

# **Productivity and time management improvement using a web application**

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<p>The purpose of this research is to evaluate the amount of time that people spend on repetitive pattern actions (RPA). It also gives an insight on the concept of PRA itself.</p> <p>The goal is to evaluate the amount of time that can be saved on performing repetitive pattern actions by using a web application, obtain a list of typical RPAs, calculate the amount of time that people spend on them and present the solution for improvements. Afterwards, the research focused on how efficiently the suggested solution performed.</p> <p>The research was implemented as a serious of data gathering activities and experiments followed by latter time calculations.</p> <p>The results were predictable and confirming. The research showed that the time saved by the respondents while using the application might sum up to relatively high numbers.</p>	
<p><b>Keywords</b> Productivity, Time Management, Web Application, RPA, Efficiency, AngularJS</p>	

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## Terms and Abbreviations

RPA	Repetitive Pattern Action
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# 1 Introduction

Apart from any other resource that people or a single individual possess there is one that is, logically, considered to be the most important. Time is something that people have always been concerned about. From using abbreviations in writing to developing more and more rapid means of transportation, the history of humanity is a never ending story of fighting for days, hours and seconds of their lifespan. Not only because “Time is money” as a famous, pitch perfect quote states, but because time is, arguably, the only strictly limited and finite resource that we possess now. Everything else is either replenished or replaceable.

As for business, leadership from both industrial and personal perspective of view is largely defined by the quickness of delivering a product or a service. Good time management is the key to success. A company might not provide the best service on the market, or be the cheapest option to work with, but if it is able to deliver a product or a service quicker than competitors, it is already a solid enough advantage over the others.

As the project management triangle states, time is one of the three most important characteristics that a project has.



Figure 1. A Project Management Triangle (<https://www.linkedin.com/pulse/time-cost-quality-welcome-tradeoff-scott-moffatt>)

However, there are many impediments that do not allow employees and therefore the companies to work to their full potential. Certainly, there is an uncountable number of reasons why some projects or companies succeed, and others fail. Project management is,

apparently, a highly sophisticated field where companies endlessly battle ineffectiveness in costs, time management, planning, etc. The cases, that consultants work with, might be so compound, intricate and specific, that improvements may require colossal amounts of efforts, money and other resources and take years to enforce. Therefore, it seems to be absurd to suggest any significant changes without being aware of context and the business on an individual basis.

Nonetheless, there is, in a varying degree, an inherent similarity in the way, time is wasted by employees, as well as individuals. Among the others, there are what can be called *Repetitive Pattern Actions*. Those actions might not seem like a big issue from the first sight but have a disastrous peculiarity to amass in tremendous time waster.

### **1.1 Research question**

This research is intended to evaluate the amount of time wasted on repetitive pattern actions and, what is more important, the amount of time that can be saved when those actions are automated with a self-created website solution.

### **1.2 Objectives**

This research will focus on a sample set of routine daily operations, and evaluate time spending while using a web application and without it. The results of the measurements will give an insight on how much time is actually being wasted on a daily basis. A set of precise measurements and calculations will be done on a scale from one day to several years for a better visual demonstration of seriousness of the time saving effects. The main objective of this thesis is to compare time spent on Repetitive Pattern Actions with and without using the application. The results of the thesis will display how a person is able to save significant amounts of time during their work or personal life.

### **1.3 Benefits**

Time is something the public genuinely cares about. However, the field of a person's interest regarding time saving is often limited to the things that are natively tracked by time. Those include but not limited to:

- Travel time to work or school
- Duration of a working day
- Amount of time normally spent in a gym
- Duration of a flight

On the other hand, there are actions that do not appear to be time consuming and therefore might easily be forgotten while analyzing the day. The shorter an instance of action gets and the rapider the action happens the less likely it is to be perceived as excessive.

It is totally understandable to take a shorter rout to save ten minutes on a road. But a typical person would not regularly think of a myriad of shorter activities, especially when it is not common to track them by time. If somebody doesn't even know or estimate how much time an action takes they generally don't think of that action as of a time waster.

#### **1.4 Research goal**

This research is intended not only to show the harsh reality but also to give an example solution on how to improve the situation. The analysis is to be useful for individuals looking for the ways to improve productivity as well as companies for which any detectable advancement in employees' productivity ordinarily leads to better profits.



## 2 Theoretical framework

### 2.1 Daily routines

The Collins Dictionary explains the word “routine” as the usual series of things that you do at a particular time. The source also states that a routine is also the practice of regularly doing things in a fixed order (Collins Dictionary 2017.).

Any habit that regularly happens on a daily basis can be called a daily routine. Examples include:

- Checking the weather before leaving home
- Brushing the teeth
- Making a cup of coffee in the morning

Many of those actions require physical involvement. However, as a life of a modern person tends to be more and more linked to the IT industry, the number of operations that are performed using personal electronic devices is constantly raising. Many of such operations do not require almost any movements other than a set of typical hand of finger movements, accompanied by perceiving information from a screen.

Among those actions there is a type that can be distinguished in its own subcategory. This type of action is called a *Repetitive Pattern Action* or *RPA*.

### 2.2 The concept of a Repetitive Pattern Action (RPA)

A *Repetitive Pattern Action (RPA)* is a permanent or temporary routine action that is performed without major changes in the algorithm. IT-related examples of RPAs include:

- Planning the route to the work every morning
- Checking Facebook for the new messages
- Googling a daily forecast

### 2.3 The threat of RPAs

There is a famous quote, part of which, states: “Man grows used to everything”. Being, presumably, one of the most important traits of human nature from the evolutionary perspective of view, this feature has a back side. Being used to something implicitly determines the lack of proper attention.

