

2010

The Meeting Planner

“The New Way of Working”

The Meeting Planner is designed as an addition to the Travel Portal. The Travel Portal is a web portal where the employees of Capgemini can plan/control their travel behavior. It is a result of the New Way of Working – program.



Preface

In this report the design of a Meeting Planner is presented. This Meeting Planner is set up to find possible meeting dates and locations for planning meetings between two or more employees.

The design and interface of this Meeting Planner is focused on use for employees at Capgemini. Capgemini is a worldwide market leader in consulting, technology, outsourcing and local professional services and is the initial constituent of this assignment. A Meeting Planner reaches the scope of the 'New Way of Working', a project initiated by Capgemini which promotes better use of resources and environment.

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1 Introduction

This chapter gives a general introduction about the program in which the Meeting Planner is embedded. First a short description about Capgemini is given, followed by a description of their mobility management program.

1.1 Description “The New Way of Working”

With the New Way of Working Capgemini combines smart travelling with smart working. The New Way of Working is time and place independent. It asks for a *mind shift* among employees, managers and clients.

With the New Way of Working Capgemini introduces an innovative and sustainable program, based on time and place independent working and focused on a better balance between work, life and mobility for employees. NWW serves employees freedom and flexibility. In consultation with the client they can choose what the most suitable working location is – at home, at the client, at the office in Utrecht or a meeting point somewhere else. NWW also yields a positive effect for the environment. Now Capgemini uses 41.000 liters of fuel, produces 105.000 kg CO₂ and is responsible for 16km of congestion every day. NWW aims to reduce the commuter traffic by 20-25 percent.

1.2 Organization

Capgemini serves with consulting-, technology-, and outsourcing services. Their main goal is adding value to the performances and change processes of clients in a great number of branches. The power to cooperate is Capgemini’s most important distinguishing factor. With this way of working, the “Collaborative Business Experience”, both parties can benefit. The largest group of employees is consultants and they are working on projects at clients’ locations most of the time. In the Netherlands there are employees (~ 5000) and clients all over the country. Therefore, mobility is an important issue at Capgemini. At the moment Capgemini employees use around 3700 lease cars that drive approximately 120.000.000 km/year where only 6.600.000 km per year is travelled by public transport.

1.3 Location

Until recently Capgemini had only three offices in Utrecht and one office in Amsterdam. By now, as part of the New Way of Working several meeting points are opened spread all over the Netherlands. There are now 10 meeting points in the Netherlands. These meeting points are a kind of hot desks and accessible for every employee. The meeting points have the same facilities as the central office and enables employees to work closer to home or the client. Before the introduction of hot desks Capgemini had 20 square meter of office space per employee, while that is only 12,5 square meter at the moment. This means that the usage of hot desks made it already possible to save almost 30.000 square meter of office space. The Capgemini offices are well equipped for all types of activities. This means that rooms are suitable for conferences, meetings or e.g. phone calls.

1.4 Mobility management

In the current lifestyle of most people, mobility is an important element. However, today’s mobility shows negative side-effects: congestion, unreliable travel times, environmental damage and pressure on work/life balance. Several possibilities exist to improve the mobility

of people and goods. Traffic management as well as ITS are well-known possibilities. However, there is more than just traffic management and ITS. Let's consider mobility management as a concept which is related to traffic management and ITS, but also to other topics such as dynamic car insurance and congestion charging. In this assignment, we will focus on mobility management for people and we will introduce three levels of mobility management.

In our vision, mobility management is more than organizing trips in a smart way, or just using more sustainable modes of transport. We also include attitude towards mobility in general. People need to consider whether they have to travel at all at certain times. Working at home needs to be an option.

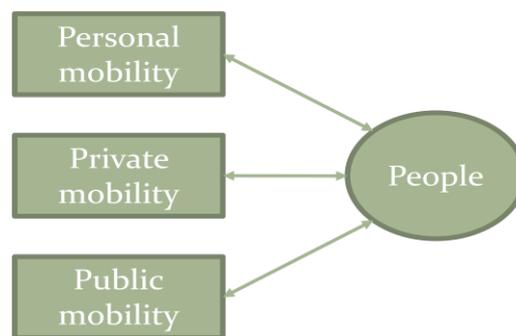


Figure 1: Three elements of mobility for people

In Figure 1 a schematic overview is made with three important elements that describe the full scale of mobility management:

- *Personal mobility* concerns the choices of individuals on where to work and live, how to get to work or leisure locations and deciding if it is necessary to travel there (or if it is possible to work from home or other places). Additionally, it also involves the best way to travel using traffic/travel information, or various kinds of ITS;
- *Private mobility* concerns the view of the employer. Employees work and live at certain locations, not necessarily the same. An employer should strive for facilitating employees in their choices for mobility and offer them services and tools. However, the business remains important. For professional mobility (such as in supply chain management) the employer needs services and tools to facilitate the mobility of goods (or people);
- *Public mobility* concerns the view of the government. A government should facilitate the need of mobile societies to a certain level, and as such should try to guarantee the accessibility of transport and the reliability thereof. Apart from that, a government also provides for limiting conditions, such as safety. A government can deploy several measures, such as traffic management, ITS, but also legislation concerning taxes.

These three elements are part of mobility management. It ranges from the long term changes (such as the land-use transport interaction - because people choose where to live and work) to the short term choices such as choosing a route towards a destination.

Capgemini is currently implementing various ideas that focus on the mobility from an employer's perspective (*Private mobility*).

1.5 The case

Capgemini has already been working on mobility management for a long time, such as the usage of hot desks. However, it all started with and is aimed at the following goals:

- Strengthen the life balance of employees
- Realize more effective use of one's time and higher productivity
- Corporate social responsibility and make environmental benefits
- Be a leader in the field of mobility management

The New Way of Working builds on this successful mobility policy and stands for a strong integration of "smart travelling" and "smart working". NWW is an innovative and sustainable program, based on time and place independent working. Specific goals of NWW are:

- (Further) reduction in car kilometers (20-25 percent for commuter traffic)
- Corporate social responsibly and make environmental benefits (CO₂ reduction)
- Strengthen the lifebalance of employees
- Strengthen client intimacy
- Cost reduction (housing and car expenses)

1.5.1 Which measure?

As said before NWW makes it possible for employees to choose each day again what the most suitable working place is – at home, at the clients, at the head office in Utrecht or at a meeting point in the country. This choice is made together with the client. The seven meeting points that are opened are located near (large) clients all over the country. All of them are easily accessible by public transport and car and have good parking facilities. The equipment is fully focused on working flexibly.

The implementation of NWW will be executed in phases, in which all four pillars (shown below) in connection are brought to a higher level. An integral approach is the critical factor to success.

