies will remain unclear about how to defend FLOSS, open standards and requirements for interoperability.
- Large publicly funded projects are almost inaccessible to FLOSS start-ups as they lack the necessary management resources to take part in such projects and to FLOSS communities because of their transnational nature.

Recommendation #14

Build awareness of FLOSS as socially beneficial because it helps grow expertise and added-value by local stake holders.

Recommendation #15

Redirect research/education software budgets to FLOSS.

Recommendation #16

Encourage career flexibility between private and public sectors.

Recommendation #17

Introduce FLOSS as early as possible in education, train teachers about FLOSS and teach basics of IT (and programming) to everyone at school.

Recommendation #18

Leverage FLOSS to reduce the digital divide and develop global FLOSS-based cooperation projects.

Recommendation #19

Design ad-hoc publicly-funded support programs for FLOSS start-ups and communities.

Theme 4

Technological and economic breakthroughs: challenge or opportunity for FLOSS?

State of the Art

SalesForce and Google Apps have demonstrated the relevance of SaaS model for enterprises and individuals: SaaS is easy to use (Anywhere, anytime, always up), it can grow on demand, it enables cost control (pay per use), and eases Time to market (no issue in deployment). Software giants like Adobe and Microsoft are releasing their "gold" applications on-line (Photoshop, Office) in order to increase customer loyalty. Objectis, ERP5 Express and other pioneers have demonstrated the relevance of SaaS to accelerate the adoption of Open Source. Costs of internal hosting are increasing and are difficult to anticipate e.g. electric power is the first cost criteria for CIOs and CFOs. SLA is critical as SaaS model becomes more used: SaaS providers are rapidly learning how to deliver 24/7 worldwide services with a large spectrum of prices and customization capabilities. Disaster recovery and legal mandatory backups find in SaaS the right solutions without investing in new and costly platforms. Virtualization is already in place and will ease the move from pure internal resources to external hosted applications. Bandwidth is no more an issue: ADSL delivers useful user experiences and Wifi, 3G, Wimax networks add the necessary mobility dimension to SaaS services. The SaaS architecture can be applied naturally as Web applications at the beginning of the Internet: communities and home workers act on SaaS model though mail, wikis, blogs, forum, office productivity or calendar tools to share day-to-day activities. However, security is still the "number one" issue. No easy data protection are available when remotely managed on SaaS servers. Managing a global security policy is "the" challenge for CIOs but in house Single Sign On provides today a first a positive approach of this issue

The Web hosting industry relies on FLOSS: GNU/Linux is the dominant OS and provides many ways to implement the required features for hosters. MySQL, Apache, PHP are the super champions tools and SugarCRM, ERP5 and many others offer enterprise-ready applications. New filesystems (ZFS, Lustre) revolutionize the management large amount of data in a much more accurate dimension. Proprietary data format can be replaced by ODF and XML standards in order to unlock users from one particular provider.

Cloud Computing is the natural "next step". Amazon Web Services are widely used as Microsoft, IBM or Gandi are delivering new Cloud services. The 2009 economic crisis will emphasize the requirement to reduce the cost of IT infrastructure and may help SaaS and Cloud Computing actors to emerge as strong partners … or competitors.

Predictions

The IT industry will be the Eco-responsibility champion

The Green IT wave

As (almost) all human activities will be digitalized, designing, building, using and recycling digital hardware and software is part of technical and international legislation. Large datacenters installed close to cheap and green electric plants will deliver an efficient number of Teraflops and Terabytes per watt. Users and customers will be aware of the CO2 footprint of each digital (trans)action. A set of market places will compete to deliver the best mix between cost, green and quality of online services. Internet highways will use "green" optic fibers to enable a global and ecological network.

A more balanced digital divide

The largest number of digital customers will be the in the Asian countries. Cost of traveling will be a barrier and virtual corporations and communities the common organization for working. This will open to the "South" many opportunities to become active economic players in a World no more dominated by the "North". The digital divide will become an energy divide which will have driven the development of alternative energies in Southern countries. Competitive services will be offered by new players from the South as high bandwidth will be widely deployed.

Cloud Computing is the dominant model

All corporations will have dematerialized all their activities including national administrations. Because of the fact that Green IT requirements cannot be applied by small and medium companies, Cloud Computing services will be the dominant model for delivering. SLA will be the way to compete including green, "no time to deploy", easy to use and manage services. The Internet will be replaced by a set of automatic workflows where individuals will customize, using Desktop Gadget and WebOS features, their personal, highly mobile et secure environment. P2P will provide the flexibility needed by the trillions of every day transactions and will rely on Cloud resources (CPU, network, storage). Semantic search will hide the "old fashion" of data files. The Clouds will allow dynamic and intelligent data aggregations that will fuel the network and Saas is a (small) part of a Total Information Outsourcing (TIO) through on-line Web services. Clouds services become utilities (like water or electricity) relying on big players to ensure continuity of services on top of which differentiations will be offered through services where tons of actors will contribute.

Web 3.0 is a "planet Cloud"

Social networks (professional and personal) will become the way to interact, communicate and satisfy commercial and individuals' needs. Interoperability between specialized Clouds will enable corporations to deliver the right services to the right consumers. As "home working" will be the way most of us will work, employees will use customized Clouds to find the most efficient way of achieving a balanced professional/private life and adequate productivity. Mobile devices, ambient computing and smart objects will rely on Clouds services to provide a seamless digital life. E-learning, e-consulting, BPO and data aggregation services will move to the Cloud.

The 2008 financial crisis will have opened new economical models. ROI, gross margins, benefit per share will be shifted to more real value creation. The license model will no longer provide the right price to pay and will shift to the more economical and manageable "pay per use"

model. The Green Planet will make the “total consumption model” over. The new business values will be “sharing” the necessary services with low ecological impacts. Green Clouds will become the next industrial revolution.

Risks

Where is my “source code” ?

The fundamental notion of license, including Free and Open Source licenses, will become irrelevant and replaced by Cloud Services that will hide software activities behind “black box services”. Community activism, as it is today, will have to find a new way to survive. “Free as freedom” will have a new meaning that remains to be described. As SaaS relying on FLOSS are diluted within Clouds, contributions of major Cloud players will be hard to track. Services patents (Amazon One Click Shopping) could threaten the open world and maybe kill the FLOSS momentum. FLOSS communities will have to continue to be involved by changing the license vocabulary.

The return of monopolies

Cloud computing will need large amount of resources offered by a very small number of actors. This will reduce the freedom of choice and put a costly entry point to new players. Application user locks will become service user locks, a much more dangerous and “cost to exit” issue. Security of data will rely on very few players and put users, citizens and even countries at risk of “denial of services”. Full fault tolerant delivery will become an “elite” service, the rest of the world getting only poor quality of services.

The end of individual innovation

FLOSS has opened a new model of contribution and the share of free (GPL meaning) source codes has enabled a huge series of cooperations to flourish. Clouds could slow down, and maybe stop, this trend by building up walls around R&D teams who will deliver only APIs to mush-up. Innovation will then be driven by large corporations without the need or the will to invite individuals to contribute. Any new business model or technology will be locked by the Clouds provider roadmaps that nobody else but providers will control. Large efforts should be put on open access to network otherwise SaaS will increase the digital gap.

Recommendations

Where are my data ?

