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SynergySoft Scheduler System

4

System Requirements Specification

5

Prepared by the design firm of

6

Bouchier, Fischer, Herschbach and Nina

7

Version 0.1

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54

55

56 **Revision History**

57

Name	Date	Reason For Changes	Version
Paul Bouchier	10-06-06	Initial Version	0.1

58
59
60
61

62 **1. Introduction**

63 **1.1 Purpose**

64 The purpose of this document is threefold:

- 65 1. To explain the process by which the preliminary requirements from SynergySoft
66 Corporation were analyzed and refined
- 67 2. To state the requirements for the SynergySoft Meeting Scheduling System in a way that
68 allows tracing from the original (ambiguous, unrefined) form to the analyzed and refined
69 form.
- 70 3. To show the analysis of the requirements (dependencies, issues resolved, how the
71 requirements have been understood, etc.)

72 Therefore, this document is more than a requirements specification – it is also a statement of how
73 the requirements were derived from the input, and how the requirements relate to each other.

74 **1.2 Product Scope**

75 The product is a software application which is accessed from a web browser and used to schedule
76 meetings.

77 **1.3 Glossary**

78 This subsection contains definitions of all the terms, acronyms, and abbreviations used in the
79 document. Terms and concepts from the application domain are defined.

80 **1.4 References**

- 81 • IEEE 830-1998
- 82 • CS6354 Project Documentation, by Bouchier, Brewster, Fischer,
83 Herschbach, Nina
- 84 • Project submissions from CS6361, Summer 2006

85 **1.5 Overview**

86 This document is laid out in a modified IEEE830-1998 style. The biggest difference from the
87 standard is the addition of section 4, which describes the process used to produce this document.

88 The following information is in this document:

- 89 • Section 2: General description of product, including user interface screen shots, dependency
90 analysis, and enterprise requirements.
- 91 • Section 3: Functional & Non-functional requirements. Note that all non-functional
92 requirements are grouped into one category, and not distributed among categories, as in
93 IEEE830. Section 3 also covers use cases and deleted requirements.
- 94 • Section 4 describes the requirements analysis process.

95 **2. General Description**

96 This system is designed to be a facility for scheduling meetings and has many potential applications,
97 such as scheduling courses and flights, room assignments at hospitals and hotels, scheduling
98 national and international meetings, logistics, job scheduling in production systems, as well as
99 command and control systems.

100
101 The particular type of system is intended to support people in order to schedule their meetings.
102 Many software vendors have attempted to offer such a system, especially one with a powerful
103 vantage point (d., Microsoft, IBM-Lotus, etc.). However, SynergySoft, Inc. aims to provide a
104 product which would outperform any such system that is currently available in this highly
105 competitive market.

106
107 The system which SynergySoft, Inc. intends to build makes a step beyond the products currently on
108 the market and intends to make it self known as the best tool for scheduling in the industry. To do
109 this, the system must be distributed in a way never before done, as well as robust enough to handle
110 any size problem set. The ability to handle high level of demands while being user friendly enough
111 for day to day scheduling is one of many keys to the success of the system. If the system
112 developed is not realistic to utilize in business, then it will quickly fall out of favor with clients and
113 fail. This above nearly all else, must be central to the design and implementation of the system.

114 **2.1 Product Perspective**

115 The SynergySoft, Inc. Scheduler system is a virtually self contained scheduling system; however, it
116 will require users to have access to a web browser on their workstation computer. This means that
117 the users of the system do not need to invest in any other software to get the most out of the
118 software system as any Windows based PC comes installed with a web browser, and any non
119 Windows machine can use FireFox or other freeware browsers. The system will also have the
120 ability to send email notifications to users when a new item is sent to their scheduling system
121 account. This feature is built into the Scheduler and does not require any other software to function.

122 **2.1.1 System interfaces**

123 As stated in section 2.1 the Scheduler system is a self contained system, relying on very little in the
124 way of external software interfaces. However, the system will require interfaces with the installed
125 computer's hardware. The system is to be a web-enabled system, meaning that all user interaction
126 is done through a web browser. The System interfaces required on the system server are the
127 following:

- 128 ○ Network interface to a network with an internet connection
- 129 ○ Database connection to the mySQL database containing user and schedule data
- 131 ○ Database connection to the mySQL database containing user and schedule data

132 **2.1.2 User interfaces**

133 All user interfaces other than initial installation occur through a web page.

134 **2.1.3 Hardware interfaces**

135 There are no hardware interfaces to this system.

136 **2.1.4 Software interfaces**

137 The system will interface to an email system using SMTP.

138 **2.2 Product Functions**

139 The Enterprise functional & non-functional requirements requirements from SynergySoft have been
140 analyzed and all issues and ambiguities resolved. In some cases, the resolution is a deviation from
141 the requirements supplied by SynergySoft. This document is for review by SynergySoft project
142 management & marketing, and the changes to the spec should be analyzed for acceptability to
143 SynergySoft.