- Accommodation (working on the best location)
 - Physical workplace: head office, meeting point, client, home or on the road
 - Tools (webcam, eye-catchers, C-port, Microsoft Communicator, push mail, I-Pass)
- Mobility (travelling in the most efficient way)
 - Time, costs and environment
 - NS-Business Card
 - Alternative ways of leasing
- Travel Portal (online communicationplatform)
 - Shows who, where and when works and how they are accessible
 - Gives insight in where and when working- and meeting space is available
 - Is a tool to determine how to travel the most efficient to the chosen location
 - Shows the impact of location- and mode choice on costs and environment
- Communication

1.5.2 Benefits

The New Way of Working has benefits for all the different “parties”, and are shown below:

Employees

A bigger freedom to execute the work at the best fitting moment and the most suitable location:

- Strengthening of the life balance
- Switch of obligation to perform to the best of one’s ability towards an obligation to produce a certain result

Capgemini

- Reduction in housing costs (expectation of 30 percent less floor space, on a yearly base 20 percent and 5,5 million euro less in costs)
- Reduction in car kilometers (expectation of 20-25 percent for commuter traffic)
- Strengthening of client intimacy (based on collective responsibility and output)

Clients

- Cost reduction (non or less investments in the housing of external employees)
- Corporate social responsibility (only travelling if necessary)

Society

- Environmental benefits (reduction in fuel usage and CO₂ emission)
- Reduction of propensity to congestion (less commuter traffic)

1.5.3 Promotion

Communication is crucial for making the NWW a success. Based on experiences with a pilot project tools are made to help realize the behavioral changes. Goal for the behavioral

development is that employees have to make more conscious choices in the time of work and location of work. The program they have to follow focuses on:

- Break the routines of going to the office
- The support and adaptations that make this possible

Central concepts in the communication are:

- Trust
- From giving account towards giving and taking responsibility

2 The assignment

In this chapter the assignment/case developed will be introduced here. First the “Travel Portal” will be introduced, followed by our assignment. The chapter ends with the goals/demands/requirements related to our Meeting Planner.

2.1 Description “Travel Portal”

The portal is meant to facilitate employees in their personal demand for mobility (*Personal mobility*). The portal provides several services for that purpose, such as real time traffic information, multi mode route guidance, information about past mobility choice and information about colleagues for carpooling or job swapping. Furthermore, information is provided on alternative locations to work, the current working location and the working locations of colleagues. At the moment Travel Portal is only informing, while in the future it has to be facilitating.

The Travel Portal aims to reduce the amount of kilometers driven each year by employees, and improve their work-life balance, because they are able to make better choices regarding their locations to work and meet and thus their (non)-mobility. Currently, the second release of the Travel Portal is operational.

In other words, Travel Portal covers the following aspects:

- Employee: where am I and where is my colleague?
- Workplace: where can I do my work or can I meet?
- Transport: How do I get there?
- All through one easy to access web interface

2.2 The assignment

The assignment was to develop a new functionality for the Travel Portal, namely a Meeting Planner. This planner will make it possible for each employee to make appointments and plan meetings with colleagues by themselves. The system will give them an advice on time and location.

2.2.1 Goals/demands/requirements

The different demands and requirements will be presented. These demands and requirements are based on the pillars provided by the implementation: communication, input, processes and output. Where possible, demands have been specified.

2.2.1.1 Communication

- Employees should be able to use the Meeting Planner anywhere
 - The Meeting Planner should be available at home
 - The Meeting Planner should be available at all different work places
 - The Meeting Planner should be available during travel
- Employees should be able to use the Meeting Planner anytime
 - The Meeting Planner should be available 100% of the time
- Checking into the system must be able with the least amount of effort
 - Checking into the system should not take more than x minutes

2.2.1.2 *Input*

- Employees should provide a detailed personal ID
 - Information should be provided on possible mode options
 - Information should be given on home location
 - Information should be given on changing home locations (e.g. hotel)
- Employees should provide detailed and up-to-date agenda information
 - Agenda information should be up-to-date to 4 weeks in advance
- Employees should provide meeting type information
 - Employees should determine whether the meeting should be physical or not
 - Employees should determine the duration of the meeting
- Locations should provide a detailed location ID
 - Every meeting location should have an agenda in which meetings are scheduled
 - Information on the accessibility should be provided

2.2.1.3 *Process*

- Meeting dates should be determined
- Meeting locations should be determined
- Travel options should be available
- The process design should be robust
 - The process design should be as little complex as possible

2.2.1.4 *Output*

- The Meeting Planner must provide a list of possible meeting dates and locations
 - The Meeting Planner should at least give 1 meeting option
- Employees should receive feedback from the Meeting Planner on how choices are made and what types of information are used
 - The process pillar should be transparent.
- Information should be given about possible travel options.

3 The Meeting Planner

3.1 Description

As said before the Meeting Planner is an extension of/addition to the existing Travel Portal: the web-portal of Capgemini where employees can inform themselves with all kinds of traffic information. Also information about employees can be found, e.g. where they are working at the moment.

This Meeting Planner makes it possible for employees to arrange meetings directly with other colleagues. They can plan a meeting without intervention of a secretary, just by using the online Travel Portal.

How this system works, will be explained in the following paragraphs.

3.2 Process

The algorithm will be implemented as shown in figure 2. In its working state the algorithm processes the inputs provided by employees and translates them into the desired outputs. Information on travel options is provided by the existing Travel Portal and not yet by the algorithm.

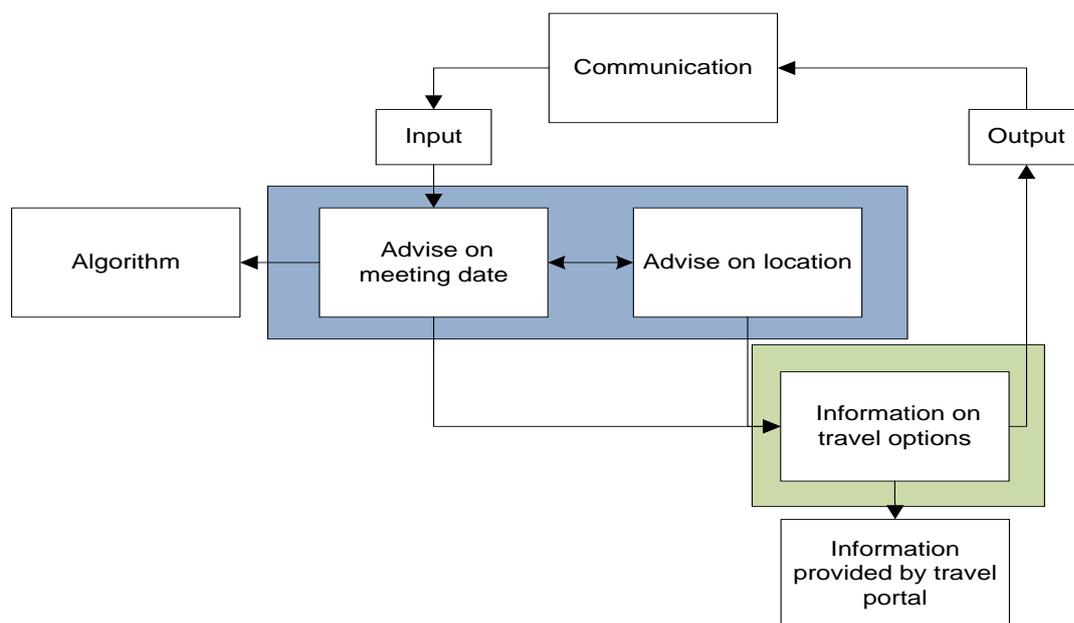


Figure 2, process design

3.3 Inputs & outputs

Here two tables are presented with the inputs that are required/incorporated in the Meeting Planner algorithm. An important assumption that has been made regarding the meeting location is the following: **All meeting facilities are available at all locations.**

Table 1, algorithm inputs

Employee ID's	Agenda information	Meeting type	Expected duration	Date range
Preference in mode - No travel options - Only car - Only public transport - All modes	Employee agenda - Available/blocked spaces - Locations of other appointments - Duration of other appointments	Physical	1 hour	1 week
Home address	Location agenda - Availability of rooms	Non-physical	2 hours	2 weeks
			3 hours	3 weeks
			4 hours	4 weeks

Table 2, algorithm outputs

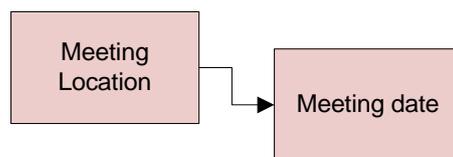
Advice on location	Advice on meeting time/date	Information on travel options
Meeting location	Meeting date	Public transport
Meeting room	Meeting time	Car
		Dual-mode
		No travelling at all

3.4 The Meeting Planner algorithm

Here the algorithm that is used for the Meeting Planner will be explained. The algorithm itself is shown in figure 3 on the next page. The different steps and blocks in the figure will be explained in the following paragraphs.