Actions that happen regularly are likely to be considered as unchangeable, or, in worst cases, even indispensable. Accompanied with the fact that those actions might be (or be

perceived as) very short in time, it is uncommon to think of them as of something that should or even could be possibly improved. Additionally, it is rare to calculate the amount of time that those actions require not least because many (if not most) of them are not naturally measured by that parameter.

When asked to analyze the possibilities to improve time management, people tend to think about the actions that appear to be long for them or the ones that have a well known defined timespan.

## **2.4 Management**

Van Fleet and Peterson (2013, 24) define management as a set of activities directed at the efficient and effective utilization of resources in the pursuit of one or more goals.

Accordingly, to the given definition, the term of management is quite comprehensive and can relevant to individuals personally, in addition to the more common, business related meaning.

## **2.5 Time management**

### **2.5.1 Definition**

Accordingly, to dictionary.com,

“Time management” is the process of organizing and planning how to divide your time between specific activities. Good time management enables you to work smarter – not harder – so that you get more done in less time, even when time is tight and pressures are high. Failing to manage your time damages your effectiveness and causes stress. (Dictionary.com, 2017.)

### **2.5.2 Importance from the personal perspective**

It is hard to underestimate the importance of time management. Getting more things done has always been one of the most important aims in human evolution. From the faster means of transportation to the sophisticated machinery, the main intent is preserved unchanged.

As for an individual, completing more tasks in the same period of time or completing assignments earlier very often results in benefiting in terms of personal growth, wealth or free time.

### **2.5.3 Importance from the business perspective**

The main objective of business is, ultimately, gaining profits. In the never stopping world of modern business, performing actions in the least possible time, all else being equal, will most likely result in better outputs, and, therefore, profits. It is challenging to name a company that is not interested in time management and optimizations. Increasing importance of the consultancy industry, which is, in many ways, very focused on time management solutions, is an unambiguous indicator of the subject's importance.

## **2.6 Productivity**

### **2.6.1 Definition**

Accordingly, to BusinessDictionary.com, productivity stands for:

A measure of the efficiency of a person, machine, factory, system, etc., in converting inputs into useful outputs.  
Productivity is computed by dividing average output per period by the total costs incurred or resources (capital, energy, material, personnel) consumed in that period.  
Productivity is a critical determinant of cost efficiency. (BusinessDictionary.com, 2017.)

### **2.6.2 Productivity app market**

Productivity is a very popular topic now. An example of the topic's popularity is high demand for the productivity improving applications that can be noticed in the online markets.

Both, the world's biggest application markets, AppStore and Google Play are packed with thousands of productivity mobile applications. Being among the top ten of the most popular categories in both stores.

As of 27<sup>th</sup> of August 2017, Google Play, being the biggest online application store in terms of number of available programs, offering 93 690 applications in the 'Productivity' section. (appbrain.com, 2017.). Considering the size of the market, which is counting more than 2,8 millions of apps, it is possible to calculate that 3.35% of the whole assortment is taken by productivity applications(statista.com, 2017.).

Similar situation is seen in the Apple's market which holds the more than 2,2 millions of apps (statista.com, 2017.). Software that belongs to the 'Productivity' category make up 3,7% of all paid programs and 3,8% of the free ones in the Finnish market (applyzer, 2017.).

### **2.6.3 Productivity evaluation**

Comprehensive productivity evaluation is, unarguably, not the easiest assessment to make. However, on a basic level the concept of a more productive action over another could be concluded by time measurement. If, in one case, an action is done noticeably faster than the exact same action in another case, without other losses, the action that was done more productively is the former and the less productive one is the latter.

## **2.7 Technologies**

The scope of the technologies that can be used for the purpose of this research is relatively wide. The required functional for the website prototype can be implemented on various types of technologies. One of the desired criteria was to make the final app small and undemanding to resources. It would be beneficial if a user decides to run the application on miniature computers such as raspberry pi.

Customization being the core idea of the service presumes that the look and functional of the final application is specific for every user. There are virtually no limits on how complicated and complex the final product may become, depending on personal requirements. Nevertheless, a JavaScript framework such as AngularJS or React is sufficient for building a working prototype and do the research.

Granted a wide choice of technology stacks, the author was not anyhow restricted in terms of technical realization and had a capacity of choosing, in personal opinion, the most pleasant stack to work with. Therefore, for the sake of this project, the author made a tenable decision towards the AngularJS framework which is, unarguably, the most customary technology for them.

From the hardware point of view, the website is hosted on a separate laptop running Linux Ubuntu.

The technologies used for creating an online application were chosen accordingly to the author's set of skills.

## 3 Research and Development Plan

### 3.1 Research plan

The research is going to consist of a survey, experiments and the final analysis. The research will be divided in 5 phases which include the following steps:

#### Phase 1

1. Conduct a survey on respondents' habitual tasks.

The survey is to be made individually through an online form or an interview.

- a. Explain the paradigm of *Repetitive Pattern Actions* to the respondents.
  - b. Check their ability to correctly distinguish RPA among other types of actions
  - c. Ask the respondents to create a list of their RPAs
  - d. Refine the list by removing the items that are not considered to be RPA
  - e. If number of given actions is less than 3, suggest additional RPAs that were not listed
  - f. Ask respondents how many times per day or per week they execute the actions that they mentioned while being at home, office, or any other place, where they have a personal dedicated working space. If the action happens less frequently than 3 times a week, consider the action as not frequent enough for the purposes of the research, and do not include it in the survey analysis.
  - g. Ask respondents to give a rough estimation of the time that they spend on each of the remaining RPA items per instance.
2. Select the most suitable respondents based on their list of RPAs for the future research.
  3. Within the selected respondents, select the actions by (in order of importance):
    - a. Suitability for the research. Give a priority to the more indicative actions. Drop the activities that are too specific.
    - b. Prevalence in the survey results
  4. Define a list of actions

The result of this phase is a personalized unordered list of performed Repetitive Pattern Actions with personal amounts of time spent on them.