144
145 See section 4 for the process used to analyze the requirements, and to generate the modified
146 enterprise requirements below. Each requirement below has a trace back to the line number in the
147 original requirements specification, which is shown in section 4. They also note if there is a
148 dependency diagram object related to the requirement. Each requirement below that was modified
149 from the original has a Note in the requirement description, which describes how it was modified.
150 SynergySoft reviewers need to review the changes that were made to the delivered requirements, to
151 ensure they are agreeable.
152

153 **2.2.1 Enterprise Requirements**

154 **2.2.1.1) Any user can create meeting [POS51815 Version: 1.7]**

155
156 Any user with an account on the system shall be permitted to create a meeting invitation, and
157 shall be able to invite anyone else on the system to the meeting.
158 Rationale: The SynergySoft spec is silent on this point, but our user rep says this is how it
159 needs to be.
160 Enterprise Dependency Diagram: Initiator
161

162 **Requirement Tracing:**

163 FUN51794 Manage Participant Interactions Requirement BouchierCs6361 Direct TO
164 POS51775 Meeting Initiator Requirement BouchierCs6361 Direct TO
165 NONFUN51807 Decentralized requests Requirement BouchierCs6361 Direct TO
166 NONFUN51814 Extensible Requirement BouchierCs6361 Direct TO
167 NONFUN51805 Reflects current meeting management Requirement BouchierCs6361
168 Direct TO
169

170 **2.2.1.1.1) Meeting Initiator [POS51775 Version: 4.6]**

171
172 The meeting initiator can be one of the participants, or some representative such as a
173 secretary
174 Traces from Enterprise Requirements lines: 29
175 Enterprise Dependency Diagram: Initiator
176

177 **Requirement Tracing:**

178 FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct TO
179
180 FUN51788 Assist replanning meetings Requirement BouchierCs6361 Direct TO
181
182 POS51815 Any user can create meeting Requirement BouchierCs6361 Direct FROM
183
184 POS51770 Conflict Resolution Policies Requirement BouchierCs6361 Direct FROM

POS51765 Meeting date range Requirement BouchierCs6361 Direct FROM

POS51818 System Administrator Requirement BouchierCs6361 Direct TO

2.2.1.2) Initiator asks attendees for schedule [POS51764 Version: 6.0]

A meeting initiator will ask all potential meeting attendees for the following information:

- * A set of dates & times on which they cannot attend the meeting (the exclusion set)

- * A set of dates & times on which they would prefer the meeting to take place (the preference set)

Traces from Enterprise Requirements lines: 3-6

Enterprise Dependency Diagram: Initiator

Requirement Tracing:

2.2.1.2.1) Meeting date range [POS51765 Version: 3.1]

The request for dates is limited to a certain range of time in the future.

Traces from ER line 8;

Enterprise dependency: Date Range

Requirement Tracing:

POS51775 Meeting Initiator Requirement BouchierCs6361 Direct TO

2.2.1.2.1.1) Meeting Date [POS51816 Version: 1.0]

A meeting date shall comprise a date and a start-time and a duration for the meeting. A meeting date is a single occurrence. Recurring meetings are not addressed by this requirement.

Rationale: This requirement clarifies the meaning of the SynergySoft spec.

Traces from Enterprise Requirements lines: 7

Enterprise Dependency Diagram: Meeting Date

Requirement Tracing:

2.2.1.2.2) Equipment Requirements [POS51766 Version: 4.1]

The initiator shall ask active participants to state special equipment requirements

Traces from Enterprise Requirements lines 9-10

Enterprise Dependency Diagram: Equipment

Notes: The SynergySoft spec said "can ask" - we clarified it to "shall ask" after consultation with user & domain reps.

Requirement Tracing:

POS51818 System Administrator Requirement BouchierCs6361 Direct TO

2.2.1.2.3) Preferred locations [POS51767 Version: 4.1]

The initiator shall ask important participants to state preferences for meeting location

Traces from Enterprise Requirements lines: 11

Enterprise Dependency Diagram: Important Participants, Meeting Location

Notes: The SynergySoft spec said "can ask" - we clarified it to "shall ask" after consultation with user & domain reps

Requirement Tracing:

POS51818 System Administrator Requirement BouchierCs6361 Direct TO

2.2.1.3) Proposed Meeting date [POS51768 Version: 2.0]

The proposed meeting date belongs to the stated date range and to none of the exclusion sets, and should belong to as many preference sets as possible, and is made as early as possible.

