

Open Source Approach to Project Management Tools

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Managing large projects involving different groups of people and complex tasks can be challenging. The solution is to use Project management software, which allows a more efficient management of projects. However, famous project management systems can be costly and may require expensive custom servers. Even if free software is not as complex as Microsoft Project, is noteworthy to think that not all projects need all the features, amenities and power of such systems. There are free and open source software alternatives that meet the needs of most projects, and that allow Web access based on different platforms and locations. A starting stage in adopting an OSS in-house is finding and identifying existing open source solution. In this paper we present an overview of Open Source Project Management Software (OSPMS) based on articles, reviews, books and developers' web sites, about those that seem to be the most popular software in this category.

Keywords: Project Management Software, Microsoft Project alternatives, Open Source Project Management Software

1 Introduction

For some decades past the project management (PM) detached from standard management disciplines and has evolved into an independent one. The need for PM emerged as the economic situation has become relatively stable. In a state of transition PM cannot be applied so successfully, unstable environment giving not a good forecast, as a consequence, risks may appear here.

According to the DEX, definition of the project is: *a plan to take, to do something; intention; the first drawing or first ideas about something that is to be made or to be put into execution.* Although, current practice identifies the project itself with *the work to be completed according to business requirements and project management — business planning activity separate from the in progress one.* PM requires a degree of professionalism, which increases with increasing project complexity. The increasing number of factors involved in running a project, high values and limited resources turn everything into a highly complex activity [1].

PM can be tricky, time consuming and confusing. It's easy to lose direction when

you are faced with many tasks, each with its own deadline for completion. PM requires the manager to be on alert all the time. Essentially, PM can be defined as *the art and science of managing everything related to a project* (duties, team members, deadlines for completion etc.). When all aspects are involved into a project without causing any rupture, we can say that the project is a successful one.

Entities who are funding a project are keeping in sight four functions - scope, quality, time and cost. These functions become constraints wherewith the project manager is operating. There are also two entities involved: stakeholders, who have direct stakes in the project, and constituents, which are affected by the impact of the project.

Every project begins with the settling down of the objectives to be achieved and of a timetable for implementing the activities. Ideally, each step must take place as planned, but for some unforeseen reason, some activities during the project may not fit the schedule. In this context, it is necessary a reprogramming of all other activities, so the whole project to be completed on time.

Along the time constraint, another important

restriction is cost, because usually a beneficiary of a project is not willing to pay too much (nothing, if possible) and also no project contractor is ready to invest too much.

Simple projects can be built without using IT tools, but accomplishing complex projects, having into account the requirements and constraints outlined above, is very difficult without using some appropriate software. In these circumstances, the PM software becomes a key tool in supporting the effort to complete a project in time and fitting it in the budget.

PM software allows passing through the critical steps which any project managers have to make, to be more efficient than using some common software, as calendar or Excel. There are opinions that these are time consuming and it implies some personality management and communication abilities, fitted to the different learning styles, for completing some basic steps:

1. Identification of problems: early, to avoid being too late to fix them;
2. Scope and contract clarification
3. Resources optimization and online organization (tools and administration): for completing the project as soon as possible;
4. Payment and budgeting cognition
5. Plan updating: fast, in a few minutes each week, in order to see the project status;
6. Programming updating when changes occur: in seconds, for all those involved in the project. [2], [3]

There are certainly many more benefits that PM software can offer, but these factors above settle on the minimum tools that every project manager requires, combined with an organized communication and collaboration (agenda, weekly status templates, metrics etc.).

2 A Classification of Project Management Software

Although we do not intend to have a comprehensive classification of PM software in this article, we consider that a short description of the main types of PM software

available [4] is needed.

2.1 Free/Open Source

Project management software market encloses a lot of products. From all these, the free or / and open source (OS) are considered to be a special category, being perfect for small businesses. A reason is the fact that such businesses actually do not need to buy huge project management software, but to understand the value of a well-founded project management. This free software / OS generally provide only basic functionality such as time lines rudimentary, PERT charts, or Gantt charts. In terms of cost accounting line their offer is slight, particularly for risk management and customer support.