#### Phase 2

Based on the instances' duration and regularity calculate the amount of time that respondents spend on the actions during a day, a week, a month and a year.

### **Phase 3**

Conduct a set of experiments based on the action list created in the phase 1. For each activity, a researcher will track and write down the time. The results then will be placed in a summary table for individuals as well as the average times for all respondents.

### **Phase 4**

This phase is dedicated for observation of the respondents while using the web application. The application itself will be hosted on a dedicated server with includes a screen. The equipment is supposed to be easily reachable from the spot where users' actions take place and be constantly working.

As well as in the phase 2, conduct a set of experiments based on the action list created in the phase 1. For each activity, a researcher will track and write down the time. It is however possible that many (if not all) the selected activities practically will not take any time except for the insignificant delay between an intention to gather a piece of information and actual perception of it. As long as this delay exists in both of the experiments (with and without the application) it can be ignored without impairing the research's quality.

### **Phase 5**

Compare and make an analysis of the results from the phases 2, 3 and 4. Make conclusions.

## **3.2 Development plan**

The web application which the research is based on is an author's self made solution. An alpha version of the product had been already developed before the work on this thesis started. The prototype is a working solution that includes a set of features that author anticipated to be useful for a regular use. The web application consists of parts which can be called *blocks*. Each block has a dedicated task, functionality and look. All the blocks are to be shown on the one main screen.

It is expected for the website to continue being developed during the research. The main intention is to fit the needs of the given research in the best possible way accordingly to the strategy of the researcher and the target group(s)' attitude. It is quite probable for the website to be adopted and acquire new blocks, functions and appearance after the surveys will have been done. Changes are expected all the way through the research process. For the user surveys that cannot be held personally, Google forms service will be used.

## 4 Research

The research is divided into 5 phases. Each phase is aimed to collect its own set of data to endorse the consecutive step(s).

### 4.1 Phase 1

This phase defines a list of base actions which are the foundation of the future research. It also gives an insight on respondents' subjective time evaluations.

#### 4.1.1 Conducting the first survey on Repetitive Pattern Actions

First of all, as the concept of RPA that was initially introduced in this research is not a widely known term, it must be explained to respondents beforehand. Accordingly, the questionnaire is preceded by a descriptive section to give an idea of the concept of RPA: *“Before you begin it is crucial to fully understand the concept of RPA (Repetitive Pattern Actions). Repetitive Pattern Action (RPA) is a permanent or temporary routine action that is performed without major changes in the algorithm.”*

##### 4.1.1.1 The list of questions for the survey #1

The survey contains the following questions:

1. *Do you completely understand the concept of the RPA (Repetitive Pattern Actions)?*
  - a. *Yes*
  - b. *No*

The interview can not be continued if the answer is “No”. If the interview is conducted personally, the concept has to be explained to a respondent. Otherwise, the questionnaire results are discarded.

2. *Which actions from the following list can be considered RPA?*
  - a. *Checking the weather*
  - b. *Weekend shopping*
  - c. *Googling a new movie's rating*
  - d. *Planning a rout from office to home*

The correct answers are “a” and “d”. The interview can not be continued if the question was answered differently. If the interview is conducted personally, the concept of RPA has to be explained to a respondent anew. Otherwise, the questionnaire results are discarded.

3. *Create the list of your RPAs. Include 3 to 5 examples. For the purpose of this particular research, each of your RPAs must occur at least **3 times a week**.*

The interviewer has to check the answers for this question to avoid incorrect items mistaken for RPA. If found any, and If the interview is conducted personally, the interviewer has to ask a respondent for a replacing item. Otherwise, all the incorrect items are discarded.

The interviewer has an option to suggest example items to a respondent if they struggle to provide their own.

4. *How many times per day do you execute the listed items while you are at home, office, or any other place where you have a personal working space? You can give approximate values or a range of values.*



#### 4.1.1.2 Results of the survey #1

Conduction of a series of five interviews gave a numerical representation of the amount of time that respondents spend on their RPLs. Numbers were then converted to minutes or seconds (in case of smaller numbers) for the purpose of better visibility.

In all tables, duration is mentioned for one Instance of an action.

#### Respondent #1

Table 1. Answers for the Survey #1 given by the Respondent #1

	<b>Regularity</b>	<b>Duration</b>
Checking the weather	1 time/day	20 sec
Using Instagram	3 – 5 times/day	5 min
Checking exchange rate	1 time/day	1 min
Reading the news headlines	1 time/day	5 min

#### Respondent #2

Table 2. Answers for the Survey #1 given by the Respondent #2

	<b>Regularity</b>	<b>Duration</b>
Checking public transport timetables	4 times/day	2 min
Checking remaining cellular data	5 times/day	2 min
Checking the local shop's offers	4 – 5 times/day	4 min

### Respondent #3

Table 3. Answers for the Survey #1 given by the Respondent #3

	<b>Regularity</b>	<b>Duration</b>
Checking Instagram	2 – 5times/day	3 min
Checking Facebook Messenger	2 – 5 times/day	10 min
Looking for new music	2 – 5 times/day	10 min

