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POLYTECHNIQUE MONTRÉAL

affiliée à l'Université de Montréal

Understanding, Defining and Managing of Operational Personal Priorities. A Tool for Task Management Self-Prioritization

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Mémoire présenté en vue de l'obtention du diplôme de *Maîtrise ès sciences appliquées*

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présenté par **Shima SAFFAR**

en vue de l'obtention du diplôme de *Maîtrise ès sciences appliquées*

a été dûment accepté par le jury d'examen constitué de :

Fabiano ARMELLINI, président

Samuel Jean BASSETTO, membre et directeur de recherche

Céline CHOLEZ, membre

DEDICATION

To my mother who taught me the sense of responsibility and self-confidence, guided my steps to success and continued to fill me with her love,

To my siblings, Hawra and Amir, who supported me during the most challenging moments.

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RÉSUMÉ

Plusieurs personnes se sentent bombardées par l'augmentation de la charge de travail et des engagements. Nous avons, souvent, le sentiment de manquer de temps. L'établissement des priorités devient un défi et émotionnel pour tout le monde. En effet, il est difficile de définir les tâches qui semblent plus le meilleur parmi plusieurs choix. Il existe des centaines d'outils numériques de gestion de temps personnel sur le marché. Cependant, il semble avoir une faible tentative de développer un outil qui s'aligne avec le comportement des gens et qui réponde à leurs besoins.

Le temps est élastique et sa gestion est difficile par des gens. Par conséquent, chaque personne reste son meilleur planificateur. Cette recherche vise à répondre à l'objectif : « Comment pouvons-nous soutenir les gens dans la gestion, sélection et priorisation de leurs propres tâches connues / inconnues afin de donner le meilleur de soi-même ? »

Pour atteindre cet objectif, les besoins des gens ont été étudiés afin de comprendre comment ils gèrent leurs tâches. Les données ont servi à cerner leurs difficultés dans la gestion, puis à élaborer un cadre pour répondre à leurs besoins. L'étude empirique a été réalisée sur le personnel du département d'urgence d'un hôpital. Le choix du département d'urgence a été fait vu l'importance de la gestion du temps et des priorités. Sur la base des résultats de l'étude de cas, un nouvel outil a été proposé, appelé " House in Goal Hierarchy (HIGH) ", qui est un outil d'établissement des priorités et de prise de décision utilisant une approche ascendante de gestion.

Le potentiel de ce nouvel outil a été testé auprès de quinze personnes de l'École Polytechnique de Montréal. Un sondage a été mené pour comprendre l'efficacité et les différences de comportement des participants avant et après l'utilisation de l'outil. Les données collectées ont été analysées qualitativement et quantitativement. Malgré cette recherche avait la limite de taille de l'échantillon, une amélioration de 50% a été mesurée auprès des utilisateurs dans leur priorisation de tâches et dans l'atteinte de leurs objectifs.

ABSTRACT

Many of us feel bombarded by our increasing workload, commitments, and requests for more time. Prioritization is very emotional and challenging for everyone since it is difficult to prioritize, which is the best among more than one choice. There are hundreds of digital and paper versions of personal time management tools available on the market. It seems there is a feeble attempt to develop a tool that meets people' behavior and needs.

Time is elastic and more or less manageable by people. Therefore, each person is his/her own best scheduler. Time-management more referred to the self and task management to make a balance between the activities.

This research tried to work on the objective of “How can we help people to manage, select and prioritize their own known/unknown tasks to account to themselves in a respectful manner?”

For this objective, people’s needs were studied to understand how people manage tasks. The data was used to identify their difficulties and then develop a framework to meet their needs. The empirical study was carried out on the personnel of the emergency department of the hospital since time and prioritizing is extremely valuable to them. Based on the results of the case study, a new tool was proposed called “House in Goal Hierarchy (HIGH)” that is a prioritizing and decision-making tool to create a bottom-up approach.

The potential of this new tool was then tested with fifteen graduate students of the École Polytechnique of Montréal. A survey was applied to understand the effectiveness and differences in the behavior of the participants, before and after using the tool. The collected data analyzed in both quantitative and qualitative ways. Even though this research had a limitation in testing in a small group, but stillthe result of using HIGH tool showed that the approach has approximately a 50% improvement in prioritizing the user’s tasks and reaching his/her goals.

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LIST OF SYMBOLS AND ABBREVIATIONS

ED	Emergency Department
HIGH	House in Goal Hierarchy
PTM	Personal Task Management
TOC	Theory of Constraints
TM	Time Management
PDA	Personal Digital Assistant
GTD	Getting Things Done
PFTF	Put First Things First
BuJo	Bullet Journal
PROJO	Project Journal

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CHAPTER 1 INTRODUCTION

People are involved in multiple tasks and activities in their daily life like work, personal and recreational. The tasks can be job duties, studies, preparing meals, sports, or other routine activities such as eating, resting, bathing, dressing and transferring to school or office on a particular time. For example, for families, it is essential that parents manage their time in order to make balance and do their duties in work, study, as well as cook and clean. For the students also, time management being vital to improve their performance by setting their goals and priorities which can be happened by self-motivation. For intense, the students should divide their energy between study, work and various aspects of their life like making time for a friend, and participation in society. More than that, international students need to spend time to be adapted to new culture and language. Making an appropriate balance between all those challenges for international students could be overwhelming and required effort and motivation (Nasrullah_Phd & Saqib Khan, 2015). Other examples are nurses in the healthcare system who are working under pressures, and they need to manage and prioritize their activities and time to provide even the highest quality care to patients (Nayak, 2018).

Extensive work can make a person feel pressurized and stressed out. The time is neither less nor more for everyone, and people get the same amount of time each day to implement numerous activities and tasks. Hence, no matter what kinds of work duties they are involved in, it is essential to implement effective task management. Laura Vanderkam (2016), who is a notable writer and speaker on the topics of time management and work-life balance, explained in her TED presentation that time is manageable and elastic, and people are the best time manager for themselves.

The important step in the time management is to get to self–recognition of what we want to achieve (Nasrullah_Phd & Saqib Khan, 2015). Then, it needs the effort to make a priority to plan the duties and desired activities and improve personal skills and information (Al-Zoubi, 2016).

Rory Vaden, who is the time-management speaker, said in his TED presentation and his book that time management is not only about using tools, technology or tips and tricks; Time management is emotional and self-management which means thinking and selecting the task to be done now that can help to make future better (Rory Vaden, 2015; Halton, 2019). Allyson Lewis is a speaker, author and known as a time management expert (Lewis, 2013). She believes that it is important to

find and define the purpose in life and based on that spending just 7 minutes in the morning and 7 minutes in the evening, to think and focus and clarify what most important and matter things to do. Those who understood the wealth of time and opportunity used it wisely and positively to reach their goals (Basri & Alghaswyneh, 2015). Lack of achievement in the personal goals has several disadvantages like the psychological health at the personal level (Basri & Alghaswyneh, 2015).

The main question this research tried to answer is "How can we help people to manage, select and prioritize their own known/unknown tasks in order to account to themselves in a respectful manner?

There are hundreds of different applications on the market, which claim to help users create their to-do list, then help to prioritize and plan the tasks. The applications have a reminder and assign a priority for the tasks based on parameters, like urgency and deadlines (Haraty, Tam, Haddad, McGrenere, & Tang, 2012). One of the difficulties of using these applications is defining the priority, especially when all the tasks are considered urgent (Blandford & Green, 2001). Among the applications, some traditional activities support tasks and time management using personal diaries and "to do" lists (Blandford & Green, 2001). Most people using "To Do" lists as external artifacts in different applications or traditional forms like sticky notes or on paper to use as memory enhancers to remind them about their tasks (Gil & Chklovski, 2007). Even though having to-do lists help people a lot to remember, how should the tasks in the to-do list be written? How do you prioritize them? One of the tools on the market in the paper version is bullet journals. Even though a bullet journal is considered simple and a user-friendly tool, as mentioned above, time management requires self-recognition to identify the goals and then effort and motivation to follow through on completing the task. Setting short and long-term goals and carrying out a self-evaluation are the two important points that the bullet journal did not consider.

Consider all those limitations in existing tools and to understand better the problem and limitation in the actual case, survey and questionnaire methods were used in the healthcare where time is more critical. Then, based on learning from the results of the case study and considering the literature and existing tools, a method of self-prioritizing management, which is called House in Goal Hierarchy (HIGH) was proposed and tested at École Polytechnique of Montréal.

Chapter 2 is a review of related literature. It starts with studied time-management, personal task-management, different behaviors and the underlying aspects of them. Also, this chapter reviewed

the techniques, tools, and theories that support personal task-management. At the end of the chapter, the limitations and gap of existing methods were pointed out.

In Chapter 3, empirical studies were done on members of the hospital on how they approached time and task management. In the end, the results of a case study were reported. A proposed method for self-managing priorities was subsequently presented and described in detail. The performance of the proposed method was verified in a small group at École Polytechnique of Montréal, and the results were presented. Chapter 4 contains the conclusions and limitations of this study and proposes future work.

CHAPTER 2 LITERATURE REVIEW

This chapter introduces personal task management (PTM), identifies previous definitions of PTM and explains the related concepts. The chapter reviews frameworks/techniques and PTM tools that are helping people manage their tasks as well.

2.1 Time management

Time is a critical aspect of regulation and planning (Eilam & Aharon, 2003; Claessens et al., 2007; Orlikowski & Yates, 2002). Time management has been addressed in many types of research (Jex & Elacqua, 1999; Davis, 2000; Therese Hoff Macan, 1994; Therese Hoff Macan, 1996; Therese H. Macan, Shahani, Dipboye, & Phillips, 1990; Mudrack, 1997). The term time management is defined in many different ways. Many researchers referred to Lakein (1973), who believes it is the process of determining the needs, having a goal to achieve the needs, and prioritizing and planning tasks to achieve goals (Blandford & Green, 2001; Ailamaki & Gehrke, 2003; Mackay, 1988a; Covey, 2004). Some other authors (Orpen, 1994; Soucie, 1986; Schuler, 1979; Jordan, Cobb, & McCully, 1989; Slaven & Totterdell, 1993; Woolfolk & Woolfolk, 1986; Claessens et al., 2007) defined time management as effective use of time, which means setting enough time to perform many tasks.

Garhammer (2002) defined the concept of the increased pace of life as doing things faster, like eating faster or sleeping less, or compressing actions, like answering the email during lunch time.

From the 1950s and 1960s, many researchers have talked about how difficult it is to manage time. The authors like Drucker (1967) and Lakein (1973) proposed methods on how to handle time. They suggested writing down the plan on paper, which was recently called the “To-Do list” in order to improve performance (Drucker, 1967). It is understood that just having the To-Do list does not always lead to the completion of planned work due to time pressure or an unexpected event.

The term of self-management in literature has a different meaning, which without any techniques for monitoring and controlling time refers more to monitoring and regulating oneself (Claessens et al., 2007). This led to the use of the term time-management instead of self-management.

In scientific research, some theories and principles believe can help people manage and prioritize their tasks. Below, the most popular theories considered in our study will be explained.

- **The 80/20 Rule**

Vilfredo Pareto (1906), an Italian economist, observed and founded the relationship between reward and effort in real life. Eighty percent of what it is done provides only 20% of what will be achieved in life, which now, is called the ‘‘Pareto Principle’’. This rule makes people focus on valuable tasks, which have long-term rewards, instead of activities that bring fun and no long-term rewards. Using this rule means making a list of the relevant and important tasks that may make a big difference in one’s life or career (Chen & Kottler, 2011). So, the central core of this principle is to focus and prioritize the tasks that have most significant benefit. So, applying this method in time management method and tools will help on prioritization.

- **Maslow’s Theory**

For life and well-being, people need certain essentials, called basic human needs. Maslow’s theory (1954) is about the hierarchy and human needs that satisfy human desires. The theory has two parts: physiological and security needs. There are other models and theories about human needs, like the model of Nicole Vézina (St-Vincent et al., 2011), Abraham Maslow (1943, 1971) and the theory of Manfred Max-Neef (2000).

Maslow’s theory focused on the efficient use of time, where people could meet higher goals (Obijiaku, 2015). Chen & Kottler (2011) applied this theory to the time management of students and referred to respecting the purpose and satisfaction. For the student, it matters to achieve the purpose and the target of it. It gives the student more self-confidence, better self-esteem and satisfaction. So, this theory considered human needs like physiological, safety, social, esteem and self-actualization as a base for setting the priority and time management.

- **The Principle of Forced Efficiency**

Brian Tracy (2002) showed the idea behind the Principle of Forced Efficiency as there is never enough time to do everything, but there is always time to do important things. The Principle of Forced Efficiency relates to the Theory of Constraints (TOC) of Eliyahu M. Goldratt, who is a business consultant and wrote the best-selling book, the Goal (Obijiaku, 2015). Like a chain that will break at the weakest link, it mentions in TOC that people also need to identify and focus on the weakest link in their life and career to reach their breakthrough (Chen & Kottler, 2011). So,

this principle wants to make people focus on the limitations in their life, and then try to find solutions to solve them, which will help to reach their goals.

- **The Momentum Principle**

The Momentum Principle states that to start a project, it takes significant energy, and there is substantial resistance, while it takes less energy once it is started (Chen & Kottler, 2011). Once the project or task is started, no matter how big or small it is, it will always gather momentum. So, to apply this principle, the most important goal should be apparent in the long and short terms, then broken down into several tasks (Obijiaku, 2015). So, defining proper long and short-term goal and then breaking them down in daily tasks is the focus of this principle.

- **The Concept of Psychic Ram**

David Allen, who is a time management expert, observed the human being and behavior. He found that humans like the computer, has a limited amount of RAM or access memory, which is called Psychic Ram (Allen, 2009). When Psychic Ram is cluttered due to lack of space for tasks, people will write down and organize their tasks on paper. It helps them to review and focus on one task at a time (Obijiaku, 2015).

- **The Principle of Suggestion**

This principle is based on using visual recognition to keep the goal in mind and insight (Chen & Kottler, 2011). Using the Principle of Suggestion means, defining and writing down the most important things to do, then putting it in a place where it can be seen all the time as a reminder. Moreover, people can inform their friends and family about the desired goal so they can help by reminding them how to reach it (Chen & Kottler, 2011). So, applying this principle means defining the goal to manage the tasks and prioritize them based on daily goals.

- **Principles of 'Put First Things First' (PFTF)**

This technique encourages people to focus on their most important thing first based on their perceptions (Covey, 2004). This method used the two concepts of Urgent and Important of the Eisenhower Matrix. The matrix contains four quadrants:

(1) Urgent and important: need to do immediately

(2) Not urgent but important: it involves building a relationship, long term planning, and identifying the personal goal.

(3) Urgent but it is not important: need an immediate reaction due to other people's expectations or priorities

(4) Not urgent and not important: it does not require immediate attention, and it does not contribute to a personal goal.

Even though many tools on the market are implemented based on these technologies and tools, the evidence shows limitations to meet the actual needs of people in the work-life setting (Haraty et al., 2012).

2.2 Personal Task Management (PTM)

A scarcity of time has become a challenge for people to manage and complete their tasks. This problem may result in a struggle to control emotions as well (e.g., anxiety, guilt and loss of control) (Leshed & Sengers, 2011). So, Personal Task Management (PTM) appears as one of the vital aspects of life.

