

An Application to Select Collaborative Project Management Software Tools

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Abstract. In an increasingly competitive market the use of project management techniques can help controlling scope, time, and cost in an efficient way. Either due to size or complexity that may exist in a project, it may be essential to use project management software tools. Some projects involve teams of people who may be geographically dispersed, being essential to exchange information among project stakeholders, hence the need for collaborative tools, best known as groupware. In this paper, we present an overview of project management and collaborative project management techniques and tools. Next, we present a framework, based on ISO 9126 and ISO 14598, to classify collaborative project management software tools. Finally, we present a model and an application to help on the selection of this type of tools.

Keywords: Project Management, Collaborative Management, Collaborative Tools for Project Management.

1 Introduction

Today, Project Management (PM) is a key area for organizations, because without PM techniques the effort to implement a project would summarize to the common sense of the project manager, being difficult to effectively monitor deadlines, manage resources and costs and keep the scope controlled.

It is important, before defining more precisely what PM is, to establish what a project is. A project may be defined as a temporary endeavor that is progressively developed, aiming to create a unique product or service [1].

The PM paradigm has changed over the years, mainly due to the increasing number of projects that are geographically distributed, in which the teams are in different places and cultures, and so the present and future PM becomes more concerned with information and with knowledge [2]. Increasing competitive pressures are driving organizations to use collaborative technology to improve its effectiveness and efficiency. The use of groupware technology is being adopted by organizations to improve collaboration and knowledge sharing [3].

For a project to succeed it is important to use software tools that support PM, especially in complex projects being subject to time and budget uncertainties. All users should be supported by tools, since it is almost impossible to manage complex projects using manual planning techniques [4].

2 Project Management and Collaboration

Project Management can be defined as the planning and control of integrated tasks in order to successfully achieve the goals for the benefit of the project participants [5]. According to Brian (1995) PM is a science of organizing, planning and controlling to create changes in products with a predictable cost, within the defined time and with the desirable quality. This definition has been the starting point for many of the PM techniques and methodologies used over the last 25 years. However Brian poses the question "What can we do better?". Although in the last years, PM techniques have improved, projects became harder to manage. The reasons for this fact are difficult to identify, but may be related to the increasing complexity of projects and the difficulty to apply PM techniques effectively. To deal with these problems Brian speaks of the importance of the interaction and communication between individuals involved in the project. There is an increasing need for collaboration [6].

The focus on the trends of today's PM is to find technology that allows the creation of a professional environment for geographically dispersed teams, similar to the expected one if these teams were in the same geographical space.

The collaboration is an added challenge when it involves the participation of individuals who are geographically dispersed. The need for collaboration is seen as an alignment between stakeholders from various parts of the organization so that they show an attitude of cooperation and focus on achieving project objectives [7].

The collaborative project management can be understood as a method that is used to plan, coordinate, control and monitor complex projects that are geographically distributed [2].

In recent years there has been an increasing demand for technology that allows collaboration between users who share common work. In an attempt to adapt to this kind of situation, software has been developed that aids collaborative work, best known as Groupware (or collaborative systems), which includes mechanisms to support interaction among members of a workgroup, manipulating objects, in shared workspaces [8].

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Technological artifacts such as collaborative systems can be useful for knowledge gathering, which should be placed in appropriate repositories, so that every people belonging to the organization have access to it [9].

Collaborative systems allow teams that are geographically dispersed perform communication, coordination and cooperation effectively and efficiently. There are two dimensions in collaborative systems that allow describing when and where the interaction occurs: (1) the horizontal dimension, which means having collaborative

tools that allow to detect where (on the same site or on different sites) the participants are; and the (2) vertical dimension, which distinguishes between synchronous communication (at the same time) or asynchronous communication (communication at different times) [10].

3 Software Tools for Collaborative Project Management Support

An initial search on the web was done in order to find the Collaborative Project Management Tools (CPMT) to be analyzed. This search was done using a search engine (Google) that had links to the official pages of several tools, forums and scientific papers. However, given the wide range of choices, first it was necessary to understand the essential characteristics of a CPMT. There are several desktop and web-based tools which offer resources for organizing tasks, defining goals and support team work. The following characteristics considered essential in a CPMT were defined:

- Correctly planning a project based on the realization of inter-related tasks;
- Evaluate and assign resources (human and material) needed to carry out a project, in accordance with identified needs;
- Manage the project calendar;
- Reporting;
- Generate Gantt charts;
- Accept precedence relations between tasks (end-start, start-start, end-end, start-end).
- Establish hierarchical levels, creating a work breakdown structure.
- Define scheduled dates for the tasks.
- And besides the previous functionalities, allow collaboration (file sharing, emails, forums, chats or wikis).