### Respondent #4

Table 4. Answers for the Survey #1 given by the Respondent #4

	<b>Regularity</b>	<b>Duration</b>
Planning a Route	1 – 3 times/day	3 min
Checking News Feed	1 – 3 times/day	20 min
Checking Weather	4 times/day	1 min

### Respondent #5

Table 5. Answers for the Survey #1 given by the Respondent #5

	<b>Regularity</b>	<b>Duration</b>
Checking the status of the university application	3 – 4 times/day	5 min
Checking route	2 – 3 times/day	1 min
Checking mail	5 – 6 times/day	2 min
Checking the weather	1 – 2 times/day	30 sec

#### 4.1.1.3 Routines summary

The conducted interviews facilitate the research with a list of action types. All the actions mentioned by respondents are summarized in the table 6 in a descending order of frequency.

Table 6. Actions summary.

<b>Action Number</b>	<b>Action Name</b>	<b>Count of Occurrences</b>
1	Checking the weather	3
2	Route planning	3
3	Using Instagram	2
4	Reading the news	2
5	Checking exchange rate	1
6	Checking remaining cellular data	1
7	Checking the local shop's offers	1
8	Checking Messenger	1
9	Looking for new music	1
10	Checking the status of the university application	1
11	Checking mail	1

The future research will be focused on the respondents who mentioned the most popular RPAs for the purpose of representativeness.

#### 4.1.1.4 Explaining Routines' Specifics

##### 4.1.1.4.1 Temporary RPAs of the Respondents #1 and #5

Among other more ordinary actions, the respondents have a distinctive specialty of checking actions that belong to the temporary RPAs.

Respondent #1 mentioned a routine of checking an exchange rate due to the fact that they were planning to go on a trip and wished to exchange the money on a day with the best rate.

Respondent #5 mentioned a routine of checking the status of their university application due to the fact that they are waiting for a decision from an education institution they applied to.

Including temporary RPAs in the current research may be beneficial to show that the improvements in time management can be reached not only for permanently happening actions but also for those that have an ending point.

#### **4.1.1.4.2 Specific routine of the Respondent #3**

The process of looking for new music, requires a high level of concentration and involvement, the respondent admitted. Therefore, despite being a daily habit, it is not a suitable action for the current research.

#### **4.1.1.5 Selecting the respondents**

Accordingly, to the research plan, it is necessary to select the most suitable (in terms of the projected research) respondents and adjust their lists of actions to continue analysis. Some actions provided by the respondents are either highly specialized or complex to implement technically. The purpose of the research is to show example actions and the way they can be improved in terms of productivity. Therefore, the selected respondents are preferred to have commonly used RPAs.

##### **4.1.1.5.1 Elimination of the unsuitable respondents**

Respondent #2 has to be eliminated on a basis of having a list of actions that is, apart from checking public transportation, too specific.

As it was already stated, it is not possible to take into account the respondent's #3 habit of looking for new music. Another action that the individual mention is Checking Facebook Messenger. This action was not indicated by other respondents. It is also technically more challenging in realization than may other options. Thus, the Respondent #3 has to be eliminated from the future research.

After elimination of unsuitable respondents, we have the following list of respondents to work with:

- Respondent #1
- Respondent #4
- Respondent #5

#### 4.1.1.6 Selecting the most suitable actions for the future research

Before selecting the best (in terms of research) RPAs, it is vital to compose a table of remaining respondents and their actions. Actions are rearranged and colored to give an improved visual on the identical habits.

Table 7. Respondents chosen for the second part of the Phase 1.

	<b>Respondent #1</b>	<b>Respondent #4</b>	<b>Respondent #5</b>
<b>Action 1</b>	Checking the weather	Checking the Weather	Checking the weather
<b>Action 2</b>	Using Instagram	Planning a Route	Checking a Route
<b>Action 3</b>	Reading the news headlines	Checking News Feed	Checking mail
<b>Action 4</b>	Checking exchange rate		Checking the status of the university application

##### 4.1.1.6.1 Elimination of the unsuitable actions

The actions, considered unsuitable for the research, have to be dropped. “Using Instagram” is one of the actions that do not perfectly fit for this research. Even though, usage of that social network is, in some places, patterned it still very often requires peculiar interaction with the user and. Another example of such action is “Checking mail”.

It was previously assumed to be a good intention to include a temporary RPA to the research even though such action may be quite specific. Between “Checking exchange

rate” and “Checking the status of the university application” it is wiser to chose the first because of much easier realization from a technical point of view. Additionally, a website block, created for checking exchange rates is universal and can be used by a wide range of people. A script that controls an application status at a university, on the other hand, is specific and will work only for the given educational institution.

Checking the news feed is, indeed, an RPA. However, this action will not be taken for the prospective research due to its level of variability.

#### 4.1.1.7 Defining the final list of actions

After the adjustments described earlier it is now finally possible to compose the table of the actions required for the future research.

Table 8. The final list of RPAs

	<b>Respondent #1</b>	<b>Respondent #4</b>	<b>Respondent #5</b>
<b>Action 1</b>	Checking the weather	Checking the Weather	Checking the weather
<b>Action 2</b>	Checking exchange rate	Planning a Route	Checking a Route

#### 4.1.2 Results of the Phase 1

Completing the Phase 1 provided a researcher with a specific set of RPAs that will be used a basis for the subsequent study.