The concept of PTM is related to managing non-scheduled items, which are called solo activities (Fleet & Blandford, 2005). Solo activities are usually personal commitments or might be multiple tasks with different and competing constraints, goals and deadlines that should be handled simultaneously (Czerwinski, Czerwinski, Horvitz, & Wilhite, 2004; González, Mark, & Mark, 2004). Usually, solo activities or non-scheduled items are done within specific periods, because they generally have a deadline. Also, they do not often directly involve other people to be completed. So, people scheduled these unplanned items separately from the scheduled items, like appointments, meetings or events that occur at a specific time, by various types of available apps on the market, such as electronic task lists, sticky notes, and calendars (Czerwinski et al., 2004).

PTM also refers to several steps as identifying needs, goals, what should be done, how to complete them, and using tools like to-do lists and calendars (Bellotti, Ducheneaut, Howard, & Smith, 2003; Gonzalez, Galicia, & Favela, 2008; Allen, 2009; Haraty et al., 2012).

2.2.1 The Four Activities of Personal Task Management (PTM)

There are four interrelated activities introduced in the literature for PTM, which are (1) planning, (2) prioritizing, (3) scheduling and (4) cognitive off-loading/list making (Kamsin, Blandford, & Cox, 2012).

- **Planning**

Egger and Wagner (1992) defined planning as identifying the required resources and constraints for doing an activity. Newman (2004) and Hazzan and Dubinsky (2007) also defined planning as determining a time to do an activity, while for Taylor and Swan (2004) planning means defining how, where, and who will do a task. Claessens et al. (2010) mentioned that planning is setting a personal goal rather than scheduling tasks.

Based on Taylor and Swan (2004), planning is essential for people who feel overwhelmed by multiple tasks to do at the same time. Some researchers, like Claessens et al. (2010), Blandford and Green (2001) and Jones et al. (2007), have pointed out that planning helps people to identify their intentions, their deadline and then increase their level of perceived control of time.

Some studies, like Egger and Wagner (1992), highlighted the limitations of planning. They showed the cause of temporal ambiguity in the cultural and social nature of time, loose coupling and problematic trajectories. Eldridge and Newman (1996) also elaborated on two types of unexpected events that prevented planning from being achieved. The first event causes an immediate and straightforward change in the plan, and the other one, due to uncertainty and indecision, eliminates the planned tasks. Re-planning then becomes more challenging for users. The other report challenges are difficulty in identifying the estimated required time to accomplish a task. This phenomenon is called the planning fallacy (Hazzan & Dubinsky, 2007; Buehler, Griffin, & Ross, 1994).

- **Prioritization**

People need to prioritize and manage their tasks based on limited resources, like time (Mark, Gonzalez, & Harris, 2005). The difficulty in prioritizing is when people have multiple tasks to do, and the new or unexpected tasks interrupted them (Newman, 2004; Mark et al., 2005). To prioritize, people make a reasonable judgment to decide which task should be completed before others while

the more difficult part would be a reevaluation and re-prioritizing of tasks (Yli-Kauhaluoma, 2009; Mark et al., 2005). Based on that, Hazzan and Dubinsky (2007) suggested that the essential tasks should be focused on first. Ailamaki and Gehrke (2003) suggested creating a list, which prioritized tasks based on the essential and due date. Rebenich and Gravell (2008) explained the three elements as a mixture of urgency and importance property, a complexity level, and determining task sequence to determine task priority. Those elements failed, however, because they were not clear and not described in detail.

- **Scheduling**

Scheduling is defined by Egger and Wagner (1992) as allocating time for each planned task. Ailamaki dan Gehrke (2003) also mentioned that scheduling is not just for specified activities, like an appointment, it is for non-face-to-face activities, like reading a paper or thinking about a project as well. In 1999, Palen (1999) believed that scheduling is part of advanced planning. She described scheduling as the complex activity of balancing and prioritizing multiple constraints.

- **Cognitive off-loading/list-making**

As mentioned earlier, people tend to externalize tasks by using a range of devices to trigger an action (Dix, Ramduny-Ellis, & Wilkinson, 1998). The externalized tasks translated to what the author refers to as cognitive off-loading or list-making. In other research, it is defined as the necessity of making lists for people (Therese Hoff Macan, 1994; Taylor & Swan, 2004). Bernstein et al. (2008) demonstrated that as a reminder to support the tasks, managers tended to scribble ideas and notes on post-its or in digital or text files. Harrison et al. (2005) found that the reason for using post-it is more for people who are looking for a quick and straightforward way and do not specify much information about the tasks except they prefer to jot it down quickly. They also found that people prefer to use scraps of paper or paper-based artifacts (Taylor & Swan, 2004).

2.2.2 Review of Existing PTM techniques and Tools.

There is a wide range of tools on the market, such as diaries/calendars, task lists/managers, sticky/post-it notes, email, and text files, as well as plain old scraps of paper (Dey & Abowd, 2000; Blandford & Green, 2001; Campbell & Maglio, 2003; Bergman, Boardman, Gwizdka, & Jones, 2004; González et al., 2004; Fleet & Blandford, 2005). However, since each of these tools offers

different properties, people prefer to use them interchangeably (Blandford & Green, 2001; Fleet & Blandford, 2005). Some known techniques and available tools of the PTM are introduced below.

- **Email:**

Some researchers studied the email application, which they originally thought was designed just for communication, but found was also used for personal task management (Mackay, 1988b; Whittaker & Sidner, 1996; Ducheneaut & Bellotti, 2001). People used their email inbox as a short or long-term reminder since most people's tasks come through email (Whittaker & Sidner, 1996).

- **Diaries/Calendars**

Some people tend to use diaries and calendars to remind them of their tasks, like non-scheduled activities or non-appointment information (Palen, 1999; Blandford & Green, 2001; Kleek et al., 2009). Calendars contain personal notes and future planning, while other users use two different diaries to separate their fixed scheduled and solo activities or personal tasks (Blandford & Green, 2001). The diaries/calendars can be available in two forms of physical and electronic task list applications. Based on some studies, people tend to use a physical object rather than the electronic version (Malone, 1983; Bellotti & Smith, 2000; Kamsin et al., 2012).

- **BuJo (Bullet Journal)**

A bullet journal, as a paper and physical version of the PTM tool, was created by Ryder Carroll (2015) and had four core collections: 1) The Index, 2) Future Log, 3) Monthly Log, and 4) the Daily Log.

- **PROJO (The Project Journal)**

PROJO, as a paper and physical version of the PTM tool, (Claire, 2016) is based on defining the goal over a three-month period and contains two books: 1) P-book and 2) N-book. The P-book contains different steps and sub-steps, like defining and mapping the vision, and the timeline to reach them. Also, it has a monthly and weekly view to schedule the goals. The N-book is a blank notebook for noting.

- **7 Minute Life daily planner**

This is a paper and physical version tool, which is presented by Allyson Lewis (2013). It contains 43 sections in six parts, including business, checklists, a daily planner, goals, self-discovery and time management.

- **Getting Things Done (GTD)**

David Allen (2009) introduced this technique as a work-life time management system, which focused on appropriately engaging in the tasks that the user wants to do. This technique highlighted five steps in time management as follows:

1. Capture, process and collect potential things-to-do as well as outcome perspective.

2. Define a task as well as how to do it, such as breaking it down into small and actionable items.

3. Organize the information and the results of things-to-do.

4. Review the options of their goal, purpose, and target what things to do.

5. Start.

Based on this technique, the Gtdagenda tool was developed. This tool is the personal task manager that allows people to create and organize their goals, projects, tasks, contexts and checklists (Gtdagenda, 2009). In observing this tool, the user employs the two factors of importance and deadlines to prioritize the tasks. In Gtdagenda, however, the two concepts are the same and will not automatically be affected or change by changing the due date. In general, it is a technique that contains Collect, Process, Organize, Do, and Review. All of the existing techniques and tools had benefits and drawbacks. That is reported in table 2.1. Table 2.1 The drawbacks and benefits of some existing tools.

Table 2.1 The drawbacks and benefits of some existing tools

Method	**Shortage / Drawbacks**	**Benefits**
Diaries/ Calendars	*Digital phone or laptop required and therefore electricity. Also, they might be affected by virus or losing them. *Paper version cannot be shared with others and looking for specific info would be difficult.	*Digital version can be shared with others. *Searching for specific information would be easy. *Can be scheduled for any time in the future. *Have reminder about what is the next action. *Writing down the tasks and activities in the paper version helps people to use visual recognition and works as a trigger for action.
BuJo (Bullet Journal)	* Lack of method for selecting the tasks * Lacks way to manage unexpected activities. * Lack of writing the goal and objective * Lack of control and evaluation. * Lack of reward and motivation.	* Simple, user-friendly and easy to use. * Allows users to break down their tasks in a different view.
PJORO (Project Journal)	* Too complicated. * Too many steps and sub-steps * Difficult to anticipate timeline for some goals. * Lacks way to manage unexpected activities * Lack of motivation or reward. * Lack of focus on daily planning * Lacks a way to prioritize the tasks	* Have goal, vision and objective * Gives for users the opportunity to think and select three main goals for the month

Table 2.1 The drawbacks and benefits of some existing tools (cont'd and end)

Method	Shortage / Drawbacks	Benefits
7 Minute Life daily planner	*This tool has too many sections and unique features, which makes it too confusing to know what to do. *It is a 3-month planner, and it is difficult to rewrite all the goals and list of tasks for the remaining year. *It needs too much practice and effort to understand which section needs to be used, which makes it not user-friendly.	*Forcing the user to spend 7 minutes in the morning and 7 minutes in the evening to think about and analyze the tasks. * It defines the goal and purpose of life. * It has 3-month evaluations which make user rearrange his/her way of work. * It has a different view of the annual, monthly and daily planner. *Has a list of unfinished tasks to remind the user.
GTD (Getting Things Done)	* This technique, which is applied in different software that selects the best software, is challenging. * The software needs clear definitions of priority factors to act correctly. * Difficult to schedule the unscheduled tasks.	* Helps the user consider criteria for evaluating the tasks that are to be prioritized. *It is easy to use. * Discover and stop bad habits, like stop using the internet without reason.

2.2.3 Requirements for Designing PTM Tools

Bernstein et al. (2008) studied the necessity of developing PTM tools. They showed five categories, which are Flexibility, Visibility, Availability and Physicality, Speed and Personalization.

- **Flexibility**

According to Boardman and Sasse (2004), the user must consider how easily he can enter his tasks by typing, writing them down or drawing them.

- **Visibility and Speed**

Another essential aspect is visibility in designing the PTM. People prefer a reminder as it is more visible for them (Campbell & Maglio, 2003). Bernstein et al., (2008) studied through some

participants and found that they used some paper that contains information and can be used as a reminder. Implementing this behavior in digital tools is more difficult. Also, based on the research of Kleek et al., (2009), for externalizing and capturing tasks, people tend to use paper to do it faster.

- **Availability and Physicality**

In compare to the physical and electronic tool, Whittaker and Hirschberg (2001) and earlier of that Bellotti and Smith (2000) found that paper-based is more available and has better support in reminding.

As an advantage of the digital version, people always have their phone, no need to carry on extra things, possible to modify, change, edit, delete, share quickly, easier to find specific information (Gray, 2013; Isip, 2015). Also, the electronic calendar makes life more comfortable because it has the function for the scheduling, which it has notification and reminder that would not let people forget anything (Opilka, 2017). For sure, in the digital era, using paper format or traditional manner like old school is archaic (Opilka, 2017). However, dealing with technology is time-consuming, especially for fixing the glitches and or for jotting a note. Also, the digital format needs to be upgraded, updated and take a backup, use battery and it might be infected by a virus (Gray, 2013; Isip, 2015; Opilka, 2017).

Some researchers (Gray, 2013; Isip, 2015; Opilka, 2017), believed that paper format is supper faster to jot down a note than digital version and it does not need any training to use and battery. Also, writing down is makes people creative; it is an enjoying moment and kind of meditation (Opilka, 2017). However, people should carry on their calendar or notebook all the time, and modifying like edit, delete, the move might be difficult and make the paper messy. Also, difficulty to the search for specific information or the possibility of losing is another disadvantage of the paper format.

Dooly, in his article (2015) discussed the study of Bangor University and branding agency that was about the different effects and the connection of paper and digital media on the brains. It was concluded that the physical material has a meaning for the brain and due to engaging with spatial memory networks, it has a place in memory. Also, the brain can respond to internal feelings with physical material.

2.3 Conclusion

The definitions and descriptions of PTM in the literature review tend to describe the concepts of planning, scheduling, prioritizing, urgency, importance and priority interchangeably. However, there are differences between planning and scheduling that should be considered. PTM seems inconsistent in the literature review and the components of PTM behavior are unclear too. The questions like, what is the important activity, how do people perform them, what is the preferred tools for people to use, how do these tools assist people in planning and prioritizing their tasks, what are the factors that make people pursue activities, and what are the main challenges and needs of people, need to be answered. Furthermore, there are limited empirical studies to show and confirm the extent of users' requirements with existing tools.

Thus, the focus of this research is to understand the details of the PTM behaviors of the user and their perspectives, then proposing the tool that supports them to manage, schedule and prioritize the tasks.

CHAPTER 3 RESEARCH METHODOLOGY, DESIGN AND PERFORMANCE OF HOUSE IN GOAL HIERARCHY TOOL

This chapter presents the objectives of this thesis and the proposed methodology. This research aimed to understand how people manage their tasks, and which factors influenced their decision to prioritize and select their to-do list based on the used time management tool. At first, the empirical study was applied in the case study of the hospital emergency department, where time is more critical, to collect data. Different methods, like interviews, a questionnaire, survey, observations, focus groups, case studies, are all reasonable ways to collect and examine the result (Boardman & Sasse, 2004). This research used the questionnaire and survey methods to explore the user experience. Based on the collected data from case studies and literature, the new tool was developed and presented. Then, the tool was tested on a group of students at Ecole Polytechnique of Montreal and the results for before and after using the tool were presented and analyzed. Some points need to be considered for future work based on the results that will be presented.

3.1 Empirical Study: a case study of a hospital

We spent one year working on a volunteer project related to process improvement in the emergency department of the hospital. The process improvement project involved different sections of the emergency department such as physicians, nurses, the cast technician, clerks, radiology, research assistance and the project controller. After observing the process, discussing it with employees and reviewing the possible solutions were the next steps. However, it was observed that the concerned employees could not participate in the meeting and discussion due to a lack of available time. It was then questioned why the employees could not engage in the continuous improvement activities, which at the end of the day was going to help them in their job.

Based on observation, developing a tool to help users manage and prioritize their tasks had been defined. The emergency department of the hospital was the best place to start to gather the information due to the critical point of time. So, understanding the knowledge of employees regarding their tasks and goals as well as finding out how they prioritize their tasks and what their PTM method and difficulties were, was the next step.

An empirical study was undertaken, using a questionnaire and survey methods. Eleven members of the emergency department of a hospital participated in the survey and questionnaire. Participants had different responsibilities, and varying years of experience at the hospital, using various types of task management tools, like software or paper diaries and lists.

3.1.1 The Survey

We first focused on the knowledge of employees regarding their tasks and goals. The survey contained 21 Likert scale questions and one open-ended question. Based on the survey, this research aimed to understand the awareness of employees about their individual and organizational goals, motivation system, job satisfaction, manner of managing and prioritizing the tasks especially for unexpected events and activities, and respecting their value and capacity. The questions were collected based on literature (Bessant, Caffyn, & Gallagher, 2001; Macey & Schneider, 2008; Dahlgaard-Park, 2012) and our one-year weekly observation in hospital. The participants answered the questions based on five rates of 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) and 5 (totally agree). Table 3.1 showed a survey that was presented to the employees.

Table 3.2 reported the age and gender of participants.

