

# **Project Management Systems and Mobile Devices: Practical and Theoretical Assessment <sup>1</sup>**

**Leonardo Grandinetti Chaves**

## **Abstract**

The article discusses traditional and agile project management in the context of using mobile devices and the tools available. Indicates evolutions and peculiarities of mobile systems and the important requirements in project management.

## **Introduction**

Technology evolves rapidly, and with it grows the world of applications. Regardless of the nature of the business, many companies integrated into its strategic plan the implementation of applications, aware that a considerable portion of the access to applications recently is made from a mobile device. However, a portion of the organizations do not have an exact idea of when to implement them.

Applications for mobile devices are those that are designed for a particular operating system on the phone. They're created exclusively for mobile phones, having to consider the operating systems of mobile devices. The advantages of developing for mobile devices are full access to the device, software and hardware, better user experience and viewing app stores. The disadvantages are the development in different programming languages and need to develop skills according to the operating system as well as higher costs and development time. There are cases where an application has reason to be exclusively native, such as when depends on device functionality. If the organization needs the application to continue running even with no internet connection, which is also known as "off-line", the development needs to point to this requirement. To reduce costs and increase productivity there are tools that generate mobile environment multiplatform way, that is, from a code can be generated for other mobile platforms. In the case of development directed to the web mobile friendly, the development follows the standard Web with known and standardized languages. In this case, the advantages are reusable code in programming, development faster and at lower cost and no installation needed. The disadvantages are the internet connection is 100% necessary, limited access to the device's hardware and loss of visibility in stores.

Many companies and developers have their applications in multiplatform. Ie, have applications that run on different operating systems for mobile devices (Android, iOS, Windows Phone, BlackBerry); and in turn, they adapt to Web and mobile nature opting for the two mentioned ways. The future is assured for tools that help generate multiplatform software, either on the phone or

---

<sup>1</sup> How to cite this paper: Chaves, L. G. (2020). Project Management Systems and Mobile Devices: Practical and Theoretical Assessment; *PM World Journal*, Vol. IX, Issue III, March.

web environment; thus allowing to develop an operating system to generate in others, reduces time and cost, and enables us to reach an ideal time to market in all stores, among other benefits. In the different project management scenarios, collection, storage and distribution of projects of information can be facilitated by Web application development and / or also accessible on mobile devices.

In addition, project managers spend most of their time communicating with the staff and other stakeholders. The Communication develops the relationships needed for successful results. It includes developing strategies and plans for artifacts and communication activities. The project communications are also based on efforts to avoid misunderstandings and communication misunderstandings and mobile devices can be an important tool for the correction of communication problems in a timely manner.

Productivity can increase when managers interact with staff. The development of mobile solutions can integrate the teams and increase the exchange of project information.

The objective of this article is to explore the state of the art mobile applications in the context of management of traditional and agile project and also particularly in the areas of knowledge related to risks, scope, cost, time, procurement, human resources, stakeholders, communications and quality. Analyze the characteristics of each area, test applications in meeting the project requirements, ease of use and integration. Discuss the requirements of project management applications for mobile devices, and classify them for adequacy. Finally, we intend to use of mobile applications builders to check the requirements, operation and adequacy of comparatively final solutions.

## **Mobile and ubiquitous computing**

THE ubiquitous and mobile computing has arisen due to miniaturization and wireless connectivity. As devices become smaller, we are better able to port them around us or use them, and we can embed them in many parts of the physical world.

As wireless connectivity becomes more prevalent, more able to connect these new small devices to one another, and for personal conventional computers and servers.

The main properties are characterized by differences between distributed shared conventional systems. They include sub-areas: wearable (which can be used); handheld (ported in hand). Add the volatility and devices containing software components. All that is subject to change, often in a given environment. As software components associated and inter-operate when entities move, failure or spontaneous appearance environments. As systems become integrated with the physical world through sensors and context knowledge.

They include security and privacy issues that arise in volatile systems physically integrated. Also arise techniques to adapt the lack of computational resources and input / output devices in small (Coulouris et al, 2005).

The idea emerged as a paradigm in which users could carry their personal computers and retain some connectivity to other machines.

Wireless devices fall under the following standards:

- IEEE 802 wireless network standards
- WiFi 802.11 Wireless Local Area Networks [IEEE 1999]
- Bluetooth 802.15.1 Wireless Personal Area Networks [IEEE 2002]
- 802.15.4 ZigBee wireless sensor networks [IEEE 2003]
- 802.16 WiMAX Wireless Metropolitan Area Networks [IEEE 2004a]

A different path of evolution has led to the handheld computing: the use of devices that fit in the hand that are general purpose computers capable of running many different types of applications. A trend in handheld computing has been the Cloud distinctions between PDAs, mobile phones and handheld devices with contruidos certain purposes, such as cameras.

How to provide seamless connectivity for mobile devices that enter and leave the base stations coverage area, which are infrastructure components that provide wireless coverage areas. How to enable collections of devices for wireless communication in places where there is no infrastructure (base stations), ie, there are Ad Hoc Networks.