Cloud Computing is a global data processing model including security, availability and privacy. Any proprietary format has to be avoided as it will be the only way for users to change from one service provider to another. Clear privacy and security contracts will have to delivered to users and must be controlled by international regulatory bodies in order to protect users against any abuses. Backups will have to be kept independently of services (safe-deposit-box) and must remain at the choice of users.

Recommendation #1

Global regulation is needed to ensure privacy, security and safety.

The necessity of new standards

Standardization bodies will have to follow the SaaS/Cloud trends and make formats, APIs and protocols transparent to users and communities. Governments will be involved in regulating this paradigm shift and avoid any new service monopoly. They will show the way by implementing and providing Clouds of e-citizen services based on open standards and fully opened to non governmental Clouds. SLA is the key to create new values and to to protect user Freedom. This emphasize the importance of standard certification (SAS 70 , ISO 270001) and of trusted suppliers for which data in their data-center are like money in Banks. Processes standards could be defined able to run on any workflow engine, freeing users from high level services “black box” providers . Like in Brazil where it is very hard (although not impossible) to get a patent on a process, Cloud processes will have to be described as "(virtual) devices" in an attempt to avoid not having their rights granted at INPI (Brazilian Patent Office).

Recommendation #2

Governments must favor Open Standards and Open Services.

No blind citizens, individuals or customers

SaaS or Clouds are not “digital miracles” hidden by the ease of use. The delegation of responsibilities is not a “game” but must be a clear and fair contract between users and providers. Privacy is not an insinuation or the last line of contracts. Any users will have the right and the means to control every step of their digital actions. Compliance authorities will give trust to end users and protect them against any abuse of their private digital life. clear privacy and security contracts through SLA and applicable Laws and granted access to all data in relation with user inputs, including logs, configuration data and native data. Services market places open the competition and will have, like new financial markets, fair economical models. Green IT labels must be controlled by authorized authorities to provide customers with transparency.

Recommendation #3

Governmental offices or regulation bodies must ensure protection of citizens, companies and Public Administrations from facetious effects due to intrusive or invasive technologies.

Theme 5

IT 3.0: towards new governance for information systems?

FLOSS Governance issues for the enterprise

IT has long been a support to the business. In a digital world, it may well BE the business. The online corporations of tomorrow will bring numerous promises, providing customers and users with 24*7 and personalized services in their everyday life. Agile and responsive, they will form and evolve at the rhythm of perpetually moving business ecosystems in a flat world, where customers and competitors will always be just a click away. The challenges: build information systems agile enough to dynamically align with constantly moving business processes, robust enough to serve the needs of potentially millions of ever-connected customers or citizens, and safe enough to guarantee trust and privacy. Not an easy challenge. By providing robust, flexible, cost-effective, independent building blocks, that can be easily assembled or adapted specifically to each corporation's need, FLOSS will be an essential part of the equation, becoming the backbone of the information systems of the future, and the core of the new generations of enterprise IT, whether directly or embedded (in SAAS, Cloud, ISV or integrator solutions,...). More, FLOSS inspired development methods and tools may be adapted by the enterprise for their own application developments. The risks, from security to cultural challenges, are important. But the promises are high. The enterprises that will succeed will be those that will meet these challenges, and leverage these opportunities.

State of the Art

In 2008, FLOSS is slowly but surely crossing the chasm from early adopter to mainstream deployment. If it was often introduced in SI infrastructures, or peripheral applications a few years ago, it is now established as a proven way to master costs, increase independence from vendors and create robust and flexible applications, including in mission-critical information systems. According to various surveys, more than 85% of enterprises use FLOSS today, in one way or another (including the use in licensed ISV software). Between 15% to 24% use FLOSS vigorously, and this figure is growing rapidly. 92% of these enterprises declare that FLOSS meets and exceeds their expectations, and the use of FLOSS will be widely extended in the years to come. Moreover, FLOSS usage is shifting from infrastructures (OS, DB, middleware...) to applications (BI, ERP, CRM...). In addition, enterprises are beginning to use best practices from FLOSS in their own IT management, from forges to agile development methods. As a result, mainstream CIO is beginning to take a closer look at FLOSS. The question is no more 'Must we use it?' but 'how to leverage it?' This is the case not only in sectors that have an established reputation for using FLOSS, such as public sector, telecoms or media/services, but also in sectors that have the reputation of being more conservative, such as manufacturing and finance. For CIOs, this is currently leading to a profound re-assessment of IT governance strategies, to take FLOSS into account.

Our Vision and predictions

In 2020, the long term evolution of IT towards digital business will arrive at maturity. In a flat, numeric world, IT will not be any more just a way to manage business. It will BE the business. Indeed, the question will no loonger be whether CIOs are spending or investing in IT, but how IT will become a source of profit aligned with business strategy. All corporations will have dematerialized most of their activities, from real time supply chain management to customer and user services and billing with ambient computing. As for industrial production, that has in the past often been outsourced to low cost countries in many corporations, many services such as helpdesk, accounting, legal, communication… will be outsourced to services providers. Projects will be formed on a virtual basis, in a transversal way, and form and disband according to business opportunities. Large integrated corporations will increasingly make way for business moving ecosystems, evolving at the pace of market demands and investments.

In this context, IT will enter the virtual enterprise era. SMEs will increasingly tend to host their information systems externally, thanks to SaaS, hosting and virtualization. They will rely on SAAS accounting software and ERP, available free of charge for basic services, and by subscription or on demand for more value added services. They will benefit from online cloud services for marketing, communication, etc. Large corporations will rely on specific, customized ISs, that they will host themselves (including in private clouds) or require facility management / outsourcing providers to host. Information systems will be at the heart of corporations' dematerialized services (specific applications) or their knowledge capital (customer data…). So applications will NOT be commodities: they will manage the organizations' 'core businesses'. CIOs will often be specialized in business applications rather than pure infrastructure (even if mastery of infrastructures is important to optimize the business applications). They will either rely on a core ERP (ISV or FLOSS), customized with a unique set of specific applications, plus BPO applications, linked with SOA to their network of customers, partners and suppliers; or on a totally specific core information system, linked with SOA to their network of customers, partners and suppliers.

By providing flexible, robust, cost effective and vendor-independent solutions, FLOSS will be instrumental in providing building blocks and tools for these evolutions. They will give CIOS the liberty to design, build and run their information systems at will, with more freedom towards suppliers, and with the possibility of dedicating budgets to real value added functions for the enterprise. The main advantage of FLOSS won't just be to reduce costs, even if it will strongly help to commoditize many software solutions. It will help enterprises regain control of their business and information systems (a power that had been somehow taken by key IT solution providers, dealing directly with CxO, and forcing them to adapt enterprise business to the processes supported by their solutions) with the possibility of tailoring them exactly to their business needs and to the ever increasing pace of IT Transformation that will be driven by business alignment. FLOSS will facilitate the move from monolithic IT to agile IT, adapting and easily recombining the building blocks, creating in the process the DNA for the truly organic IT needed in a digital world. This is a cultural revolution. As with Web 2.0, success will be granted to those who will be able to attract and leverage the collective intelligence of an open world.

To meet these objectives, we suggest the following predictions and recommendations.

1. FLOSS will be instrumental in the evolution of Enterprise IT from an 'on the shelf" or 'build' approach to an Open mix of services, depending on the business logic.