3.4.1 Hierarchy

The algorithm design, presented on the next page, is based on the following hierarchy:



This means that the meeting location will always have a higher priority than the meeting date.

The meeting location will have the highest priority because minimizing the travel distance and travel costs are part of the biggest goal set by Capgemini. This means that a location which has the lowest overall travel distance will be best for planning meeting. The chosen meeting location will be a constraint for setting a meeting date.

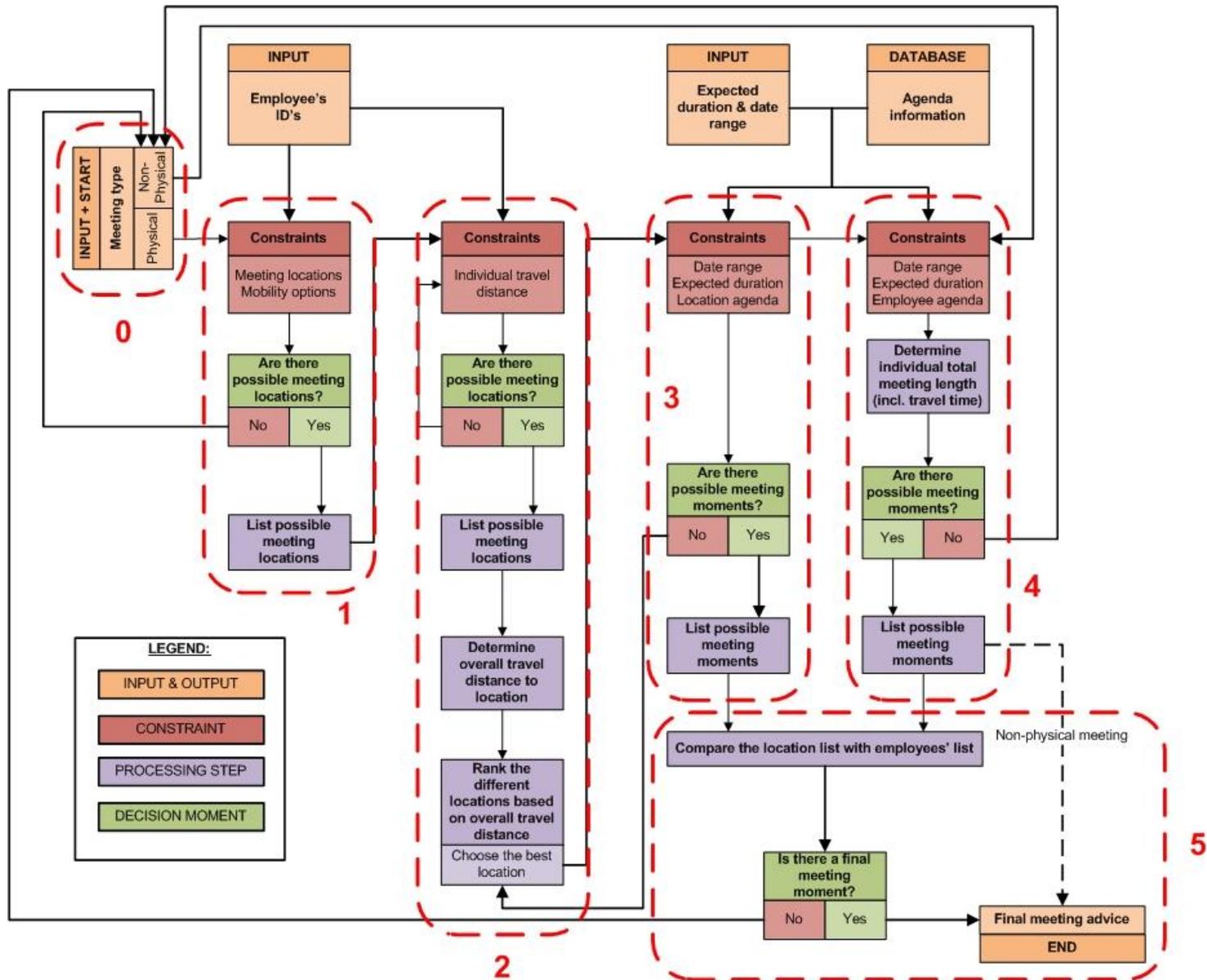


Figure 3, Meeting Planner algorithm

3.5 Algorithm in (pseudo-) programming language

In this paragraph, the presented algorithm design will be thoroughly explained and where possible algorithm steps are written down in pseudo programming language. Together with the algorithm flow-chart this will provide basic understanding of what the programming structure must look like. The red numbers/dotted red lines correspond with the numbers of the steps as explained below.

3.5.1 Step 0: start of the algorithm

The first step of the algorithm will be the option between a physical and a non-physical meeting. This will solely be determined by the employees who are planning a meeting. The choice for a meeting type has a big influence on the algorithm path. A non physical meeting will direct the algorithm immediately to step 4 of the algorithm because a location doesn't have to be selected.

3.5.2 Step 1: generating locations (physical meeting)

In step one location information will be compared with employee information. Only accessibility is being considered by the algorithm in this step. The algorithm should compare mode options provided by the employee ID's and select locations accordingly. For this example only public transport and car use will be considered.

Input

Employee ID's: Information on mode options will be the only input and will be taken from the employee ID's.

Constraints

Mode options provided by the employee ID's

Accessibility of the meeting locations

Process

In programming language the following procedure can be used:

Determining of variables

$M_{x,0}$ = *employee x has no travel options*

$M_{x,1}$ = *employee x uses car and public transport*

$M_{x,2}$ = *employee x uses only car*

$M_{x,3}$ = *employee x uses only public transport*

In a situation where three employees are planning a meeting, the following result could be possible:

$M_{1,1}$ & $M_{2,2}$ & $M_{3,3}$

This means that locations must be selected which are accessible by both public transport and car. Locations will be listed as following:

$L_{x,1}$ = location x is accessible by car and public transport
 $L_{x,2}$ = location x is accessible by car only
 $L_{x,3}$ = location x is accessible by public transport only

Since locations must be selected which provide access for both car and public transport, all the locations with label $L_{x,1}$ will be listed.

Output

A list with all meeting locations that are suitable for planning a meeting. This list is based only on accessibility.

No possible meeting locations

If no possible meeting locations can be found, then the only option will be to select a non-physical meeting. Employee ID's and location accessibility will not be suitable for change. It is however very unlikely that no locations will be listed. A location that is accessible by both car and public transport will always be listed, therefore the list will never be 'empty' if such a location exists. Only if an employee has no travel options the list will be empty. This means that a non-physical meeting will be the only option.