Both problems arise because the direct wireless connectivity, it is often not available between two data devices. The communication has to be achieved on different network segments: wireless or wired. Two factors lead to this wireless coverage subdivision:

- The greater the range (range) of a wireless network, the devices compete for its limited bandwidth.
- The energy required to transmit a wireless signal is proportional to the square of its range (range).

But many devices have limited power capacity. Ubiquitous means "to be found everywhere." Weiser saw the growing dominance of computing devices, leading to revolutionary changes in the way we could use computers (Coulouris et al, 2005).

The infrared transmission has a range (range) limited and so will be captured only if the user is near.

The physical circumstances may be, in principle, any physically measurable or detectable thing. Such as, the presence of a user, time of day or weather conditions.

From the point of view of distributed systems, there is no essential difference between ubiquitous and mobile computing or sub-areas. These volatile systems include certain changes that are common. The set of users, hardware and software in ubiquitous and mobile systems, is highly dynamic and unpredictable changes.

Relevant forms of "volatility" include failures of devices and communication links, changes in communication features such as bandwidth. Creating and destroying associations - logical communication relationships - between components of software residing on the devices.

The term "component" means any software unit such as objects or processes, regardless of whether they interoperate as a client or server, or "peer".

The solutions found in Coulouris (Coulouris ET AL, 2005) on replication approach on processing and communication failures being the exception rather than the rule, and the existence of redundant processing capabilities. Already volatile systems not only break those assumptions, but also further add the phenomenon of changes, notably the frequent changes in associations between components.

Volatility is not a property of the definition of ubiquitous and mobile systems: there are other systems that show one or more forms of volatility, but that are neither mobile nor ubiquitous.

An example is the peer-to-peer computing, such as file sharing applications (Coulouris ET AL, 2005), in which the number of participants processes and associations between them are subject to high rates of change.

What is different in ubiquitous and mobile computing systems, is that they (associations) exhibit all forms (mentioned before) volatility (therefore change) because of the way that these are integrated with the physical world.

There is much to say about physical integration and how this cause volatility. Physical integration is not a system of property distributed, while volatility is.

You can enter computing devices in nature, where there is no infrastructure to make an application for environmental monitoring. A smart space contains a relatively stable computing infrastructure, which may include: servers, printers, displays, sensors and a wireless network infrastructure, connecting to the Internet.

There are several types of movement that can occur in a smart space. A process or mobile agent can move into or out of the smart space, or to / from a user's personal device. A physical movement of a device can cause a logical move components within it. Users can add relatively static devices (such as media players) as long-term additions to the space, and correspondingly withdraw his old devices. Devices can be turned off or fail and thus "disappear" for a space.

It may or may not be possible to distinguish any particular component devices for "infrastructure" of the devices "visitors". An important difference that may arise between volatile systems is the rate of change.

Algorithms that have to run the "Appear" or "disappear" components (for example, in a home smart) can be designed differently from those for which there are at least such a change at any time (for example, a system implemented using Bluetooth communication between mobile phones in a very populated city) (Coulouris et al, 2005).

While the phenomenon of "Appear" and "disappear" looks like, to a first approximation, from a security point of view, one thing is a user device goes into an intelligent space, and another thing is a software component out if moving to an infrastructure device belonging to the space.

With the emergence of ubiquitous computing and mobile, a new class of devices is becoming part of distributed systems. This device is limited in its energy and computing resources. He may have some ways to interface with the physical world.

To enable its integration with the physical world, in particular, to make it aware of the context, devices are equipped with sensors and actuators. They are devices that measure physical parameters and supply values for its software. Devices are controlled by software that affect the physical world. The sensors measure position, orientation, load (weight), sound levels and lighting (Coulouris et al, 2005).

An important issue for the sensors is precision, which is quite limited and thus may lead to unwanted behavior, such as inappropriate response to location. The vagueness is characteristic of devices that are inexpensive enough to provide "ubiquosidade". Already connection technologies (Bluetooth, WiFi, GPRS, ...) vary in their nominal bandwidth and latency in your energy costs and if there are financial costs for communication (WIRELESS, 2019).

## **Project management**

There are several project management methodologies that can follow models and / or best practices with greater or lesser adherence to guides. The project manager can focus on following a plan to control the changes as an agile leader deals with the adjustments to inevitable changes. Additionally, companies have their own processes of your value chain. The traditional value chains focus on internal competencies, processes and infrastructure, products and services, channels and customers. New value chains emphasize customer needs, integrated channels, products and services, flexible processes and infrastructure in-house expertise.

According to Kerzner (Kerzner, 2013), maturity in project management means the adoption of a project management methodology and its use in a consistent manner, the implementation of a philosophy that drives the company toward a maturity in project management and communicating it to all employees. Management processes and organizational processes support the organization to achieve its results. People work with the knowledge of processes in which its activities are located. What about the processes, employees often need to know why, for whom, impacts, standards and quality of the process. It would not be different from the need for information about the activities and the project.

It is up to the project manager to identify the communication and information requirements, try to analyze the different needs, concerns and expectations of stakeholders and especially the team as the project is planned and carried out. In addition, you should worry about balancing the competing project constraints including, but not limited to the scope, quality, schedule, budget, resources and risk.