This last point was very important since the goal was to study tools that allow some form of collaboration, and have at least one of the features mentioned above.

Next, we present the sixty tools selected for evaluation in this study. Due to space limitations, just the name of the CPMT will be presented (see table 1).

Table 1. Software tools for collaborative Project Management analyzed

2-plan	Clarizen	Freedcamp	LibrePlan	PHPProjekt	Teambox
5pm	Collabtive	Ganttlic	LiquidPlanner	ProjectManager	TeamLab
AceProject	Comindware Tracker	GanttProject	Mavenlink	Project.net	Teamwork
ActiveCollab	Comindwork	Genius Inside	Merlin	Projectplace	Ubidesk
AjaxWorkspace	ClockingIT	GroveSite	Clientspot	ProjectPier	Vkolab
AtTask	Dooster	Goplan	Open Workbench	Projecturf	Web2project
Basecamp	Deskaway	GroupCamp	OnStage	ProWorkflow	Work Zone
Celoxis	DotProject	HyperOffice	OpenProj	QuickBase	Workspace
Central Desktop	Easy project	IManageProject	OneDesk	Redmine	Wrike
Cerebro	<i>EGroupware</i>	InLoox	PhpGroupware	Smartsheet	Zoho Project

According to Waltano Júnior (1992) [11], ISO 14598 provides requirements and recommendations for practical implementation of the evaluation of software products. The evaluation process is based on ISO 9126, which defines software quality metrics and can be used both to evaluate finished products and products in development. This standard can be used by evaluation entities, software vendors, software buyers and users, each with their goal [12].

The standard is divided into six parts, which are: 14598-1: Overview; 14598-2: Planning and Management; 14598-3: Process for the Development Team; 14598-4: Process for Customer; 14598-5: Process for the Assessor and 14598-6: Assessment Module. The assessment process according to ISO/IEC 14598-1 is defined by: establish assessment requirements (establishing the purpose of the assessment, identify types of products to be evaluated, specify the quality model); specify the evaluation (select metrics, establish levels of scores for the metrics, establish criteria for judgment); design evaluation (produce the assessment plan) and perform assessment (obtain measures, compare criteria, judge the results) [11].

ISO 9126 is divided into two subtypes: internal and external quality, and quality in use. The internal and external quality is the sum of the characteristics of the software product, and the quality in use is the view of the quality of the software product from the point of view of the user [13]. The internal and external quality of the software is perceived in the six characteristics, but only their sub-characteristics can be measured using metrics, Figure 1 [14].

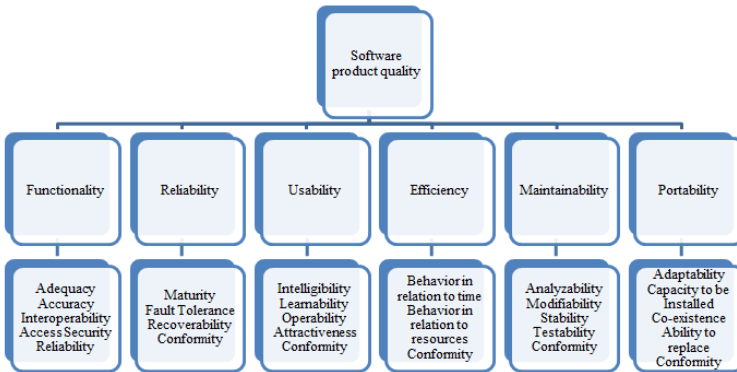


Fig. 1. Quality Model - ISO 9126 (Internal and external quality) [15]

4 Comparative Evaluation of Collaborative Project Management Software Tools – Model Developed

After a literature review about project management and document analysis (theses, official documents of tools, scientific articles and forums), we proceeded to the definition of the group of requirements based on characteristics and sub-characteristics of the ISO 9126, presented in section 3. Afterwards, we have

developed an evaluation model that can support project managers to choose the best tool that fits their needs. Based on the requirements, we defined a set of criteria and metrics to be used in the evaluation process. This section summarizes the proposed model and the results of the evaluation process of the sixty tools.