Table 3.1 The survey presented to employees

DATE: ……..……..									
Department Section / Job title: ……									
Seniority in the organization (years): ……..									
Age:	<25 years		25-35 years		36-50 years		> 51 years		
Gender:	Male		Female						
Next, rate with 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) or 5 (totally agree) the following statements:									
Questions						1	2	3	4	5
1. There are goals and objectives of continuous improvement (CI) for my area of work, both individual and group										
2. I understand and share why these individual and group goals have been set.										

Table 3.1 The survey presented to employees (cont'd and end)

Questions	1	2	3	4	5
3. I have goals and objectives for my work					
4. I believe that the proposed objectives and indicators are assumable and coherent with my goal and objective					
5. I believe that there is a system of recognition and rewards that I found attractive and aligned with the other forms of remuneration and promotion of the hospital					
6. I always think about a reward for myself					
7. I believe that I will be fairly rewarded and recognized in a visible way for all of my contributions to the hospital's CI					
8. Depending on the personal skills of each person, we are assigned tasks and clear and assumable responsibilities within the system of continuous improvement (CI)					
9. I believe that my effort (energy, time, resources) to participate in CI activities will improve the system					
10. I have my daily to-do list.					
11. The tasks that I work on are the ones given the highest priority.					
12. I set aside time for planning and scheduling.					
13. I use goal setting to decide which tasks and activities I should work on.					
14. I know whether the tasks I am working on are of high, medium, or low value.					
15. I leave contingency time in my schedule to deal with "the unexpected."					
16. I find myself dealing with interruptions.					
17. Frequently, my day is disrupted by people or new jobs.					
18. I always say yes to other expectations, a requirement even if I am in the middle of an important job					
19. I know my value and based on that I accept other expectations and requirements					
20. I know what I want to achieve in a typical day					
21. I know my capacity and based on that I plan my day.					
22. If you do not participate in the improvement activities in the hospital, could you please indicate the reasons why you do not?					

Table 3.2 The age and gender of respondents.

Categories	Sub-categories	Frequency
Age	25-35	5
	36-50	2
	> 51 Years	4
Gender	Female	8
	Male	3

The survey questions were asked in positive ways. So, the results with an average score of 3 or less were considered as in disagreement and above three were considered as in agreement with the question. Figure 3.1 showed the average number for the results of each question. No significant differences were observed between the answers of the employees, and they were close to the average.Based on the results of survey questions 1 to 4, the individual and group goals and objectives were unclear for the employees. Survey questions 5 to 9 explained that the system and the employee did not think about an award for participation in the improvement activity. Also, the employee did not think their effort and ideas would be essential for the system. Survey questions 10 to 14 showed that the employees did not have specific personal time management and environmental awareness. Survey questions 15 to 18 showed that they are facing too many unexpected situations, and therefor, managing their time would be difficult. Moreover, in the end, survey questions 19 to 21 showed that the personal value and objective was not clear for the employees.

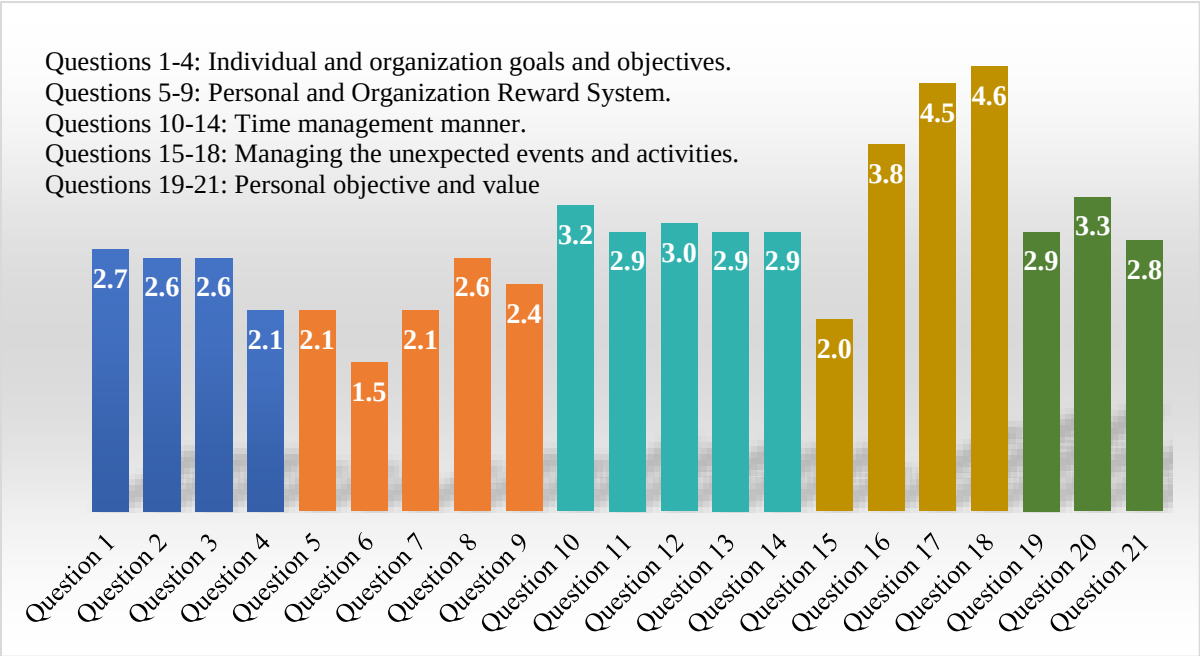


Figure 3.1 The average results of the survey

Table 3.3 reported the results of the open question of the survey as the reasons for not participating in the improvement activities in the hospital (Survey 22).

Table 3.3 The result of open-ended questions

Reason	Number of answers
Time constraints	6
Unaware of any activities	4
I try to participate.	1
No answer	2

The results of the survey confirmed that the participants have difficulty participating in continuous improvement activities due to time constraints.

3.1.2 The Questionnaire

After the survey, we asked 15 open-ended questions from the same group of employees about their time management tool and manner. Table 3.4 showed the questionnaire.

Table 3.4 Questionnaire

Row	Question	Answer
1	What is your current job?	
2	Please write briefly about your work routine.	
3	Please write briefly about your routines.	
4	Do you have a busy schedule?	
5	Do you use any particular tools, such as a dairy, calendar, post-it or sticky notes to manage your time? If so, is it an electronic or paper-based tool?	
6	How do you make your task lists?	
7	How frequently do you make your task lists?	
8	What is it that you like about your current tool?	
9	What is it that you dislike about your current tool?	
10	What are your problems or difficulties with your current tool?	
11	Do you prioritize your time?	
12	How do you prioritize your time?	
13	Do you have any guidelines or techniques or principles you use to prioritize?	
14	Do you determine priority based on urgency and importance? Do you have any other aspects/factors to determine priority?	
15	Do you have any critical situation or incident where you feel it is difficult to manage and prioritize your time? Can you explain and describe it?	

Figure 3.2 showed a pecentage of the personal task management tools used by each male and female participant., which is categorized in memory, digital and physical tools. Digital tools are like phone, google calendar and email inbox while physical tools are like notepads, sticky notes and diaries.

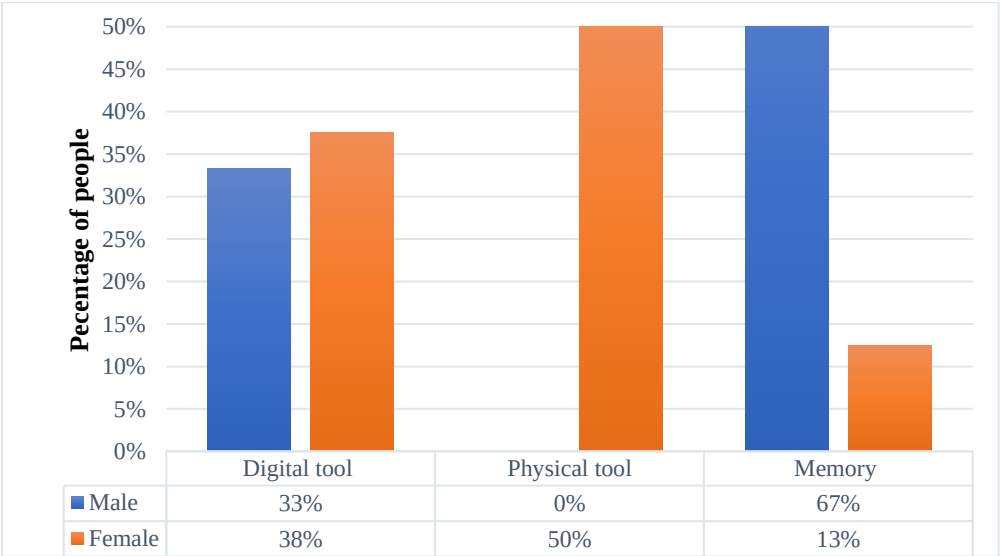


Figure 3.2 the percentage of used personal task management tool

Based on the answers to questions 5 to 10, the employees used planning, prioritization and list-making activities for managing their time. However, they were having some difficulties in the used category (see Table 3.5).

Table 3.5 Time management techniques used by employees and their difficulties

Category	**Underlying activities**	**Difficulties**
Time management	Planning	Scheduling big tasks
		Effective use of time
	Prioritization	Re-prioritizing
		Effective use of time
	List-making	Writing tasks list
		Number of tasks

Based on the answers to questions 11 to 14, the decision-making factors and behavior to participants were presented in Figure 3.3.

The employees used different indicators for their decision-making such as priority, duration of the tasks, the difficulty of tasks, availability to do desired tasks or based on mental states. As an example, participants consider different factors like important, urgent or both important and urgent for selecting the priority of the tasks.

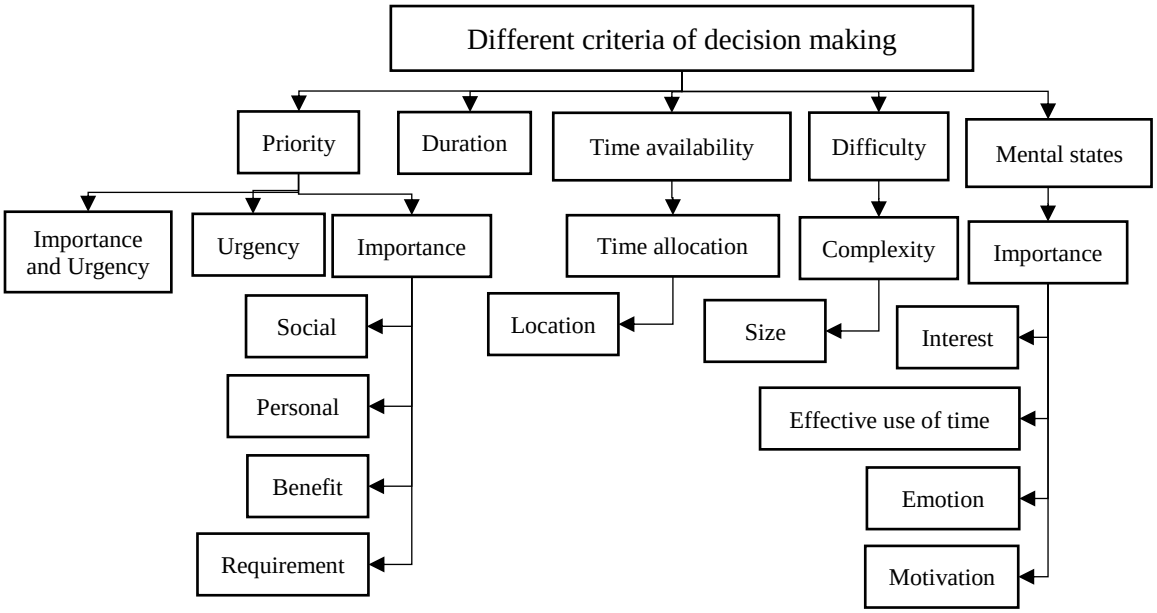


Figure 3.3 The manner of decision making of the employees for managing their time

3.1.3 Discussion of the case study

Based on our observations in the emergency room of the hospital, the survey and questionnaire were prepared to collect information on different aspects of time management. Our findings can be summarized as follows:

A. Most of the employees did not have a clear view of individual and organization goals and objectives. For the employees that believed they knew the goals, however, there was still confusion about how to apply and continue the goals and objectives of the organization as well as personal ones in the daily tasks.

B. In some cases, the employees felt nothing and were thinking their skills and activities were not taken into consideration in the organization.

C. Employees had difficulty managing unexpected events and activities. They also had difficulty with planning, such as identifying the big tasks and breaking them down into smaller tasks by prioritizing, rearranging and making a to-do list. It was confirmed by the lack of tools used.

D. It was demonstrated that the employees' choices for prioritizing their tasks are based on emotion, mental/physical strength, motivation, and interest.

There is no reward from the organization to motivate the employee, while the employee did not even think about any reward for themselves.

3.2 Building the HIGH tool

The literature review and the results of the case study in the emergency department of a hospital were used to propose a self-personal task management tool, called House in Goal Hierarchy (HIGH). The proposed tool tries to help the user cover the essential below criteria:

- As we discussed in part "A" of section 3.1.3, people need to understand the environment and have a clear view of the tasks and organization and personal goals as define in the vision, mission, and values to make sure they will be covered in the short and long term.
- Based on our observation on part "C" of section 3.1.3, the new tool needs to help to break-down the big tasks into smaller tasks in daily, monthly and annual tasks.
- Based on our observation on part "C" and "D" of section 3.1.3, there is need to give an opportunity to think and have freedom in decision making, especially for unexpected activities, based on daily objectives and types of priority.
- Part "B" of section 3.1.3 shows the lack of self-satisfaction, so there is need to give the user an opportunity to evaluate his activities at the end of each day and consider an award if he passed his criteria, which can just be" a pat on the back."

So, the tool needed to contain the important sections below to cover the essential criteria:

- Vision, mission, personal value: to help the user to define their important personal goals. This section was also the resulted of learning from "the principle of force efficiency," "the principle of suggestion" from literature as well as part "A" of section 3.1.3.
- Annual, monthly, weekly and daily view: this is to help the user to break down the big goal and task. This also resulted of learning from "the momentum principle" from literature as well as part "C" of section 3.1.3. Considering "My list" and the "brain-dump" section to help the users write down all their tasks and then decide to prioritize them. That was also

the result of “the 80/20 rule”, “the concept of psychic ram” from literature as well as parts “C” and “D” of section 3.1.3.

- Reward section: this section helps the user evaluate his work and decisions about daily activities. This was also the result of learning from part “B” of section 3.1.3 as well as “Maslow’s theory” and “the principle of force efficiency” to evaluate and reach self-satisfaction. The evaluation step will help the user to check his daily activities and learn from them to see if there was a better decision that could have been made to reach the daily objective.
- Considering different categories for unexpected events or activities in the daily view, such as expectation, requirement, opportunity and threat: this helps the user put the unexpected events in the right category and select the priority based on the type of priority and reaching the daily objective. This was to answer the difficulty of part “C” of section 3.1.3.