The virtual enterprise era marks a paradigm change. In this world, Enterprise IT will no more be an isolated island, but part of a moving and constantly changing IT business ecosystem, linking suppliers, regulators and customers. Constantly moving, it will dynamically reorganize with business and relationship changes. In this context, IT will DEFINITIVELY MATTER. While infrastructures may be commoditized, applications will not be. Therefore, the preoccupation of IT managers will shift from infrastructure issues to business logic and relationship issues. The challenge: Building and rapidly making evolve business process-centric services, federating (or providing services to) the ecosystem to its advantage. As they are themselves building blocks of a larger IT ecosystem, enterprises will do the same for their own services. Shifting the 'mashup corporation' concept to a new level, they will assemble their IT services using a custom mix of online services (ie google map), SaaS ERP functions, CRM tools and custom functions. The key to success: do not reinvent the wheel, but find the right mix of objects and services providing the best value to the ecosystem. FLOSS and SaaS services can be instrumental in this paradigm change, by providing low cost, modular, extensible building blocks that can be easily leveraged and modified in cooperation with partners. For success, however, three key problems must be solved: where to find the components and skills, how to guarantee interoperability, how to certify quality and support. In the old world, the classical answer to this challenge had been to purchase solutions from an established vendor, with an established reputation, and a wide range of solutions. The software market consolidation of the 2000s is the result of this logic: The advantage (get a catalog of integrated solutions) compensated the flaw: price, lack of flexibility, non best-of breed solutions. The 'object' orientation of tomorrow's IS will only be possible if answers are found to these challenges, that may reconcile "best-of-breed" component strategies with seamless integration. Five conditions are necessary for success, and are our recommendations:

Recommendation #1

The development of open directories / marketplaces of components & services is needed for the emergence of the dynamic information systems of the future.

As well as object components, libraries are essential in Object development, service and components directories must be developed to identify key solutions. The development of global players to provide these services is essential. SourceForge, OpenLogic, and others are first steps in this direction today. Company IT departments will need to change their vetting process – from one dependent on vendors to educate and "sell" a component, to one that leverages independent third party data and community information to evaluate and certify open source.

Recommendation #2

FLOSS governance will be a key enabler to allow companies to leverage the benefits of FLOSS.

FLOSS governance will provide the guidelines and processes by which enterprises can safely and successfully use FLOSS. By creating a basic governance foundation, like having a policy on how to control and manage the consumption and contribution to FLOSS, companies will be able to use FLOSS more freely by mitigating legal or operation risks.

Recommendation #3

Interoperability between FLOSS components (and their SaaS counterparts) must become the standard, rather than the exception.

Beyond the respect of open standards, communities must federate projects and define solution frameworks, with interoperable architectures, to facilitate seamless deployment. Solutions ecosystems such as Apache, Eclipse, OSA and OW2, among others, – that federate various players and vendors among common standards - allow this interoperability without monopolistic vendor lock-in.

Recommendation #4

FLOSS communities must agree on a common, automated maturity model and certification quality process.

Without an established brand, quality cannot be claimed. It must be proved. To facilitate adoption, recognized maturity models and CMM-like certifications procedures must be widely available or adapted for FLOSS components, with as much possible automatic testing to reduce certification costs and overheads for developers. The work undertaken in projects such as Qualipso is a step in this (the right) direction.

Recommendation #5

System Integrators should propose service level agreements-like engagements on integrated FLOSS components.

FLOSS is moving the barriers between actors so that system integrators and open-source vendors are now in 'coo-petion' with traditional ISV, and have to address key issues like support, skills and legal requirements that are specific to FLOSS. CxO are looking for bundled services without the specific risk. System integrators will have to leverage various providers (software, service, support, indemnification …) in a coherent and efficient way to respect their engagement.

2. Enterprises will adopt FLOSS development practices and tools internally, from agile methods to virtualshore and community sourcing

Tomorrow's IT will be characterized by new fundamentals: time to market, client and ecosystem centric logic. Up to now, classical development methods often result in long development processes and high failure rates: weeks of specifications, months of development, years of deployment, often ending up in solutions poorly aligned with business needs. Future time to market constraints in a dematerialized world (with the concept of 'internet year' coming back on stage!) will not only lead to the preference for object-oriented solutions or approaches, leading to a focus on business logic and the integration of various existing components and services in a flexible solution mix. It will also favor agile methods, leading to incremental developments. Moreover, the collaborative tools from FLOSS forges, enabling diverse contributions to be made from various teams from all over the word, will offer an essential answer to the challenge of speed, flexibility and innovation. In 2008, many enterprises already apply some FLOSS development methods internally. The year to come will see a rapid development of this principle, moving from the tailoring approach of early development methods to widespread use of the

collaborative revolution within enterprises. Beyond that, these methods will be adopted between enterprises and their suppliers, enabling us at last to solve the dilemma that caused IT projects to move constantly back and forth between inshore, nearshore, offshore or rightshore processes.

A more global 'virtualshore' approach may reconcile the best of both worlds. Beyond suppliers, many enterprises will also put the FLOSS principle to work in its natural capacity, that is, participating in, or even driving some communities. As well as services such as Swift in the banking industry, Amadeus or Sabre in the Transport industry, etc. have brought organizations together to join forces and create inter-professional communities, FLOSS communities will be developed by end users to create vertical-specific solutions, especially in domains such as telecom, healthcare, e-government, retail, etc. However, this evolution will drive the need for new generation FLOSS forges and development tools, mixing the flexibility of open source with the security and industrialization needs of enterprise IT. Three conditions are necessary for success, and form the basis for our recommendations:

Recommendation #6

New players must develop to provide Application Lifecycle Management/FLOSS development services to enterprises.

Forge and ALM/integration tools must get more industrialized and secure, to meet enterprise needs and criteria.The development of specific solutions and service providers, helping enterprises industrialize FLOSS components use (including with legal and IP watch) and integration, and leverage most agile and collaborative development practices, will be essential in this evolution.

Recommendation #7

Tomorrow's forges must not only be forges: they must also become marketplaces

They will not only be used by developers. They may also be used by various players, vendors, integrators, etc. with various business models. A public body may want to pay integrators to add some components to a FLOSS e-government solution directly on the forge. An enterprise may be ready to pay members of the community to develop some additional module it needs. A user may want to easily locate service providers for support and integration, among the various community members. The addition of global marketplaces functions to forges will be important for the future. Sourceforge.net/marketplace, OpenLogic Exchange and Red Hat Exchange, among others, are first steps in that direction.

Recommendation #8

Enterprises' attitudes towards FLOSS must change, from a pillage approach to a collaborative participation.

Up to now, enterprises too often rely on FLOSS components without giving back to the communities. A change of attitude is necessary to set up a virtuous circle between code producers and users. The level of maturity of a company towards FLOSS should evolve from simple consumer to participant, contributor and finally sponsor. The ultimate level for a company will depend on their FLOSS governance and if it makes business sense to do so.