To use the model, the user (the project manager) must follow the following steps: define and group the assessment criteria (requirements group), associate weights to the subcriteria (requirements), assign a level of attainment to each sub-criterion and finally verify the type of solution.

First, we have started by grouping the evaluative criteria, based on the characteristics and sub-characteristics defined in ISO/IEC 9126. The features selected to be evaluated were: "Functionality", "Usability" and "Portability". The grouping of the requirements was defined as represented in the hierarchical structure shown in Figure 2.

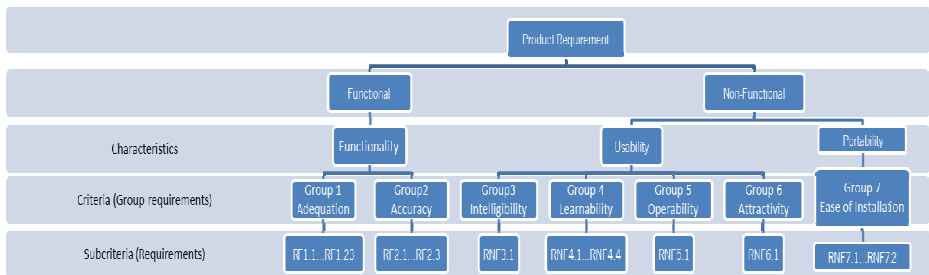


Fig. 2. Grouping of requirements

The sub-criteria considered for evaluations were grouped into three categories: project management, collaborative and others (see table 2).

Table 2. Requirements

Project Management	Collaborative	Others
Subtasks; Definition of task start and end dates; Milestones; Definition of tasks precedence's; GANTT chart; Critical path; Network diagram; Importation of projects; Exportation of projects; Input of work duration (days, weeks, months); Calendar; Event notification; Event log; Highlight important dates; Reporting; Appoint resources (people); Appoint resources (material); Indicate if a resource is overloaded; Input costs of resources; Project budget; Project control.	Chat; Email integration; Online conference; Forum.	User friendly; Help; Tutorials; Tool demonstration videos; Free updates; Shortcuts; Graphical user interface customization; Easy installation in a specific environment; Easy configuration.

After defining and grouping the requirements to assess, we proceed to the assignment of metrics. First, we define the priority or weight of each sub-criterion, which may be essential (weight of 3), important (weight of 2) or desirable (weight of 1). The priority demonstrates the importance of the tool having certain requirement.

After setting the priority or weight of each sub-criterion we have to assign the level of service, using the same analysis method of Cerqueira & Silva (2009) [16] which comprises: total (value=2), partial (value=1) or none (value=0). Total means that the tool has the complete requirement, partial means that the tool has partially the requirement, and none means that the tool does not have the requirement.

Besides the level of attainment and priority, we indicate a note regarding the type of assessment and respective percentage. Using the same analysis method of Marçal & Beuren (2007) [17] we considered the following levels: Excellent (90-100), Good (75-90), Satisfactory (60-75), Regular (50-60) or Poor (0-50). The total score reached by each tool is evaluated, using the set of evaluation criteria established for each characteristic according to equation 1 [16].

$$\text{Total Score} = \sum_{I=1}^N (P \times A) \quad (1)$$

N = Feature's number of criteria
 I = Identifies the criteria (ranging from 1 to N)
 P = Criteria's weight of priority
 A = Criteria's level of attainment

5 The Application to Compare CPMT and Results Obtained

In order to use the decision support multicriteria model, we have developed a software application. This allows project managers to define what tools they want to compare, the requirements needed and the respective weights. The developed application allows the introduction of new tools and their respective requirements, as well as to remove tools, and presents as a result the assessment of the tools under analysis. The name of the tool and the respective score are depicted in descending order, as well as the weights assigned to each requirement. When selecting a tool from the list of results, general information about the selected tool is shown. The application was developed using the program Lazarus and Pascal programming language. For constructing the database, SQLite was used. The application interface is shown in Figure 3.