Communication is key to the project manager able to integrate management processes. It also refers to the exchange of information. And communication can be thought of as a plan or

organized. According agile or hybrid models. Communication intended as a trading plan project information there is greater control and formality. You must specify methods to transmit information without noise, clearly, always having the receiver feedback (Kerzner, 2013).

In a communication responsive to communication often occurs across the front between the team members, with customers, managers, business analysts, etc. that can be gathered in a single room. It emphasizes real-time communications and transparency with constant feedback. There is also the need for maturity among stakeholders that can be collaborative among the team members.

It is important to distinguish the integration of project management processes in an approach as guided by the PMI (PMI, 2004) and the integration of other agile methodologies, for example. While the integration agile relates and the leadership role within the team, the integration process has driven the definition of inputs and outputs processes within the project life cycle. Consolidates all project phases (initiation, planning, executing, monitoring and controlling, and closing).

Integration also performed by Scrum Master (Schwaber, K., 2009). consists to bring together all parts of a project into a cohesive unit. And its management is the main role of the project manager. It supports the iteration in the project and is making choices about where to focus resources and efforts, anticipating potential problems and treat them before they become critical, and coordinating work. The need for integration in project management becomes evident in situations where individual processes have interaction: cost, time, risk, etc.

Communication in all methodologies improves the level of knowledge of all about the project. The management integration in the project also represents the balance between all areas of knowledge, according to the PMI (PMI, 2004). In high performance teams, "the leaders manage the principles and the principles manage the team" (LARSON, C., LAFASTO, F., 1989).

Leadership is an attribute of people, distinct from formal authority, who is charge of the attribute. They emphasize the project team motivation, the mission of the project, leadership skills and the environment within which the process of leadership is exercised. Additionally, it should be analyzed motivation (high or low) and competence (high or low). Leadership relates also to the development team, motivation, communication, influence, decision-making, political and cultural knowledge and negotiation. It is a broad subject and involves a substantial body of knowledge that is not limited to the context of projects that have been investigated as a skill to develop.

It is up to the project manager to make an analysis of the project stakeholders and communication requirements.

These requirements result from the sum of the information needs of stakeholders and are defined combining the type and format of information needed with an analysis of the value of such information.

The required information may include organizational charts, project organization, responsibilities among stakeholders, internal and external information needs, departments involved, among others.

Additionally, it is recommended that the "bad news" should be shared and the number of participants in a project that determines the number of communication channels. It is natural to have a larger number of participants of a larger project for the scope.

An important component of planning the project's communications is to determine and limit who will communicate with whom and who will receive what information as the project manager integrates the processes and the project takes place.

### **Communication on ICT Project Management**

Reports on ICT projects also involves identifying a problem or best practice in a specific section, feel like is staff morale in general and, in rare occasions promote a new initiative. Hear people's ideas and visions regarding design work issues, answer personal questions.

The leader can emphasize both the need for high levels of achievement as excellent relationships with staff.

The leader of Burns (Burns, 1978) need to identify specifically what his followers really do value and what they fear, and use what you know in your negotiations. Create a reliable link with the people under his command, clarifying their values, views and position, and defend them even when things get tough. Such behavior of consistency increases the confidence they have in you, and greatly facilitate the change of organizational culture. Bennis and Nanus (BENNIS, W.; nanus1988) (Theory of transformational leadership) recommend talking to people in case of performance decline, for example. Maintaining good communications with staff and adopt their good ideas, look for signs of discontent among them, bad mood, passive or aggressive behavior, tensions between two or more members of staff, malicious comments during meetings or conversations and murmurs desairosos in general. According to Adams, any sense of inequality arises from the perception that the person has the injustice that has been treated. Such perceptions are rarely based on facts but led by emotions.

The model of Hackman and Oldham (HACKMAN, OLDHAM, 1976) suggests encouraging staff to use a variety of skills and abilities to complete the task. Give them the freedom to choose their own working methods and control those resources need to complete the task. How can I support you for you to do what needs to be done? How can we solve this? What do you suggest to move forward?

The model Drexler team performance and Sibbet suggests questions to ask at each stage of the process related guidance, trust development, goal clarification, commitment, implementation, high performance, renovation (DREXLER & Sibbet, 1996)

Possible interdependencies may impact on resources, cost, time and cause delays. Projects environments in organizations are characterized predominantly by temporary teams. The team of a project can contemplate the management staff, support specialists, representatives of users or customers, vendors, business partners and human resources of the project.

It is up to the project manager to select, work the team's key people, and coordinate planning general design, know the product to be delivered, establish the work structure, identify those responsible for parts of the project, be aware of the reference schedule, prepare and coordinate the project management plans, including resource management plan humans.

Some project management methodologies have specific plans for people. The PMBOK presents managing human resources plan that includes from planning to completion of the project (PMI, 2013). As in formal planning, Agile also reinforce the interactions between the teams. The agile manifesto, for example, recommends individuals and over processes and tools interactions (AGILE MANIFESTO, 2015).

The staffing management plan can include how and when staff members will be hired or mobilized, training needs, recognition and awards, the security issues and the impact of the human resources plan in the organization (PMI, 2013). With the increasing competition, recognition and awards can stay in the background. As a solution, the functional manager and the project manager can choose to exchange for some form of compensation (working clearances, for example).