2.2 Client-Server

Some client-server software project management are more specialized in niche areas. They are more targeted to desktop software and offers rich features such as the Gantt and PERT charts, risk management, Critical Path Analysis, EVA, accounting, and resource utilization.

2.3 Online/Web-based

Sophisticated online web-based enterprise-wide project management solutions allow project members to report task evolution, and report the details of their progress online. This, in turn, allows the project manager to readily understand the status of the various participants and to focus on the issues that are most important.

There are web-based solutions that can be operated from anywhere in the world, whether on an intranet or internet. This means that everyone from top management to the frontline workforce can access project-related information anytime. Outside subcontractors as well as customers, can log onto their relevant portion of the project and get to track it.

Among other modules, there are usually useful considered the timesheet modules, project calendars and email notification, all these helping the manager to monitor and to be proactive about both costs and time deadlines.

2.4 General Project Management Tools

Some tools such as Microsoft Project and

Visio are examples of applications well rated among PM software. They do everything fairly well, but nothing tremendously. That PM software is mere tool in the hands of the project manager.

3 Collaborative Aspect of Project Management Software

As mentioned in the introduction of this paper, a PM must provide modern software tools for planning, organizing, managing and to collaborate within and across teams in order to reach the project goals and objectives.

Classical solutions, offline and standalone (desktop) are not good enough for these tasks, since they do not offer modules collaboration and since the communication between project members is made difficult.

Web-based PM software comes with collaborative tools that facilitate fast and efficient management of tasks and activities. It is more comfortable to work with Web-based applications, so it is not a surprise the increasing number of Web-based alternatives. Web 2.0 benefits are clearer for most people working in a technical field.

Even Microsoft offers as part of Project 2007 the Microsoft Office Online version (and includes connectivity options with its Web-based Microsoft Office Project Server 2007 and Microsoft Office Project Portfolio Server).

A Web-based PM software can be accessed via an intranet, WAN / LAN or Internet using a Web browser, so there is no requirement to install any other software in the computer system. Software can be easily used, with access control features (multi-user). Unfortunately they have deficiencies in project planning, defining dependencies and projects performances analysis.

When a company chooses to use online PM software, maybe it is because it does not want an application hosted on a server hosting company, paid as a monthly subscription. Some companies want to install software on their own server, assuming all responsibility for IT matters arising from there.

A few years ago installing and configuring a Web server database and scripting language associated (e.g., Apache, MySQL and PHP), able to support an online software was a relatively difficult task that requires the presence of an IT specialist. But currently there are OS application packages like XAMPP, WAMPP leading these tasks to become simpler to reach, even for a person who has a minimum IT knowledge.

In addition, these packages also allow installation of Web-based PM software on the PC itself, it operated like a conventional applications offline desktop.

4 Why Open Source Software Project Management Solutions?

There are different levels of complexity for PM software, priced between 30 and 20.000 dollars or more. However, not everyone has the budget necessary to start with a PM commercial solution, such as Microsoft Project or similar.

Microsoft Project is undoubtedly a powerful tool for PM, an incredibly capable application, but often too complex and exclusively targeted to the project manager. Somewhat similar circumstances encountered Office package, 80% of users using only 20% of the many features of Microsoft Project [5]. The top alternatives at that time (year 2008) mentioned by this author were: OpenProj (also described below in our paper), Zoho and Ganttproject.

Besides this, the Professional Edition sells for \$599, and if it would run on a server, the price exceeds \$1,500. Under these conditions this software could become be too expensive for most SMEs, not mentioning the fact that because it is a desktop application the collaborative support is poor.

When a project manager needs software to improve collaboration or planning a small project, he may choose simpler solutions of PM. For example choose software collaboration features and simpler planning such as Microsoft Outlook, SharePoint, and Visio to solve problems.