3. Enterprises will leverage cloud as the next wave of IT. But a FLOSS approach is vital to avoid the risk of vendor lock-in, even worse than with licensed software

With the advent of Cloud Computing, the IT landscape is going through a paradigm change. As has been the case for hundreds of years for energy, IT computing power and some application services may well become a commodity tomorrow like water or electricity. However, this domain is sometimes misunderstood as there will not be one unified cloud, but several cloud services providers (probably including existing players such as Google, Microsoft with Azure, and emerging ones such as Amazon with EC2, large integrators or telecom providers). Some enterprises and public services will even have their own private clouds. Enterprises will select each application or service indiviudally whether it's based on a cloud or hosted internally. Most SMEs will probably leverage only a mix of cloud services, mashing up services such as Google Apps, a SaaS ERP player, a SaaS e-commerce tool, etc. Larger enterprises will use some cloud services, host some applications externally, but also maintain complete internal control on some applications, to master security issues, and sometimes also cost ones. Despite some preconceived beliefs, hosting a service externally is not always the best solution in terms of cost and performance. Large e-commerce or media providers are well aware of the practise of launching and ramping up a new service externally at the beginning, and then re-internalizing it when it has reached a certain level. In all cases, SaaS and cloud computing will be a key part of the equation. And FLOSS – and its capacity to master complexity - may be essential to provide low cost, very robust infrastructures for clouds, as it is already commonly used to do by Google, Amazon, Yahoo, eBay, etc. However, key aspects will be essential for enterprises: the interfaces cloud offers to develop and host new applications, its management tools, and the possibility for the user to migrate from a cloud provider to another. Indeed, if some (but not all, ie Azure) cloud services rely on FLOSS foundations (Linux, etc.), hosting interfaces (applications, virtual machine infrastructures…) and management tools often remain proprietary. Escaping from the lock-in of software licenses to a lock-in in cloud/hosting services is not a progress. It is a regression in an even worse slavery! The development of open cloud standards and interfaces are essential to avoid this flaw for the future. Four conditions are necessary for success, and are our recommendations:

Recommendation #9

FLOSS communities must not be satisfied with the success of Linux: they must work on the Operating System of the future: the cloud OS.

This should be an essential preoccupation of all FLOSS communities, around the Linux Foundation.

Recommendation #10

Open cloud computing should bring open technologies into the heart of infrastructures, preserving them from the risk of vendor lock-in, and favoring the emergence of new services.

We therefore need to develop open cloud technologies in open platforms for IT consumers as well as for IT vendors. A company always tries to earn more benefits from technologies for business innovation and competitiveness. Open cloud technologies could help enterprises choose freely the way they want to implement cloud computing technologies, and plan how they will adopt them. They could protect against the risk of lock-in, and keep competition at healthy levels in cloud services.

Recommendation #11

BPM/Management will be the new frontier in FLOSS applications.

Beyond infrastructures and even ERP, the management of the mashup IT and business services of tomorrow will be key to the future. Large communities must develop key initiatives, to build open foundations for these tools, around large multi-vendor communities such as Apache and OW2.

Recommendation #12

Security & privacy will be the N°1 challenge for cloud… and for FLOSS.

Security and privacy are essential domains where FLOSS should bring value and solutions, enabling independence and trust. Paradoxically, the lack of trust in FLOSS is the main inhibitor to FLOSS deployment today! A strong initiative on the part of all players is necessary. IThis is not only in the interests of FLOSS players. It is in the interests of SaaS players, who will find that lack of trust is also the first inhibitor to SaaS and Cloud for enterprises.

4. Enterprises will evolve from an investment IT purchasing model to a service economy, leveraging FLOSS efforts.

The generalization of FLOSS used by enterprises requires from CIOs new strategies for building and managing their budgets. With FLOSS, they evolve from a principle of hardware and software investments ('depreciation expenses', that have an impact on the enterprise debt ratio) to principles based on the purchase of solutions and services (on demand), directly related to enterprise business development. This approach can lower in the short term the enterprise operating revenue, but offers CEOs and CFOs a return on investment approach to IT costs, that is more in direct relation with the business. With FLOSS, IT departments therefore evolve from being a « cost center» type entity to a « services provider » type entity. The rise in the Cloud Computing model will accelerate this evolution, notably in SMEs. Paradoxically, the generalization (whether intended or not) of FLOSS solutions will drive a move towards a re-internalization (at least partially) of some of the functional and technical competences that were up until now externalized to computer makers, independent software vendors, and even integrators… The budget priority for CIOs will move to the Human Resources budget, with re-investment on value added experts, open, and more oriented towards value creation than the 'button-pushing' consultants trained by traditional IT vendors. Last but not least, a key challenge to the widespread use of FLOSS will be the necessity for enterprises to donate code and contribute to FLOSS ecosystems. When enterprises and CIOs will be confident in the robustness of open solutions and in the true universality of their standards and norms, they shouldn't need to be confronted with inhibitors to do so, especially if accounting or tax mechanisms become incentives. Giving back and contributing to FLOSS code may then become for them a new axis of investment, that will leverage and develop the expertise level of their IT teams, and guarantee the durability of their information system. The only requisite will be to maintain the level of expertise of the IT teams. Two conditions are necessary for success, and are our recommendations:

Recommendation #13

Accounting rules should evolve in order to favor intangible investments iso that enterprises that adopt FLOSS are not penalized.

Recommendation #14

To develop enterprise contributions to FLOSS, the patronage in nature or knowledge should be recognized for tax calculation, for enterprises that will give back to FLOSS communities and foundations,

whether totally or partially, the developments based on FLOSS components. This implies that public authorities should recognize the 'public utility' of communities and foundations. This is the « sponsoring in kind » logic (payment in kind for development resources and human time) that should be a general operating principle among CIOs and enterprises opting for FLOSS.

5. Open IT needs open minded engineers. Towards IT 3.0, FLOSS will mark a cultural shift in Human Resources Management for enterprise IT departments.

The collaborative revolution, including Web 2.0 and FLOSS, has introduced a paradigm change in IT: open innovation, with the involvement of the user. Instead of relying only on a limited and close-knit team of developers, openness means the IT can enrich the collective intelligence of external contributors. The IT team of the future won't be just a core of developers placed in the same open space for years to work on the same datacenter application. It will probably be a set of enterprise business and IT managers plus a temporary set of providers and partners, forming and disbanding dynamically along the way on various projects, working collaboratively from many places, in close relationship with players and users of the enterprise's ecosystem. To leverage this potential, enterprises must choose to leverage other's innovations, and to welcome feedback and contributions from partners, and even end users. Ebay or Facebook today are good examples of this best practice. This is not only a cultural challenge. This is also a challenge in execution. The world is full of Open projects that didn't succeed in attracting and retaining contributors. Nurturing a community requires a special spirit and a long term effort. Before this step, enterprises must develop an open spirit in their own teams. The expertise to leverage FLOSS is not the one of a classical engineer trained in proprietary environments, that means, trained to know which are the right buttons to push in a closed solution. FLOSS requires curiosity, inventiveness, innovative spirit, the ability to search and collaborate with others. The talents are not the same and must be searched for. The new generation of digital natives may naturally have this kind of spirit, but it must be nurtured by the enterprise. Enterprises must therefore develop an open culture of innovation, and a new way to develop talents, either internally, or externally. 'The Enterprise's first asset is its people' has long been a common buzzphrase in HR, and one not always materialized in everyday practice. The future may see it being practised more …, at least in successful enterprises. For success, however, four points are essential, and are our recommendations:

Recommendation #15

Collaborative working and methods must be valued within the enterprise.