3.5.3 Step 2: rank & select locations (physical meeting)

The list of possible locations generated in step one will be listed in a hierarchical order based on overall travel distance. The overall travel distance is the sum of the individual travel distances.

Input

Employee ID's: Information on departure address will be the only input and will be taken from the employee ID's.

Constraints

Individual travel distance: an employee should not travel more than Y kilometers to join a meeting. The variable Y can be chosen based on the number of meeting locations and the total length of the travel network.

Process

In programming language the following procedure can be used:

For: X_1 = distance between departure place and location place for employee 1
 X_2 = distance between departure place and location place for employee 2
 X_3 = distance between departure place and location place for employee 3

If $X_1 < Y$ With Y being the individual travel distance constraint (e.g. 100 km)
And $X_2 < Y$

And $X_3 < Y$

Then $LX,x = (x_1 + x_2 + x_3)$ is the total overall distance for location x .

If else Then LX,x is removed from the list.

Output

The locations that pass the individual distance constraint will be hierarchical listed in order of shortest overall distance.

No possible meeting locations

If no meeting locations will pass this algorithm step, than this means that no location will pass the individual travel distance constraint.

The only way to solve this is to lengthen the individual travel distance constraint. Lengthening the individual travel distance constraint will be done when no single meeting location can be chosen.

3.5.4 Step 3: search locations' meeting options (physical meeting)

The location with the shortest overall travel distance, which meets the individual travel distance constraint, will be selected. For this location, possible meeting dates will be generated.

Inputs

Date range: in what time frame should the meeting take place.

Expected meeting duration

Location agenda: One location agenda for every meeting room. Only one agenda is considered in this example, but more rooms will lead to more agenda's and more meeting options.

Constraints

The inputs will also serve as the constraints

Process

In programming language the following procedure can be used:

E.g. the date range is 1 week, the expected duration is 1 hour and the agenda of the chosen location is shown in table 3:

Table 3, locations' agenda

	4-jan	5-jan	6-jan	7-jan	8-jan
9:00	9:00 till 11:00				9:00 till 11:00
9:30					
10:00		10:00 till 12:00	10:00 till 12:00		
10:30					
11:00				11:00 till 13:00	
11:30					
12:00	12:00 till 16:00				
12:30					
13:00			13:00 till 15:00		
13:30					
14:00				14:00 till 15:00	14:00 till 18:00
14:30					
15:00		15:00 till 17:00		15:00 till 18:00	
15:30					
16:00	16:00 till 18:00		16:00 till 18:00		
16:30					
17:00					
17:30					

The open spaces with a one hour length will be selected as possible meeting dates. These time frames are presented in table 4.

Table 4, location meeting options

	4-jan	5-jan	6-jan	7-jan	8-jan
9:00	9:00 till 11:00	Meeting option	Meeting option	Meeting option	9:00 till 11:00
9:30					
10:00		10:00 till 12:00	10:00 till 12:00		
10:30					
11:00	Meeting option			11:00 till 13:00	Meeting option
11:30					
12:00	12:00 till 16:00	Meeting option	Meeting option		
12:30					
13:00			13:00 till 15:00	Meeting option	
13:30					
14:00				14:00 till 15:00	14:00 till 18:00
14:30					
15:00		15:00 till 17:00	Meeting option	15:00 till 18:00	
15:30					
16:00	16:00 till 18:00		16:00 till 18:00		
16:30					
17:00		Meeting option			
17:30					

Output

The possible meeting options are presented in table 5:

Table 5, possible locations' meeting options

4-jan	5-jan	6-jan	7-jan	8-jan
11:00 till 12:00	9:00 till 10:00	9:00 till 10:00	9:00 till 11:00	11:00 till 14:00
	12:00 till 18:00	12:00 till 13:00	13:00 till 14:00	
		15:00 till 16:00		

No possible meeting dates

If no possible meeting date is available this means that the location has no meeting dates available within the given date range and the given meeting length. The following options will be provided to solve this problem:

Choose the next best location provided by step 2. The meeting length or the date range cannot be subjected to change, since this will affect the meeting quality.

3.5.5 Step 4: search employees' meeting options (physical/non-physical meeting)

The fourth step of the algorithm is to generate possible meeting-dates based on the employee agenda's. This algorithm step will partly not be described in pseudo-programming language because this is beyond the scope of this project.

For a non physical meeting the algorithm skips the first three steps and starts at this step. Differences between a physical and a non-physical meeting will be pointed out where necessary.

Inputs

Date range: in what time frame should the meeting take place

Expected meeting duration

Employee agenda's

Constraints

The inputs will also serve as the constraints.

Process

First the individual meeting length will be determined. This individual meeting length is determined as follows:

$$\begin{aligned} \text{For: } T(X) &= \text{Individual meeting length for employee } X \text{ (hours)} \\ T(t,x) &= \text{Individual travel time for employee } x \text{ (hours)} \\ X(x) &= \text{Individual travel distance for employee } x \text{ (kilometers)} \\ T(X) &= 2 * T(t,x) + \text{expected meeting duration} \end{aligned}$$

The individual travel time is multiplied by 2 because the meeting is a round trip. For a non physical meeting the individual travel distance is 0 and so the individual travel time is also 0. The formula for a non-physical meeting therefore is:

$$T(x) = \text{expected meeting duration}$$

The individual travel time will be based on the individual travel distance already determined in step 2. To convert the individual travel distance to the individual travel time the following formula will be used.

$$T(t,x) = X(x) / 80$$

This formula implies that a employee can travel at 80 km/hour (subjected to change). The formula is presented in this simplistic form because mode choice option is not included in the algorithm, therefore only a simplistic formula can be determined.

The individual meeting lengths will be the basis for determining meeting dates. This will be explained in the following example. With the same date range (1 week) and meeting duration (1 hour) as in step 3 the agenda of employee 1 is presented in table 6.

Table 6, employees' agenda

	4-jan	5-jan	6-jan	7-jan	8-jan
9:00					9:00 till 11:00
9:30					
10:00		10:00 till 12:00	10:00 till 12:00		
10:30					
11:00				11:00 till 13:00	
11:30					
12:00	12:00 till 16:00				
12:30					
13:00					
13:30					
14:00			14:00 till 15:00		
14:30					
15:00		15:00 till 17:00			
15:30					
16:00	16:00 till 18:00		16:00 till 18:00	16:00 till 18:00	
16:30					
17:00					
17:30					

If (for the chosen location) $X(x) = 40$ (km)
 Then $T(t,x) = 40 / 80 = 0,5$ hour
 and $T(X) = 2 * 0,5 + 1 = 2$ hours

The possible meeting options for employee 1 are presented in table 7:

Table 7, employees' meeting options

	4-jan	5-jan	6-jan	7-jan	8-jan	
9:00	Travel			Travel	9:00 till 11:00	
9:30	Meeting option			Meeting option		
10:00		10:00 till 12:00	10:00 till 12:00			
10:30				Travel		
11:00				11:00 till 13:00		
11:30						
12:00	12:00 till 16:00	Travel	Travel			Travel
12:30		Meeting option	Meeting option			Meeting option
13:00				Travel		
13:30			Travel	Meeting option		
14:00	Travel		14:00 till 15:00			
14:30	Meeting option	Travel				
15:00		15:00 till 17:00				
15:30	Travel			Travel		
16:00	16:00 till 18:00		16:00 till 18:00	16:00 till 18:00		
16:30						
17:00						
17:30					Travel	

This will yield the following meeting possible dates and times for a one hour meeting for employee 1.