The evaluation of the *functionality* feature shows that the tool Genius Inside obtains the highest score in comparison to other evaluated tools. This tool provides explicit support for multiple project management, resource managing, budgets, risks, schedules and planning. In terms of collaboration it is an excellent tool for professionals who are, for example, familiar with Facebook, Twitter and LinkedIn. The tool with the lowest score is the Goplan; it lacks basic functionalities required for project management, namely resource management, budget etc.

The evaluation of the *usability* feature shows that the tools with the highest score are 5pm, Celoxis, and ClockingIT. However, other tools like Cerebro, Comindware Tracker, Easy project, GanttProject, InLoox, TeamLab, and OpenProj are very close to the score of the first; they do not comply with only one assessment criterion.

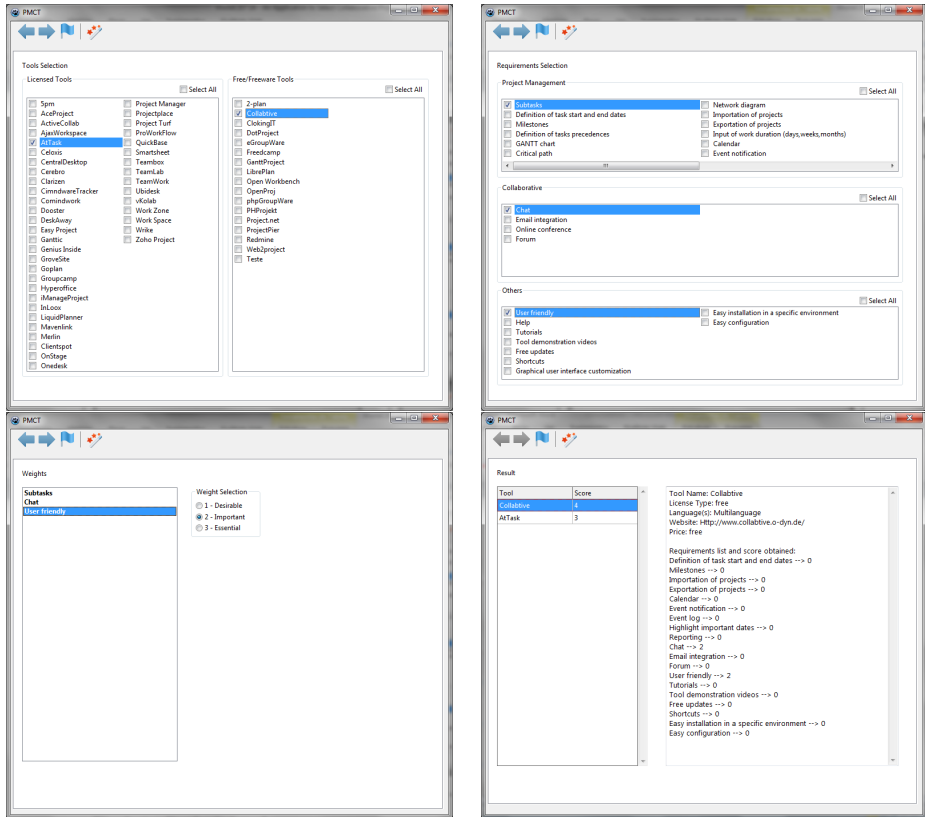


Fig. 3. Application’s Interface

As the results are almost identical, it can be stated that with regard to the *portability* feature, all tools have the desired quality, except ActiveCollab. This is mainly due to the fact that this tool is difficult to install, requiring technical expertise to do it. DotProject, Merlin and phpGroupWare present also lower performance in the *portability* feature. For example, DotProject is difficult to install, demanding a previous installation of MySQL and PHP and requires some specific technical settings.

The tools Celoxis and Genius Inside have the best overall score. The tool Goplan gets the worst overall score. The fact that Celoxis and Genius Inside are quite complete tools, allowing the management of resources, documents, budget, risk, and planning, makes them excellent tools in terms of *functionality*. Regarding the *usability* feature, such prominence does not exist, primarily due to the learning curve that is

needed to deal with the complex modules that these tools include. Hence, some professionals may value the *usability* over *functionality*, in order to save time with the learning process.