The PMBOK suggests some tools for their development planning: organizational charts and job descriptions, the expert opinion and the meetings held by the project team (PMI, 2013). Another aspect concerns the relationship networks that involve informal interaction between people in an organization while the Organizational Theory deals with the behavior of individuals and teams (CHIAVENATO, 2003).

The teams development stages involve bringing people together in teams, setting behavior, the establishment of procedures, delegation and individual development (Forming, Storming, Norming, *Performing*, *Adjourning*) (Tuckman, 65). It is observed these elements may also be applied to virtual teams (SD Johnson et al, 2002).

In SCRUM methodology there is the team leader's role is responsible for ensuring that the team is in accordance with the values, practices and rules. The leader helps the team, educates, trains, leading the team to be more productive and to develop higher quality products (Schwaber, K., 2009).

Training includes all activities designed to enhance skills. Activities can range from a five-minute agenda item in a meeting to evaluate the progress until an external expertise to improve interpersonal relationships.

For the management of the project team, the manager can apply your knowledge of behavioral and motivational theories. One of Herzberg, discusses the enrichment of tasks and displays the X and Y Theory (Michel, 2015). In addition, it argues that the hygiene factors in the project (HERZBERG, 1997; Robbins, 2002). Maslow already deals with the hierarchy of needs (CHIAVENATO, 2003).

The project as a major component of human resources, represented by the manager and the team, requires the involved skills, posture, techniques and diverse knowledge; it may occur shocks



opinion, leading to inevitable conflicts, which, if properly treated, will be beneficial. In this sense there are several techniques of conflict resolution.

Fischer and Ury (FISCHER AND URY, 2005) argue that negotiation is a two-way communication process with the aim of reaching a joint decision.

The conflict management, negotiation and leadership are also important environmental features of projects. It is up to the manager to deal with the complexity of the project adding knowledge management, people, processes and projects.

Leadership is another attribute of important people. They emphasize the project team motivation, the mission of the project, leadership skills and the environment within which the process of leadership is exercised. Leadership can be analyzed for the tasks or people. In the case of leadership to a set of tasks allows you to choose the technical leader who has the role of assisting in guiding the team and the project (AGILE MANIFEST, 2015).

The first commitment of leadership is with the clarity and communication is very important in this aspect (ENDERSBE et al, 2012).

The involvement of staff is a key part in meeting the project requirements. And the consensus planning tends to be strongly implemented. In addition, relationships with the acquisition, communication, deadlines, quality, costs, from its planning to execution tend to be tightly coupled because they are invariably realized and understood by people.

Trading may separate the people from the problem back the efforts of the negotiators for the focus problem of helping to reduce the number of necessary decisions. Additionally, a mediator may have different perspectives of authority, leadership and power.

Another challenge is the understanding of the organizational culture, the project environment, the behavioral and motivational theories. In this regard, the project manager does not always have enough time to deal with all the complexity of organizational processes. You have to project sponsor support to support the same execution that all aspects of planning have not been treated in time.

The team development stages involve bringing people together in teams, setting behavior, the establishment of procedures, delegation and individual development (Forming, Storming, Norming, Performing, Adjourning) (Tuckman, 65). It is observed that these elements can also be applied to virtual teams (SD Johnson et al, 2002).

## **And innovation projects**

Organizational structures and / or individuals' arrangements for conducting innovation processes are a form of communication of the company Regarding the level of priority and strategic importance That These elements occupy. The stakeholders of innovation projects may include Educational Institutions, ICT's basic industrial infrastructure, technology company clusters, suppliers, users, systems innovation, government, financial markets, the legal systems,

development agencies, business systems, among others. Added to this is the example of the industrial revolution in the political and economic Which Were environment factors in encouraging innovation.

In general, project management methodologies deal with stakeholder management. The PMBOK 5th ed. (PMI, 2013) presents a set of identification, planning, management and control of the engagement level of stakeholder. The Scrum (Schwaber, 2009) reinforces the importance of the relationship between the stakeholders with frequent meetings. Prince2 (PRINCE2, 2019) underscores the importance of your engagement. Particularly in the field of innovation, stakeholder engagement and engagement (fully identified) project is critical to success.

The innovation depends on the technological capacity of the organization. The technological capacity is related to a set or stock of resources based on technological knowledge. Often companies derive mechanisms of technological learning. The form and speed with Which companies build and accumulate technological capacity impacts directly on Their competitiveness. Some questions are relevant in the assessment of capacity and technological innovation:

- Where are we in terms of technological capacity?
- How long does it take to get here?
- How long are we "stationed" at a given Beheerder level of capacity for a specific technological function?
- How far are we from the technological frontier?
- Where do we want to be until year x?
- What are the resources and how do you manage Them to reach a level of technological capacity in x years?

Technology capability and technology are developed Within specific organizational contexts. The more complex the more it is Difficult to imitate it and copy it - the source of competitive advantage. In the context of Developing Countries, human capital and organizational capital have greater relative importance than technical systems.