When, however, managers are challenged with large projects, planning or collaboration

work may exceed the possibilities of normal software. In this situation some PM system is required and free and OS software (OSS) can be probably a good choice. The ticketing system and the management tasks are comprehensive, even if it has many forms. This is probably due to the fact that these applications are written by Web developers who understand the importance of a comprehensive system management tasks. Thus, online PM applications, by contrasting to commercial OS, are noted through a detailed task management. Commercial applications, on the other hand, are distinguished by attention to detail in the user interface.

Thus, some natural questions like: What software should eventually to adopt? Whom to give greater importance, credibility a.s.o.? are very probable to come into light. The discussion is hard-bound, on each approach one could say "it has advantages and disadvantages and areas where it is most appropriate". We can think of Microsoft's business - a colossus in the field of computer applications - as a business policy which probably scared the world, being sometimes very aggressive in their businesses. But there are plenty of cases when the solutions offered by hard money were abandoned in exchange for solutions "much more" in terms of cost, market aggression (e.g. Oracle). OS, outside its place, now well more defined within the software, can be seen as an incentive to motivate other groups to innovate, change and take closer to the user view (and his pocket).

From simple presentation sites or portals, to collaboration and information complex sharing, in dynamic pages, from public

administration and education to advertising, business, commerce and other services, OSS has proved to be an alternative worthy to take into account [6] [7].

The above-mentioned are among the main reasons that led us to choose this particular category of software, with its many distinctive features and to achieve the present article.

5 Free/Open Source Alternative to Project Management Software

Sustaining the idea that a Free/OS PM software (OSPMS) is an almost essential commodity to keep business and/or working life running smoothly in our days and to face the challenges of new economy [8], we will expose in the subsequent part of this paper an overview of OSPMS solutions.

This overview of OSPMS solutions is an empirical study, based on articles, reviews, books and developers' web sites, about those that seem to be the most popular software in this category, and we consider as being helpful for the process of identifying the best PM software for an organization. This is a necessary part from adopting an OSS (Fig. 1), as shown in documentations of governments which found that open source software alternative and open source platforms offers significant potential benefits to their governmental agencies and to their wider community [9] [10]. In the "Recommended Tasks In Adopting OSS Opportunity" of [10, p.13-15], this stage, entitled "**Define Possible Solutions**" is considered as **Task A** — recommended for on-going projects, or **Task C** — recommended for new projects and cut-over projects.