Comparative Table

The multicriteria decision model was applied to sixty tools. After evaluating the service levels of the criteria for each tool, a comparative table was constructed. In Table 3, we present a sample of the comparison involving two tools, exemplifying how to determine the score for each tool, taking into account their level of attainment (A) and their weight (or priority) (P). The score of each criterion in the comparative table is the result of multiplying the priority assigned to each criterion with the level of attainment, named Result (P*A). Besides the level of attainment and priority, we indicate a grade considering the type of evaluation. As an example of evaluation and comparison of the sixty tools, the 2-plan tool has a result of 59%, which means that it is considered as a tool with a regular type solution. The tool 5pm obtained a result of 66%, which is considered a satisfactory type solution.

Table 3. Comparative Table

Software	Requirement	RF1.1	RF1.2	RF1.3	RF1.4	RF1.5	RF1.6	RF1.7	RF1.8	RF1.9	RF1.10	RF1.11	RF1.12	RF1.13	RF1.14	RF1.15	RF1.16	RF1.17	RF1.18	RF1.19	RF1.20	RF1.21	RF1.22	RF1.23	RF1.24	RF1.25	RF1.26	RF1.27	RF1.28	RF1.29	RF1.30	RF1.31	RF1.32	RF1.33	RF1.34	RF1.35	RF1.36	RF1.37	RF1.38	RF1.39	RF1.40	RF1.41	RF1.42	RF1.43	RF1.44	RF1.45	RF1.46	RF1.47	RF1.48	RF1.49	RF1.50	RF1.51	RF1.52	RF1.53	RF1.54	RF1.55	RF1.56	RF1.57	RF1.58	RF1.59	RF1.60	RF1.61	RF1.62	RF1.63	RF1.64	RF1.65	RF1.66	RF1.67	RF1.68	RF1.69	RF1.70	RF1.71	RF1.72	RF1.73	RF1.74	RF1.75	RF1.76	RF1.77	RF1.78	RF1.79	RF1.80	RF1.81	RF1.82	RF1.83	RF1.84	RF1.85	RF1.86	RF1.87	RF1.88	RF1.89	RF1.90	RF1.91	RF1.92	RF1.93	RF1.94	RF1.95	RF1.96	RF1.97	RF1.98	RF1.99	RF1.100	RF1.101	RF1.102	RF1.103	RF1.104	RF1.105	RF1.106	RF1.107	RF1.108	RF1.109	RF1.110	RF1.111	RF1.112	RF1.113	RF1.114	RF1.115	RF1.116	RF1.117	RF1.118	RF1.119	RF1.120	RF1.121	RF1.122	RF1.123	RF1.124	RF1.125	RF1.126	RF1.127	RF1.128	RF1.129	RF1.130	RF1.131	RF1.132	RF1.133	RF1.134	RF1.135	RF1.136	RF1.137	RF1.138	RF1.139	RF1.140	RF1.141	RF1.142	RF1.143	RF1.144	RF1.145	RF1.146	RF1.147	RF1.148	RF1.149	RF1.150	RF1.151	RF1.152	RF1.153	RF1.154	RF1.155	RF1.156	RF1.157	RF1.158	RF1.159	RF1.160	RF1.161	RF1.162	RF1.163	RF1.164	RF1.165	RF1.166	RF1.167	RF1.168	RF1.169	RF1.170	RF1.171	RF1.172	RF1.173	RF1.174	RF1.175	RF1.176	RF1.177	RF1.178	RF1.179	RF1.180	RF1.181	RF1.182	RF1.183	RF1.184	RF1.185	RF1.186	RF1.187	RF1.188	RF1.189	RF1.190	RF1.191	RF1.192	RF1.193	RF1.194	RF1.195	RF1.196	RF1.197	RF1.198	RF1.199	RF1.200	RF1.201	RF1.202	RF1.203	RF1.204	RF1.205	RF1.206	RF1.207	RF1.208	RF1.209	RF1.210	RF1.211	RF1.212	RF1.213	RF1.214	RF1.215	RF1.216	