Collaborative tools for development such as open forges, social networks development (internal or external) must be encouraged.

Recommendation #16

In a digital economy, knowledge becomes one of the key enterprise assets.

The development of open knowledge management processes and tools will be fundamental in the enterprise, from Enterprise 2.0 tools (wikis, blogs, etc.) to more advanced knowledge management tools.

Recommendation #17

Beyond pure technical expertise, relationship capital will be key in IT.

Enterprises should value and encourage IT managers to network with, and participate in, communities, as a way to increase expertise and inventiveness. Communities and networks such as Apache, Eclipse, Ohloh, OW2, The Linux Foundation...,…should be considered, as well as vertical communities (ADULLACT-OSOR, etc).

Recommendation #18

IT departments must learn to attract external contributions.

As with Web 2.0, tomorrow's mashup IT won't be monolithic, but will welcome external contributions and add-ons. IT Managers must set up the conditions – and incentives - to welcome them in a controlled and managed way.

Risks

We identify four main risks:

The development of closed cloud computing and the development of 'Commercial Open Source' may lead to another kind of vendor lock-in.

Many Commercial FLOSS vendors develop business models that appear similar to proprietary vendors. To avoid vendor lock-in, companies should ensure that FLOSS components they get from Commercial Vendors embrace open standards. Companies must also understand that the FLOSS market is a competitive market. In most cases, IT departments can choose from a variety of vendors for support and other services. Because the source code is open, they are no longer limited to one vendor. The ability to compare vendors will help to keep prices for commercial support competitive. From a legal perspective, FLOSS licenses will also have to take the SaaS phenomenon into account to avoid cloud computing being taken over by commercial vendors.

The regular absorption of FLOSS leaders like software publishers and main project foundations could create a feeling of "insecurity" and a lack of "credibility" around FLOSS production and its business models.

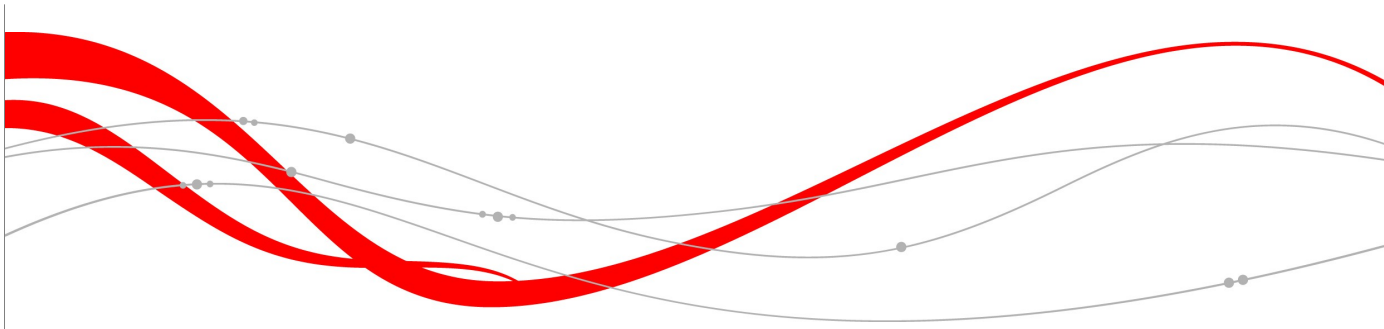
A large turnover of economic players could present a risk to the technological road map and the economic model built around licenses and maintenance policies. This would erase the idea of differentiation between the proprietary and FLOSS economic industries.

Floss license complexity and a global legal war initiated by the patents generalization supporters (notably in the US) could create legal risks for customers.

This would bring complications like having to make financial provision for risks, which most companies wouldn't like to support. FLOSS vendors should fight the proliferation of FLOSS licenses to avoid having to rework and clarify the legal issues to facilitate adoption.

The evolution towards FLOSS involves a cultural revolution in the enterprise,

not only technical (open environments) but mostly organizational (new financial models, new modes of innovation…) and human (competences, behaviors). FLOSS is a structuring choice and the transition must be managed. This is not an easy task.



Theme 6

FLOSS: a lever for employment and careers

State of the art

The information economy market (10% of GDP in most countries) is a large market and software is one of the key elements within this market. Representing a significant share of the software market, FLOSS now provides a large number of jobs.

A Full Employment Market

When comparing the overall unemployment rate to the IT unemployment rate in various countries, it is clear that the IT market is close to full employment: this is no surprise, as market demand for IT-related personnel is increasing at a faster pace than qualified IT professionals are coming onto the market.

	Overall unemployment rate	IT unemployment rate
Brazil	7,60%	
France	7,20%	3,75%
US	5 % (January 2008)	2,00%
India	7,20%	
European Union	6,80% (October 2008)	

	IT-related jobs	% of the population
Brazil	400000	0,20%
France	600000	1,00%
Us	3580000	1,17%
India	2010000	0,17%

Focus on India : Knowledge Professionals employed in the Indian IT-BPO sector

The Indian IT-BPO industry is one of India's outstanding successes. It provides direct employment to over 2 million people directly and over 8 million indirectly (for every job created in the IT-BPO industry, 4 jobs are created in rest of the economy according to a Crisil Survey) in sectors such as commercial real estate, physical security, transport, catering, hospitality and mortgage banking industries. As a proportion of national GDP, the Indian technology sector

revenues have grown from 1.2 per cent in FY1998 to an estimated 5.5 per cent in FY2008. Net value-added by this sector, to the economy, is estimated at 3.3-3.9 per cent for FY2008.

	2000-1	2001-2	2002-3	2003-4	2004-5	2005-6	2006-7	2007-8
IT Exp. & Services Exports	162,000	170,000	205,000	296,000	390,000	513,000	690,000	860,000
BPO Exports	70,000	106,000	180,000	216,000	316,000	415,000	553,000	700,000
Domestic Market	198,114	246,250	285,000	318,000	352,000	365,000	378,000	450,000
Total	**430,114**	**522,250**	**670,000**	**830,000**	**1,058,000**	**1,293,000,**	**1,621,000**	**2,010,000**

The FLOSS fragment of the IT employment market – specificities

Free software: use, read, modify and share the code

Free or open software is specifically software for which the source code is open and accessible for everyone to use, read, modify and share. This enables collaborative development, unrestricted technical learning, faster innovation, reduction and sharing of development costs, as well as unrestricted code auditing at unprecedented levels.

It allows interested and curious individuals to learn the inner workings of sophisticated software components without the burden of formal contracts, and without the artificial barriers imposed by proprietary software, that hides behind the back box of binary code entire layers of a software architecture.

It is bringing about a radical change in the way innovative projects can recruit highly skilled programmers, as the exposure of the code allows programmers to get interested in the projects, and prove their value in a much more direct and efficient way than in the traditional software industry.

By allowing re-usability of a multitude of software components, it favours quick innovation, where the effort can be focused on the (usually small) fraction of the code that produces the novel service, in a true « stand on the shoulders of the giants » fashion.

By eliminating the artificial barriers imposed by decades of proprietary software licensing practices, it allows users to test and deploy software components prior to the formal procurement process, giving the technically savvy people an opportunity to assess the solutions independently of marketing, brand and policy considerations. As such, it allows even small players a real opportunity for acquiring a significant user base without disproportionate marketing investments.