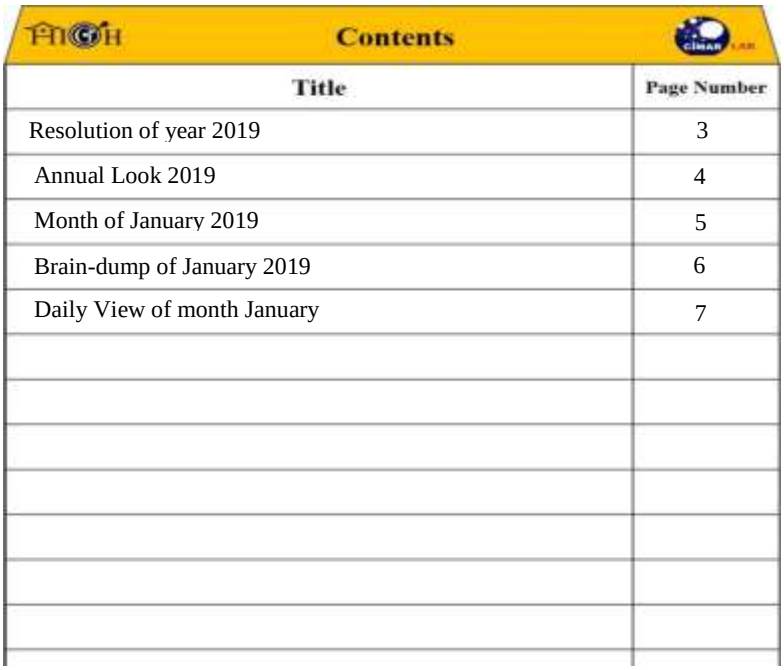
It should be mentioned that the tool presented below is the final version of the House in Goal Hierarchy (HIGH) tool. The initial versions were presented and evaluated in a case study group of students at Ecole Polytechnique of Montreal. Their feedback was taken into consideration to modify the tool at each step before evaluating the final version. One of the feedbacks was to add daily, weekly, and monthly views to help the user better schedule, and break down the big goal and tasks more easily. Also, the initial version had a daily vision, mission, and value, which was replaced with a daily objective because the vision, mission, and value will not be changed for at least a month. Adding brain-dump was another modification of the tool and is being considered for the task that is still not known when to schedule it and to separate it from daily tasks. Furthermore, annual self-evaluation was added to the final version.

3.2.1 House in Goal Hierarchy (HIGH)

The final version of HIGH tool presented in the yearly notebook covers contents, annual resolution, annual look, monthly look, brain-dump, daily look and the results of annual resolution.

➢ Contents

Contents that will be used for finding the information and pages. Figure 3.4 is the view of contents in the tool.



Contents

Title	Page Number
Resolution of year 2019	3
Annual Look 2019	4
Month of January 2019	5
Brain-dump of January 2019	6
Daily View of month January	7

Figure 3.4 Contents view

➢ Annual Resolution

As definitions of personal time-management in the literature review, people have to identify the needs, goal, and how to complete the tasks. As an annual resolution, the user should identify the resolution in the format of vision, mission and value at the beginning of each year. Figure 3.5 showed the view of the annual resolution in the HIGH tool.

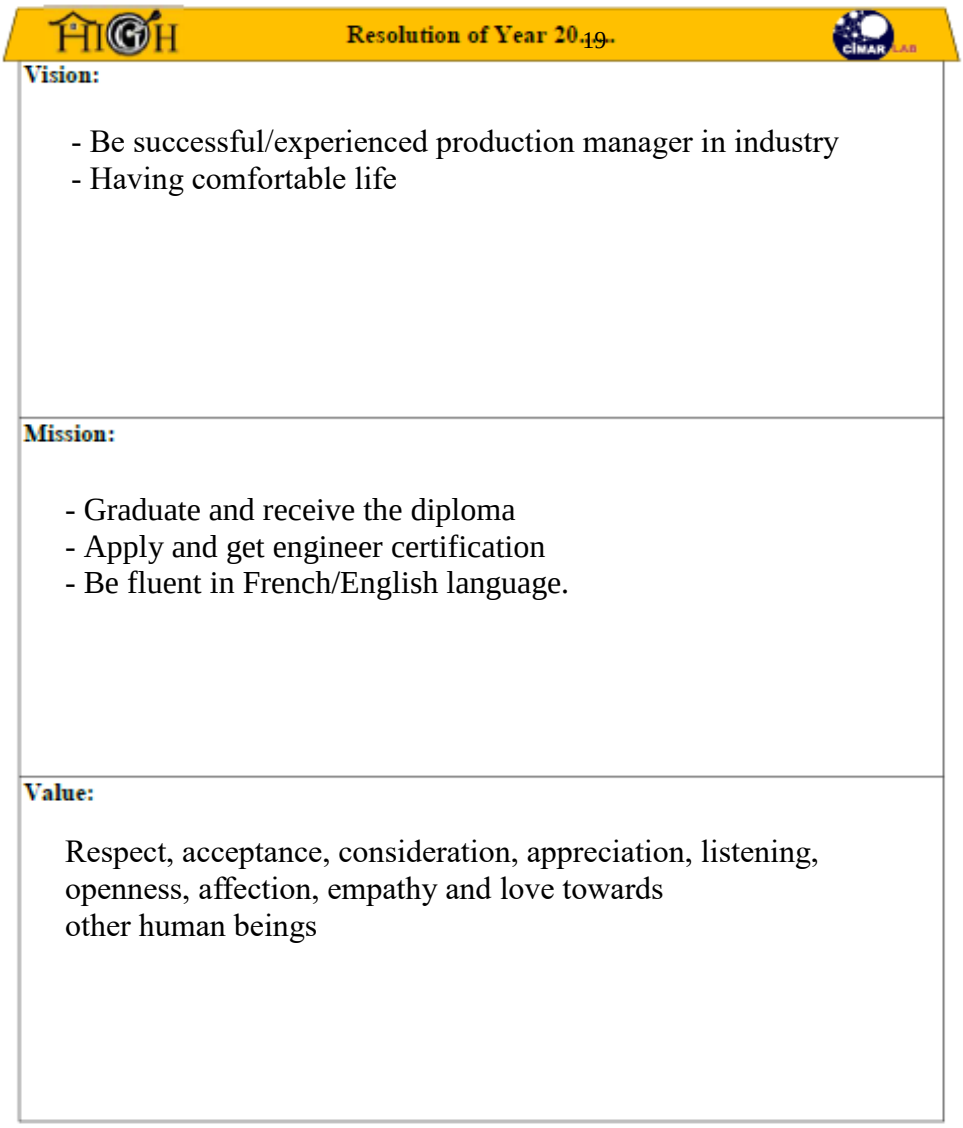


Figure 3.5 view of Annual Resolution

- **Vision**

In personal time management, it is necessary to know why the user needs to manage his time. In planning, it is essential to have an idea of the future goal of the user; otherwise, the results will be pointless (Kolbusa, 2013). Having an appropriate vision and big goal drives people forward and sustains them through tough times. The main question to ask to know the vision is “when I succeed, what do I want to look like?” (Calloway, Feltz, & Young, 2010). Kolbusa (2013) mentioned that a vision shows a clear guide to the future and an ambitious description for a person’s long-term goal.

Halvorsen (2015) defined the vision as the powerful and underutilized resources available. He showed that if vision is appropriately defined, it can be used for encouraging people and ethical decision making. For example, as the head of the hospital, you will try to be more welcoming to patients. Identifying the way to reach it, such as organizing the department and personnel, so they are available all the time, is called the Mission.

- **Mission**

Halvorsen (2015) showed that without a mission, it would be hard to control the process of reaching a vision. The difference between vision and mission is the difference in using "cause" and "effect." The mission is something that should be accomplished while vision is a future goal that should be pursued to achieve that accomplishment (BusinessDictionary.com, 2015).

Defining the proper mission is recognized as the filter to separate the critical and non-critical steps to reach the vision (BusinessDictionary.com, 2015).

- **Values**

Values come from beliefs about life, which guide the behavior. This behavior is what people around us would see as our skills and actions. In other words, personal values show who we are (Halvorsen, 2015). Once the values are identified, it will bring some guidance for deciding which tasks should be completed first (Grusenmeyer, 2009). Defining proper values will help people put their priorities in order.

➢ Annual View

Figure 3.6 showed an annual view by month to use for showing fixed dates, like birthdays, appointments, and meetings. It keeps all the events of the year in one place. A place for the name of the month, year, and days of the week is empty, to be flexible as a starting point. Note that the section for each month is for explaining the events.

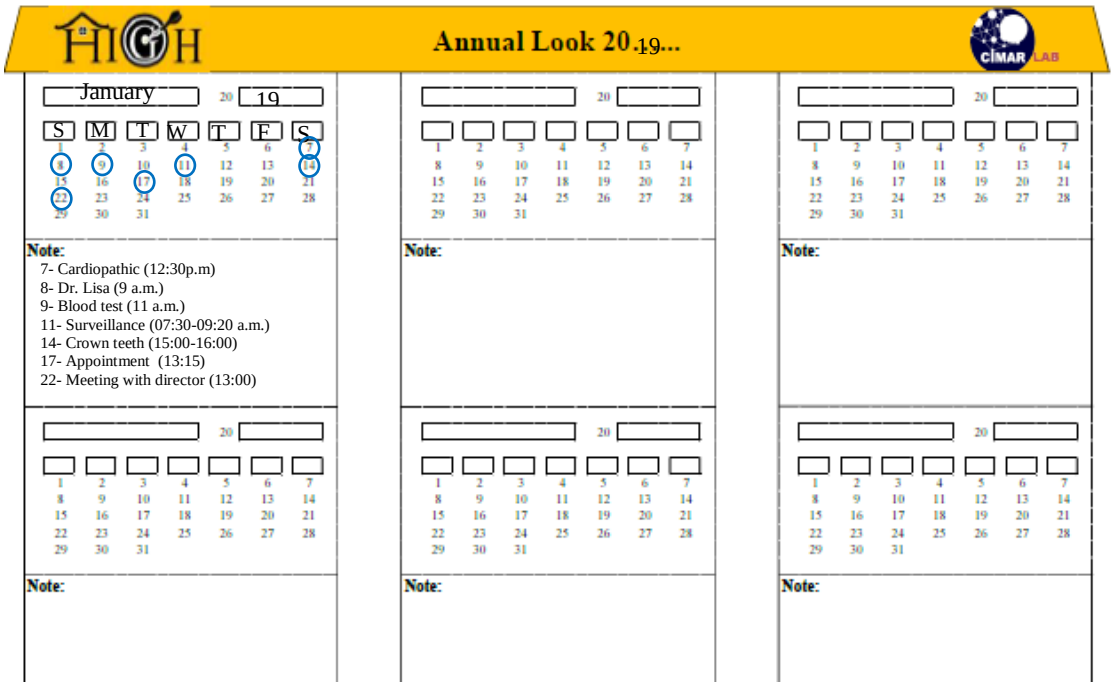


Figure 3.6 Annual view of HIGH Tool

➢ Monthly Look and Brain-dump

Monthly look and brain-dump are both related. The monthly look located on the left-hand page and the brain-dump is on the right-hand page of the HIGH tool.

- **Monthly Look**

At the beginning of each month, the user assigns his general plan as a monthly vision, mission and value as kind of breaking down the annual vision, mission and value. Then he assigns planned hours for each day of the month like class time, appointments, and meetings. The user can refer to the annual look to assign the fixed dates of his month.

Figure 3.7 showed the monthly look. This look has two columns and one row. The first column has 31 rows that represent the 31 days of the month. The second column is the name of the day (Sunday, Monday) that the user fills in based on the month.

The first row has 24 columns that show the 24 hours of the day and would depend on the start/finish time of the user. Having 24 hours is for the user who likes to track his sleep time as well.

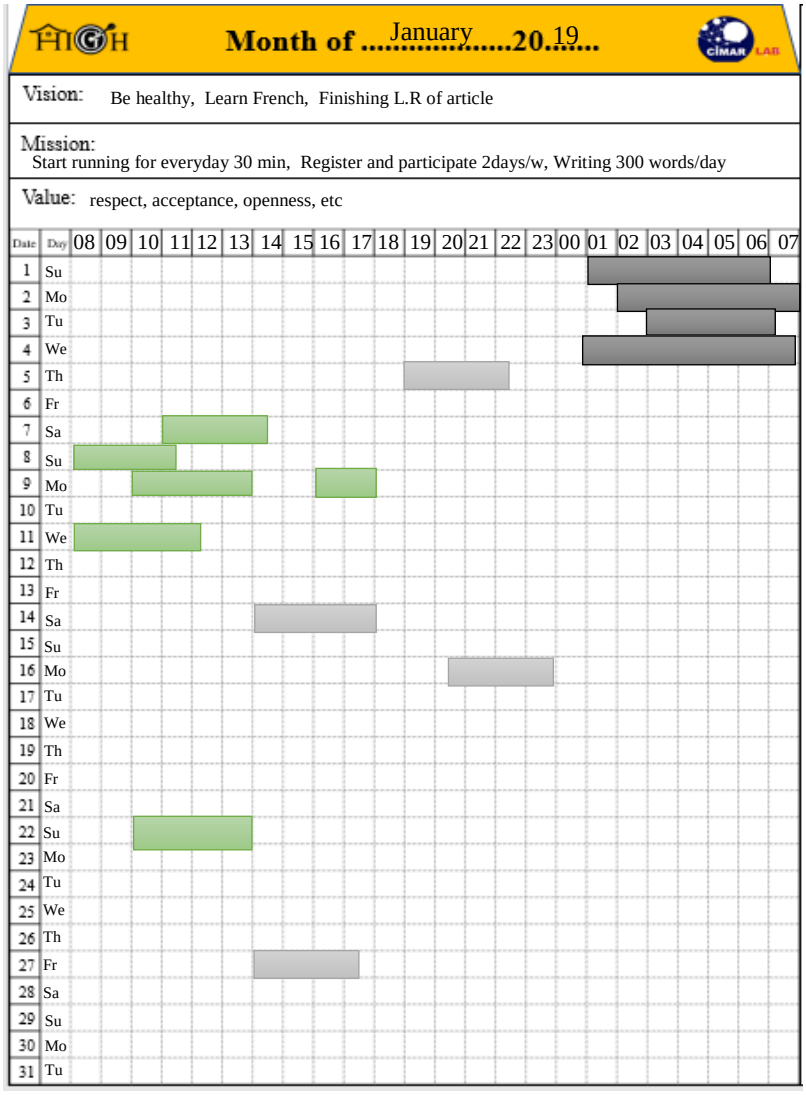


Figure 3.7 Monthly view

Now that the user can see how his month and days look, the next step is to fill the brain-dump of the month.

- **Brain-dump**

The user writes down all his tasks, whether essential or not, without needing to know the day that he wants to do them. Once the user starts to use the daily look, he can refer to the brain-dump list and select the tasks that he wants to do on that day. Figure 3.8 presents a view of the brain-dump.

The brain-dump has a view of four weeks, in case the user has a task with a specific deadline, like homework. For example, the deadline for the project for one of his classes is the second week of

the month, so he should schedule and write “doing a project in the first week of the month.” Based on the literature review (Fleet & Blandford, 2005), there are non-scheduled tasks, called solo activities, that have constraints, like deadlines. In this part, the user knows the deadline and how many days and weeks it must take to complete it. So, he will place it in the proper week and then consider it in the daily view.