## 4.2 Phase 2

It this phase is dedicated for calculation the time that the remaining respondents spend on the remaining repetitive pattern actions. The information about time needed to perform each of the actions and number of occurrences that happen throughout the day were already given by the interviewed people. Now, based on the received data, it is time to calculate amount of time that people think they spend on the actions on a longer scale. In case of a varying “regularity” parameter, total duration will be represented as a range. Time periods are:

- Day (duration of an instance multiplied by amount of occurrences)
- Week (total amount of time for a day multiplied by 7)
- Month (total amount of time for a day multiplied by 30)
- Year (total amount of time for a week multiplied by 12)

Totals will be calculated by combining the time spent on different actions. In case of a varying “regularity” parameter, three totals shall be calculated:

- Maximum Total (Maximal Regularity multiplied by a timespan)
- Minimum Total (Minimal Regularity multiplied by a timespan)
- Average Total (Maximum Total + Minimum Total) divided by 2

The numbers may be rounded as the main point of the research is not to precisely evaluate specific actions and time spend on them but to show the concept itself.

### 4.2.1 Estimated time loses for the Respondent #1

Amount of time spent by the Respondent #1 based on the given data about their daily routines, adjusted in the previous step is shown in the table 9.

Table 9. Selected actions and their length of the Respondent #1

	<b>Regularity</b>	<b>Duration</b>
Checking the weather	1 time/day	20 sec
Checking exchange rate	1 time/day	1 min

Based on that data it is possible to calculate time loses on a longer run. Results are presented in the table 10.

Table 10. Calculated RPAs' durations for the Respondent #1

	Calculated Duration Per			
	Day	Week	Month	Year
Checking the weather	20 sec	2,3 min	10 min	120 min
Checking exchange rate	60 sec	7 min	30 min	365 min
<b>Total</b>	<b>80 sec</b>	<b>9,3 min</b>	<b>40 min</b>	<b>485 min</b>

As the “regularity” did not vary for any of the performed actions, there is no need to calculate maximum, minimum and average Totals.

In this case, calculating time estimation for “Checking exchange rate” might not be a realistic case, as how it was previously stated, this action is temporary and will most likely end much sooner. However, the calculation was still done for the example purposes and keeping the report homogeneous. Ultimately, all the listed actions are, even though specifically selected, but nevertheless just accidental examples. It is feasible to project those examples at their alternatives of the similar duration.

#### 4.2.2 Estimated time loses for the Respondent #4

Amount of time spent by the Respondent #4 based on the given data about their daily routines, adjusted in the previous step is shown in the table 11.

Table 11. Selected actions and their length of the Respondent #4

	Regularity	Duration
Checking the weather	4 times/day	1 min
Planning a Route	1 – 3 times/day	3 min

Based on that data it is possible to calculate time loses on a longer run. Results are presented in the table 12.



Table 12. Calculated RPAs' durations for the Respondent #4

	Calculated Duration Per			
	Day	Week	Month	Year
Checking the weather	4 min	28 min	120 min	24 hrs.
Planning a Route	3 – 9 min	21 – 63 min	90 – 270 min	18 – 54 hrs.
<b>Total (Minimum)</b>	<b>7 min</b>	<b>49 min</b>	<b>210 min</b>	<b>42 hrs.</b>
<b>Total (Maximum)</b>	<b>13 min</b>	<b>91 min</b>	<b>390 min</b>	<b>78 hrs.</b>
<b>Total (Average)</b>	<b>10 min</b>	<b>70 min</b>	<b>300 min</b>	<b>60 hrs.</b>

#### 4.2.3 Estimated time loses for the Respondent #5

Amount of time spent by the Respondent #5 based on the given data about their daily routines, adjusted in the previous step is shown in the table 13.

Table 13. Selected actions and their length of the Respondent #5

	Regularity	Duration
Checking the weather	1 – 2 times/day	30 sec
Checking a Route	2 – 3 times/day	1 min

Based on that data it is possible to calculate time loses on a longer run. Results are presented in the table 14.

Table 14. Calculated RPAs' durations for the Respondent #5

	<b>Calculated Duration Per</b>			
	<b>Day</b>	<b>Week</b>	<b>Month</b>	<b>Year</b>
Checking the weather	30 – 60 sec	3,5 – 7 min	15 – 30 min	3 – 6 hrs.
Checking a Route	2 – 3 min	14 – 21 min	60 – 90 min	12 – 18 hrs.
<b>Total (Minimum)</b>	<b>2,5 min</b>	<b>17,5 min</b>	<b>75 min</b>	<b>15 hrs.</b>
<b>Total (Maximum)</b>	<b>4 min</b>	<b>28 min</b>	<b>120 min</b>	<b>24 hrs.</b>
<b>Total (Average)</b>	<b>3,25 min</b>	<b>22,75 min</b>	<b>97,5 min</b>	<b>19,5 hrs.</b>

#### 4.2.4 Results of the Phase 2

Phase 2 resulted in a set of numerical information about respondent actions' duration throughout multiple timespans. Calculated averages will be later used for comparison with the results of time tracked experiments.

### 4.3 Phase 3

In this phase the researcher will conduct a set of experiments on the actions discussed in the previous phases. The results will be very similar to the results of the Phase 2. However, it is anticipated that people were not able to track the time that they spent on their PRAs because it is not common to treat those actions as the ones that need a time estimation.

All the experiments are conducted individually. The experiment procedure is uncomplicated. A respondent is asked to replay a typical algorithm that they perform while doing an action. Time is tracked by a researcher for one instance of an action. It is then easy to calculate time values for longer terms.

As in the Phase 2, the numbers may be rounded as the main point of the research is not to precisely evaluate specific actions and time spend on them but to show the concept itself.