RF1.217	RF1.218	RF1.219	RF1.220	RF1.221	RF1.222	RF1.223	RF1.224	RF1.225	RF1.226	RF1.227	RF1.228	RF1.229	RF1.230	RF1.231	RF1.232	RF1.233	RF1.234	RF1.235	RF1.236	RF1.237	RF1.238	RF1.239	RF1.240	RF1.241	RF1.242	RF1.243	RF1.244	RF1.245	RF1.246	RF1.247	RF1.248	RF1.249	RF1.250	RF1.251	RF1.252	RF1.253	RF1.254	RF1.255	RF1.256	RF1.257	RF1.258	RF1.259	RF1.260	RF1.261	RF1.262	RF1.263	RF1.264	RF1.265	RF1.266	RF1.267	RF1.268	RF1.269	RF1.270	RF1.271	RF1.272	RF1.273	RF1.274	RF1.275	RF1.276	RF1.277	RF1.278	RF1.279	RF1.280	RF1.281	RF1.282	RF1.283	RF1.284	RF1.285	RF1.286	RF1.287	RF1.288	RF1.289	RF1.290	RF1.291	RF1.292	RF1.293	RF1.294	RF1.295	RF1.296	RF1.297	RF1.298	RF1.299	RF1.300	RF1.301	RF1.302	RF1.303	RF1.304	RF1.305	RF1.306	RF1.307	RF1.308	RF1.309	RF1.310	RF1.311	RF1.312	RF1.313	RF1.314	RF1.315	RF1.316	RF1.317	RF1.318	RF1.319	RF1.320	RF1.321	RF1.322	RF1.323	RF1.324	RF1.325	RF1.326	RF1.327	RF1.328	RF1.329	RF1.330	RF1.331	RF1.332	RF1.333	RF1.334	RF1.335	RF1.336	RF1.337	RF1.338	RF1.339	RF1.340	RF1.341	RF1.342	RF1.343	RF1.344	RF1.345	RF1.346	RF1.347	RF1.348	RF1.349	RF1.350	RF1.351	RF1.352	RF1.353	RF1.354	RF1.355	RF1.356	RF1.357	RF1.358	RF1.359	RF1.360	RF1.361	RF1.362	RF1.363	RF1.364	RF1.365	RF1.366	RF1.367	RF1.368	RF1.369	RF1.370	RF1.371	RF1.372	RF1.373	RF1.374	RF1.375	RF1.376	RF1.377	RF1.378	RF1.379	RF1.380	RF1.381	RF1.382	RF1.383	RF1.384	RF1.385	RF1.386	RF1.387	RF1.388	RF1.389	RF1.390	RF1.391	RF1.392	RF1.393	RF1.394	RF1.395	RF1.396	RF1.397	RF1.398	RF1.399	RF1.400	RF1.401	RF1.402	RF1.403	RF1.404	RF1.405	RF1.406	RF1.407	RF1.408	RF1.409	RF1.410	RF1.411	RF1.412	RF1.413	RF1.414	RF1.415	RF1.416	RF1.417	RF1.418	RF1.419	RF1.420	RF1.421	RF1.422	RF1.423	RF1.424	RF1.425	RF1.426	RF1.427	RF1.428	RF1.429	RF1.430	RF1.431	RF1.432	RF1.433	RF1.434	RF1.435	RF1.436	RF1.437	RF1.438	RF1.439	RF1.440	RF1.441	RF1.442	RF1.443	RF1.444	RF1.445	RF1.446	RF1.447	RF1.448	RF1.449	RF1.450	RF1.451	RF1.452	RF1.453	RF1.454	RF1.455	RF1.456	RF1.457	RF1.458	RF1.459	RF1.460	RF1.461	RF1.462	RF1.463	RF1.464	RF1.465	RF1.466	RF1.467	RF1.468	RF1.469	RF1.470	RF1.471	RF1.472	RF1.473	RF1.474	RF1.475	RF1.476	RF1.477	RF1.478	RF1.479	RF1.480	RF1.481	RF1.482	RF1.483	RF1.484	RF1.485	RF1.486	RF1.487	RF1.488	RF1.489	RF1.490	RF1.491	RF1.492	RF1.493	RF1.494	RF1.495	RF1.496	RF1.497	RF1.498	RF1.499	RF1.500	RF1.501	RF1.502	RF1.503	RF1.504	RF1.505	RF1.506	RF1.507	RF1.508	RF1.509	RF1.510	RF1.511	RF1.512	RF1.513	RF1.514	RF1.515	RF1.516	RF1.517	RF1.518	RF1.519	RF1.520	RF1.521	RF1.522	RF1.523	RF1.524	RF1.525	RF1.526	RF1.527	RF1.528	RF1.529	RF1.530	RF1.531	RF1.532	RF1.533	RF1.534	RF1.535	RF1.536	RF1.537	RF1.538	RF1.539	RF1.540	RF1.541	RF1.542	