Traces from Enterprise Requirements lines: 12-13

Enterprise Dependency Diagram: Meeting Date, Inclusion Set, Exclusion Set, Date Range

Requirement Tracing:**2.2.1.3.1) Date Conflict [POS51769 Version: 3.1]**

A date conflict occurs when no date can be found that meets the requirements for a proposed meeting date. A conflict is strong when no date can be found within the date range and outside all exclusion sets. A conflict is weak when dates can be found within the date range and outside all exclusion sets, but there is no date that is in all preference sets.

Traces from Enterprise Requirements lines: 14 - 16

Enterprise Dependency Diagram: Date Conflict

Requirement Tracing:

FUN51797 Negotiation & conflict resolution Requirement BouchierCs6361 Direct TO

2.2.1.3.2) Conflict Resolution Policies [POS51770 Version: 3.3]

Conflicts can be resolved in several ways, including:

- * Initiator extends date range
- * Some participants remove dates from their exclusion set
- * some participants withdraw from the meeting
- * some participants add new dates to their preference set
- * The meeting can be cancelled

If there's a strong conflict, the initiator must choose which conflict resolution method to use - the system will not choose a date with a strong conflict.

If there's a weak conflict, the system shall pick the earliest meeting date that doesn't have any strong conflicts.

Traces from Enterprise Requirements lines: 17-21

Enterprise Dependency Diagram: Conflict Resolution

Notes: The SynergySoft didn't say much about how to choose a date when there's a conflict. After consultation with user & domain reps, we chose policies for dealing with weak & strong conflicts. Line 41 suggested a meeting may be cancelled in certain types of conflict, so we added this to the list of available conflict resolution techniques.

Requirement Tracing:

POS51775 Meeting Initiator Requirement BouchierCs6361 Direct TO

FUN51793 Conflict Resolution Policies Requirement BouchierCs6361 Direct TO

POS51772 Meeting Room Available SUSPECT Requirement BouchierCs6361 Direct TO

2.2.1.3.2.1) Quick and convenient resolution [POS51771 Version: 2.0]

Each conflict should be done as quickly as possible and with no more interaction than is really needed

Traces from Enterprise Requirements lines: 22-23

Enterprise Dependency Diagram: Performed Quickly, Minimal Interaction

Requirement Tracing:**2.2.1.4) Meeting Room Available [POS51772 Version: 4.0]**

A meeting room must be available at the selected meeting date. It should meet the equipment requirements; furthermore it should ideally belong to one of the locations preferred by as many important participants as possible. Meeting room unavailability and equipment unavailability shall result in strong conflicts. Unavailability of the preferred location shall produce a weak conflict. In either case, conflict resolution shall be used to resolve the conflict.

Traces from Enterprise Requirements lines: 24-25

Enterprise Dependency Diagram: Meeting Room, Meeting Location

Notes: The SynergySoft spec didn't say what to do if meeting room or equipment was unavailable. We chose to treat meeting room and equipment unavailability the same as a participant with an exclusion set which corresponds to the unavailability of a suitable room or equipment; and where the location availability is treated the same as a participant with an inclusion set which corresponds to the available dates.

Requirement Tracing:

POS51770 Conflict Resolution Policies SUSPECT Requirement BouchierCs6361 Direct FROM

2.2.1.5) Minimize Negotiation [POS51817 Version: 2.0]

The number of negotiations should be kept minimal. but a new round of negotiation may be required when no room can be found for a proposed meeting date.

Traces from Enterprise Requirements lines: 27-28

Enterprise Dependency Diagram:

Requirement Tracing:**2.2.1.6) Virtual meeting [POS51773 Version: 2.1]**

Each meeting may take place in a virtual place, e.g. through teleconferencing through laptop computers.

Traces from Enterprise Requirements lines: 26

Enterprise Dependency Diagram:

Requirement Tracing:

POS51774 Importance of virtual meeting Requirement BouchierCs6361 Direct TO

2.2.1.6.1) Importance of virtual meeting [POS51774 Version: 2.1]

The flexibility to hold virtual meetings is considered crucial in the future

Traces from Enterprise Requirements lines: 27

Enterprise Dependency Diagram:

Requirement Tracing:

POS51773 Virtual meeting Requirement BouchierCs6361 Direct FROM

2.2.1.7) System Administrator [POS51818 Version: 1.2]

There shall be a person or persons in the organization who are responsible for administering the system and keeping the system's knowledge of rooms, user accounts, etc. current.