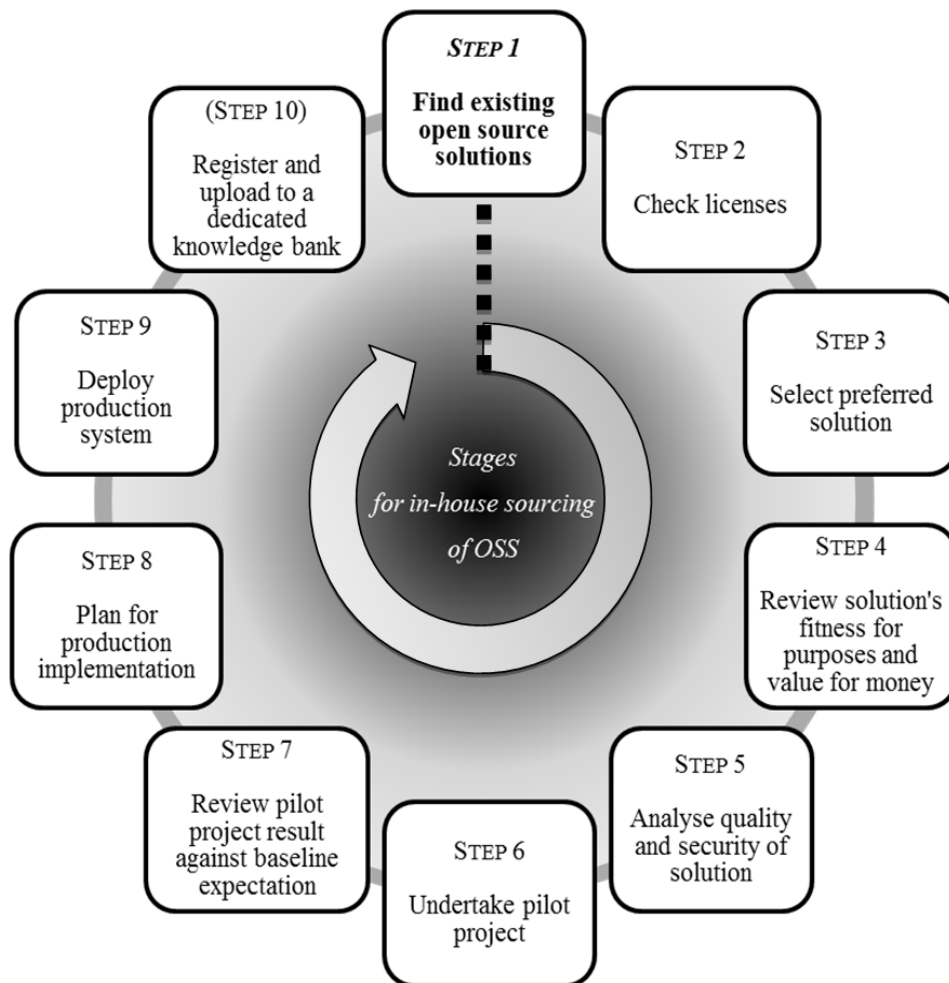


Fig. 1. A model workflow for in-house sourcing of OSS products [9] [10]

A top or a deep comparison of OSPMS solutions performances and features is difficult to be highlighted enough in a single paperwork. Thus, it will be the subject of a future research paper. For the current paper we decided to present the OSPMS solutions grouped by the criterion “web-based” and “desktop”, because we believe that it is a defining element for choosing the most appropriate solution. In addition to a brief presentation of applications, we have considered the identification of features such as Collaboration, Project Portfolio Management, Resource Management Planning, Project Scheduling, Risk and Issue Tracking System, Document Management, Help / Support and platforms (operating systems) on that they can run.

5.1 Strictly desktop-client programs

5.1.1 OpenProj

OpenProj is a free OS PM solution developed to replace the commercial project solutions. Currently it is considered to be „the most advanced project solution ever provided to the open source community” (<http://openproj.org/openproj>) and it is owned by Serena Software, Inc., that developed also another product based on the same core scheduling, resourcing and costing algorithms, delivered on a monthly subscription.

Because OpenProj had the same columns (fields) as Microsoft Project, the users of OpenProj will be familiar with the features as if they have using Microsoft Project. One of the great things about OpenProj is that it can open native Microsoft Project or Primavera files. So, you can easily switch to this free

project management software, without losing existing MPP files. Being translated into French, Spanish, German, Portuguese, Swedish, Finnish, Galician, Persian, Russian, Korean and Chinese, it is used in more than 142 countries [11].

OpenProj is ideal for desktop PM that operates on Java Platform, so that is compliant with Linux, Unix, Mac or Windows. There is literally no time or effort involved in switching to OpenProj, and the teams can manage projects on any platform for free. OpenProj was selected also for inclusion with Star Office suite boxes in Europe.

5.1.2 GanttProject

GanttProject (<http://www.ganttproject.biz>) is considered to be a very valuable freeware PM program, suitable to any administrative manager who wishes to have a computer program which helps them to easily manage staff and projects. It provides a variety of tools to manage staff and keep track of projects, like *Gantt's free project scheduling and management software* — can be used to define milestones and generate breakdowns of work and arrange them in chart format to be easier to understand visually. These charts can then be exported in various file formats such as PNG images, PDF files, and HTML files. This provides a link with the software that you are already familiar with and thus make the entire system easier to use overall. It is compatible with Microsoft Project and allows you to create Gantt Charts, which include Work Breakdown Structure, dependencies, and defining milestones. After that, you can assign human resources to tasks, and create *PERT charts*.