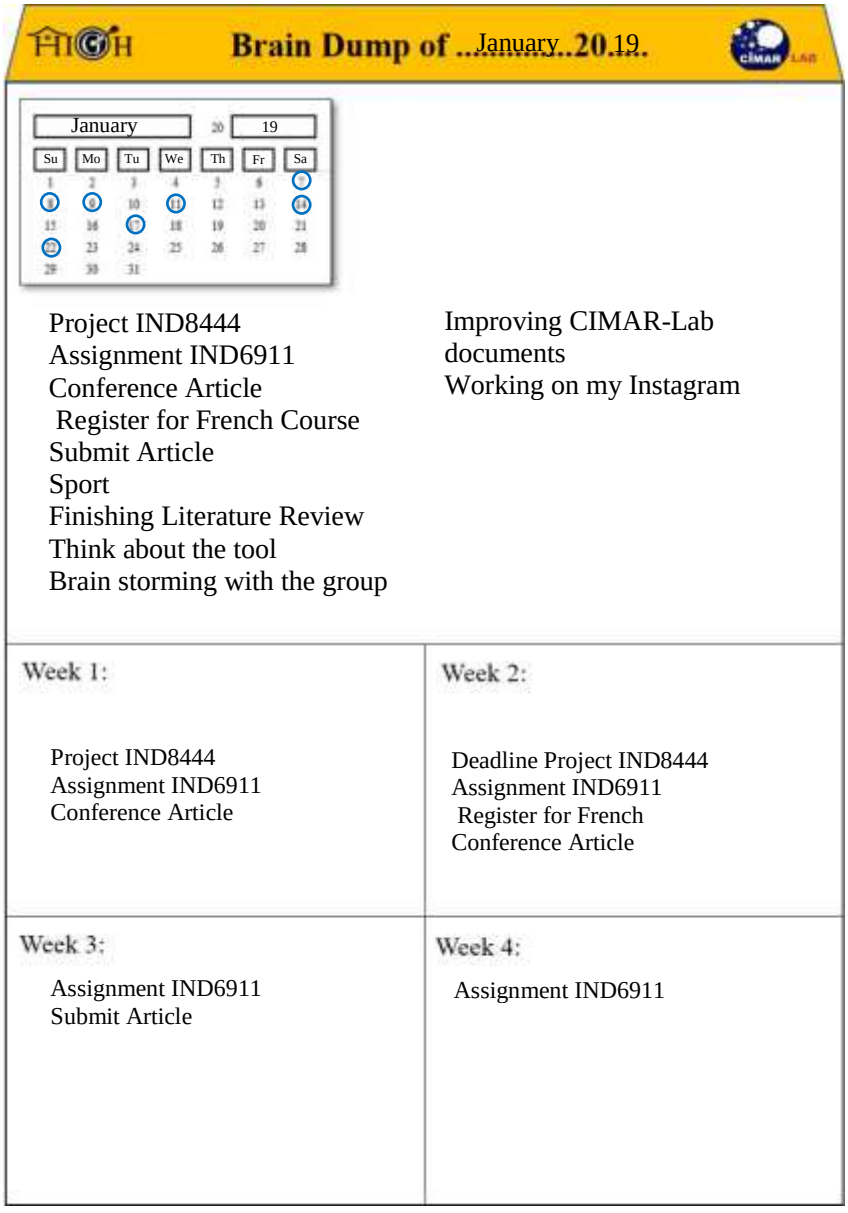


Figure 3.8 The view of the brain-dump

- **Daily View**

Figure 3.9 shows the example filled the daily view, which has five parts as follows:

1. An objective of the day
2. Expectation, requirement, threat and opportunity
3. List of activities
4. Prioritized action
5. Reward

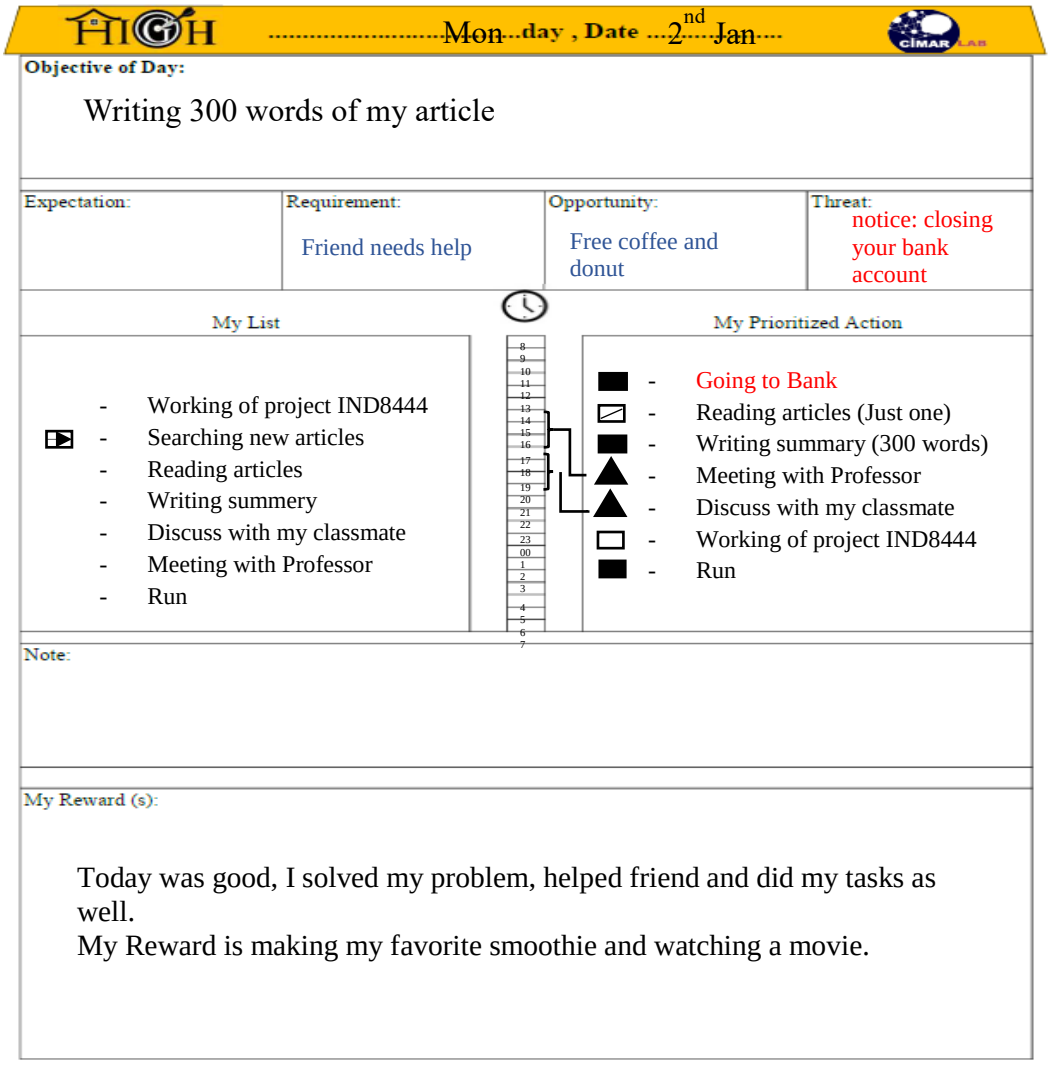


Figure 3.9 The look of the Daily View

- **Objective of day**

It is essential and beneficial to ask people to consider having an objective for each day. The objective will give the user a guide to prioritize their tasks daily to know which tasks should be done first.

- **Expectation, Requirement, Threat and Opportunity**

Each person, daily, faces some unexpected events, such as tasks from his boss, a family member, friend or environmental issues which can be categorized into four aspects.

1) Expectation

As mentioned above, some researchers believed that expectation is driven by value and information (Mittilä & Järvelin, 2001). Consider the iceberg in the sea, a part of which is visible and the rest of which is floating below water level. The reputation is the tip, and the expectation is the rest of the iceberg.

The term "expectations" is defined by Ojasalo (1999) in explicit, implicit, fuzzy, realistic or unrealistic categories. He explained the explicit expectation as having a clear and conscious vision of the future. The customer knows what they want from the future, but at the same time, had an implicit expectation, which means they do not think about all aspects of the future. The fuzzy expectation is for when the customer expects something, but he is not sure what that is, and he will be unsatisfied if it does not meet his expectations. A realistic expectation is set within reasonable limits and possibly fulfilled by putting in some effort (Ojasalo 1999, 82-84).

The expectation could be official or unofficial. The official expectation is based on the goal and strategy that is expressed by an evaluator in the evaluation while unofficial is related to the desire or wish of an evaluator (Järvelin, 2001).

In personal time management, the concept of the expectation is affected by the to-do list. Respond to the expectation that was received from the environment means changing or eliminating some tasks in the to-do list. It does not always mean that the user should respond to that expectation. If the received expectation is not within the user's capability or is not aligned with the daily user's objective, the user could say no.

2) Requirement

The requirement can be related to the technical, economic or social aspect (Holmlund, 2004). The technical requirement is based on the technical aspect of a project, which could change due to quality standards or any variations in the technology. The financial requirement can change depending on general economic fluctuations. Political aspects can change due to the policy of the organization, team or government. Moreover, the social requirement is based on organizational cultures and relationships (Mittilä, 2000; Järvelin, 2001).

The requirement is also the same as the expectation. If the user faces a requirement that is not aligned with his daily objective, he could say no to it, otherwise, it will impact his to-do list.

3) Threat

The ability of the human to survive depends on his ability to live and work effectively with other people and the environment. When people are faced with a threat, they will react and decide (Grant, 2016).

A person faces a different type of threat in his daily life. For example, the user suddenly gets sick and needs to see his family doctor, but he did not expect that, so he did not schedule it in his to-do list. If he does not visit his doctor and continues his to-do list, it is considered as a threat to him and his health.

4) Opportunity

Usually, an opportunity has the possibility of improving a person's skill. (Ruyle, 2016). As an example, in daily life, an opportunity for the student is to participate in a specific workshop to improve his writing skills. If a student has difficulty in academic writing and the workshop is held once a year, it is considered an opportunity for him.

- **My List - List of activities**

My list area works like a to-do list where the user will write all his tasks. It helps the user to overcome an overwhelming feeling and makes the user productive throughout the day (Benz, 2016). The user can refer to the weekly side of the brain-dump to remember his tasks for the week or the listing side of the brain-bump to select his list. For example, the user needs to write an article

that is considered a non-scheduled activity. The question is, how he should schedule it in the daily view? The user needs to break down his action to finish the article, for example, writing on average 300 words per day.

Sometimes people are faced with expectations, requirements, threats or opportunities, and they must decide whether they want to add it to the list or not. If the unexpected event is important or it aligns with the objective, the user will accept it and react. In these cases, people also learn to say "No," which is one of the key elements in time management.

If there are some tasks in "my list" that the user does not have time to do or could not finish them that day, then HIGH proposes the basic key symbols to visualize the status of the activity. Figure 3.10 presents the proposed symbols.

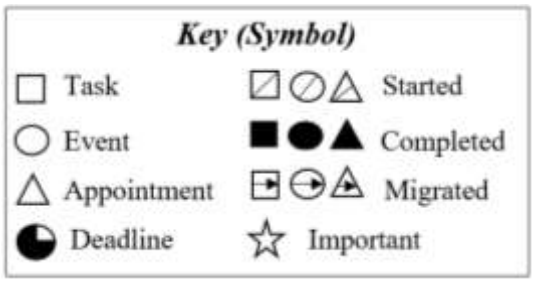


Figure 3.10 The Key Symbols of the HIGH Tool

The user should migrate the remaining tasks to the next day or other days, or if he is not sure when he wants to do them, he can add them to the brain-dump of the current or following month.

- **My prioritized action**

Once the user selects his tasks, it is time to prioritize them. The user needs to start the prioritization process based on daily objective and time requirements to finish the tasks. In the meantime, if he receives unexpected tasks, he needs to define the type of unexpected task first and compare them with the daily objective. The user must ask himself if the unexpected task is aligned with his daily objective and can it affect, positively or negatively, his personal or career? Based on the answers, he can select and modify his priority list. If the unexpected event is not important and does not align with the objective, the user rejects it. In these cases, people learn to think, analyze and say "No," which is one of the key elements in time management.

- **My Reward**

In most of the research (Ibrar & Khan, 2015; Richardson, 2010), the authors talk about how important it is to have a reward for the employee. However, how and when people need to expect a reward is the key question. People always wait for the external reward, but when they assign their value, which means if they reach and respect their value, time and goal, they should put an award for themselves. People are free to select their reward. It can be anything like buying something, sleeping, drinking or even go hiking with friends.

This is mainly to help the user to evaluate his work and decisions regarding daily activities. The user can learn from this evaluation and see if there was a better decision that can be made to cover the daily objective.

➢ The Result of Annual Resolution

Figure 3.11 showed the view of the results of an annual resolution. The first step of the method was assigning the annual resolution. At the end of the year, the user clarifies what his achievement was. Considering that at the end of the year, the user's achievements will be reported provides the user motivation to follow their vision and consider a proper mission based on a yearly experience. Also, it is possible that during the year, the user is faced with some life-changing events. So, it is necessary for the user to reflect on his vision, mission and value to define next year's annual resolution.

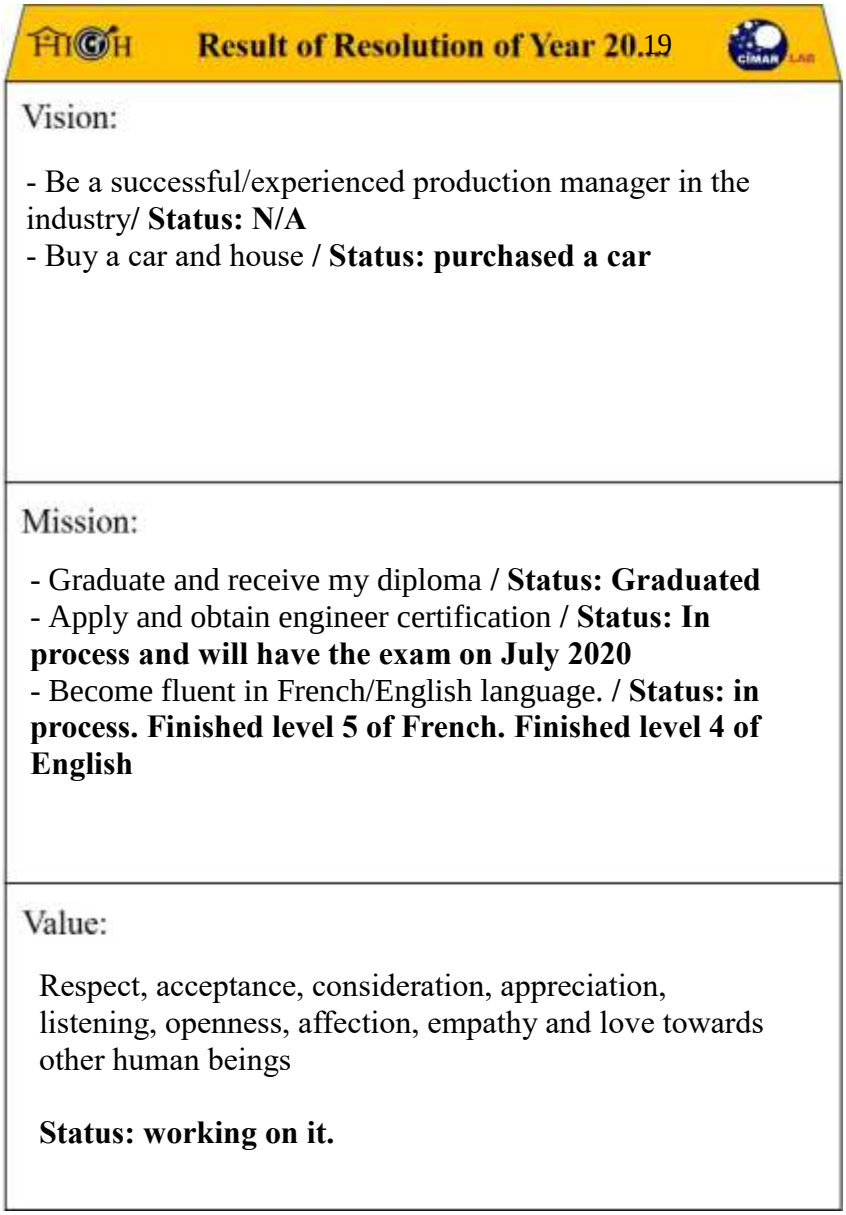


Figure 3.11 The result of an Annual Resolution

3.2.2 Comparing the HIGH tool with existing tools

Before presenting the test steps for the HIGH tool, the similarity and advantage of some existing tools are presented (see Table 3.6).