According to Temaguide, "Technology Consists of knowledge and experience as well as equipment and facilities. It is software as well as hardware and it is services and systems as well as products and processes. Technology uses ideas, creativity, ingenuity, intuition, intelligence and foresight "(Temaguide 1998). Innovation in organizations can be Analyzed in three dimensions: macro, meso, and micro. The macro dimension Refers to short-term indicators, S & T & I policies, national / regional innovation infrastructure, systems innovation, cooperation networks, technological regimes and systems sector, financing innovation (public and private) and the socio-cultural context. The meso dimension is related to the innovation strategy, institutional guidelines for ICT for innovation, innovative business models, innovation projects portfolio and organizational structuring for innovation. innovation deals with the micro projects, the construction of competences - Individuals and groups, technological learning, entrepreneurial behavior, financial management of innovation.

The organizations are immersed in the contexts act That conditioners of the innovative activity. For this, companies must take into consideration the market, the solutions, the commercial relationships, the consumer experience, among other aspects. Innovation Also Differs industrial sectors among (TIDD and Pavitt, 2008).

The sectoral competition pattern presents its own structural characteristics:

- Intensity of competition;
- Degree of concentration of production;
- Entry barriers;
- Exposure to international competition;
- Regulation.

Companies demand funding for Their innovation projects because of the inherent risk of These activities. Investing in development and market testing is still needed to mitigate risk. Many projects must Manda the impacts They can bring to the development of the business.

Investment patterns and the influence of capital differ between sectors. The key factor can be related to the understanding of internal processes and the innovation model (Stage-gates (COOPER ET. AL., 2002).

The innovation model can determine Also the inclusion of new stakeholders. The innovation models include the joint development with external partners, the use of formal networks or consortia, joint ventures, open innovation and open source. Depending on the level of influence of the partners, They will have more or less strength in relation to the project direction.

Other aspects que Can Be Considered in the identification and engagement of stakeholders are the implementation of idea channels, use of experiments and prototypes, and control of deliveries. Additionally, it is Suggested to avoid believing That ideas are all Within the company, letting the "owner" of the idea of the project management from start to finish. This will impact the identification and management of stakeholders. It is important to the project manager defines and select the strategy, plans coordinating the project management, human resources management plan specially channels and stakeholders.

## **Communication is vital**

The mechanisms by which information can be exchanged: Writing (physical or electronic), spoken (in person or electronic), formal or informal (formal documents or electronic media), through gestures (tone of voice or facial expressions) through media (images, actions or just the choice of words). Project managers spend most of their time communicating with the staff and other stakeholders. Communication activities can have many dimensions, including, but not limited to internal (stakeholders within the project and organization), external (external stakeholders such as customers, suppliers, other projects, organizations, government and environmental activists).

Communication can also be no official in order to establish and maintain the profile and recognition of the project and develop strong relationships between the project team and stakeholders, using flexible means.

Communication develops the relationships needed for successful results. It includes developing strategies and plans for artifacts and communication activities. The project communications are based on efforts to avoid misunderstandings and communication misunderstandings. Misunderstandings can be reduced, but não eliminados using the 5c's communications written in the writing of a traditional message.

The 5cs of written communications in the drafting of a traditional message translate into Correct (grammar and correct spelling), concise (concise expression and elimination of excess words), clear (purpose and targeted clear expression to the reader's needs), coherent (logical and consistent flow of ideas) controlled (controlled flow words and ideas).

The 5cs rules in written communications are supported by communication skills: active listening (remain engaged with the speaker and summarize the conversations to ensure effective exchange of information), awareness of cultural and personal differences, identifying, defining and managing the expectations of stakeholders.

Improving these skills of all team members involved: persuade a person, team or organization, motivate people, provide encouragement or confidence, guiding to improve performance, resolve conflict and negotiate to reach mutually acceptable agreements.

Emerging trends and practices for managing project communications include but are not limited to: inclusion of stakeholders in project review, inclusion of stakeholders in project meetings (including the inherent practices to agile approaches). It is observed the increased use of social computing and multifaceted approaches to communication.

As each project is unique, the project team will need to adjust how the Communications Management processes are applied. The considerations for adaptation (tailoring) include stakeholders (internal, external or both), physical location, technology communications, language, knowledge management. design environments subject to various elements of ambiguity and change are inherent need to communicate details evolving and emerging more frequently and quickly. Post project artifacts in a transparent manner and conduct frequent periodic review of interested parties aimed at promoting communication with management and stakeholders.

Effective communication involves interpersonal knowledge and skills related to a set of technical, interpersonal and conceptual skills. It is a broad subject and involves a substantial body of knowledge that is not limited only to the project context. The Communication refers to the effective exchange of information and involves the emitter and receiver models, feedback, communication barriers, choice of medium, writing styles and how and dealing with conflict.

The computerized project management employs the processes required to ensure the generation, collection, distribution, storage, retrieval and disposal of project information in a timely and appropriate manner. This provides critical links among people and information that are necessary for successful communications. Everyone involved in the project should understand how communications affect the project as a whole.

According to PMI, GP's spend around 90% of their time acquiring or communicating project information. It is the central point for all project communication and should be well prepared and focused for communication with senior management, project team, peers and customers. It should also act as the principal representative of the project management for the customer and maintain an open and friendly relationship. It should serve as a focal point to ensure a real and two-way communication between the team project and client.