RF1.543	RF1.544	RF1.545	RF1.546	RF1.547	RF1.548	RF1.549	RF1.550	RF1.551	RF1.552	RF1.553	RF1.554	RF1.555	RF1.556	RF1.557	RF1.558	RF1.559	RF1.560	RF1.561	RF1.562	RF1.563	RF1.564	RF1.565	RF1.566	RF1.567	RF1.568	RF1.569	RF1.570	RF1.571	RF1.572	RF1.573	RF1.574	RF1.575	RF1.576	RF1.577	RF1.578	RF1.579	RF1.580	RF1.581	RF1.582	RF1.583	RF1.584	RF1.585	RF1.586	RF1.587	RF1.588	RF1.589	RF1.590	RF1.591	RF1.592	RF1.593	RF1.594	RF1.595	RF1.596	RF1.597	RF1.598	RF1.599	RF1.600	RF1.601	RF1.602	RF1.603	RF1.604	RF1.605	RF1.606	RF1.607	RF1.608	RF1.609	RF1.610	RF1.611	RF1.612	RF1.613	RF1.614	RF1.615	RF1.616	RF1.617	RF1.618	RF1.619	RF1.620	RF1.621	RF1.622	RF1.623	RF1.624	RF1.625	RF1.626	RF1.627	RF1.628	RF1.629	RF1.630	RF1.631	RF1.632	RF1.633	RF1.634	RF1.635	RF1.636	RF1.637	RF1.638	RF1.639	RF1.640	RF1.641	RF1.642	RF1.643	RF1.644	RF1.645	RF1.646	RF1.647	RF1.648	RF1.649	RF1.650	RF1.651	RF1.652	RF1.653	RF1.654	RF1.655	RF1.656	RF1.657	RF1.658	RF1.659	RF1.660	RF1.661	RF1.662	RF1.663	RF1.664	RF1.665	RF1.666	RF1.667	RF1.668	RF1.669	RF1.670	RF1.671	RF1.672	RF1.673	RF1.674	RF1.675	RF1.676	RF1.677	RF1.678	RF1.679	RF1.680	RF1.681	RF1.682	RF1.683	RF1.684	RF1.685	RF1.686	RF1.687	RF1.688	RF1.689	RF1.690	RF1.691	RF1.692	RF1.693	RF1.694	RF1.695	RF1.696	RF1.697	RF1.698	RF1.699	RF1.700	RF1.701	RF1.702	RF1.703	RF1.704	RF1.705	RF1.706	RF1.707	RF1.708	RF1.709	RF1.710	RF1.711	RF1.712	RF1.713	RF1.714	RF1.715	RF1.716	RF1.717	RF1.718	RF1.719	RF1.720	RF1.721	RF1.722	RF1.723	RF1.724	RF1.725	RF1.726	RF1.727	RF1.728	RF1.729	RF1.730	RF1.731	RF1.732	RF1.733	RF1.734	RF1.735	RF1.736	RF1.737	RF1.738	RF1.739	RF1.740	RF1.741	RF1.742	RF1.743	RF1.744	RF1.745	RF1.746	RF1.747	RF1.748	RF1.749	RF1.750	RF1.751	RF1.752	RF1.753	RF1.754	RF1.755	RF1.756	RF1.757	RF1.758	RF1.759	RF1.760	RF1.761	RF1.762	RF1.763	RF1.764	RF1.765	RF1.766	RF1.767	RF1.768	RF1.769	RF1.770	RF1.771	RF1.772	RF1.773	RF1.774	RF1.775	RF1.776	RF1.777	RF1.778	RF1.779	RF1.780	RF1.781	RF1.782	RF1.783	RF1.784	RF1.785	RF1.786	RF1.787	RF1.788	RF1.789	RF1.790	RF1.791	RF1.792	RF1.793	RF1.794	RF1.795	RF1.796	RF1.797	RF1.798	RF1.799	RF1.800	RF1.801	RF1.802	RF1.803	RF1.804	RF1.805	RF1.806	RF1.807	RF1.808	RF1.809	RF1.810	RF1.811	RF1.812	RF1.813	RF1.814	RF1.815	RF1.816	RF1.817	RF1.818	RF1.819	RF1.820	RF1.821	RF1.822	RF1.823	RF1.824	RF1.825	RF1.826	RF1.827	RF1.828	RF1.829	RF1.830	RF1.831	RF1.832	RF1.833	RF1.834	RF1.835	RF1.836	RF1.837	RF1.838	RF1.839	RF1.840	RF1.841	RF1.842	RF1.843	RF1.844	RF1.845	RF1.846	RF1.847	RF1.848	RF1.849	RF1.850	RF1.851	RF1.852	RF1.853	RF1.854	RF1.855	RF1.856	RF1.857	RF1.858	RF1.859	RF1.860	RF1.861	RF1.862	RF1.863	RF1.864	RF1.865	RF1.866	RF1.867	