Table 8, possible employees' meeting options

4-jan	5-jan	6-jan	7-jan	8-jan
9:30 till 11:30	12:30 till 14:30	12:30 till 13:30	9:30 till 13:00	12:30 till 17:30
14:30 till 15:30			13:30 till 15:30	

For employee 2 and 3 the same tables will be generated, which means that there will be three tables like table 7.

These three tables will be compared and all overlapping dates and time that include a one-hour period will be selected.

Output

The output is one table that includes all possible meeting options that satisfy all the employee agenda's.

This table could for example look like table 9:

Table 9, meeting options for all employees

4-jan	5-jan	6-jan	7-jan	8-jan
10:00 till 11:00			9:30 till 12:00	13:00 till 17:00
			14:30 till 15:30	

No possible meeting dates

If no possible meeting date is available this means that the employees have no meeting dates available within the given date range and the given meeting length. The following options will be provided to solve this problem:

Have a non-physical meeting.

If a non-physical meeting is selected, the individual meeting length is shortened substantially, which means that other meeting options might become available.

The meeting length or the date range cannot be subjected to change, since this will affect the meeting quality.

For a non-physical meeting, the algorithm ends here. If no date is optional, this means that there is no way to plan a meeting that satisfies the given date range and meeting length.

3.5.6 Step 5: generating final meeting advice (physical meeting)

In this final step of the algorithm the meeting options based on the location agenda will be compared with the meeting options provided by the employees agenda's. The overlaps in both will be suitable meeting dates.

Inputs

No inputs from outside the algorithm are needed.

Constraints

The two tables provided by step 3 and 4 are the constraints for this algorithm step.

Process

The two tables are once more presented below.

Table 10, possible locations' meeting options

4-jan	5-jan	6-jan	7-jan	8-jan
11:00 till 12:00	9:00 till 10:00	9:00 till 10:00	9:00 till 11:00	11:00 till 14:00
	12:00 till 18:00	12:00 till 13:00	13:00 till 14:00	
		15:00 till 16:00		

Table 11, meeting options for all employees

4-jan	5-jan	6-jan	7-jan	8-jan
10:00 till 11:00			9:30 till 12:00	13:00 till 17:00
			14:30 till 15:30	

The overlaps of table 10 and 11 equal or larger than 1 hour are presented in table 12:

Table 12, possible meeting moments

4-jan	5-jan	6-jan	7-jan	8-jan
			9:30 till 11:00	13:00 till 14:00

Output

The output is one table that presents the possible meeting dates and times. With 30 minute intervals, 3 possible meeting dates can be selected.

Table 13, final meeting advice

January 7 th	9:30 till 10:30	Utrecht main office
January 7 th	10:00 till 11:00	Utrecht main office
January 8 th	13:00 till 14:00	Utrecht main office

The possible meeting dates are hierarchical listed based on meeting time and meeting date, but the final decision lies with the employee who is planning the meeting.

No possible meeting dates

If no possible meeting date is available this means that the location agenda and the final employee agenda do not overlap. The only option that will be provided to solve this problem is:

Have a non-physical meeting.

Since robustness and simplicity must be the most important aspects of the algorithm, choosing another meeting location will not yet be incorporated in this algorithm.

4 Interface

In this chapter a basic layout will be presented for integrating the Meeting Planner in the existing Travel Portal.

4.1 Integration of the Meeting Planner with the Travel Portal

The Meeting Planner will be integrated in the existing Travel Portal. In the 'my services' box an extra option 'Meeting Planner' will be incorporated (see figure 4).

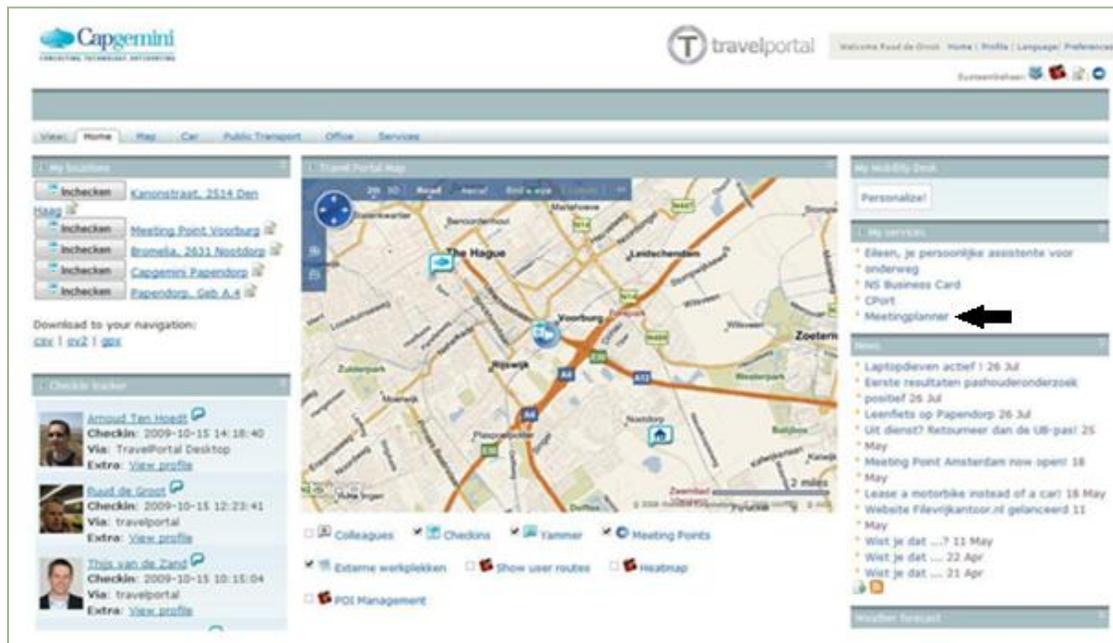


Figure 4, place of Meeting Planner

4.2 Selecting participating employees

The first step of using the Meeting Planner is to select the employees with whom the meeting should take place. To find other employees easily the following functions will be incorporated:

- A employee search menu
- Alphabetical employee list based on normal work-location or department

With a search menu and an alphabetical employee list, the planner of the meeting will be able to select all the participants of the meeting. An extra option "favorites" will also be included in which the planner can store colleagues with whom he has frequent meetings. This can be seen in figure 5.



Figure 5, selecting employees

4.3 Selecting inputs

The second option (figure 6) is selecting the meeting inputs, these are (the planner selects these);