For this, the project manager must develop an approach and appropriate communication plan for the project, based on the needs and requirements of interested parties and organizational assets available. Some important observations that should be taken into account: who needs what information and who is authorized to access it when the information is needed, where information must be stored and in what format, how the information should be retrieved, which spindles schedules, communication barriers, and cultural aspects must be considered. There are countless documents that assist the project manager in its activities: project charter, project management plan, project documents, documentation of requirements which may include communications with stakeholders.

The organizational process assets are important in addition to the lessons learned include the historical information that can provide decisions and results based on previous similar projects related to communications problems. The analysis of the communications requirements results in the sum of the information needs of stakeholders and are defined by combining the type and format of information needed with an analysis of the value of such information. An important component of planning the project's communications is to determine and limit who will communicate with whom and who will receive what information.

Communication technology involves the methodologies used to transfer information between stakeholders and may vary between meetings, documents, websites, databases, etc. Factors affecting the choice of technology: the urgent need for information, availability of technology, ease of use, design and environmental sensitivity and confidentiality of information.

The communications management plan usually pretty involves the reporting requirements of stakeholders, the information to be forwarded, format, content and level of detail, the person responsible for communication of information, methods or technologies used to convey the information, the Frequency communication.

## **Electronic communication tools**

They are not limited to e-mail, fax, voice mail, telephone, video, Internet meeting, websites and publications on the web. Electronic tools include project management web interfaces for project management software and preparation of schedules, software to support virtual meetings and offices, portals and collaborative work management tools. May include performance reports, performance reports, status of deliveries, schedule progress, costs incurred, registration issues, project financing requirements. Other documents may be included, such as correspondence, memos, meeting minutes and other documents used in the project.

The computerized environment can enable monitor the entire project life cycle to ensure that the communication needs of stakeholders are met. It may also include data representation and evaluation matrix of stakeholder engagement by providing information on the effectiveness of communication activities.

In the project environment, it is common to see change requests related and impact on estimates of new and revised cost, activity sequences, schedule dates, resource requirements, and analysis of alternative risk responses.

On from there has been adjustments to the project management plan and document corrective action recommendations, preventive action recommendations. However, there are actions that the GP can take to ensure effective communication.

The GP must recognize the importance of interpersonal communication between members of your team and encourage their informal communication. GP's must also recognize that communication is a two-way road and cannot simply give orders, but encourage feedback and consensus building. The GP must unite your team, start relationships, links, establish reporting and accountability in formal and informal communication. You should also avoid communication barriers.

Project managers should establish a management plan of communications, post status reports, asking Interested parties which should be communicated to them, identify which communications need to obtain stakeholder review communications often in team meetings to reduce communication problems. Possible interdependencies may impact on resources, cost, time and cause delays or other problems.

Another challenge is the understanding of the organizational culture, the project environment, the behavioral and motivational theories. In this regard, the project manager does not always have enough time to deal with all the complexity of organizational processes. You have to project sponsor support to support the same execution that all aspects of planning have not been treated in time.

## Mobile systems

We selected some mobile systems and tested for sua completeness and adherence to these requirements and concepts in project management methodologies for verifying their completeness and consistency.

**Wrike** is a highly customizable project management tool. It comes with all the standard project management features: task creation and management, resource allocation, team communication. Wrike Also built-in features team and budget tracking, report Aside from the standard task management options, detailed Gantt charts, and dynamic to-do lists, Wrike for Android Incorporates device options such as the camera and photo-attachment function, and simplified file management. Its Android mobile app Also does the nitty gritty, such as using Gantt Charts (Wrike, 2019).

**Asana.** Its task management features let you organize, add, and complete tasks from your Android device including the ability to create tasks, Set deadlines and assign team members to Them. Project managers can Also add task details, share and start conversations inside team. Asana comes with extensive reporting, custom dashboards, task dependencies and integrated search. Likewise, the tool's project management features are perfect for collaborating with team members on shared tasks or projects. The ability to add photos and files to each task Ensures That Is everyone on the same page. If that's not the case, Then the comment, announcement, and question features keep lines of communication open. Asana Also offers dashboards and features collaboration, and webinar training for the app. Asana with the project leader can share projects with teams as well as with unlimited clients, vendors, contractors. You can use to plan Asana Their day visualize goals and milestones, Sep tasks and due dates, and communicate priorities, offers central administration and billing (Asana, 2019).

**BaseCamp.** The app's dashboard shows your team's discussions, to-do lists, events, and more in the same place. Elsewhere in the app, you can embed images into messages, comment directly on lists and tasks, attach code samples, and more. You can even forward important emails into Basecamp so you can share with your team Them. it Allows users to create projects, add and assign tasks to team members Them. However, compared to previous tools, created in each project is organized differently with Basecamp to-do lists, message boards and schedules. The tool includes Also collaboration features such as in-app messaging and document sharing team (BASECAMP, 2019).