Notes: The whole administration area was not addressed in the SynergySoft spec. After consultation with the domain rep we decided there needs to be an administrator. We need to point this out to SynergySoft, because it affects manpower requirements.

Requirement Tracing:

FUN51820 Administrative Account Requirement BouchierCs6361 Direct TO

POS51766 Equipment Requirements Requirement BouchierCs6361 Direct FROM

POS51775 Meeting Initiator Requirement BouchierCs6361 Direct FROM

POS51767 Preferred locations Requirement BouchierCs6361 Direct FROM

2.3 User Characteristics - Jon

There are three types of users in this system. The first two are, authorized users, and non authorized users, the only distinction between them is that authorized users are allowed to see the preference and exclusion sets of other users. It is the third type of user, the administrator, who is able to initially setup the system, add new users, and set their authorization level.

Most users will be of the type non-authorized. These users are able to accept or decline schedule invitations, set their preferences or schedule meetings. However, during the schedule meeting event, they will not be able to view the selected participants preference or exclusion set. This means that the system will be 100% relied upon to ensure that a meeting time and location is found. If a meeting time is not found, then the non-authorized user has to pick a resolution choice without knowing what may resolve the issue the easiest.

The next most common type of user is the authorized user. These users have the same permissions as the non-authorized user with the additional ability to view other users preference and exclusion set. This ability allows them to visibly check who among their selected participants may cause a meeting to have a conflict and contact them directly before sending out the invitations for the meeting. This may help prevent some conflicts from occurring before the meeting is even entered into the system. However, this advantage really is only helpful for small meetings of limited number of individuals or meetings with a few important people who would determine the time and location.

Finally, the system administrators are users who are able to setup the system from the initial installation and maintain the systems user accounts. They automatically have the functionality of authorized users within the normal operation of the system, however have additional menu options which allow them to maintain the system.

All users have to have basic computer skills which include working with a web browser such as Internet Explorer or FireFox. Since all interaction with the UI of the system is through a browser window, the system can not be used without access and knowledge of web browser functionality.

394 **2.4 Constraints**

395 There are a number of constraints which the system must abide by during development. The system
396 must be developed within their bounds. These constraints dictate a number of the functional and
397 nonfunctional requirements specified by this document. Others are because of a requirement
398 specified to us by our customer. All are important to be aware of during the implementation of the
399 software system.

- 400
- 401
- 402 ○ System is to be developed for distributed use as a web application. This will limit the ability
403 for real time updates to the system.
- 404 ○ System is to be developed in Java through Servelets and JSP pages.
- 405 ○ Data must be stored in a relational database for quick queries and storage.
- 406 ○ Passwords must be sent and stored in encrypted form.
- 407 ○ Some users are authorized users while some are non-authorized users. Non-authorized users
408 can not see other user's preference and exclusion sets.
- 409 ○ System must be robust enough to handle virtual meetings through teleconferencing, etc.
- 410 ○ System must handle rescheduling meetings with no outside input from initiator unless
411 conflict arises
- 412 ○ System must be able to send email notifications to any common email server promptly and
413 correctly
- 414 ○ Keep user overhead to an absolute minimum. Anywhere the system can handle a decision
415 itself, it must do so.
- 416 ○ Server-Client communication must be done over TCP connections
- 417 ○ Meetings can be rescheduled up to 24hrs prior to their current start time.
- 418
- 419

420 **2.5 Assumptions and Dependencies**

- 421 • . System will be installed on a machine running Windows operating system, Tomcat
422 and MySQL 5.0 or newer.
- 423 • Monitoring as stated in the requirements given to us by the customer means that it
424 monitors changes to the participant's preference and exclusion set and reschedules
425 the meeting if needed.
- 426 • Monitoring the actual meeting content is not within the scope of this product and has
427 been removed from the requirements.
- 428 • The meeting initiator will control who the important participants of a meeting are.
- 429 • The meeting initiator will decide on what form of conflict resolution to pursue.
- 430 • A meeting can not be rescheduled within 24hrs of meeting start time (defined lower
431 bound).
- 432 • A meeting can be rescheduled a maximum time of 3 times (defined upper bound).
- 433 • Users will use this system as their primary calendar for keeping track of meetings, no
434 external interfaces with Google Calendar or Microsoft Outlook needed.
- 435

436 **2.6 Apportioning of Requirements - Jon**

437 SynergySoft, Inc. fully intends to ship a fully operational and complete system with its first release
438 version. However there is some functionality that could be released at a future date if needed.
439

440 The primary functionality that could be held back for future release is the Email Notification
441 feature. The ability to send out emails to users when a new invitation is ready to be viewed in the
442 system for acceptance or decline is a feature which will make the system far more user friendly in
443 the fast paced business world. It is however a feature that the system can be used without and still
444 function in its original scope and requirement.