There is also a feature that allows various users to collaborate with others to help on a project or with some management features using the WebDAV interface. Collaboration is a feature that is invaluable to anyone who works in an office environment in a management role as interacting with other staff is an integral part of the job and therefore it is important that any software catering for this market has features that

allow staff to work together easily.

Help support consist in a development blog (<http://ganttproject.blogspot.com/search/label/faq>), a forum (<http://forum.ganttproject.biz/>) and a video tutorial (http://teachertube.com/viewVideo.php?video_id=10418&title=GanttProject).

5.1.3 Open WorkBench

Sponsored by CA's Clarity, Open Workbench is a free and Powerful Alternative to Microsoft Project in terms of ITS advanced functionalities, and features (<http://www.openworkbench.org>).

Open WorkBench is an OS Windows-based desktop application that can import Microsoft Project files in XML format, so that you can easily transfer your project from Microsoft Project to Open WorkBench.

Open WorkBench is remarkable by his powerful scheduling feature called Auto Schedule. Open Workbench provides the unique ability to generate project schedules based on resource constraints. This schedule can be saved, and any future revision can be compared to this original schedule. It has a schedule view that lets you fine-tune key schedule elements, such as resource availability and start and finish dates.

Other tools included in Open WorkBench are: a nice set of tools to view information in various forms, including, Gantt and Phase Level Gantt charts, as well as logical, PERT-style displays, the possibility to create projects, tasks, and corresponding estimates, and provide resource availability. All these help project managers in identifying impact of scope change on project timelines, and new resourcing requirements, easily management of all the details, and their presentation in an easy to understand format.

5.1.4 TaskJuggler

It takes some effort to master the TaskJuggler power, but it will become “a companion you don't want to miss anymore” (<http://www.taskjuggler.org>).

Covering the complete spectrum of PM tasks from the first idea to the completion of the project, it assists you during project scoping,

resource assignment, cost and revenue planning, risk and communication management.

Its new approach to project planning and tracking is more flexible and superior to the commonly used Gantt chart editing tools. It has already been successfully used in many projects and scales easily to projects with hundreds of resources and thousands of tasks. TaskJuggler provides an optimizing scheduler that computes your project time lines and resource assignments based on the project outline and the constraints that you have provided. The built-in resource balancer and consistency checker offload you from having to worry about irrelevant details and ring the alarm if the project gets out of hand.

5.2 Web-based Open Source Project Management Software

5.2.1 dotProject

DotProject is a free PM tool, based on web and PHP, useful for anyone from big businesses to the lone freelancer working from home (<http://www.dotproject.net>).

In addition to the core modules which provide all the typical PM features, the Web site also includes links to a number of add-on modules for integration with other applications, invoicing, help desk, and more. DotProject provides users with the ability to create a visually simple schedule of projects, allowing them to prioritize based on the importance of certain tasks. The interface retains a high level of simplicity, meaning that very little training is needed in order to use this free PM software. It is accessible to almost any user, making it the ideal choice for an organization that combines people of varying levels of skill and computer literacy. [12]

As the service is web-based, various accounts can be created to enable use for collaboration between employees. This allows the employer to delegate various tasks to their employees and create working schedules for the employees that they oversee; making sure that everything gets done. The support/helping system is available by

forums (<http://forums.dotproject.net/>), and wiki documentation sites, and also a training site that use a learning management system (Moodle).

5.2.3 Collabtive

Collabtive is PM software aiming to be an OS alternative to proprietary tools like Basecamp or ActiveCollab. It is a PHP based PM system, which means that can be run on almost any computer (<http://www.collabtive.o-dyn.de>).