For all these reasons, free software lowers entry barriers, opens a market place for maintenance services and weakens monopolistic situations, reviving innovation and competition in market segments where monopoly players had stifled these, and fosters in their place interoperability and standardization.

A strong and sustained growth of enterprises

These observations are confirmed by various studies: Gartner estimates FLOSS penetration of the IT services at 27% of the IT market in 2011, and according to the UNU-Merit led FlossImpact study, « defined broadly, FLOSS-related services could reach a 32% share of all European IT services in 2010 and the FLOSS-related share of the economy could reach 4% of European GDP by 2010 ». This is a major revolution in the field of information technology as well as of the other sectors of economy that are high consumers of IT.

It comes with various challenges, some of which are related to training the developers, engineers, architects, project leaders, managers, teachers and researchers of tomorrow.

Perspectives for FLOSS employment

According to the sources mentioned above and to our analysis, 40% of employment in IT will be FLOSS related by 2020. Assuming 2% growth in annual IT employment, this represents 1.5 million direct jobs in Europe, i.e. the creation of 1.2 million totally new jobs. To these figures we must also add thousands of related jobs stemming from other IT jobs and activities impacted by FLOSS usage.

Challenges from the FLOSS market

FLOSS faces several challenges, some of which are well known, like software patents, DRM technology, or various anti-FLOSS strategies put into play by legacy players whose business model is directly challenged by FLOSS; these challenges are best discussed in other sections of this roadmap.

But the analysis above shows that there is one major challenge, too often overlooked, that is of paramount importance in this part of the roadmap: the shortage of skilled professional and how to address it.

Recent studies (OPIEEC) warn of a shortage of qualified personnel, and this is particularly true in the FLOSS market: industry has discovered FLOSS relatively recently, and has since its discovery played a sort of free raider role over the past ten years, draining a significant amount of skilled professionals, whose proficiency in FLOSS had developed over long periods and many years, and which are not easy to reproduce on demand in a short time.

It takes time to train skilled programmers, capable project leaders, insightful software architects, and even simple technicians for the FLOSS world, where proficiency is something more demanding than passing a simple professional qualification test on a given piece of software: one needs to understand the inner workings and rules of different code communities, the intricacies of a plethora of programming languages, software frameworks and build systems, the basis of free software licenses, and how to design software to benefit from the community effect.

There will be an increasing need for thiese kinds of skills, and to respond to this need, we must make sure that these skills will be acquired through proper education in IT, and not despite legacy education methods in IT : we face the challenge of turning FLOSS proficiency from an art to a science.

Recommendations to ensure a healthy development of skilled FLOSS professionals and careers

Recommendation #1

Specifically tailored Curricula for FLOSS in IT Higher Education

The natural answer to the need for skilled IT professionals proficient in FLOSS is to adapt the

current IT-related curricula in academia to take into account all the specificities of FLOSS. Some authoritative voices have already advocated the need to restructure IT curricula, incorporating for example the participation in FLOSS projects (Paterson, CACM 2006), and we believe that there is an urgent need to go much further, by adding several new topics to the traditional IT courses, as well as properly recognizing that the effort required to teach these new topics is often higher than for teaching traditional material.

Various isolated and uncoordinated approaches to teaching FLOSS exist already, so we are not starting from zero, but there is now an urgent need to create a set of common guidelines for this new curriculum, getting it validated in academia, creating new teaching materials and textbooks.

All this takes time, and getting the approach accepted takes more time, and then training the first students takes even more time, so it is becoming urgent to move forward, and to fund an international initiative that can federate the existing experiments into a unified approach.

Recommendation #2

Favoring the usage of FLOSS tools in all engineering cycles

Proficiency in the usage of FLOSS tools and techniques (collaboration, distributed development, user communities) is becoming a need even outside the IT sector itself, so special attention needs to be paid to the choice of tools and methodologies in higher education, in all areas, to make sure that exposure to FLOSS tools and methodologies is ensured for everybody.

Recommendation #3

Opening FLOSS-specific research centers

Teaching Computer Science and IT-related material in higher education, as the ACM clearly states, cannot be done properly without a significant presence of research in the area. Teaching FLOSS efficiently is no different, and will also need a significant presence of researchers specifically interested in FLOSS-related problems and technologies.

As has been shown in other disciplines, an efficient way of jump-starting the process is by creating research centers directly connected to academia, and with strong bonds with code communities, where researchers, teachers, students, programmers, and members of code communities meet and work together on topics where they have high skills.

Recommendation #4

Validation of FLOSS professional experience, and FLOSS Professional certification

As mentioned above, FLOSS allows a form of self teaching that is unprecedented in the IT scenario, and this needs to be properly taken into account via appropriate means.

Local rules, which vary from country to country, may allow the award of a degree, or a number of academic credits, on the basis of the skills acquired by professional (or even non professional) experience: this should systematically be allowed for FLOSS skills too.

Industry should also mobilize to set up professional certification for specific skills or application domains, as this will allow low-level needs to be fulfilled more easily.

Theme 7

FLOSS in an Open World: Innovations and best practices from Brazil

Evaluation of the Brazilian Public Software Portal

Introduction

The main aim of our research into Brazilian Public Software was to analyze the possibilities perceived to result from the information society at its present stage, as characterized by practices and relations established according to shared knowledge based production. The social network under scrutiny is made up of a variety of actors involved in a complex network of relationships in a governmental virtual space created for the purpose of developing public software in Brazil. It represents a pioneer initiative, the only one of its kind recorded in the world so far. The research object is the Brazilian Public Software Portal, a virtual space created in 2007 under the coordination of the Secretariat of Logistics and Information Technology of the Brazilian Government´s Ministry of Planning.

The main purpose of the Portal is to foster the development of a "collaborative environment that not only reduces the government´s costs but also enables the development of technological artifacts" (Santanna, 2007). According to Santanna, "the concept of free source code utilization – that must sustain modern societies – is central to the Brazilian Software Public Portal. The Brazilian Public Administration needed an environment in which diverse social actors would be able to share their computer solutions already tested and approved in order to avoid, among other factors, the overlapping of costs with others that are similar to the ones that already exist" (Santanna, 2007).

Contemporary authors such as Castells, Benkler and Simon underline the importance of shared knowledge based production to the economic development of this historical period. The Informational and Technological Revolution – in progress since the end of the twentieth century – has transformed traditional relationships, values and practices in scientific, technological, political, cultural and especially in economic domains. This historical period is characterized by an increase in the importance of intangible goods – such as information and knowledge – for the macroeconomic context of contemporary societies. Software solutions, in this epoch, are some of the main artifacts involved in the process (Meffe, 2008).

Benkler developed the concept of "commons based peer production" to designate the new way of production based on peer group collaboration, such as the one experimented by social actors in the Brazilian Public Software Portal. It represents a new means of wealth generation, where an open community cooperates, spontaneously, uncoordinated and voluntarily to produce

informational goods. This model is different from the one observed in traditional organizations which have a rigid administrative functioning system based on hierarchies and in the production of goods with the main intention of selling them on in the marketplace. The shared production creates new economic relations and patterns (Simon & Vieira, 2008; Benkler, 2007). Free and public software have a central role in this process since they make information production and storage possible according to the commons logic.