445
446 If it is required that the Email Notification feature is postponed, it is highly recommended that this
447 feature be developed and added on to the system as quickly as physically possible. As it is highly
448 important to the ease of use by the customer and a big selling point which will help keep the system
449 ranked highly against competitors.

450

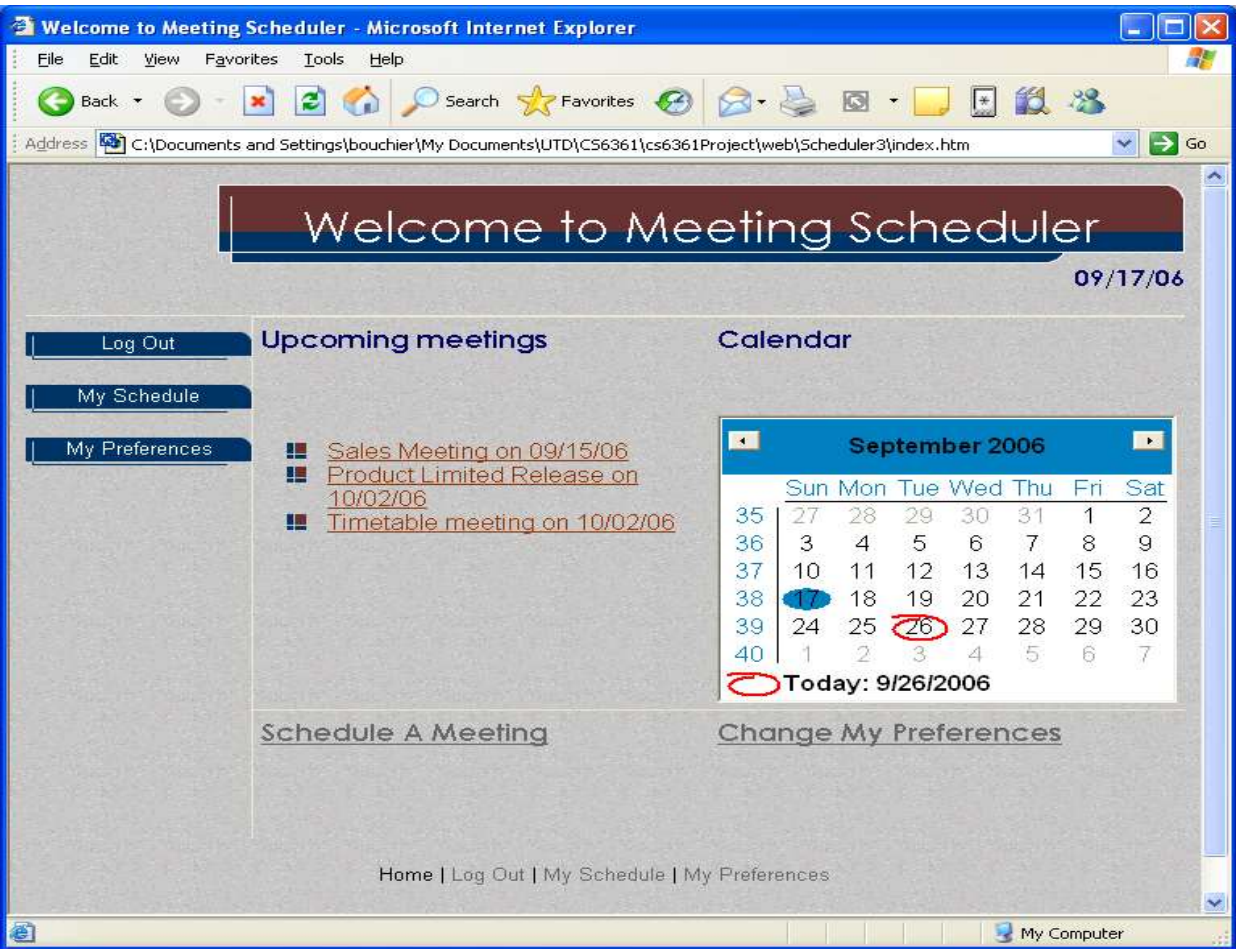
451 **3. Specific Requirements**

452 This section specifies the detailed requirements which the system shall meet.

453 **3.1 External Interfaces**

454 This section specifies the user interfaces to the system. All user interfacing is done through a web
455 UI. The web pages are shown below.