Collabtive may not be as power-packed as its commercial counterparts, but it provides more than a decent feature set to keep track of all the tasks and milestones associated to your project. It offers the ability to track projects, milestones, tasks and time, and rounding itself out with reporting. Although it doesn't provide advanced features such as Gantt charts, it does provide for a very simple and efficient mechanism to keep track of your projects.

Collabtive allows you to manage projects by setting up different tasks and assigning them to different users. The progress of these tasks can then be tracked using the easy interface of the application. The administrator can add multiple users to the application and each user can access the interface through his/her browser.

Collabtive can be used in a number of scenarios such as: to track curriculum progress in schools; by manufacturers to track the status of various orders. For students, it can be an ultimate collaboration platform, where they would be able to share notes, homework, even entire assignments and research. And last, it can be used as a simple calendaring application.

5.2.4 Redmine

Redmine is an OS Web-based PM system, distributed under GNU General Public License v2 (GPL). It works on many platforms and can use many different database back ends, including Oracle or MySQL, and was written using Ruby on Rails (<http://www.redmine.org>).

Redmine contains a lot of functionality

geared heavily towards developers. It's powerful but may take some getting used to. The default interface is not as clean as Collabtive, but the whole point of OS is that it is free and you can contribute your enhancements back to the development community.

It supports multiple projects, role-based access and permissions, Gantt charting and a calendar. Redmine also supports wiki and forums assigned on a project level to help centralize information and communication.

5.2.5 eGroupWare (Community Version)

eGroupWare is a free OS groupware software, intended for businesses from small to enterprises. It can be used either via its native web-interface, making access platform-independent, or by using different supported groupware clients, such as Kontakt, Novell Evolution, or Microsoft Outlook. It can also be used by mobile phone or PDA via SyncML (<http://www.egroupware.org>).

Its primary functions allow users to manage contacts, appointments, projects and to-do lists. The Project Manager module is designed to create and manage multiple hierarchical projects. It supports milestones and tracks both working time and costs. Projects can be managed by lists or by using a Gantt chart. In addition to PM tools, it includes a calendar, address book, email system, file manager, version tracking system, time sheet and wiki.

User accesses can be customized to allow for efficient work and administration. Contacts, tasks and calendar information are shared among all eGroupWare applications to help create more accurate project models.

5.3 Compressed Comparison of OSPMS

In the next part we will depict the information found about the previously described OSPMS solutions in a more compressed and visually comprehensible way. For having a reference with a leader in the PM software, table 1 contains also a line for Microsoft Project's features. The structure of the table refers to the following

criteria:

- **Web-based** – the possibility to access the software over a network such as the Internet or an intranet, through a web browser. [13]
- **Platform** – the operating system on which the software can run.
- **Collaboration** – the possibility to easily collaborate with everyone involved in the project on a regular basis. This is done usually through emails, online chats and forums. [13], [14]
- **Project Portfolio Management** – Managing a portfolio of projects, balancing resources across a portfolio of projects, etc. Tracking of the project sales process, probabilities of potential projects, enterprise-wide project resource planning [13], [15], [16]
- **Resource Management Planning** – includes tools for defining resources (human and material), allocating to projects and analyzing utilization; association of resources with tasks for a single project. With human resources, you should be able to group them by department, by skills and by availability without double-booking resources or overloading them with tasks. [14], [15], [16]
- **Risk, Issue Tracking System** – refers to features for defining and mitigating risks and tracking issues. [13]
- **Project Scheduling** – Creating and tracking on a schedule dependencies and milestones, classical Gantt charts, calendars etc. [15], [16], [14], [13]
- **Document Management** – Features for track and store electronic documents and/or images of paper documents. [13]
- **Help/Support** – Online project management could have a variety of help options, including support and FAQs for general questions, or online chat, blogs and forums for more specific questions. The information about products and its use and problems may appear in wiki-type sites and/or on-line training (learning management systems). [14]