#### 4.3.1 Time tracking results for the Respondent #1

Table 15. Duration of the tracked actions of the Respondent #1

	<b>Regularity</b>	<b>Duration</b>
Checking the weather	1 time/day	16 sec
Checking exchange rate	1 time/day	13 sec

Based on that data it is possible to calculate time loses on a longer run. Results are presented in the table 16.

Table 16. Calculated RPAs' durations for the Respondent #1

	<b>Calculated Duration Per</b>			
	<b>Day</b>	<b>Week</b>	<b>Month</b>	<b>Year</b>
Checking the weather	16 sec	112 sec	8 min	96 min
Checking exchange rate	13 sec	91 sec	6,5 min	78 min
<b>Total</b>	<b>29 sec</b>	<b>203 sec</b>	<b>14,5 min</b>	<b>174 min</b>

#### 4.3.2 Time tracking results for the Respondent #4

Amount of time spent by the Respondent #4 based on the given data about their daily routines, adjusted in the previous step is shown in the table 17.

Table 17. Duration of the tracked actions of the Respondent #4

	<b>Regularity</b>	<b>Duration</b>
Checking the weather	4 times/day	7 seconds
Planning a Route	1 – 3 times/day	35 sec

Based on that data it is possible to calculate time loses on a longer run. Results are presented in the table 18.

Table 18. Calculated RPAs' durations for the Respondent #4

	<b>Calculated Duration Per</b>			
	<b>Day</b>	<b>Week</b>	<b>Month</b>	<b>Year</b>
Checking the weather	28 sec	3,2 min	14 min	2,8 hrs.
Planning a Route	35 – 105 sec	4 – 7 min	17,5 – 52,5 min	3,5 – 10,5 hrs.
<b>Total (Minimum)</b>	<b>63 sec</b>	<b>7,2 min</b>	<b>31,5 min</b>	<b>6,4 hrs.</b>
<b>Total (Maximum)</b>	<b>133 sec</b>	<b>10,2 min</b>	<b>66,5 min</b>	<b>13,3 hrs.</b>
<b>Total (Average)</b>	<b>98 sec</b>	<b>8,7 min</b>	<b>49 min</b>	<b>9,85 hrs.</b>

#### 4.3.3 Time tracking results for the Respondent #5

Amount of time spent by the Respondent #5 based on the given data about their daily routines, adjusted in the previous step is shown in the table 19.

Table 19. Duration of the tracked actions of the Respondent #5

	<b>Regularity</b>	<b>Duration</b>
Checking the weather	1 – 2 times/day	13 sec
Checking a Route	2 – 3 times/day	42 sec

Based on that data it is possible to calculate time loses on a longer run. Results are presented in the table 20.

Table 20. Calculated RPAs' durations for the Respondent #5

	<b>Calculated Duration Per</b>			
	<b>Day</b>	<b>Week</b>	<b>Month</b>	<b>Year</b>
Checking the weather	13 – 26 sec	1,5 – 3 min	6,5 – 13 min	1,3 – 2,6 hrs.
Checking a Route	84 – 126 sec	9,8 – 14,7 min	42 – 63 min	8,5 – 12,8 hrs.
<b>Total (Minimum)</b>	<b>98 sec</b>	<b>11,3 min</b>	<b>48,5 min</b>	<b>9,8 hrs.</b>
<b>Total (Maximum)</b>	<b>152 sec</b>	<b>17,7 min</b>	<b>76 min</b>	<b>15,4 hrs.</b>
<b>Total (Average)</b>	<b>125 sec</b>	<b>14,5 min</b>	<b>62,25 min</b>	<b>12,6 hrs.</b>

#### 4.3.4 Results of the Phase 3

Phase 3 resulted in a set of numerical information about recorded and calculated respondent actions' duration throughout multiple timespans. Calculated averages will be later used for comparison with the results of the Phase 2.

#### **4.4 Phase 4**

This phase initially was supposed to measure the amount of time that the respondents spend while performing their RPAs while being assisted with the web application. However, when the screen with a running application was set up in front of them it turned out to be nearly impossible to make any time tracking.

The application itself was constructed only from blocks that were needed by a specific user. As the required information was always on the screen, all what was needed was to turn a head towards the monitor. In some cases, the working environment allowed the screen to take its place right next to the respondent's eyes. So receiving the information from the webpage was as fast as a human being is able to comprehend a text written on the screen. This time period is actually so little (not more than a couple of seconds) that it can be neglected. It might have taken some time for individuals to get used to take a look on the additional screen in the first place. But as soon as they got used to it (which happened very fast) that action become mechanical.

## 4.5 Phase 5

The last phase of the research will contain multiple comparisons among time that people estimated to spend on their PRAs, actual time calculations and time that people spent while using the productivity improvement application. As it was stated in the Phase 4, the last measurement is given without exact numerical values and assumed to momentum. It does not damage the current research as the main point of it is to visually present a possibility of time management improvements using a web application to automatize RPAs and eliminate a time wasting factor. Exact figures are not the main point of this work. However, if a more precise calculation is needed, a rough time estimation of between 1 and 2 seconds may be taken into account. Nonetheless, this report will not consider it.

The following calculations will be done:

- Amount of time saved on performing each of the actions by each of the respondents
- Amount of time saved by each individual on performing all their actions combined
- Averaged amount of time saved on performing an action
- Averaged amount of time that may possibly be saved by an individual if the number of actions is 5, 7 or 10.

### 4.5.1 Comparison of estimated and real time spending

Table 21 compares respondents' estimations, real values and gives a reference of "0" for the same actions but with the assistance of the web application. Actions names are not given intentionally so that the results can be conceived without an association with a concrete action but as a concept.