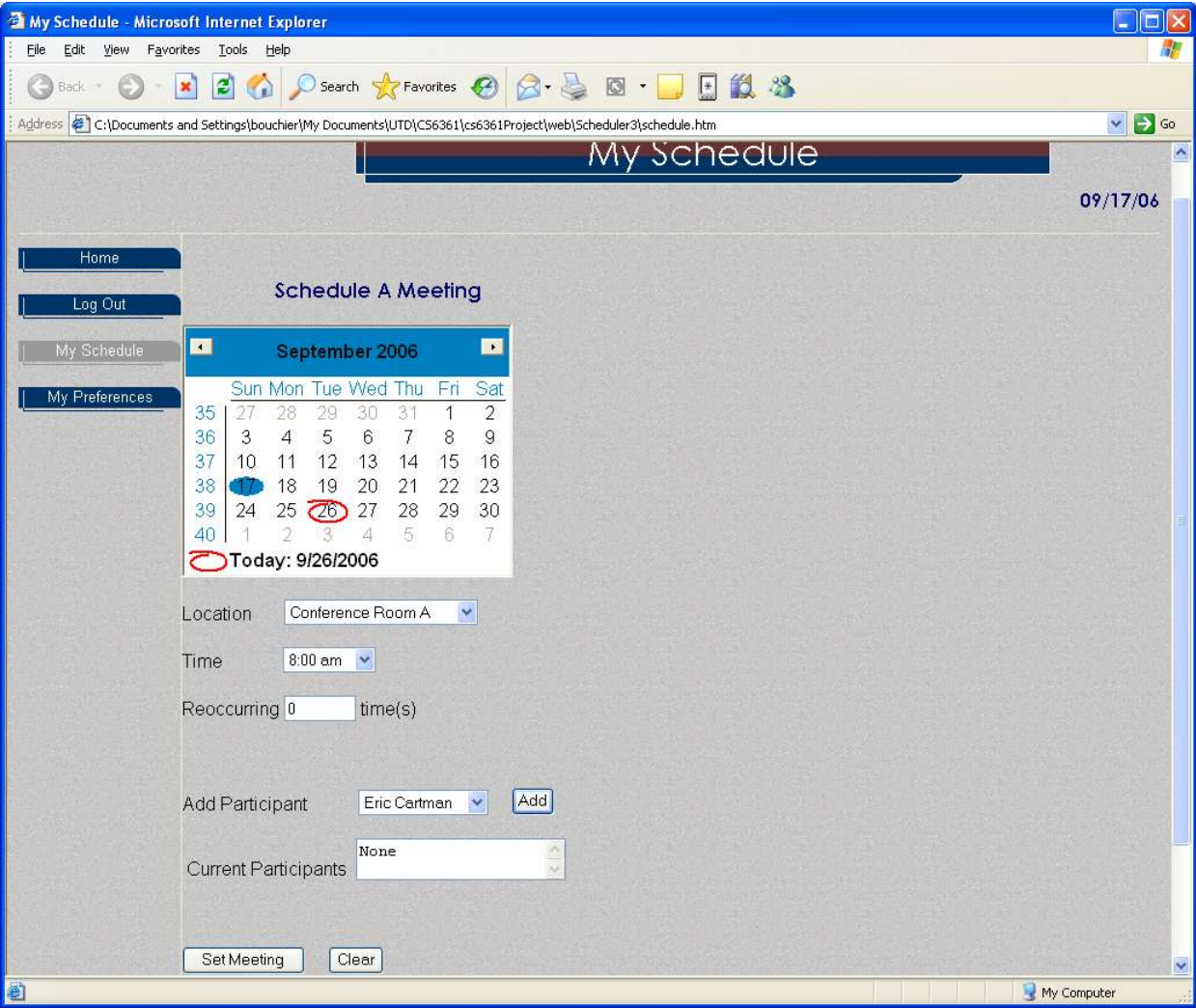
456



457 **Figure 1: Home page**

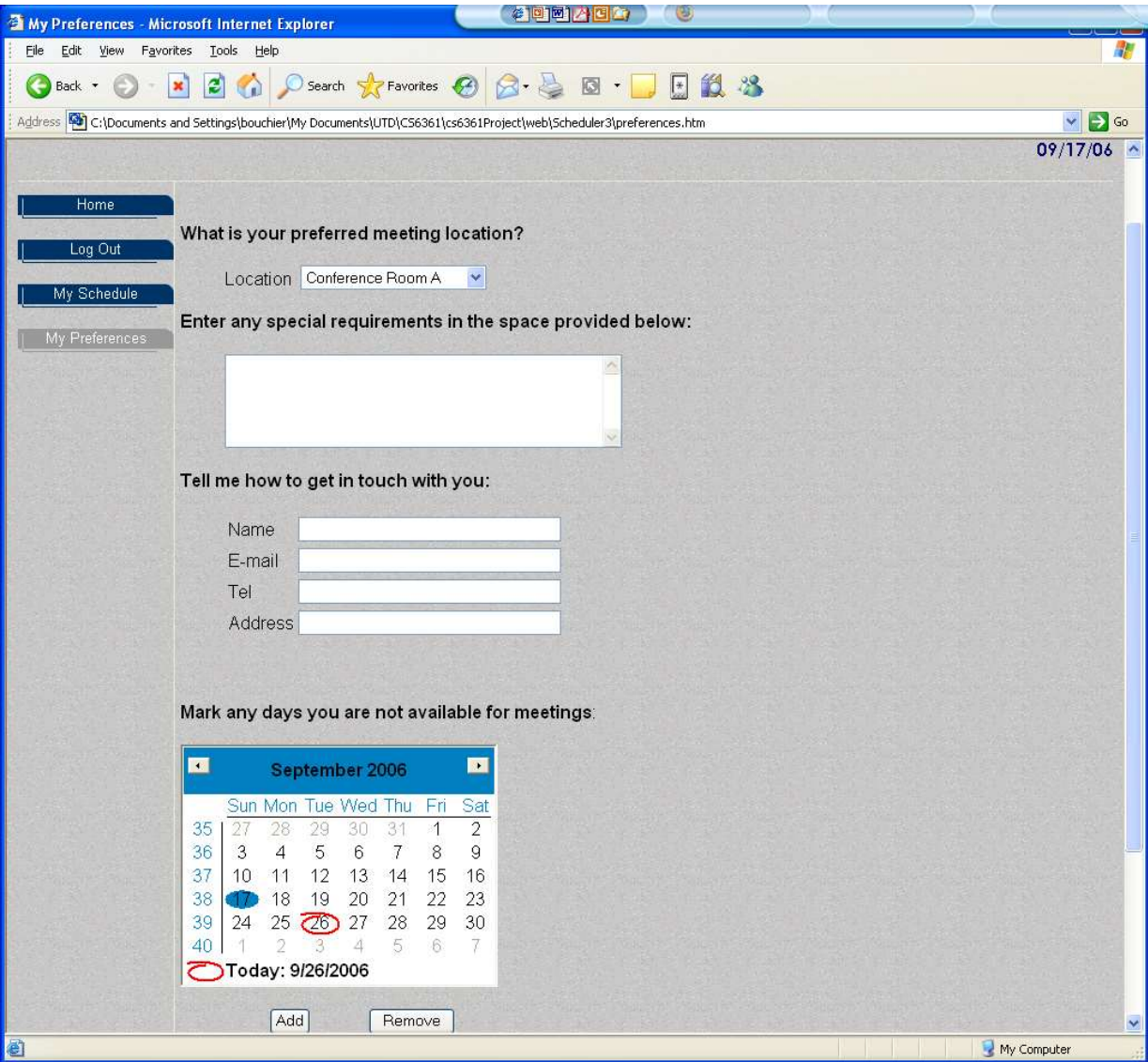
458 The home page is where the user arrives after logging onto the system.

459 **Figure 2: Create meeting screen**



460 The schedule meeting screen allows the user to create a meeting invitation
461

462 **Figure 3: Meeting preference/exclusion sets & preferences**



463 The preference/exclusion sets, and user preferences are set on this screen.
464

465 **3.2 Functions**

466 System functional requirements are specified by use cases and specific requirements. The use case
467 helps understand system behavior, and the specific requirements extend the information from the
468 use case.
469

470 **3.2.1 Use Case: 1 Respond To Meeting Invitation**

471 -----
472 CHARACTERISTIC INFORMATION
473 Goal in Context: The user has been notified that they have been invited to a meeting or that it is
474 desired that they attend a meeting. Their goal is to respond by accepting or denying an invitation (if

one has been sent) and potentially to update their preference and/or exclusion-set. The method by which they're notified of a need to access the system is not addressed by this use case. An invitation to which the user should respond may or may not exist (the meeting organizer may have called them to alert them that they should update their preference & exclusion sets in preparation for a meeting he's going to call).