**Trello.** Among other options, you can access all of your Trello boards, cards moves around to prioritize tasks, and add to-do lists That let you check off When complete. You can even attach files from file storage systems like Google. It's a great option for teams que use Kanban Agile or to manage and organize Their Work. With Trello, projects through boards are organized lists and for each specific task statuses Within board. Tasks are added via que cards can be moved from one list to another According to status: planning, in development and completed - for example. It is

available on Android, iOS, MacOS, Windows and web platforms, and accommodates Individuals, as well as small and medium-size businesses. Its drag and drop interface includes agile project management, budgeting, collaboration, customization, issue tracking, learning and training support, notifications, task management and traditional project management functionality. Also offers Trello and expense budget tracking, reporting, resource management and project notifications; automatic backup and secure data storage security (Trello, 2019).

**Monday** lets users plan and work on projects in the same space. Its goal is to help you manage projects of all sorts, from ad campaigns to bug tracking. Best of all, you can do this from your laptop or Android app. Monday.com gets great reviews in the Google Play store. Users love its simple UI, task synchronization, vendor tracking, and more. You can Also manage, plan, schedule, and track tasks, alongside time tracking per project (MONDAY, 2019).

**Smartsheet's UX** will feel familiar to use Those who spreadsheets to track or manage projects. With different views for lists, spreadsheets, charts or Gantt, its flexibility Gives you a great overview of each project you work on. You can create a new sheet Within the app. It is an online tool PM que Provides rich data integration tools and task collaboration for businesses of all sizes an easy to use Within spreadsheet interface. Provides solutions Smartsheet's project teams with budget management, bug tracking, collaboration, file sharing, Gantt charts, management idea, issue management, tracking milestone, percent fill-tracking, project planning, resource management (SmartSheet, 2019).

**TeamWork Project's** Teamwork Projects helps manage Them Several large projects at once with features like time tracking, task management, Gantt charts, and more. Among other features, its Android app lets you answer messages, share using a predefined project template, task sheet, or blank sheet. Then, you can grant access to anyone on your team (TEAMWORK, 2019).

**Other project management tools:** MeisterTask for project combining; KanbanFlow (Web) for combining kanban, time tracking, and Pomodoro; Freedcamp for managing projects and all communications in a single tool; Paymo for freelancers who charge by the hour; Bitrix24 is classic Gantt charts with project management; Podium for customizing your project management tool; Yodiz for Agile and Scrum teams; Agantty (Web) for creating Gantt charts quickly and easily; AND CO for projects que require invoicing. Integration with other applications assists in mimizar the limitations both as functionality specifically communication. The Monday.com is one example of the tested applications (GETAPP, 2019).

### Requirements partially met

Stated following requirements tools and techniques partially supported by the systems analyzed. Among them stand out and can be treated in documents, external and through spreadsheets tools: corrective actions (implemented), deliveries, implemented defect repair, implemented changes, requested changes implemented preventive actions, rejected changes, value technique, forecasts ,



integrated change control, termination of contracts, templates, forms, standards, product analysis, alternative IDs, asset organization processes, dictionary of eap, inspection, redesign, models, activity attributes, list of landmarks, prepayments applications and delays, method of mDP precedence diagram method of mds arrows diagram, resource estimation of activity,

Other limitations relate to organizational structure, productivity indicators, process development, process mapping and the chosen project management methodology.

## Conclusions

This article first addressed the motivation to use the technology application in businesses, mobile devices specially in advancing to understand its usage under strategic planning. Strategy fundamentals were discussed then, with the purpose of studying the situations where IT could be efficiently applied, in order to achieve predetermined goals and actions planned before.

It is observed limitations in the tools for mobile devices for both meeting the formal methodologies as compared to the agile practices. Thus, each tool has its own characteristics and favorable points for its adoption according to the specificity of the organization.

It must underline that there are important requirements not contemplated by the tools should be observed by the methodologies and organization to organization.

Another aspect is to highlight the growing importance of mobile devices especially in the communication that is essential to the success of projects.

## References

AGILE MANIFEST. Manifesto para Desenvolvimento Ágil de Software. Disponível em: <http://agilemanifesto.org/iso/ptbr/manifesto.html> . Acesso em: 07/2015.

ASANA PROJECT MANAGEMENT. Disponível em: <https://asana.com/> . Acesso em: mai 2019.

BASECAMP. Disponível em: <https://basecamp.com/>. Acesso em mai 2019.

BENNIS, W.; NANUS, B. Líderes: estratégias para assumir a verdadeira liderança. São Paulo: Harbra, 1988.

BLANCHARD, KEN, Liderança de alto nível. Como Criar e liderar organizações de alto desempenho, Bookman. São Paulo, 2010.

BREWIN, J.. AMA - Manual de Gerenciamento de Projetos, 2ed, 2014.

BURNS, J. M. Leadership. New York: Harper and Row, 1978.

CHIAVENATO, ADALBERTO. Introdução a Teoria Geral da Administração: Uma visão abrangente da moderna administração das organizações, 7ed., Rio de Janeiro: Elsevier, 2003.

CHIAVENATO, ADALBERTO. TGA, vol 2, 6ed., Rio de Janeiro: Elsevier, 2002.

COOPER, R. G.; EDGETT, S. J.; KLEINSCHMIDT, E. J. Optimizing the stage-gate process. what best practice companies are doing. Research-Technology Management, v. 45, n. 5, p. 21-27, 2002.

DINSMORE, Paul C., CABANNIS-The AMA handbook of project management, 2006, Amacom Books.