The Public Software Concept and the Portal

Our research aims to analyze the social network involved with producing and disseminating public software in the Portal. Public software is developed with public resources by a governmental entity or partners with common interests. Brazilian Public Software represents a new concept built out of the free software concept. It is a public product for general use in a shared production space available for the entire society. The Public Software Portal fosters a shared knowledge economy since supply and demand are gathered in the same collaborative virtual space. It is directed not only at social actors interested in establishing economic and commercial relations but also at the community in a wide-ranging way. Producers of software and users with other interests can also participate.

The Portal helps generate employment and income by facilitating contact between those seeking computer solutions, and those supplying them. It also establishes a complex system of economic, political and social relationships involving various spheres of society. Software, in this context, is not only a product, but also an artifact through which its creators provide possibilities for new forms of production. The actors in this scenario are simultaneously producers and consumers. They are what Tapscott & Williams describe as the "prosumers" (Tapscott & Williams, 2007).

The Brazilian Public Software Portal Evaluation

The research in progress applies theoretical principles of the Social Network Analysis (Wasserman & Faust, 1994). Socio-technical networks - permeating all fields of knowledge production - are the objects of study. The networks of interest here are those made up of actors involved with public software production: scientists, technologists, managers, governmental agents and civil society members in general. The unit of analysis is the relationship established between them. From the analysis of networks it is possible to elaborate maps and typologies of social structures. Knowing the features of individual and group typologies in the Brazilian Public Software Portal is one of the main aims of this research. Its overall goal is to know the social, economic and political implications of the use of Brazilian Public Software and the consequences on the country´s development. The research evaluates the governmental program by defining the characteristics of individual and collective actors in the Portal´s network of shared knowledge production. It is then possible to define management and quality indicators that are essential to the consolidation and dissemination of the program.

Information technology indicators are developed to understand the reality of Brazil and its advances and limitations regarding the education and preparation of the population to participate in the present information society. The theoretical reference for the development of these indicators is the concept of techno-informational capital (Freitas, 2004). This type of capital arises nowadays as a result of the constant need for specific knowledge to control and manage machines that are part of any individual´s life in contemporary society. The techno-informational capital concept considers various elements as essential conditions for digital inclusion. These conditions are the material apparatus, the educational and cultural background that contributes to the foundation of tacit knowledge and the theoretical, methodological and technical knowledge necessary to access all available opportunities or possibilities . The individual´s insertion in the information society happens when these conditions are satisfied.

The research analyzes the social network that characterizes the Brazilian Public Software Portal or the "public software production ecosystem". Interviews were carried out with the highest profile actors in the free and public software production field in Brazil. A questionnaire was also created. This will be available on-line for three months on the Portal so that all 29,000 of its users will have access to it.

The partial results of the data gathered so far demonstrate the success of the government´s initiative. This statement is based on some significant facts. Some of these can be identified by analyzing the history of CACIC[1] – the first Brazilian public software. This software solution inventory was developed by a government agency (Dataprev) in 2005 and launched in the 6th Free Software International Forum in Porto Alegre, Brazil, using the second version of the GPL license in Portuguese (Peterle, Meffe, Castro, Bretas & Santanna, 2005).

At the start of its implementation, the CACIC software was aimed at satisfying internal demands of the Brazilian government. Gradually, the artifact started to respond to and fulfill needs of other actors and entities that were not necessarily in the governmental sphere. This fact led the researchers to conclude that the software was fulfilling a limited demand on the part of Brazilian society. A short period of time after the software solution was released, a significant network of users and developers was built.

Furthermore, another interesting data item came to light: the fact that the CACIC software was available in a public and collaborative environment intensified its use. At that moment, there were already free and open tools as well as proprietary tools offering the same possibilities, some of them more mature and stable in the market than CACIC. Even so, this software was quickly adopted by various entities and companies. Its rapid distribution resulted in a service providers´ network being established in all the twenty-seven states of Brazil. Society at large began progressively to assume a dynamic role in the process of software development, not only participating in its construction, but also reaping many kinds of benefits – not just economic ones – as a result of the shared knowledge based production.

By the end of 2006, a year and a half after CACIC´s launch, no tool had been replaced, implying that users were satisfied with the software. Two other characteristics were noted. An impressive number of users did not want to make changes to the available documentation, and service providers were willing to participate in the software migration to a new version. Results such as these confirm one of the main hypotheses of the research: the technological artifacts available in the Portal fill a market gap, and result in an increase in production, competitiveness, innovation and in quality of computer solutions. In 2006 it was already possible to identify a production network that had formed in the Portal, bringing together market offerings and demands in a unique forum, and promoting new contracts among the different players.

A significant fact observed nowadays is that new users are constantly forming associations cvia the Brazilian Public Software Portal. In October of 2008 there were 29.000 registered users. Over a period of two months, three thousand new users joined, giving an average registration of 1,500 new users per month. Even though the Portal is well-subscribed with formal users, some limiting factors have been detected. When the researchers set out to calculate the number of effective contributors in the shared knowledge production process, the conclusion was that participation was not as high as had been hoped, and did not include all the formal users. One of the reasons for this is the fact that many actors in this social network do not have enough accumulated techno-informational capital to enable them to participate. This scenario leads us to the conclusion that initiatives promoting digital inclusion need to be associated with other governmental programs such as the one discussed in this work.

Conclusion

The successful experience of the Brazilian Public Software Portal suggests that a new technological reference is being generated. With this initiative, Brazil offers an original model for the country´s development. Instead of acting as a developing economy – in which "the process of technical change is restricted to the assimilation and improvements of innovations produced in developed economies" (Rezende & Tafner, 2005: 46) – Brazil offers, in this case, an original model that produces "authentic competitiveness" in the world market based on new political and technological features. This means the Brazilian initiative of developing public software has the "capability of maintaining or increasing Brazil´s participation in the international market in the long term, promoting economic development and improving the quality of life of its population" (Rezende & Tafner, 2005: 46).

With the data gathered so far it is possible to observe a tendency confirming the hypotheses offered at the beginning of the research. The most important one refers to the relationship between the use of the Portal and the significant benefits and advantages to Brazilian society. The virtual space congregates, simultaneously, actors offering and demanding products and services. Basic elements for defining a model for the economic development of intangible goods can be derived from an examination of this space's characteristics.

The practices established in the Portal tend to generate alternative sources of income to actors that were once disconnected or weakly connected to their groups of interest. The virtual space offers an opportunity for the association of actors with common goals. The actors are integrated into a social network in a variety of more or less strictly delimited ties. This intensity will determine an individual's potential social and digital inclusion.

Another important conclusion is that public software is not only adopted to reduce costs, but also to increase quality and agility in the process of problem solving. When an impressive number of actors work collaboratively to develop a technological artifact, a significant amount of time is saved and its use, any changes made to it, the way it is copied, its modification and distribution are all optimized.

Knowledge production in a collaborative ecosystem leads to better results in a shorter amount of time than the knowledge production that takes place in a non-collaborative environment. It is also important to highlight that the results of this shared production are appropriated by the entire society. Thus, the Brazilian Public Software Portal integrates their participants in a new model of technological knowledge production, contributing significantly to the social and economic development of Brazil.