- Meeting type
- Meeting length
- Date range

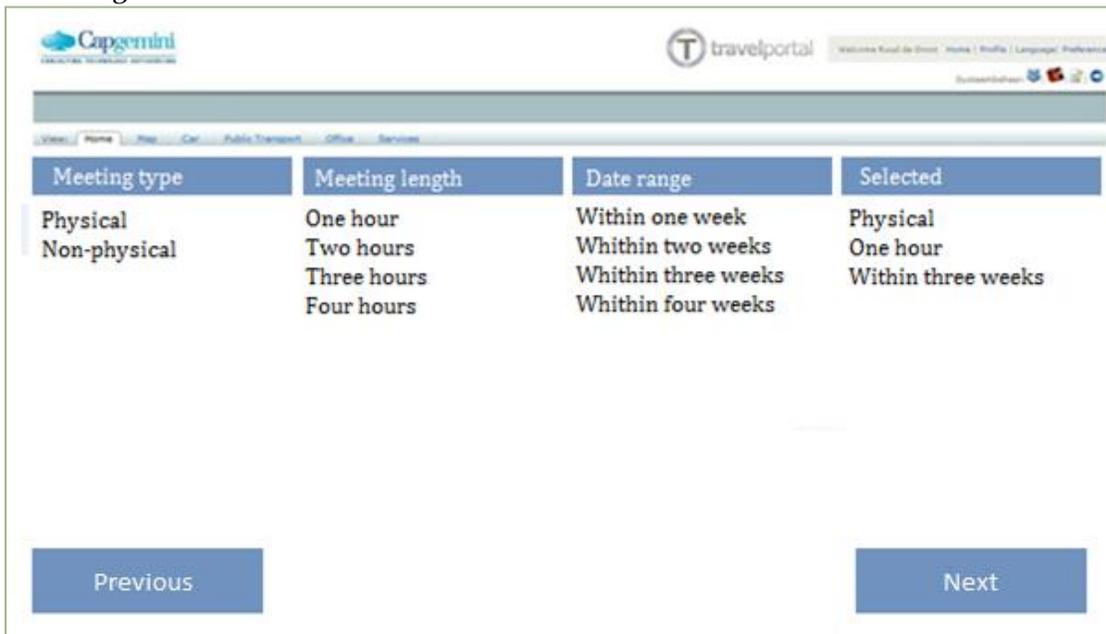


Figure 6, selecting inputs

After this the algorithm has all the information to start planning the meeting.

4.4 Selecting outputs

Based on the participants of the meeting and the selected inputs, meeting options will be generated. From the meeting options, the planner can select the option which suits him best.

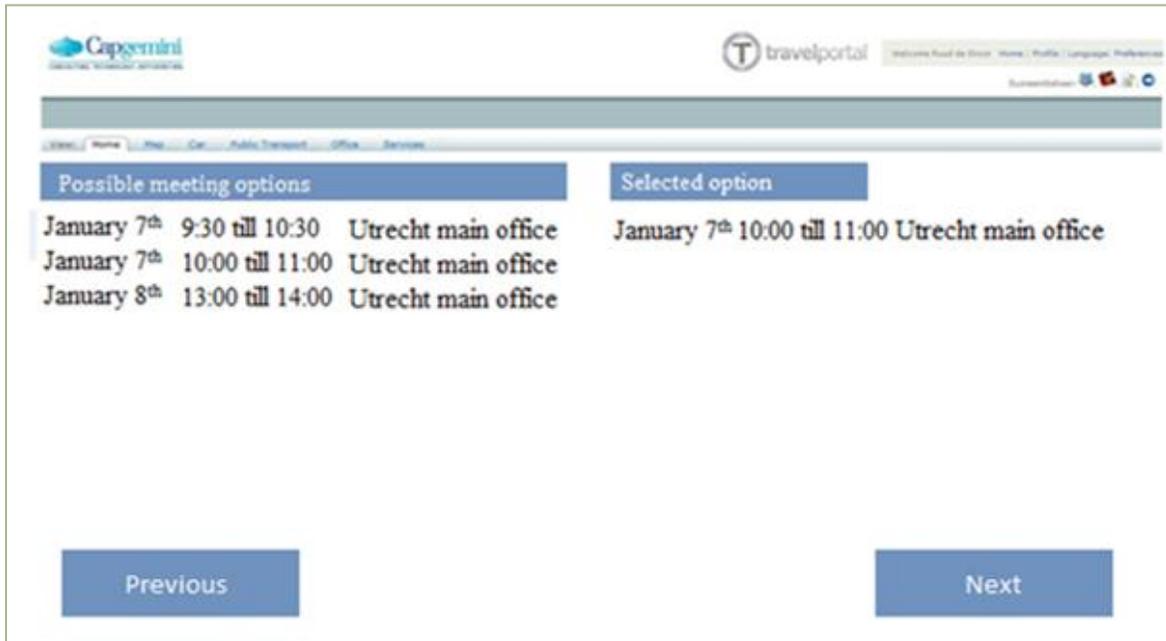


Figure 7, selecting outputs

If no meeting option is generated then the system will inform the planner and will tell why no option could be generated.

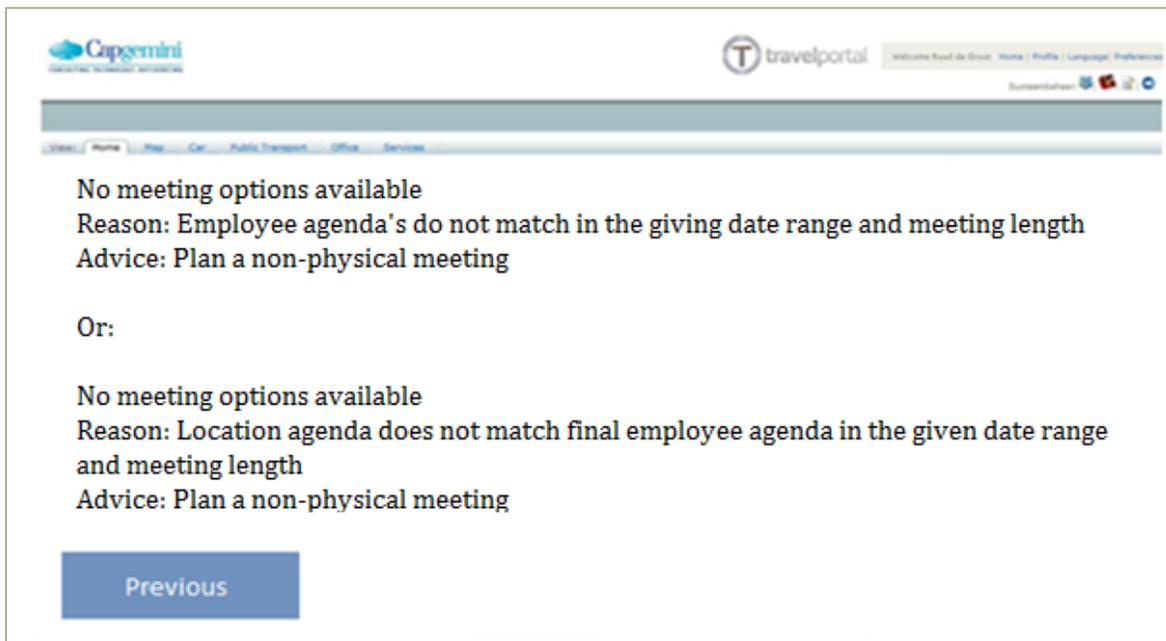


Figure 8, no meeting options explanation

In this version of the algorithm the Meeting Planner will not solve this problem by itself. The employee who is planning the meeting will have to make adjustments to the inputs by itself.

4.5 Meeting Planner summary

To provide a double-check to the employee who is planning a meeting a final screen which shows a summary of the chosen options will be provided. In this screen the planner can see what choices he has made and change these choices if necessary.