Table 1. Synthetic comparison of presented Open Source Project Management solutions

Feature \ Software	Web-based	Platform	Collaboration	Project Portfolio Management	Resource Management Planning	Risk, Issue Tracking System	Project Scheduling	Document Management	Help/ Support
Collabtive	✓	Windows, Linux, Mac OS	✓	✗	✗	✗	✗	✗	✓
dotProject	✓	Windows, Linux	✗	✗	✗	✓	✗	✓	✓
eGroupWare (Community Version)	✓	Windows, Linux, Mac OS	✓	✓	✓	✓	✓	✓	✓
GanttProject	✗	Windows, Linux, Mac OS	✗	✗	✓	✗	✓	✗	✓
Open Workbench	✗	Windows	✗	✗	✓	✗	✓	✗	✓
OpenProj	✗	Windows, Linux, Unix, Mac OS	✗	✗	✓	✗	✓	✗	✓
Redmine	✓	Windows, Linux	✓	✓	✗	✓	✓	✓	✓
TaskJuggler	✗	SuSE Linux	✓	✗	✓	✗	✓	✗	✓
Microsoft Project	✗	Windows	✗	✗	✓	✗	✓	✗	✓

No matter the software, it does not make project managers more effective, or teach them how to define the scope, how to communicate with the project sponsor or properly allocate tasks to project members, it just makes them more efficient in accomplishing the PM tasks. Nevertheless, ones tried to outline the requirements for an ideal PM toll. According to [17], such a PM solution should: 1. be simple; 2. be agile; 3. be inexpensive; 4. be able to offer to organization leaders an adequate visibility on internal operation from their organization, real-time, with the possibility to easily merging all parts into a bigger picture immediately available to everyone on the team to see; 5.eliminate the routine, so that the project manager to be only preoccupied

with guidance and leadership, to focus on making the process more productive, effective and attractive for all participants; 6.integrate the e-mail, as an automate mean of communication (not manually copy updates from one software to another every time when plans need to be updated). It is interesting to see if in the future a closed source/commercial solution or a free/open source software will come up to the closer to the ideal requirements formulated for such a software.

6 Conclusions

PM software market is rich in OS solutions that are able to provide similar functionality or even superior to those offered by commercial solutions, some of the most

representative being presented in this paper. One of the main advantages of OSPMS is their availability on various platforms and operating systems, a fact that is very important in circumstances where there is a worldwide trend of increasing use of OS operating systems, usually for security and cost reasons. Most OS solutions are 100% compatible or supports import files in formats specific commercial software, so migration from commercial solutions to the OS is easy, while maintaining the consistency if necessary collaboration and file sharing firms using commercial solutions of PMS.

Many OSPMS are Web-based solutions, most of them having high collaboration and mobility capabilities, in line with current trends – this being an issue on what the desktop and MS Project solutions are presently scarce.

Some OSPMS are designed strictly to provide some particular functions, thus making them more strictly to fold on certain activities, hence it is not necessary to purchase a widespread commercial software for using only some modules.

Last, but not least (maybe the most important issues for SMEs, especially in the context of global economic crisis), is the cost of software acquisition, which for OS solutions are much lower than commercial solutions.

One of the less “comfortable” aspects about the use of OSPMS is technical support and documentation. This is usually poor or lacks. Also, in order to fully implement OS (desktop, infrastructure, application etc.), the organization needs skilled (experienced) IT personnel, over the average level, aspects that may lead to increased costs of implementation.

Which OS for PM applications are best? It depends on activities are used and the best results that any software generates depends on the sharp brain and intellect of the human resource that are involved. Each of the software presented in the paper is distinctive in some way and requires a test to see if it fits for company activities. There will always be pros and cons to the choice of online

software open source and commercial PM, but a good documenting and testing mixed with a sharp view about the kinds of projects you have to manage will allow you to select a PM software and tools according to organization’s need.

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