Table 3.6 Comparing the HIGH tool with some existing tools

Existing tools	**Similarities with HIGH tool**	**The difference compared to the HIGH tool**
Diaries/ Calendar	*Have the yearly, monthly and daily look. *Can schedule and plan the tasks per hours.	*Lack of defining goal and objective. HIGH has annual and monthly vision mission value and daily objective. * No options and guidance for the user to know how to select and prioritize the tasks, especially for unexpected events. HIGH ask the user to decide on priority based on daily objective and type of unexpected tasks. * Lack of opportunity for users to control and evaluate their decisions. HIGH considered a self-evaluation option for daily and annual resolution.
BuJo (Bullet Journal)	* Look like a yearly paper notebook. *Have the yearly, monthly and daily look. * Have a specific area for listing the monthly tasks. * Have key symbol to visualize the tasks.	* Lack of defining goal and objective. HIGH has annual and monthly vision mission value and daily objective. * No options and guide for the user to know how to select and prioritize the tasks especially for unexpected events. HIGH ask the user to decide on priority based on daily objective and type of unexpected tasks. * Activities are not scheduled per hours in monthly look. HIGH gave the capability for the user to consider 24 hours. * Lack of opportunity for users to control and evaluate their decisions. HIGH considered a self-evaluation option for daily and annual resolution.

Table 3.6 Comparing the HIGH tool with some existing tools (cont'd and end)

Existing tools	**Similarities with HIGH tool**	**The difference compared to the HIGH tool**
PJORO (Project Journal)	* Look like a yearly paper notebook. * Has a vision view. * Has a monthly and weekly view. * Breaks down the goal and vision in monthly view.	* It is a confusing and complex tool as it has too many steps and sub-steps and lacks flexibility for users. HIGH tries to be simple, flexible, and user-friendly. * Lack of opportunity for users to control and evaluate their decisions. HIGH considered a self-evaluation option for daily and annual resolution. * Does not give daily view to users. HIGH has more focus on daily view as it was considered to be the most important step to achieve the final goal.
7 Minute Life daily planner	* Looks like a yearly paper notebook. *Has a the yearly, monthly and daily look. * Defines the purpose and goal of life. * Evaluate the outcomes of each goal per 90 days. * Considering an option for the user to select the priority tasks	* It has too many sections. HIGH tries to be simple, flexible and user-friendly. * It is considered the priority based on personal value and in a positive way. It gives 75 options and asksthe user to select the top 10 options and then make the priority list to reach that. HIGH asks the user to decide on priority based on daily objective and four types of unexpected tasks. One of the unexpected types is "Threat". * options and guide for the user to know how to select and prioritize the tasks, especially for unexpected events. HIGH asks the user to decide on priority based on daily objective and type of unexpected tasks. *Even though it has the evaluation of each goal, there is no self-evaluation for the user's daily actions and decisions. *Lack of daily self-evaluation.

3.3 Testing the HIGH Tool

Fifteen graduate students of Industrial Engineering of École Polytechnique of Montréal at the master, Ph.D. and post-doctoral levels from different laboratories were invited to participate in the test. A survey with 20 Likert scale questions and one open-ended question was used to evaluate the tool.

Two separate surveys were prepared to obtain user's comments before and after using the tool and cover seven different aspects as follows:

(1) Defining and developing personal visions, missions, and values;

(2) The manner of time-management;

(3) Unexpected events, tasks;

(4) Making a to-do list;

(5) Prioritizing manner;

(6) Capacity;

(7) Personal reward and self-confidence.

The questions of the both the before and after surveys are presented positively to understand, first the behavior and manner of participants before using the tool and, then after using the tool to learn the effect on their behavior. The participants needed to answer the survey in the qualitatively Likert scale as 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) or 5 (totally agree) which present their agreement level for each question.

For example, in question #1, the participant had been asked about knowing and understanding their vision, mission and values. If the answer is 5, it means they totally know about it, and if the answer is 1, it means they have difficulty in defining those concepts. Those type of questions will help us to understand the behavior and knowledge of participants in time management before using the tool. After using the tools, we asked the same type of questions from the user to find the effect of using the tool on their behavior and knowledge if there is any. For example, in question #1, we asked if after using the tool, the participants have a better knowledge of their vision, mission and

values. If the answer is 1, it shows that the tool does not help the user, and if the answer is 5, confirm the improvement effect of tool on user behavior.

So, the process of the test was as follows:

- The students were invited individually to complete the survey before using the tool based on their current method for managing their time (see Table 3.7 as an example of the test and questions).
- Then, the HIGH tool was presented and explained in detail to the students.
- Students started using the HIGH tool for 3-7 weeks.
- Then, they were asked to fill in the after survey based on their experience of using the HIGH tool (see Table 3.8 as an example of the test and questions).

Table 3.7 The before survey

DATE: ……..……..

Department Section / Job title: ……

Seniority in the organization (years): ……..

Age: <25 years ☐ 25-35 years ☐ 36-50 years ☐ > 51 years ☐

Gender: Male ☐ Female ☐

Before

Next, rate with 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) or 5 (totally agree) the following statements:

Criteria's	Questions	1	2	3	4	5
Defining, developing personal visions, missions, values	1. I know what my vision, mission and values are.					
	2. To reach my vision, I know what type of indicators help me to measure my successes.					
	3. I know how my vision, mission and values have an impact on my daily life.					
	4. I always consider my vision, mission and values in my daily tasks.					
	5. I have mechanisms to reach and respect my vision, mission and values.					
The manner of time-management	6. I believe that the practices, techniques and tools used in daily management allow me to identify and define better routines or work habits					
	7. Based on my vision, mission and values, I know what is important and what is not.					
Unexpected Events, Tasks	8. In my daily life, I am facing unexpected events (expectations, threat and opportunities).					
	9. I know what the difference between expectation, requirement, threat and opportunity are.					
	10. I always respond and react to unexpected events (expectations, threat and opportunities).					
	11. I know how unexpected events can change my to-do list.					
Making to-do list	12. I have a to-do list for my daily life.					
	13. I know my capacity and based on that I consider tasks in my to-do list.					
	14. I know how to reschedule my to-do list if needed.					
Prioritizing manner	15. I have difficulties in prioritizing my to-do list.					
Capacity	16. I am not working more than my capacity.					
	17. Even though I am a very busy person, I can still find free time to enjoy my life.					
Personal reward and self-confidence	18. I know what personal rewards mean.					
	19. I have thought about a reward for myself.					
	20. I always try to do my best at work and life.					

21. What do you need/require to increase your priority actions to be satisfied and improve your time management?

Table 3.8 The after survey

DATE: ……..……..

Department Section / Job title: ……

Seniority in the organization (years): ……..

Age: <25 years ☐ 25-35 years ☐ 36-50 years ☐ > 51 years ☐

Gender: Male ☐ Female ☐

After using the HIGH tool, I feel that:

Next, rate with 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) or 5 (totally agree) the following statements:

Criteria's	Questions	1	2	3	4	5
Defining, developing personal visions, missions, values	1. I have better knowledge of what my vision, mission and values are.					
	2. To reach my vision, I know better what type of indicators help me to measure my successes.					
	3. I know better how my vision, mission and values impact my daily life.					
	4. I should consider my vision, mission and values in my daily tasks.					
	5. I have better mechanisms to reach and respect my vision, mission and values.					
The manner of time-management	6. I believe that the practices, techniques and tools used in daily management allow me to identify and define better routines or work habits					
	7. Based on my vision, mission and values, I know what is important and what is not.					
Unexpected Events, Tasks	8. In my daily life, I know that I will face different types of unexpected events (expectations, threat and opportunities).					
	9. I know better what the difference between expectation, requirement, threat and opportunity are.					
	10. I know how to respond and react to unexpected events (expectations, threat and opportunities).					
	11. I know how to change my to-do list based on unexpected events that I want to react.					
Making to-do list	12. I would have a to-do list for my daily life.					
	13. I know my capacity and based on that I consider tasks in my to-do list.					
	14. I know better how to reschedule my to-do if needed.					
Prioritizing manner	15. My difficulty in prioritizing my to-do list has improved.					
Capacity	16. Now, I am not working more than my capacity.					
	17. Even though I am a very busy person, I learn to find more free time to enjoy my life.					
Personal reward and self-confidence	18. I understand what personal rewards mean.					
	19. I have better thought about a reward for myself.					
	20. I always try to do my best at work and in life.					

21. Do you have any comments to improve the HIGH tool? Please explain.

3.4 Evaluation of the HIGH tool

For the evaluation of the results of the survey, both quantity and quality aspects were used and will be presented below.

3.4.1 Quantitative analysis of the tool testing

Data analysis is a multi-step process. The collected data were summarized and categorized and then, ultimately were processed to examine the hypotheses. In this process, various statistical methods, such as descriptive and inferential analysis, were used to analyze the data.

- **Descriptive statistical analysis**

The distribution and percentage of frequency of the case study, such as education level and gender, were presented in Table 3.9.

Table 3.9 Distribution and percentage of frequency of participants

Categories	Sub-category	Frequency	Percent %
Education Degree	Ph.D.	8	53.3
	Master	6	40.0
	Post-doctoral	1	6.7
Gender	Female	6	40.0
	Male	9	60.0

- **Inferential statistics and test hypotheses**

After collecting the data from the participants, the results were examined and evaluated using SPSS21 software with the help of a statistical specialist.

For statistical methods, it is necessary first to check the collected data and determine whether to consider it normal or non-normal distribution. If the distribution of collected data is normal, then parametric tests need to be used to check the hypotheses; while nonparametric tests will be used for non-normal distribution (Mordkoff, 2015; Stephanie, 2016).

The distribution of each of the seven aspects was checked using the Kolmogorov-Smirnov test (K-S).

Hypothesis test:

H_0: if the Data is normal.

H_1: if the Data is non-normal.

If the value of the significance level (sig) is greater than the error value of 0.05, it means the hypothesis H_0 will be confirmed, and if the significance level (sig) is lower than the error value of 0.05, then Hypothesis H_1 will be confirmed.

Based on the evaluated results, variables have a normal distribution (see Table 3.10). Then the homogeneity of the variance needs to be check by one-way ANOVA. The assumption of the test is as follows:

H_0: Variance of variables are homogeneous.

H_1: Variance of variables are not homogeneous.

Since the significance level of the before-test and after-test data was higher than the error level of 0.05 (Sig> 0.05), then the hypothesis H_0 is confirmed (see Table 3.11). It showed the homogeneity of the results.

Table 3.10 Results of the Kolmogorov-Smirnov test on seven aspects

Before and After of aspects	**Kolmogorov-Smirnov Z**	**Asymp. Sig. (2-tailed)**
Before-Defining	1.132	0.154
After-Defining	0.884	0.415
Before-manner	0.795	0.552
After-manner	1.183	0.122
Before-Unexpected	0.82	0.512
After-Unexpected	0.971	0.302
Before-Making to do	0.72	0.678
After-Making to do	1.129	0.156
Before-Prioritizing manner	0.965	0.309
After-Prioritizing manner	1.357	0.05
Before-Capacity	1.3	0.068
After-Capacity	1.341	0.055
Before-Personal reward	0.918	0.368
After-Personal reward	0.87	0.436

Table.3.11 Test of Homogeneity of Variances

Before and After of aspects	Statistic	Sig.
Before-Defining	3.929	0.051
After-Defining	1.748	0.219
Before-manner	0.203	0.819
After-manner	0.051	0.951
Before-Unexpected	0.755	0.493
After-Unexpected	0.079	0.925
Before-Making to do	3.882	0.053
After-Making to do	0.827	0.463
Before-Prioritizing manner	1.45	0.276
After-Prioritizing manner	1.17	0.346
Before-Capacity	0.228	0.799
After-Capacity	1.17	0.346
Before-Personal reward	2.646	0.115
After-Personal reward	0.723	0.507

As mentioned above, since the variables have a normal distribution, then parametric tests need to be considered for evaluating the data. In this research, the t-paired test (Paired-Sample T-test) were used. The before-test and after-test results for one aspect were presented here, and the rest is reported in Appendix A.

- **Before and after the test of defining, developing personal visions, missions, values**

Table 3.12 showed the distribution statistics of before-test and after-test for aspect 1.

Table 3.12 Descriptive statistics of before-test and after-test

Before, after aspect 1	Mean	Std. Deviation	Minimum	Maximum
Before-defining, developing of personal visions, missions, values	2.5733	0.34531	2.2	3.4
After-defining, developing of personal visions, missions, values	4.5067	0.1831	4.2	4.8

As shown in Table 3.12, the results of the before-test have a mean of 2.57 and a standard deviation of 0.35, while the results of after-test have a mean of 4.51 and a standard deviation of 0.18. The t-

paired test was used to compare the before and after results and evaluate them using the HIGH tool. The assumption for the t-paired test is the following:

H_0: There is no difference between before-test and after-test.

H_1: There is a difference between the before-test and the after-test.

As shown in Table 3.13, if the value of the significance level is 0.000, and it is less than the error of 0.05, while the magnitude of the t-statistic is 19.182 and more than the value of table 1.96, then the hypothesis H_1 is confirmed. It concluded with 95% confidence that there are a difference and improvement between the before-test and after-test.

Table 3.13 Paired Sample Test

Before, After Defining	**Paired Differences**					**T**	**df**	**Sig. (2-tailed)**
	Mean	**Std. Deviation**	**Std. Error Mean**	**95% Confidence Interval of the Difference**				
				Lower	**Upper**			
	-1.93	0.39036	0.10079	-2.14951	-1.71716	-19.182	14	0.000

The same trends were found for the remaining six aspects, and the sake of brevity, the data are not shown here (see Appendix A).

At the end of this section we can conclude that even though the test was done in a small group of the students at Ecole Polytechnique of Montreal, the quantitative analysis confirmed that the collected data of participants has a normal distribution with the homogeneous variance and the answer are not biased. It also concluded that there are effect and improvement between the before-test and after-test.

To better compare and present the effect and impact of using tools in each of the seven aspects, the qualitative analysis and data were presented.

3.4.2 Qualitative analysis of the tool testing

For testing the HIGH tool, the results of the before and after surveys, each containing 20 Likert-scale questions, were collected. Then, the average number for each aspect was rounded-up and used for analysis. As a control, the average number of 3 and less than three were considered as an

issue for them before the survey, which means the participant had difficulty with the aspect. However, for the after survey, if the average number is 5, it is considered as no issues, and the participant does not have any difficulties with the aspect. The average number of all the participants for the after the survey was above 4, which means the participants agreed that HIGH tool helped them in task management.

Table 3.14 reported the qualitative results of the survey. It showed that almost most all of the participants had difficulty in all aspects before using the tool, while approximately a 50% improvement was observed after using the tool. It should be noted again that this is based on the results of considering an average number of 5 for improvement for the after survey. Because of this baseline, the results of aspect number 3, i.e. dealing with unexpected tasks, showed that 12 participants had not had issues before using the tools (giving score 4 and 5) while only 11 participants giving a score of 5 after using the tool.