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[1] CACIC – or "Computational Automatic Shaping and Information Collector" – is a software solution that provides a precise map of the computer park of organizations and collects information regarding the environment, such as its number of computers and its distribution inside a company or another entity.

Appendix

FLOSS in India

State of the Art and Recommendations

There is a reasonably good level of awareness in India regarding FLOSS, its potentials and possibilities, more perhaps in the government and academic circles than in the industry. There would hardly be any public sector department or academic department without some one there being passionate about FLOSS who keeps crusading its cause. Very large number of SMB/SME s survive on use of FLOSS for their IT infrastructure. Web browsers, mail clients, office tools, operating systems, web servers, data bases etc are some of the areas where FLOSS Products are popular and are making an impact. Academic and R&D sectors are also beginning to use popular FLOSS tools in areas like Signal Processing, Design and Drawing, GIS, Library Management, Academic Course Management, etc.

In the public sector in India, FLOSS is felt relevant on the following counts: (I) cost-effectiveness for implementing E-Governance programs, especially at the early stages, (ii) avoidance of risks associated with vendor lock-in , (iii) Security concerns,especially in strategic applications (iv) Ability to modify and adapt as needed for the context,(v) curbing the use of unlicensed software which is otherwise quite high. However, at present there is no comprehensive policy in the government towards FLOSS in India; the various initiatives being taken are centered around the interests and passions of individuals with in the different segments of the governments. These take the form of introducing popular FLOSS tools and applications like Firefox, Thunderbird, OpenOffice, Linux, Apache, JBOSS, KDE, Postgres and MySQL, Perl, Python, etc. It is however the case that none of the various Applications being developed by the government departments for their use are being done in the FLOSS mode; even when there is commitment to FLOSS, it doesn't seem to go beyond using the commonly available FLOSS tools and platforms.

Affordability is the single most key aspect of FLOSS as far as citizens are concerned, as it is this that can make it possible to reach IT and its benefits to the citizens. With the government of India coming up with more and more Internet-enabled citizen-services as part of their e-governance programs, their reach or penetration amongst the masses becomes a central issue that will decide the success of such programs – something which in turn depends on the affordability aspect.

In the absence of any clear policy directives, FLOSS in India is spreading at the rate at which it is doing almost entirely on its own merits,through diffusion, depending on the interests and initiatives of individual players. FLOSS Community, especially the Linux User Groups (LUGs), have played a major role in popularizing FLOSS in India. Various governments have also started working on evolving FLOSS Policies, and these should be in place with in an year or so. As far as the Central Government of India is concerned, such policy pronouncements are however unlikely to take the form of enforceable mandates; they are likely to be rather advisory in nature, indicating some amount of preference for FLOSS and Open Standards over proprietary softwares and standards in government procurements and implementations. Other than the lack of any clear

policy directives, the other major bottleneck in the greater spread of FLOSS in India is the lack of trained man power necessary to support and sustain individual initiatives. Availability of trained FLOSS manpower can give a great impetus to its absorption in enterprises, especially in the SME sector, which is why NRCFLOSS has a sharp focus on the issue of HRD in FLOSS.

Globally, India has not been a great contributor to the FLOSS corpus so far; the FLOSS Movement, like much else, has been dominated by the west, and 'outsiders' don't generally find it easy to join in except peripherally and as consumers. India has largely been a major consumer of FLOSS so far, though a number of Indians outside India do contribute to the global FLOSS corpus. But with greater levels of FLOSS competence and confidence building up in the country, this is likely to change and India may also start contributing to the global FLOSS corpus in significant ways. By and large India is likely to follow the trend in the rest of the world in the future use of FLOSS , though with greater intensity and commitment due to the lower cost factor. An area where FLOSS may have a great impact in India is that of Indian language computing where the FLOSS way may be the only available way due to the very low profit margins that alone can be expected in this domain --the potentially huge size of this market segment can be gauged from the fact that only through an Indian language can one reach over 90% of India's 1.2 billion strong population!

FLOSS and Innovation

India needs FLOSS to enhance its Software and IT innovativeness. India's success in providing Software and IT-enabled services to the western world have been driven largely by its ability to produce a massive pool of computer and IT engineers, presently at the rate of about 300,000 an year, and organise them into a committed work force that was very low cost by western standards. The work content involved in this however has been largely mediocre,at a level suited to the talent level of the work force, and has not called for any great levels of technological innovation and creativity, due to (I) need to work only with black box packages and tools necessary for supplying the services needed, (ii) working for remote markets that the developers were not familiar with. With the low cost advantage slowly vanishing,Indian Software and IT industry can retain the western markets only if its work 'moves up the value chain' – something that needs a work force with better skills and talents as can be produced through the FLOSS route of education and training. Parallely, with the size of the Indian economy expanding, there is a large emerging local Software and IT market with in the country that needs products and services suited for its distinct local conditions – something that again calls for creativity and innovation as is best possible in the FLOSS mode. The key to both these aspects lies in basing software and IT education and training on the tools, techniques and methodology of the FLOSS Movement, a direction that NRCFLOSS plans to explore soon.

About NRCFLOSS

www.nrcFLOSS.org.in, http://nrcFLOSShelpline.in/web/

NRCFLOSS (India) was initiated in 2005 with a 3-year project funding by the Govt. Of India, and with a broad mandate of FLOSS promotion in India. It is being executed jointly by a government R&D agency called C -DAC (www.cdac.in), and the AU-KBC Research Centre of Anna University Chennai (www.au-kbc.org), the first party focusing on FLOSS Product Development/ Deployment, and the thrust of the second party (ours) being on Human Resource Development in FLOSS.

NRCFLOSS has a broad mandate of promoting the tools, technologies, products, architectures, applications, methodology and philosophy of FLOSS amongst the various sections of the Indian society. As a publicly funded entity, it has two broad objectives – (i) How can FLOSS help sustain and enhance India's standing and strength in the software and IT fields? (ii) How can FLOSS help make Software and IT affordable to the masses and thereby help bridge the "digital divide"? Enhancing the quality of our computer and IT graduates through training them in FLOSS and its methodologies is one of the ways we are trying to address the first question, while large scale promotion of FLOSS tools and technologies is expected to contribute to answering the second question. We have succeeded in getting many Universities to accept the importance of FLOSS and introduce them as formal subjects of study with credits, as a part of the curricula themselves. As availability of having teachers trained in FLOSS is a critical step in FLOSS promotion in colleges and universities, we have particularly concentrated on this and have so far trained over 250 teachers from all over the country. In the last three years, over 2000 engineering students have gone through the formal FLOSS Elective Courses designed by us. We are also exploring as to how entire CSE/IT Degree programs could be designed around the philosophy, methodology and tools of FLOSS, as is presently being discussed in Europe.

As a university- led activity, NRCFLOSS at Anna University also works with the larger goals of promoting ideas of freedom and collective ownership of knowledge through its work. In this dimension, it works closely with the Indian FLOSS Community.

The C-DAC part of NRCFLOSS has been promoting an Indian Linux Distribution (a Debian derivative) called BOSS Distribution that is especially tailored to meet the needs of E-Governance programs of the government, and having certain Indian Language support features. It is expected that the BOSS platform will be promoted strongly with in the government, providing a common FLOSS adoption environment.

NRCFLOSS project funding is presently being extended by the government, along with efforts to stabilize it financially and institutionally.