DREXLER, A.; SIBBET, D.; FORRESTER, R. The Team Performance Model. New South Wales: Grove International, 1996.

ENDERSBE, TOM; THERRIEN, JAY; WORTMANN, Jon. Os Três Compromissos da Liderança. São Paulo: Clio Editora, 2012.

FISHER, ROGER; URY, WILLIAM. Como chegar ao sim: negociação de acordos sem concessões. 2ed., Imago: Rio de Janeiro, 2005.

GETAPP. Disponível em: <https://www.getapp.com/p/sem/project-management-software>. Acesso em: out 2019.

GRAMIGNA, MARIA RITA. Modelo de Competências e Gestão dos Talentos, 2ªed. – São Paulo: Pearson Prentice Hall, 2007.

G. COULOURIS, J. DOLLIMORE AND T. KINDBERG, *Distributed Systems Concepts and Design*, Addison-Wesley, 4th Edition, Pearson Education, Edinburgh, 2005.

HACKMAN, J. R.; OLDHAM, G. R. Motivation through the design of work: test of a theory. *Organizational Behavior and Human Performance*, v. 16, p. 250-279, 1976.

HERZBERG, FREDERICK. Mais uma vez: como motivar seus funcionários. In: VROOM, Victor. *Gestão de pessoas, não de pessoal*. Rio de Janeiro: Campus, 1997.

IPMA, National Competence Baseline (NCB). IPMA – Referencial de competências, 2015.

KERZNER, H.R. (2013) *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. John Wiley, New York.

LARSEN, CARL E., LAFASTO, F. M. . 1989. *Teamwork : What Must Go Right, What Can Go Wrong*. Newbury Park, CA: Sage Publications. Maurer, Rick. 1994.

MAXIMIANO, ANTÔNIO CESAR AMARU. *Administração de projetos: como transformar idéias em resultados*. 4. Ed. São Paulo: Atlas, 2010.

McGREGOR, D. *O lado humano da empresa*. São Paulo: Martins Fontes, 1980.

MICHEL, MURILO. As Teorias X E Y e suas potencialidades de aplicação a sistemas Administrativos de Recursos Humanos em Organizações nos dias atuais. *Revista eletrônica de administração*, 8ed. – ISSN 1676-6822. Disponível em: <http://faef.revista.inf.br/> . Acesso em: 05/2015.

MONDAY. Disponível em: <https://monday.com/>. Acesso em: jun 2019.

PMI - Project Management Institute - *Guia do Conjunto de Conhecimentos em Gerenciamento de Projetos*. 5. ed. New Square: Project Management Institute, 2013. ISBN 9781935589679.

Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. Newtown Square, Pa: Project Management Institute, 2004.

ROBBINS, STEPHEN PAUL. *Comportamento Organizacional*. São Paulo: Prentice Hall, 2002.  
SCHWABER, K., *GUIA DO SCRUM*. 2009. (Tradução).

S.D. JOHNSON et al, Team development and group processes of virtual learning teams. *Computers & Education* 39 (2002) 379–393. *Computer and education*, 2002.

SMARTSHEET. Disponível em: <https://www.smartsheet.com/> . Acesso em: jul 2019.

TEAMWORK. Disponível em: <https://www.smartsheet.com/> . Acesso em: AGO 2019.

TEMAGUIDE: *A GUIDE TO TECHNOLOGY MANAGEMENT AND INNOVATION FOR COMPANIES*. Fundación Cotec para la Innovación Tecnológica, 1998.

TIDD, J.; BESSANT, J.; PAVITT, K. *Gestão da inovação*. 3ed. São Paulo: Artmed, 2008.

PRINCE2. Disponível em: <https://www.axelos.com/best-practice-solutions/prince2> . Acesso em: 08/2019.

TRELLO. Disponível em: <https://trello.com/> . Acesso em: mar 2019.

TUCKMAN, BRUCE W (1965). "Developmental sequence in small groups". *Psychological Bulletin*.

VARGAS, RICARDO VIANA. *Manual prático do plano de projeto: utilizando o PMBOK Guide*, 3ed., Rio de Janeiro, Brasport, 2007.

WRIKE SOLUTION, Available in: <https://www.wrike.com/pt-br/> . Acesso em: 2019

WIRELESS. Disponível em:  
<http://www.wirelessbrasil.org/wirelessbr/colaboradores/alancarvalho/gprs.html> . Acesso em: 08/2019.

## About the Author



### **Leonard Grandinetti Chaves**

Minas Gerais, Brazil



**Leonard Grandinetti Chaves, MSc, PMP** is a graduate and postgraduate in IT in Fumec and MSC, master's at Computer Science from Universidade Federal de Minas Gerais -UFMG. He has experience in Computer Science, focusing on Database, Geoprocessing and acting on the following subjects: EAI, XML, GML. His experience includes Project Management in private companies and government agencies. Leonardo is an instructor in several training courses organized by PMI Minas Gerais-Brazil Chapter as volunteer. He is MBA Professor at Puc Minas and Senac, and a lecturer with several publications. He can be contacted at [leonardo.grandinetti@gmail.com](mailto:leonardo.grandinetti@gmail.com)