Table 3.14 The qualitative result

Aspects	**Before**	**After**
1. Defining, developing of personal visions, missions, values	0/15	8/15
2. The manner of time-management	5/15	14/15
3. Unexpected Events, Tasks	12/15	11/15
4. Making to-do list	1/15	10/15
5. Prioritizing manner	0/15	7/15
6. Capacity	0/15	11/15
7. Personal reward and self-confidence	2/15	10/15

Anecdotal evidence can also be part of a qualitative argument. Regarding respond to the unexpected events and activities, some participants mentioned that they accept the unexpected requests, and sometimes they found using all their day doing unnecessary activities. However, using the HIGH tool showed them that they need first to analyze the effect of the unexpected

activities on his personal or career based on their daily objective and then decide to reject or to do them. For example, one participant rejected his wife request to help on her homework as he had some urgent project, and the unexpected request was not aligned with his daily objective. Once he submitted the project, start helping his wife, and at the end of the day, both items were done.

Also, some participants claiming that having a manner to use vision, mission, value and daily objective for prioritizing the tasks, helped them to meet important activities. This was helping them to consider personal life as a task and making a balance between life and work.

Also, for example, regarding aspect number 7 for personal reward and self-confidence, we received anecdotal evidence that after using the HIGH tool, the users start to evaluate themselves in daily bases and learned from their good and poor decisions. They start using this experience for making better decision to cover their daily objective in coming days.

CHAPTER 4 CONCLUSION AND RECOMMENDATIONS

The main question of the research was, “How can we help people to manage, select and prioritize their own known/unknown tasks in order to account to themselves in a respectful manner?” To answer the question, the researchers conducted a survey and questionnaire with the members of the emergency department of a hospital. We first focused on understanding their knowledge about organizations and their goals and objectives, how they feel about their organization and themselves, and how they do their tasks and prioritize them. The findings demonstrated a lack of communication, awareness, organization and personal reward.

Subsequently, we asked the same people their method of time management and their tool in order to understand their difficulties in time and task management. We found that they are using the three categories of planning, prioritizing and list-making, but have difficulties in scheduling, writing down their lists, the number of tasks to-do and re-prioritizing. We studied their method of decision making for managing their time by asking about their tools. The results of decision making were based on the five categories of priority, duration, difficulty, availability and mental states.

Based on the result of the case study and the literature, the tools to help to manage people’s time and tasks were established and called the HIGH tool. The proposed tool tried to cover some essential criteria, such as helping the user to understand the environment and have a clear view of his task, helping the user to break-down the big task into smaller tasks in daily, monthly and annual tasks, giving the user the opportunity to think and have freedom in making decisions especially for unexpected activities based on daily objectives and types of priority. Most importantly, it allows the user to evaluate his activities at the end of each day. The evaluation step is helping the user check his daily activities to learn from them and see if there is a better decision that could be made to cover the daily objective. The HIGH tool was presented and tested in the École Polytechnique of Montréal. The test compared the results of before and after using the HIGH tool. The survey had one open-ended question that helped this research to improve the first version of the HIGH tool, and the final version was presented and tested by the students of École Polytechnique of Montréal.

The results of the survey for before and after using the HIGH tool were analyzed by quantitative and qualitative analysis. The quantitative analyses confirmed that the collected data of participants have a normal distribution with the homogeneous variance. The results of the seven aspects, which

were 1) defining, developing personal visions, missions, values 2) the manner of time-management 3) unexpected events, tasks 4) making a to-do list 5) prioritizing manner, (6) capacity and (7) personal reward and self-confidence showed improvement after using the HIGH tool. It was observed that almost all of the participants had difficulty in all aspects before using the tool, while approximately a 50% improvement was reported after using the tool. They also learned to evaluate their daily activities and assign a reward for themselves, which at the beginning was very difficult for them because they were not used to saying thank you to themselves.

4.1 Limitations

This research had some limitations, as follows:

- It was started in a case study in healthcare, but the final version of the tool was tested in a university. Also, the case study and the university test group had a small number of the same type of participants, and it was a biased sample and could not validate the HIGH tool.

- The HIGH tool presented and tested in a paper version.

4.2 Future Work

For the continuation of this work and future research, the following items are recommended:

- Testing the HIGH tool in a larger and different group and organization. As mentioned, the presented HIGH tool was tested after applying some revisions based on received feedback. Also, the current version of the tool with the daily and annual self-evaluations gives users the opportunity to think, evaluate, learn and then reflect on it for the next few days or year. So, the tool can be considered as an assessment and reflective tool for now. It is believed that a larger number of participants from different organizations would result in more comments to improve the tool and then be modified to support and react to improvisation events as well.
- This research presented the paper version tool because we wanted to be sure about the functionality of each element of the HIGH tool. However, it would be good to consider and present the digital version of the HIGH tool after testing it in different groups and collecting more information.

REFERENCES

Ailamaki, A., & Gehrke, J. (2003). Time management for new faculty. *ACM SIGMOD Record*, *32*(2), 102. https://doi.org/10.1145/776985.777004

Allen, D. (2009). Getting Things Done: How to achieve stress-free Productivity. Retrieved February 3, 2019, from https://www.amazon.com/Getting-Things-Done-stress-free-Productivity/dp/B006U1N4QK

Alter, A. (2017). *Why our screens make us less happy*. Retrieved from https://www.ted.com/talks/adam_alter_why_our_screens_make_us_less_happy

Basri, W., & Alghaswyneh, O. (2015). The Role of Time Management and its Impact On Students' academic achievement. *International Research Journal of Finance and Economics*.

Bellotti, V., Ducheneaut, N., Howard, M., & Smith, I. (2003). Taking email to task: the design and evaluation of a task management centered email tool. *Proceedings of the Conference on Human Factors in Computing Systems - CHI '03*, 345. https://doi.org/10.1145/642611.642672

Bellotti, V., & Smith, I. (2000). Informing the Design of an Information Management System with Iterative Fieldwork. *Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, 227–237. https://doi.org/10.1145/347642.347728

Benz, K. (2016, October 31). There's a better way to write your to-do lists. Retrieved February 14, 2019, from Quartz website: https://qz.com/709921/how-to-write-a-good-to-do-list/

Bergman, O., Boardman, R., Gwizdka, J., & Jones, W. (2004). Personal Information Management. *CHI '04 Extended Abstracts on Human Factors in Computing Systems*, 1598–1599. https://doi.org/10.1145/985921.986164

Bernstein, M., Kleek, M. V., Karger, D., & Schraefel, M. (2008). Information scraps: How and why information eludes our personal information management tools. *ACM Trans. Inf. Syst*, 1–46.

Bessant, J., Caffyn, S., & Gallagher, M. (2001). An evolutionary model of continuous improvement behavior. *Technovation*, *21*(2), 67–77. https://doi.org/10.1016/S0166-4972(00)00023-7

Blandford, A. E., & Green, T. R. G. (2001). Group and Individual Time Management Tools: What You Get is Not What You Need. *Personal Ubiquitous Comput.*, *5*(4), 213–230. https://doi.org/10.1007/PL00000020

Boardman, R., & Sasse, M. A. (2004). "Stuff Goes into the Computer and Doesn'T Come out": A Cross-tool Study of Personal Information Management. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 583–590. https://doi.org/10.1145/985692.985766

Buehler, R., Griffin, D., & Ross, M. (1994). Exploring the "planning fallacy": Why people underestimate their task completion times. *Journal of Personality and Social Psychology*, *67*(3), 366–381. https://doi.org/10.1037/0022-3514.67.3.366

Calloway, J., Feltz, C., & Young, K. (2010). *Never by Chance: Aligning People and Strategy Through Intentional Leadership*. John Wiley and Sons.

Campbell, C., & Maglio, P. (2003). Supporting Notable Information in Office Work. *CHI '03 Extended Abstracts on Human Factors in Computing Systems*, 902–903. https://doi.org/10.1145/765891.766061

Chen, D. D., & Kottler, J. A. (2011). *Stress Management and Prevention: Applications to Daily Life* (2 edition). New York, NY: Routledge.

Claessens, B. J. C., Eerde, W. van, Rutte, C. G., & Roe, R. A. (2010). Things to do today…: A daily diary study on task completion at work. *Applied Psychology: An International Review*, *59*(2), 273–295.

Claessens, B. J. C., W. Eerde, V., Rutte, C. G., & Roe, R. A. (2007). A review of the time management literature. *Personnel Review*, *36*(2), 255–276. https://doi.org/10.1108/00483480710726136

Claire. (2016). PROJO - The Project Journal. Retrieved May 4, 2019, from Kickstarter website: https://www.kickstarter.com/projects/2008075022/projo-the-project-journal

Covey, S. R. (2004). The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change. Retrieved February 3, 2019, from https://www.amazon.com/Habits-Highly-Effective-People-Powerful/dp/0743269519

Czerwinski, M., Czerwinski, M., Horvitz, E., & Wilhite, S. (2004). A Diary Study of Task Switching and Interruptions. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 175–182. https://doi.org/10.1145/985692.985715

Dahlgaard-Park, S. M. (2012). Core values – the entrance to human satisfaction and commitment. *Total Quality Management & Business Excellence*, *23*(2), 125–140. https://doi.org/10.1080/14783363.2012.655067

Dey, A. K., & Abowd, G. D. (2000). CybreMinder: A Context-Aware System for Supporting Reminders. In P. Thomas & H.-W. Gellersen (Eds.), *Handheld and Ubiquitous Computing* (Vol. 1927, pp. 172–186). https://doi.org/10.1007/3-540-39959-3_13

Dix, A., Ramduny-Ellis, D., & Wilkinson, J. (1998, September). *Redefining Organisational Memory- Artefacts and the Distribution and Coordination of Work*. Other presented at the Workshop on Understanding Work and Designing Artefacts. Retrieved from http://eprints.lancs.ac.uk/11643/

Dooley, R. (2015, September 16). Paper Beats Digital In Many Ways, According To Neuroscience. Retrieved February 14, 2019, from Forbes website: https://www.forbes.com/sites/rogerdooley/2015/09/16/paper-vs-digital/

Drucker, P. F. (1967). The Effective Decision. Retrieved February 3, 2019, from https://hbr.org/1967/01/the-effective-decision

Ducheneaut, N., & Bellotti, V. (2001). E-mail As Habitat: An Exploration of Embedded Personal Information Management. *Interactions*, *8*(5), 30–38. https://doi.org/10.1145/382899.383305

Egger, E., & Wagner, I. (1992). Time-management: A Case for CSCW. *Proceedings of the 1992 ACM Conference on Computer-Supported Cooperative Work*, 249–256. https://doi.org/10.1145/143457.143517

Eilam, B., & Aharon, I. (2003). Students' planning in the process of self-regulated learning. *Contemporary Educational Psychology*, *28*(3), 304–334. https://doi.org/10.1016/S0361-476X(02)00042-5

Eldridge, M., & Newman, W. (1996). Agenda Benders: Modelling the Disruptions Caused by Technology Failures in the Workplace. *Conference Companion on Human Factors in Computing Systems*, 219–220. https://doi.org/10.1145/257089.257290

Fleet, L., & Blandford, A. E. (2005). Requirements of time management tools for outpatient physiotherapy practice. *Health Informatics Journal*, *11*(3), 179–199. https://doi.org/10.1177/1460458205055684

Garhammer, M. (2002). Pace of Life and Enjoyment of Life. *Journal of Happiness Studies*, *3*(3), 217–256. https://doi.org/10.1023/A:1020676100938

Gil, Y., & Chklovski, T. (2007). *Enhancing Interaction with To-Do Lists: Using Artificial Assistants*. 9.

Gonzalez, V. M., Galicia, L., & Favela, J. (2008). Understanding and Supporting Personal Activity Management by IT Service Workers. *Proceedings of the 2Nd ACM Symposium on Computer Human Interaction for Management of Information Technology*, 2:1–2:10. https://doi.org/10.1145/1477973.1477976

González, V. M., Mark, G., & Mark, G. (2004). "Constant, Constant, Multi-tasking Craziness": Managing Multiple Working Spheres. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 113–120. https://doi.org/10.1145/985692.985707

Grant, R. M. (2016). *Contemporary Strategy Analysis: Text and Cases Edition*. John Wiley & Sons.

Gray, J. (2013, November 19). Digital vs. Paper Task Managers: How Do You Choose? | Profound Impact Coaching and Training. Retrieved February 14, 2019, from https://profound-impact.com/time-management/digital-vs-paper-planner-one-right

Grusenmeyer, D. (2009). *Mission, Vision, Values & Goals*. Retrieved from https://ecommons.cornell.edu/handle/1813/36906

Halvorsen, S. (2015). *How to implement global vision, mission and strategy into a Norwegian company*. Retrieved from https://brage.bibsys.no/xmlui/handle/11250/301620

Haraty, M., Tam, D., Haddad, S., McGrenere, J., & Tang, C. (2012). Individual Differences in Personal Task Management: A Field Study in an Academic Setting. *Proceedings of Graphics Interface 2012*, 35–44. Retrieved from http://dl.acm.org/citation.cfm?id=2305276.2305284

Harrison, B. L., Cozzi, A., & Moran, T. P. (2005). Roles and Relationships for Unified Activity Management. *Proceedings of the 2005 International ACM SIGGROUP Conference on Supporting Group Work*, 236–245. https://doi.org/10.1145/1099203.1099245

Hazzan, O., & Dubinsky, Y. (2007). The Software Engineering Timeline: A Time Management Perspective. *Software Science, Technology and Engineering, IEEE International Conference on(SWSTE)*, 95–103. https://doi.org/10.1109/SwSTE.2007.9

Halton, M. (2019, January 28). Multiply your time by asking 4 questions about the stuff on your to-do list. Retrieved May 11, 2019, from ideas.ted.com website: https://ideas.ted.com/multiply-your-time-by-asking-4-questions-about-the-stuff-on-your-to-do-list/

Holmlund, M. (2004). Analyzing business relationships and distinguishing different interaction levels. *Industrial Marketing Management*, *33*(4), 279–287. https://doi.org/10.1016/S0019-8501(03)00057-9

Ibrar, M., & Khan, O. (2015). The Impact of Reward on Employee Performance (A Case Study of Malakand Private School). *International Letters of Social and Humanistic Sciences*, *52*, 95–103. https://doi.org/10.18052/www.scipress.com/ILSHS.52.95

Isip, R. (2015, May 23). Quiz: Should You Use a Digital or Paper Planner? Retrieved February 15, 2019, from The Order Expert website: https://www.theorderexpert.com/quiz-should-you-use-a-digital-or-paper-planner/

Järvelin, A.-M. (2001). *Evaluation of relationship quality in business relationships*. Tampere: Univ.

Jex, S. M., & Elacqua, T. C. (1999). Time management as a moderator of relations between stressors and employee strain. *Work & Stress*, *13*(2), 182–191. https://doi.org/10.1080/026783799296138

Jones, W., Bruce, H., Foxley, A., & Munat, C. F. (2007). Planning personal projects and organizing personal information. *Proceedings of the American Society for Information Science and Technology*, *43*(1), 1–24. https://doi.org/10.1002/meet.14504301159

Jordan, C., Cobb, N., & McCully, R. (1989). Clinical Issues of the Dual-Career Couple. *Social Work*, *34*(1), 29–32. https://doi.org/10.1093/sw/34.1.29

Kamsin, A., Blandford, A., & Cox, A. L. (2012). Personal Task Management: My Tools Fall Apart when I'm Very Busy! *CHI '12 Extended Abstracts on Human Factors in Computing Systems*, 1369–1374. https://doi.org/10.1145/2212776.2212457

Kleek, M. V., Bernstein, M. S., Panovich, K., Vargas, G. G., Karger, D. R., & Schraefel, M. M. C. (2009). Note to self: examining personal information keeping in a lightweight note-taking tool. *CHI*. https://doi.org/10.1145/1518701.1518924

Kolbusa, M. (2013). Implementation Management: High-Speed Strategy Implementation. Retrieved February 3, 2019, from https://www.springer.com/gp/book/9783642420351

Lakein, A. (1973). *How to get control of your time and your life*. New York: Peter H. Wyden.