The comparison will be represented on a scale of a day, a week, a month and a year. Averaged values will be used where applicable.

Table 21. Comparison on a scope of one day.

		<b>Estimated</b>	<b>Real</b>	<b>Application</b>
<b>Respondent #1</b>	Action 1	20 sec	16 sec	X
	Action 2	60 sec	13 sec	X
	<b>Combined</b>	<b>80 sec</b>	<b>29 sec</b>	<b>X</b>
<b>Respondent #4</b>	Action 1	4 min	28 sec	X
	Action 2	3 – 9 min	35 – 105 sec	X
	<b>Combined</b>	<b>10 min</b>	<b>98 sec</b>	<b>X</b>
<b>Respondent #5</b>	Action 1	30 – 60 sec	13 – 26 sec	X
	Action 2	2 – 3 min	84 – 126 sec	X
	<b>Combined</b>	<b>3,25 min</b>	<b>125 sec</b>	<b>X</b>
<b>Total</b>		<b>14,6 min</b>	<b>4,2 min</b>	<b>X</b>

Table 22. Comparison on a scope of one week.

		<b>Estimated</b>	<b>Real</b>	<b>Application</b>
<b>Respondent #1</b>	Action 1	2,3 min	112 sec	X
	Action 2	7 min	91 sec	X
	<b>Combined</b>	<b>9,3 min</b>	<b>203 sec</b>	<b>X</b>
<b>Respondent #4</b>	Action 1	28 min	3,2 min	X
	Action 2	21 – 63 min	4 – 7 min	X
	<b>Combined</b>	<b>49 min</b>	<b>8,7 min</b>	<b>X</b>
<b>Respondent #5</b>	Action 1	3,5 – 7 min	1,5 – 3 min	X
	Action 2	14 – 21 min	9,8 – 14,7 min	X
	<b>Combined</b>	<b>22,75 min</b>	<b>14,5 min</b>	<b>X</b>
<b>Total</b>		<b>81,05 min</b>	<b>26,6 min</b>	<b>X</b>



Table 23. Comparison on a scope of one month.

		<b>Estimated</b>	<b>Real</b>	<b>Application</b>
<b>Respondent #1</b>	Action 1	10 min	8 min	X
	Action 2	30 min	6,5 min	X
	<b>Combined</b>	<b>40 min</b>	<b>14,5 min</b>	<b>X</b>
<b>Respondent #4</b>	Action 1	120 min	14 min	X
	Action 2	90 – 270 min	17,5 – 52,5 min	X
	<b>Combined</b>	<b>300 min</b>	<b>66,5 min</b>	<b>X</b>
<b>Respondent #5</b>	Action 1	15 – 30 min	6,5 – 13 min	X
	Action 2	60 – 90 min	42 – 63 min	X
	<b>Combined</b>	<b>97,5 min</b>	<b>62,25 min</b>	<b>X</b>
<b>Total</b>		<b>7,3 hrs.</b>	<b>2,4 hrs.</b>	<b>X</b>

Table 24. Comparison on a scope of one year.

		<b>Estimated</b>	<b>Real</b>	<b>Application</b>
<b>Respondent #1</b>	Action 1	120 min	96 min	X
	Action 2	365 min	78 min	X
	<b>Combined</b>	<b>485 min</b>	<b>174 min</b>	<b>X</b>
<b>Respondent #4</b>	Action 1	24 hrs.	2,8 hrs.	X
	Action 2	18 – 54 hrs.	3,5 – 10,5 hrs.	X
	<b>Combined</b>	<b>60 hrs.</b>	<b>9,85 hrs.</b>	<b>X</b>
<b>Respondent #5</b>	Action 1	3 – 6 hrs.	1,3 – 2,6 hrs.	X
	Action 2	12 – 18 hrs.	8,5 – 12,8 hrs.	X
	<b>Combined</b>	<b>19,5 hrs.</b>	<b>12,6 hrs.</b>	<b>X</b>
<b>Total</b>		<b>87,6 hrs.</b>	<b>25,35 hrs.</b>	<b>X</b>

The real times are smaller than then people estimated. It can be explained by the fact that people tend to give rounded values and always round to the highest.

#### 4.5.2 Identifying the average time saved on an average action

Averaged amount of time saved by an average individual is presented on the table 25. The averages were calculated by dividing a sum of *combined real time* by the number of people from the tables 21-24.

Table 25. Average amount of time saved by an individual per task

	<b>day</b>	<b>week</b>	<b>month</b>	<b>year</b>
<b>Average</b>	1,4 min	8,9 min	48 min	8,45 hrs.

The figures given in the table 25 might not look tremendous or possibly even significant. But they are. The presented calculation was made for a *one short* typical task performed by a *single* person. Those figures may add up and become enormous. Especially from the management perspective where an executive may have tens or hundreds or even thousands of employees.

#### 4.5.3 Scaling the number of actions

It is demonstrative to calculate how much time an individual could have possibly saved if they had more of their RPAs included in the productivity web application. In the table 25 figures are calculated for 3, 5 and 7 hypothetical RPAs.

Table 26. Global estimation of possible time saving

	<b>day</b>	<b>week</b>	<b>month</b>	<b>year</b>
<b>3 RPAs</b>	4,2 min	26,7 min	2,4 hrs.	25,35 hrs.
<b>5 RPAs</b>	7 min	44,5 min	4 hrs.	42,25 hrs.
<b>7 RPAs</b>	9,8 min	62,3 min	5,6 hrs.	59,15 hrs.