RF1.868	RF1.869	RF1.870	RF1.871	RF1.872	RF1.873	RF1.874	RF1.875	RF1.876	RF1.877	RF1.878	RF1.879	RF1.880	RF1.881	RF1.882	RF1.883	RF1.884	RF1.885	RF1.886	RF1.887	RF1.888	RF1.889	RF1.890	RF1.891	RF1.892	RF1.893	RF1.894	RF1.895	RF1.896	RF1.897	RF1.898	RF1.899	RF1.900	RF1.901	RF1.902	RF1.903	RF1.904	RF1.905	RF1.906	RF1.907	RF1.908	RF1.909	RF1.910	RF1.911	RF1.912	RF1.913	RF1.914	RF1.915	RF1.916	RF1.917	RF1.918	RF1.919	RF1.920	RF1.921	RF1.922	RF1.923	RF1.924	RF1.925	RF1.926	RF1.927	RF1.928	RF1.929	RF1.930	RF1.931	RF1.932	RF1.933	RF1.934	RF1.935	RF1.936	RF1.937	RF1.938	RF1.939	RF1.940	RF1.941	RF1.942	RF1.943	RF1.944	RF1.945	RF1.946	RF1.947	RF1.948	RF1.949	RF1.950	RF1.951	RF1.952	RF1.953	RF1.954	RF1.955	RF1.956	RF1.957	RF1.958	RF1.959	RF1.960	RF1.961	RF1.962	RF1.963	RF1.964	RF1.965	RF1.966	RF1.967	RF1.968	RF1.969	RF1.970	RF1.971	RF1.972	RF1.973	RF1.974	RF1.975	RF1.976	RF1.977	RF1.978	RF1.979	RF1.980	RF1.981	RF1.982	RF1.983	RF1.984	RF1.985	RF1.986	RF1.987	RF1.988	RF1.989	RF1.990	RF1.991	RF1.992	RF1.993	RF1.994	RF1.995	RF1.996	RF1.997	RF1.998	RF1.999</
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6 Conclusions

CPMT are an essential support for an effective PM. This is due both to the complexity inherent to PM activities and the increasing tendency for teams to be geographically distributed, requiring strong coordination and control. In addition, project managers are constantly pressured to increase efficiency, and to perform more tasks with fewer resources. CPMT can help to handle and support the various challenges in an increasingly globalized and demanding market. In this research we began to survey a representative sample (sixty CPMT) available on the market. After selecting the tools, we have developed a decision support multicriteria model where we have identified a set of relevant criteria to assist in the evaluation and comparison of CPMT, according to the ISO / IEC 9126 and ISO / IEC 14598. Finally, we developed a computer application that implements the proposed decision support multicriteria model that aims to support project managers in evaluating a set of CPMT, taking into account the predefined criteria. The results obtained for the sixty CPMT analyzed allowed concluding that the tools Celoxis and Genius Inside have the best overall score, mainly due to the *functionality*, *usability*, and *portability* features. The tool Goplan got the worst overall qualification. Besides the comparison of CPMT, it is important to note that a software application was developed allowing the comparison of any CPMT.

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