Leshed, G., & Sengers, P. (2011). "I Lie to Myself That I Have Freedom in My Own Schedule": Productivity Tools and Experiences of Busyness. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 905–914. https://doi.org/10.1145/1978942.1979077

Lewis, A. (2013, January 1). The 7 Minute Life – Time Management You Have Time For. Retrieved May 11, 2019, from https://www.the7minutelife.com/

Macan, Therese H., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: Correlations with academic performance and stress. *Journal of Educational Psychology*, *82*(4), 760–768. https://doi.org/10.1037/0022-0663.82.4.760

Macan, Therese Hoff. (1994). Time management: Test of a process model. *Journal of Applied Psychology*, *79*(3), 381–391. https://doi.org/10.1037/0021-9010.79.3.381

Macan, Therese Hoff. (1996). Time-Management Training: Effects on Time Behaviors, Attitudes, and Job Performance. *The Journal of Psychology*, *130*(3), 229–236. https://doi.org/10.1080/00223980.1996.9915004

Macey, W., & Schneider, B. (2008, March). (PDF) The Meaning of Employee Engagement. Retrieved February 12, 2019, from ResearchGate website: https://www.researchgate.net/publication/255593558_The_Meaning_of_Employee_Engagement

Mackay, W. E. (1988a). Diversity in the Use of Electronic Mail: A Preliminary Inquiry. *ACM Trans. Inf. Syst.*, *6*(4), 380–397. https://doi.org/10.1145/58566.58567

Mackay, W. E. (1988b). More Than Just a Communication System: Diversity in the Use of Electronic Mail. *Proceedings of the 1988 ACM Conference on Computer-Supported Cooperative Work*, 344–353. https://doi.org/10.1145/62266.62293

Malone, T. W. (1983). How do people organize their desks?: Implications for the design of office information systems. *ACM Transactions on Information Systems*, *1*(1), 99–112. https://doi.org/10.1145/357423.357430

Mark, G., Gonzalez, V. M., & Harris, J. (2005). No Task Left Behind?: Examining the Nature of Fragmented Work. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 321–330. https://doi.org/10.1145/1054972.1055017

Mittilä, T. (2000). *Relation trine: an analysis of industrial supplier-customer relations*. Tampere: Univ.

Mittilä, T., & Järvelin, A.-M. (2001). *EXPECTATION MANAGEMENT IN BUSINESS RELATIONS: STRATEGIES AND TACTICS*. 15.

Mordkoff, J. T. (2015). The Assumption (s) of Normality. *(2000). 1. Web*.

Mudrack, P. E. (1997). The Structure of Perceptions of Time. *Educational and Psychological Measurement*, *57*(2), 222–240. https://doi.org/10.1177/0013164497057002003

Nasrullah_Phd, S., & Saqib Khan, M. (2015). *The Impact of Time Management on the Students' Academic Achievements*. *11*.

Newman, W. M. (2004). *Busy Days: Exposing Temporal Metrics, Problems and Elasticities through Diary Studies*.

Obijiaku, U. (2015). Effective Time Management for Haaga-Helia UAS International Students Porvoo Campus. Retrieved February 3, 2019, from http://www.theseus.fi/handle/10024/101926

Opilka, M. (2017, May 16). Why you should use a paper calendar. Retrieved February 15, 2019, from Slow Digital website: https://muditalab.com/why-you-should-use-a-paper-calendar-8a4d94139d66

Orlikowski, W. J., & Yates, J. (2002). It's About Time: Temporal Structuring in Organizations. *Organization Science*, *13*(6), 684–700. https://doi.org/10.1287/orsc.13.6.684.501

Orpen, C. (1994). The Effect of Time-Management Training on Employee Attitudes and Behavior: A Field Experiment. *The Journal of Psychology*, *128*(4), 393–396. https://doi.org/10.1080/00223980.1994.9712743

Palen, L. (1999). Social, Individual and Technological Issues for Groupware Calendar Systems. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 17–24. https://doi.org/10.1145/302979.302982

Rebenich, T., & Gravell, A. (2008, June 30). *An Adaptive Time Management System for Student Learning*. 5357–5366. Retrieved from https://www.learntechlib.org/primary/p/29121/

Richardson, T. (2010). *The Impact of Reward on Task Performance in Individuals of High and Low Need for Achievement*. 19.

Rory Vaden. (2015). *How To Multiply Your Time*. Retrieved from https://www.youtube.com/watch?v=y2X7c9TUQJ8.

Ryder, C. (2015). Bullet Journal. Retrieved May 4, 2019, from Bullet Journal website: https://bulletjournal.com/pages/learn.

Slaven, G., & Totterdell, P. (1993). TIME MANAGEMENT TRAINING: DOES IT TRANSFER TO THE WORKPLACE? *Journal of Managerial Psychology*, *8*(1), 20–28. https://doi.org/10.1108/02683949310024432

Stephanie. (2016, March 8). Assumption of Normality / Normality Test. Retrieved February 15, 2019, from Statistics How To website: https://www.statisticshowto.datasciencecentral.com/assumption-of-normality-test/

Taylor, A. S., & Swan, L. (2004). List Making in the Home. *Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work*, 542–545. https://doi.org/10.1145/1031607.1031697

Nayak, S. G. (2018). *Time Management in Nursing –Hour of need*. *11*(3), 4.

Vanderkam, L. (2016). *How to gain control of your free time*. Retrieved from https://www.ted.com/talks/laura_vanderkam_how_to_gain_control_of_your_free_time.

Whittaker, S., & Hirschberg, J. (2001). The Character, Value, and Management of Personal Paper Archives. *ACM Trans. Comput.-Hum. Interact.*, *8*(2), 150–170. https://doi.org/10.1145/376929.376932

Whittaker, S., & Sidner, C. (1996). Email Overload: Exploring Personal Information Management of Email. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 276–283. https://doi.org/10.1145/238386.238530

Woolfolk, A. E., & Woolfolk, R. L. (1986). Time management: An experimental investigation. *Journal of School Psychology*, *24*(3), 267–275. https://doi.org/10.1016/0022-4405(86)90059-2

Yli-Kauhaluoma, S. (2009). Time at R&D Work: Types and strategies of time in the collaborative development of a chemical technology. *Time & Society*, *18*(1), 130–153. https://doi.org/10.1177/0961463X08099948

APPENDIX A: DETAIL OF ANALYSIS DISCUSSION

A.1. The detail of all statistical analysis of the tests of the HIGH tool.

Table A.1 Department Section of Job

Category		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PhD	8	53.3	53.3	53.3
	Master	6	40.0	40.0	93.3
	Postdoctoral	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

Table A.2 Gender

Category		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	6	40.0	40.0	40.0
	Male	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

A.2. Test of Aspect 1: Defining, developing personal visions, missions, values

Table A.3 One-Sample Kolmogorov-Smirnov Test

ASPECT 1		Before-Defining	After-Defining
N		15	15
Normal Parameters [a, b]	Mean	2.5733	4.5067
	Std. Deviation	.34531	.18310
Most Extreme Differences	Absolute	.292	.228
	Positive	.292	.187
	Negative	-.175	-.228
Kolmogorov-Smirnov Z		1.132	.884
Asymp. Sig. (2-tailed)		.154	.415

a. Test distribution is Normal.

b. Calculated from data.

Table A.4 Test of Homogeneity of Variances

ASPECT 1	Levene Statistic	df1	df2	Sig.
Before-defining	3.929	2	11	.051
After-defining	1.748	2	11	.219

Table A.5 Paired Samples Statistics

ASPECT 1		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before-Defining	2.5733	15	.34531	.08916
	After-Defining	4.5067	15	.18310	.04727

Table A.6 Paired Samples Test

ASPECT 1		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before-Defining – after-Defining	-1.93333	.39036	.10079	-2.14951	-1.71716	-19.182	14	.000

A.3. Test of Aspect 2: The manner of time-management

Table A.7 One-Sample Kolmogorov-Smirnov Test

ASPECT 2		Before-manner	After-manner
N		15	15
Normal Parameters [a, b]	Mean	2.9333	4.6667
	Std. Deviation	.67788	.30861
Most Extreme Differences	Absolute	.205	.305
	Positive	.205	.305
	Negative	-.132	-.260
Kolmogorov-Smirnov Z		.795	1.183
Asymp. Sig. (2-tailed)		.552	.122

a. Test distribution is Normal.

b. Calculated from data

Table A.8 Test of Homogeneity of Variances

ASPECT 2	Levene Statistic	df1	df2	Sig.
Before-manner	.203	2	11	.819
After-manner	.051	2	11	.951

Table A.9 Paired Samples Statistics

ASPECT 2		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before-manner	2.9333	15	.67788	.17503
	After-manner	4.6667	15	.30861	.07968

Table A.10 Paired Samples Test

ASPECT 2		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before-manner – after-manner	-1.73333	.70373	.18170	-2.12305	-1.34362	-9.539	14	.000

A.4. Test of Aspect 3: Unexpected events, tasks

Table A.11 One-Sample Kolmogorov-Smirnov Test

ASPECT 3		Before- Unexpected	After- Unexpected
N		15	15
Normal Parameters [a, b]	Mean	3.6667	4.5333
	Std. Deviation	.29378	.20845
Most Extreme Differences	Absolute	.212	.251
	Positive	.188	.180
	Negative	-.212	-.251
Kolmogorov-Smirnov Z		.820	.971
Asymp. Sig. (2-tailed)		.512	.302

a. Test distribution is Normal.

b. Calculated from data

Table A.12 Test of Homogeneity of Variances

ASPECT 3	Levene Statistic	df1	df2	Sig.
Before-unexpected	.755	2	11	.493
After-unexpected	.079	2	11	.925

Table A.13 Paired Samples Statistics

ASPECT 3		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before-Unexpected	3.6667	15	.29378	.07585
	After- Unexpected	4.5333	15	.20845	.05382

Table A.14 Paired Samples Test

ASPECT 3		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before-Unexpected – after-Unexpected	-.86667	.33894	.08751	-1.05437	-.67897	-9.903	14	.000

A.5. Test of Aspect 4: Making a to-do list

Table A.15 One-Sample Kolmogorov-Smirnov Test

ASPECT 4		Before- Making to do	After- Making to do
N		15	15
Normal Parameters [a, b]	Mean	2.4667	4.5556
	Std. Deviation	.61464	.34885
Most Extreme Differences	Absolute	.186	.292
	Positive	.186	.175
	Negative	-.147	-.292
Kolmogorov-Smirnov Z		.720	1.129
Asymp. Sig. (2-tailed)		.678	.156

a. Test distribution is Normal.

b. Calculated from data

Table A.16 Test of Homogeneity of Variances

ASPECT 4	Levene Statistic	df1	df2	Sig.
Before-making to do	3.882	2	11	.053
After-making to do	.827	2	11	.463

Table A.17 Paired Samples Statistics

ASPECT 4		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before-Making to do	2.4667	15	.61464	.15870
	After-Making to do	4.5556	15	.34885	.09007

Table A.18 Paired Samples Test

ASPECT 4		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before-Making to do – after-Making to do	-2.08889	.58373	.15072	-2.41215	-1.76563	-13.860	14	.000

A.6. Test of Aspect 5: Prioritizing manner

Table A.19 One-Sample Kolmogorov-Smirnov Test

ASPECT 5		Before- Prioritizing manner	After- Prioritizing manner
N		15	15
Normal Parameters [a, b]	Mean	1.8000	4.4667
	Std. Deviation	.77460	.51640
Most Extreme Differences	Absolute	.249	.350
	Positive	.249	.350
	Negative	-.202	-.316
Kolmogorov-Smirnov Z		.965	1.357
Asymp. Sig. (2-tailed)		.309	.050

a. Test distribution is Normal.

b. Calculated from data

Table A.20 Test of Homogeneity of Variances

ASPECT 5	Levene Statistic	df1	df2	Sig.
Before-prioritizing manner	1.450	2	11	.276
After-prioritizing manner	1.170	2	11	.346

Table A.21 Paired Samples Statistics

ASPECT 5		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before-Prioritizing manner	1.8000	15	.77460	.20000
	After-Prioritizing manner	4.4667	15	.51640	.13333

Table A.22 Paired Samples Test

ASPECT 5		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before-Prioritizing manner – after-Prioritizing manner	-2.66667	.72375	.18687	-3.06746	-2.26587	-14.270	14	.000

A.7. Test of Aspect 6: Capacity

Table A.23 One-Sample Kolmogorov-Smirnov Test

ASPECT 6		Before- Capacity	After- Capacity
N		15	15
Normal Parameters [a, b]	Mean	2.1333	4.8000
	Std. Deviation	.54989	.31623
Most Extreme Differences	Absolute	.204	.403
	Positive	.196	.264
	Negative	-.204	-.403
Kolmogorov-Smirnov Z		.791	1.361
Asymp. Sig. (2-tailed)		.559	.052

a. Test distribution is Normal.

b. Calculated from data

Table A.24 Test of Homogeneity of Variances

ASPECT 6	Levene Statistic	df1	df2	Sig.
Before-Capacity	2.630	2	11	.117
After-Capacity	1.170	2	11	.346

Table A.25 Paired Samples Statistics

ASPECT 6		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before-Capacity	2.1333	15	.54989	.14198
	After-Capacity	4.8000	15	.31623	.08165

Table A.26 Paired Samples Test

ASPECT 6		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before-Capacity–after-Capacity	-2.66667	.69864	.18039	-3.05356	-2.27977	-14.783	14	.000

A.8. Test of Aspect 7: Personal reward and self-confidence showed

Table A.27 One-Sample Kolmogorov-Smirnov Test

ASPECT 7		Before-Personal reward	After-Personal reward
N		15	15
Normal Parameters [a, b]	Mean	3.1333	4.6222
	Std. Deviation	.37374	.30516
Most Extreme Differences	Absolute	.237	.225
	Positive	.163	.175
	Negative	-.237	-.225
Kolmogorov-Smirnov Z		.918	.870
Asymp. Sig. (2-tailed)		.368	.436

a. Test distribution is Normal.

b. Calculated from data

Table A.28 Test of Homogeneity of Variances

ASPECT 7	Levene Statistic	df1	df2	Sig.
Before-personal reward	2.646	2	11	.115
After-personal reward	.723	2	11	.507

Table A.29 Statistics

ASPECT 7		Before-Personal reward	After-Personal reward
N	Valid	15	15
	Missing	0	0
Mean		3.1333	4.6222
Std. Deviation		.37374	.30516
Minimum		2.33	4.00
Maximum		3.67	5.00

Table A.30 Paired Samples Statistics

ASPECT 7		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before-Personal reward	3.1333	15	.37374	.09650
	After-Personal reward	4.6222	15	.30516	.07879

Table A.31 Paired Samples Test

ASPECT 7		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before-Personal reward – after-Personal reward	-1.48889	.50185	.12958	-1.76680	-1.21097	-11.490	14	.000