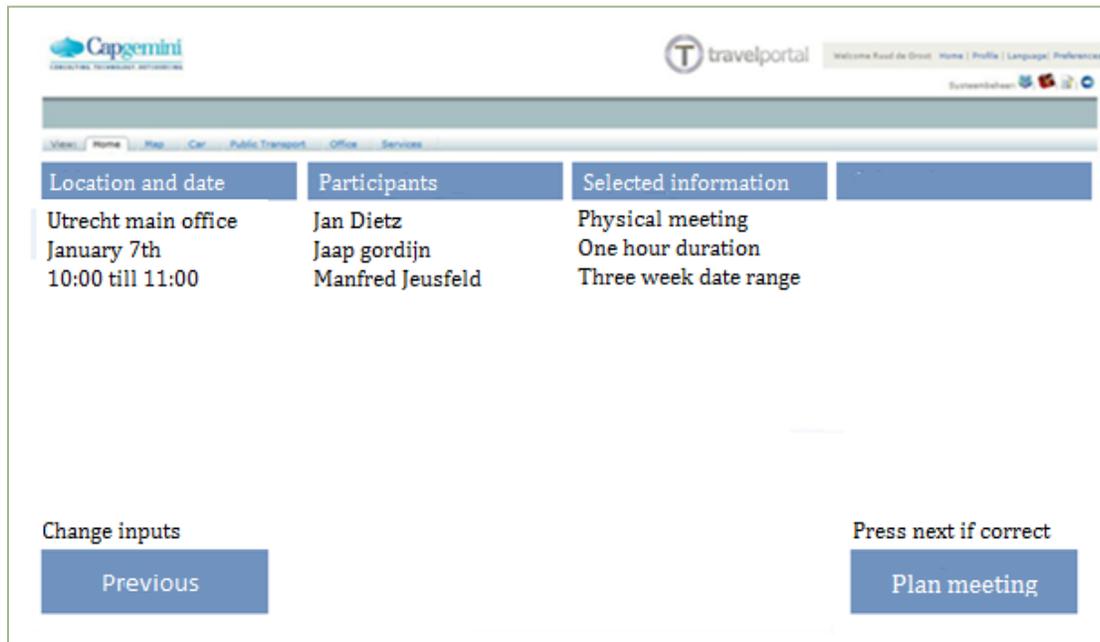


Figure 9, Meeting Planner summary

When the meeting date has been accepted by the employee who plans the meeting, an e-mail will be sent to all participants who'll also have to accept the meeting date. When all the participants accept, the meeting date will be final.

If one or more participants decline the meeting proposal, the Meeting Planner must be used again from the start. This is because the employee ID's and agenda's might have changed from the moment the proposition was sent and the moment the proposition was denied. It can easily take a couple of days before an employee actually reads the e-mail or respond to it.

5 Future developments

Since it was important to keep the Meeting Planner simple and user friendly, it is important to mention issues that can (and sometimes should) be included in future versions of the Meeting Planner. The scope of this project was also to ensure the robustness of the algorithm, what means that sometimes the program does not opt for the best/ideal options but for the most robust one. The options that are left out by now, but can be important in the future, will be listed and briefly discussed here.

- **Use zoning-system instead of home-addresses**

Privacy is an important issue that can cause some difficulties in the implementation/development of the Meeting Planner. Also because of the importance on work-/life balance it is important to always make it possible for employees to separate work and private matters easily. This balance will be negatively affected if the Meeting Planner has to make use of the employees' home addresses. Therefore localization based on a zoning system can be used.

- **Determine locations based on travel costs**

At the moment the choice of possible meeting locations is based on travel distance. This is mainly done because it reduces the complexity and it strengthens the robustness. However, in the ideal situation you want the choice to be optimal instead of “not complex”. This means more than one factor should be included. To make this possible, each factor has to be transformed into a certain “cost” (money). Because this is nothing new in the transport system, it will not cause any problems. It will be possible to include (amongst others) travel time and travel distance. It will also be easier to include the zoning system into the system, because now certain costs can be assigned to each zone. Another important issue in the future is the implementation of road pricing. With a cost based decision, it will not ask for much effort to include this as well.

- **Advise on mode choice**

The inclusion of giving an advice on mode choice in the Meeting Planner is something that can be really useful in the future. By this it will be possible to e.g. include sustainability better in the mobility management program. It is not included yet because at the moment employees want to make the mode choice by themselves, but also because not all modes are available for everyone. When people get used to the system and use it more frequently, the system can be extended or adapted.

- **Dynamic advice/Meeting Planner**

The Meeting Planner as presented now, is a static one. The user gives an input, and the system simply gives an (static) advice on the intended meeting. In the ideal/future situation the Meeting Planner should work everywhere and always. The Meeting Planner should be able to reschedule meetings based on the actual situation (e.g. congestion) on the road, or the actual location of the employee instead of its home address.

- **Experiences from users**

When the Meeting Planner is implemented and used by the employees of Capgemini, there will certainly come forward comments and recommendations for improvement of it. This can either be for the user interface or the working of the algorithm. This provides an important source to improve and expand the initial system and to keep it working properly.

- **Make locations more specific**

At this moment it is being assumed that all meeting rooms at a location offer the same facilities. In reality meeting rooms might differ in capacity and facilities as beamers, lunch-options et cetera. In the future this information can be incorporated into the algorithm by adding a 'room-filter', which filters unwanted meeting rooms at a meeting location based on specific inputs.

- **Include location preferences**

At this moment the meeting location is determined by (and only by) the algorithm. In the future it will be possible to choose your meeting location or to exclude one or more locations based on personal preferences. This can be done by adding a building block at step one of the algorithm in which the location choice or locations to be excluded serve as constraints for the first step of selecting a location.

- **Include travel preferences**

At this moment employees cannot add their travel preferences. When route- and mode choice becomes facilitating instead of informing, travel preferences can be included to determine route choice more specific and personal.

5.1 Future developments in the algorithm

Because the algorithm is developed while keeping the idea of simplicity and robustness in mind, it will be not difficult to make any adaptations in the future. Additional input is easy to implement and extra building blocks can be put into the algorithm without much effort. The programming language is also easy to understand and not difficult to adapt or change.

6 ICT elements

The ICT elements needed for implementation and usage of the Meeting Planner are determined and discussed here. These elements will be divided into three parts: ICT components, ICT networks and ICT services.

1. Communication & Input/output

Components Direct: Mobile (smart) phones, personal computers, laptops
Future: Detection devices (GPS)

With these components it is possible for employees to make use of the Travel Portal (and Meeting Planner) all the time. It makes it more attractive and easier to use if people can use the system everywhere and every time they want. It is important that the system should be available by each mode of traffic. Employees can provide information towards the system (about their location, schedule, etc.) They can also obtain important information from the system whenever they want (congestion, public transport schedules etc.).

Via GPS it will be possible to automatically locate people and make the system work more effectively. It is also needed to make the system as dynamic as possible.

Networks GSM, GPRS, WLAN, WiFi
All these different networks are needed for the communication between the different components. The most important fact is that the system operates/is accessible via the internet, which means that internet must be available everywhere. The detection via GPS needs the GPRS network.

Services *As already became clear, the services here are mostly related to communication. In the future the localization service will be incorporated*

2. Processing

The processing part exists of two ICT elements: The algorithm which will determine meeting dates and locations and the Travel Portal which will provide information on travel planning.

Components *Both parts are “processing” components. The algorithm processes the information and executes calculations to obtain the best meeting location and time. This is done in a “central computer”.*

The Travel Portal is also a processing component and will also be ran on the “central computer”. It stores the data that comes in from all the different sources (not only the employees, but also weather stations, road operators etc.) and processes them to make them accessible for the employees.

7 Evaluation

The designed Meeting Planner will be subjected to the original needs and demands. The needs and demands will be presented and will be evaluated. After this, the reasons for selecting the model will be summarized.

7.1 Evaluation on original needs and demands

The original needs and demands, provided by Capgemini, will be listed and will be evaluated.