## 5 Results and Evaluation

The research gave an insight on the amount of time that individuals spend on a set of routine actions and the possibility to improve personal time management with a web application.

First of all, it is worth noticing that all the respondents managed to understand the concept of repetitive pattern actions without any complications. The description that was given in the beginning of the questionnaire was competent in giving a clear idea of the term. None of the respondents requested any further explanations. The description block was followed by a question to determine how well the concept is understood. None of the five respondents made a mistake in this task.

Three respondents gave only three examples of their daily routine while the questionnaire asked for any amount between three and five. Remaining two individuals provided four examples. All in all, 17 RPAs were mentioned of which 11 were unique. It is no surprise that dominant, by the amount of mentioning, examples were the ones, given as a reference in the survey's form.

Some of the RPAs were dropped due to unsuitability for the research. Eventually, each of the remaining respondents were left with two items. It made the time loses estimations more even among the individuals.

The time estimations that were received from the respondents are much greater than the real value of time they spent on their actions. It is totally logical and can be explained by the fact that the respondents gave rounded figures and, rationally, rounded to the maximum. Nevertheless, none of the interviewed people admitted to seriously consider the listed actions as significant time wasters.

None of the respondents claimed any problems related to the web application usage. All the tested individuals rapidly managed to get used to perceiving needed data from a screen. Eventually some of respondents stated that using a dedicated screen for repetitive pattern actions appeared to be more comfortable and even more natural than breaking away from the action they were doing to check the desired information.

Moreover, as the respondents had useful information constantly in front of them, they showed a tendency to check some of the parameters (for example, the weather) more frequently. Thus, they possessed more up to date information than they probably would

have had in case of manual checks. This feature might become especially useful for more sophisticated business oriented tasks and turn out to be another additional benefit if the system is utilized in corporate world.

As we it can be clearly identified from the results of the research, the more actions an individual dedicates for the mentioned web application the more time they save. And the longer actions take the more significant the result will be. However, even for the relatively short actions, reviewed in the analysis, the improvement is already easily distinguishable.

It is safe to conclude that using the reviewed web application is highly beneficial for individuals based on the research outcomes. Thus, a plain theoretical assumption can be made for larger number of repetitive pattern actions by extrapolating the existing results. Granted, for instance, seven repetitive pattern actions theoretically included into the personal web assistant, it is easily possible to save ten minutes of personal time a day. Which awards users with more than an hour of purely saved time on weekly basis. All of it with absolutely no harm to the working process.

As for the business, the possible outcomes may be very roughly assumed by multiplying the obtained figures by the number of employees. However, it hugely depends on the tasks that a firm is striving to optimize and requires a much more specific approach.

What can be certainly stated now (for most of the cases), is that the bigger the company the more people it usually employs. And the more people are employed the more tasks they perform. And the more tasks they perform the higher chance some of them happen to be RPAs. And the more RPAs there are, the more of them might be able to be handled with the researched solution. And the more RPAs are eventually handled, the more time will employees and, accordingly, the employer save.

## **6 Conclusions and Summary**

### **Goals and results**

The research went smoothly in a strict accordance with the research plan. There were no unpredicted problems or challenges. All the goals for this research were met completely and the results have met the expectations.

### **Validity of sources**

Only reliable sources were taken into account. None of them gives even a slight reason to consider them untrustworthy. In addition to publicly available information sources, a significant part of data was received from the interviewed respondents. All the given data can be characterized as considerably realistic and has no signs of being made up. Additionally, the questions in the interviews were not very personal and did not include any specific requests that the respondents might have wanted to avoid. Furthermore, open-ended questions, which were the core of the interviews allowed individuals to decide themselves which data to give. In other words, the respondents had room for choosing the least confidential info they wanted to give. Conclusively, it is safe to assume that the given data was true.

### **Validity of results**

Validity of results is affected by reliability of the information sources, and calculation accuracy. Information sources were already recognized to be reliable. As for the calculations it is a little different. The aim of the research was not to get precise numbers of how much actions take, but to prove the concept work. Therefore, even though, the computations were made with a maximum precision of modern personally owned means of computing, many of the values were afterwards rounded. For this research, the visibility is being of a greater importance than numerical accuracy.

Additionally, as evaluation of the time needed for gathering the information from the web application was not made (due to the reasons mentioned above), the resulting time, saved by the respondents is a little less than mentioned in the results of the research.

## **Evaluation of learning**

The author of this work undoubtedly considers the committed research as a beneficial learning assignment. This research is the biggest research that the composer of the written work has ever performed. The author is completely satisfied with the research process as well as the results.

Among the other things, this reported positively reflected on the following author's skills:

- Creating web applications
- Using AngularJS framework
- Working with APIs
- Conducting surveys
- Analyzing results
- Understanding research methods and procedures

## **Further research/development**

The research can be continued to give better estimations on a set of different, tasks than were mentioned in this report. Each task is assumed to have individual values for time consuming and, therefore, possible productivity improvements.

It is also possible to scale the reviewed web application to fit the employees' needs of a small company or a start up and identify how well it could work in a business sector.

Another option is studying the matter from a psychological point of view. It could be helpful to understand the genuine reasons of why people do not generally pay much of their attention to RPAs and what can be done with it.

An additional question is how disturbing could the main screen of a productivity application be. In the former research, the web pages were made to perform just two actions and seemed to not to be disturbing for the users. However, no research was done in that matter so it is not possible to state such an idea. It is possible to study this topic further and see how people interact with the application during longer time periods while having more fictional blocks of different complexity and appearance.

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