7.1.1 Communication

1. Employees should be able to use the Meeting Planner anywhere
 - The Meeting Planner should be available at home
 - The Meeting Planner should be available at all different work places
 - The Meeting Planner should be available during travel

The Meeting Planner is part of an online-environment which makes it accessible by computer, laptop and smart-phone.

2. Employees should be able to use the Meeting Planner anytime
 - The Meeting Planner should be available 100% of the time

The Travel Portal offers a back-up network which keeps access possible if the main network malfunctions.

3. Checking into the system must be able with the least amount of effort
 - Checking into the system should not take more than x minutes (x is not yet a number, but checking in must be considered as easy as possible)

The Meeting Planner is incorporated in the Travel Portal which makes accessible and easy to use.

7.1.2 Input

1. Employees should provide a detailed personal ID
 - Information should be provided on possible mode options
 - Information should be given on home location
 - Information should be given on changing home locations (e.g. hotel)

The personal ID of an employee includes: home address and possible mode options. Also the personal ID can be subjected to change, which makes it possible to change locations. This function isn't relevant to the current Meeting Planner design but will be when the Meeting Planner becomes more dynamic.

2. Employees should provide detailed and up-to-date agenda information
 - Agenda information should be up-to-date at 4 weeks in advance

For the Meeting Planner to function correctly, it is necessary that employees keep their agenda up to date. This of course is the responsibility of the user him/herself.

3. Employees should provide meeting type information
 - Employees should determine whether the meeting should be physical or not
 - Employees should determine the duration and date range of the meeting

The Meeting Planner needs the inputs listed above otherwise it will not be able to plan a meeting. This secures that the inputs will be inputted in the Meeting Planner.

4. Locations should provide a detailed location ID
 - Every meeting location should have an agenda in which meetings are scheduled
 - Information on the accessibility should be provided

Every room at every location has its own agenda, which will be updated once a meeting has been planned in that room. This secures that every location has up-to-date and complete agenda-information.

7.1.3 Process

1. Meeting dates should be determined
2. Meeting locations should be determined
3. Travel options should be available
4. The process design should be robust
 - The process design should be as little complex a possible

The algorithm design provides meeting dates and meeting locations. Information on travel options is available through the original Travel Portal.

The algorithm design is kept simple and robust by solely providing the basic building blocks, which in the future can be expanded by adding building blocks. Future developments have been described but not yet incorporated in the algorithm due to the simplicity and robustness.

7.1.4 Output

1. The Meeting Planner must provide a list of possible meeting dates and locations
 - The Meeting Planner should at least give 1 meeting option

If a meeting date and location is generated, the Meeting Planner will list this date and location as a possible meeting option. If more than one option is available all these options will be listed and the planner can choose the desired one.

2. Employees should receive feedback from the Meeting Planner on how choices are made and which types of information are used
 - The process pillar should be transparent.

If a meeting option is not available, the Meeting Planner will tell the planner the reason(s) for this. The planner therefore always knows why the Meeting Planner failed in generating meeting options.

3. Information should be given about possible travel options.

The Meeting Planner considers all travel options provided by an employee. Information on reaching the meeting location is still provided by the Travel Portal and is not yet a component of the Meeting Planner itself. Nevertheless this information is available.

The evaluation shows that all needs and demands are reached in this stage of the Meeting Planner design.

7.2 Usefulness of the Meeting Planner

Reasons for selecting the designed Meeting Planner will be given here:

- **Meeting Planner meets the needs and demands**

As shown in the previous section, the Meeting Planner meets the current needs and demands set by Capgemini. This means that the Meeting Planner can be evaluated on that aspect.

- **Meeting Planner is simple and robust**

Simplicity and robustness makes the algorithm easy to implement and keeps it stable while using it. This was also the main focus in the design-phase.

- **Meeting Planner is designed for future changes and expansion**

Simplicity of the Meeting Planner makes it not very versatile at this point, but the Meeting Planner's robustness and simplicity make the algorithm very suitable for future changes and expansion. Changing and/or expanding the Meeting Planner can easily be done by adding or removing building blocks out of the algorithm design.

- **Interface is recognizable and easy to get used to**

The interface of the Meeting Planner is based on the Travel Portal interface. This makes the Meeting Planner very recognizable. Because of the simplicity, the inputs are easy to determine and therefore working with the Meeting Planner should be easy as well. The transparent features of the algorithm make it easy to make input changes, when results are insufficient.

8 Introduction of the Meeting Planner in practice

As already described, the Meeting Planner has a very recognizable interface and due to its simplicity it is very easy to use. Employees at Capgemini must be aware of those facts before the Meeting Planner will gain acceptance. A couple of advices will be given on how to launch and implement the Meeting Planner and thus gain acceptance.

- **Organize workshops**

A workshop can be organized to make employees familiar with the Meeting Planner and its interface. Because of the simplicity, the workshop doesn't have to take a long time.

- **Create a manual**

A small manual can be created and can be distributed via e-mail.

Maintaining the Meeting Planner is highly dependent on criticism and using this to improve the current Meeting Planner design. Especially in the start-up phase, a lot of bugs in the system will be found and must be reported. The following advices are given on reaching these goals:

- **Helpdesk service**

Setting up a helpdesk that can be contacted to report bugs or ask questions would serve the maintenance of the Meeting Planner. This helpdesk can be a part of the Travel Portal helpdesk.

- **Questionnaires**

After a couple of months questionnaires can be sent via e-mail or interviews can be held with employees to find out the positive and negative aspects of the Meeting Planner. With this information, changes can be made to the algorithm or the interface.

9 Conclusion

The Meeting Planner algorithm that is presented in this report meets all the current demands set by Capgemini. The Meeting Planner is not evaluated on top demands as cost reduction and environmental benefits, but since lower level demands that flow from the broken up top demands have been reached it is likely that top demands also will be reached.

The simplicity and robustness of the algorithm makes it easy to implement. The algorithm design uses simple equations and can draw inputs from agenda's like Microsoft's Outlook. Probably the biggest challenge for implementing the algorithm will be making the agenda's compatible with the Meeting Planner.

Simplicity and robustness also guarantees the Meeting Planner to be easily adjustable for future developments. The algorithm consists of building blocks that can easily be extended, removed or re-arranged. Future demands and user experience can therefore be translated into new building blocks that can be added to the algorithm. Since the designed algorithm is simple and robust it means that the 'core' of the Meeting Planner will always be stable and understandable.

The interface of the Meeting Planner shows that few inputs have to be selected and is done within the current Travel Portal interface, which makes it easy to get used to and easy to maneuver. Planning a meeting should not take more than a minute using the described interface.

The interface will be highly dependent on user experience and changes must be made according to user comments. Feedback from users is crucial since using the algorithm and the interface will give great insight on where the algorithm fails and where the interface lacks simplicity and maneuverability. Feedback can easily be gathered by handing out questionnaires, have interviews with users after a few months after implementation.

The Meeting Planner asks from employees to keep their agenda's up-to-date for it to function properly. The use of the Meeting Planner therefore should be promoted, not for it to work optimally, but for it to work satisfying and will gain acceptance from users. Promotion campaigns can be done with small work-shops and presentations to clarify the benefits of using the Meeting Planner.

The meeting planner presented in the report gives full insight in the design and implementation of the meeting planner. Also it gives advice on launching and maintenance. Therefore, it can be concluded that:

The current algorithm design and the presented future developments show that the Meeting Planner has great potential to be a valuable part of the Travel Portal and is a great next step in the New Way of Working.