Scope: Scheduling system

Level: Primary task

Preconditions: User has an account & has logged in successfully, or has finished creating a meeting invitation. User is not the administrator. There are no outstanding invitations that conflict with the exclusion set.

Success End Condition: All outstanding invitations have been accepted or denied, and the user has updated their preference/exclusion sets. No outstanding invitations overlap user's exclusion set.

Minimal Guarantee: Any invitations that the user accepted or declined have been returned to meeting initiator(s). Others are left outstanding. Any preference/exclusion set changes that the user committed are stored in the system.

Primary Actor: Attendee

Trigger: User logs into system

MAIN SUCCESS SCENARIO

1. System shows all outstanding meeting invitations, user's current meeting schedule, and provides options that allow user to:
 - accept/decline zero or more invitations
 - modify preference/exclusion sets
 - create a meeting invitation
 - check for newly arrived invitations
 - logout
2. User accepts or declines all outstanding invitations
3. System shows user's current meeting schedule, and provides options that allow user to:
 - modify preference/exclusion sets
 - create a meeting invitation
 - check for newly arrived invitations
 - logout
4. User updates preference/exclusion sets.
5. System shows user's current meeting schedule, and provides options that allow user to:
 - modify preference/exclusion sets
 - create a meeting invitation
 - check for newly arrived invitations
 - logout
6. User logs out

EXTENSIONS

- 1a There are no invitations:
 - 1a1 system goes to step 3
- 2a, 4a, 6a User checks for new invitations:
 - 2a1, 4a1, 6a1 system goes to step 1
- 2b, 4b, 6b User modifies inclusion/exclusion sets:
 - 2b1, 4b1, 6b1 system goes to step 1
- 2c, 4c, 6c User creates meeting invitation. See use case 2

524 3a, 5a System displays invitations that arrived during the previous user interaction:
 525 3a1, 5a1 system goes to setp 1
 526 5b User enters an exclusion set item that overlaps a meeting already in the schedule:
 527 5b1: System warns user that they must decline the meeting before they can enter an
 528 exclusion date that conflicts with an accepted meeting and asks if they want to decline the accepted
 529 meeting. If user says yes, system sends decline to meeting initiator, and removes the meeting from
 530 their calendar.
 531
 532 <put here there extensions, one at a time, each refering to the step of the main scenario>
 533 <step altered> <condition> : <action or sub.use case>
 534 <step altered> <condition> : <action or sub.use case>
 535 -----
 536 RELATED INFORMATION (optional)
 537 Priority: Must
 538 Performance Target: <the amount of time this use case should take>
 539 Frequency: every login
 540 -----
 541 OPEN ISSUES (optional)
 542 1. Is integration with email, or other tools such as outlook a desirable future enhancement?
 543 2. Need to bring in conference room equipment requirement
 544 3. What should happen if there are multiple updates to an invitation?
 545 4. What should happen to pending invitations that relate to meetings in the past
 546 5. What should happen when a user declines a meeting they had already accepted? Possible
 547 approach: resolve based on re-evaluating preference & exclusion sets
 548 6. Another exception: Initiator deletes previously scheduled meeting
 549 7. Do we want the system to offer banner ads?

550 **3.2.2 Use Case: 2 Initiate a meeting**

551 -----
 552 CHARACTERISTIC INFORMATION
 553 Goal in Context: The user creates a meeting invitation with maximal overlap with preference sets of
 554 all attendees, and no overlap with any attendee's exclusion set.
 555 Scope: scheduling system
 556 Level: Primary task
 557 Preconditions: User is not an administrator
 558 Success End Condition: Meeting is scheduled for all participants
 559 Minimal Guarantee: A meeting that cannot be scheduled without overlapping a participant's
 560 exclusion set is not accepted by the system
 561 Primary Actor: Meeting initiator
 562 Trigger: User at step 2, 4, or 6 in use case 1 asks to create a new meeting
 563 -----
 564 MAIN SUCCESS SCENARIO
 565 1. Initiator enters information about the meeting:
 566

- meeting name,
- participants
- desired date range
- any known equipment or conference room requirements, or indicates the meeting is

 567 virtual
 571 2. System chooses the best date &time & conference room & sends an invitation to attendees and
 572 allows user to create another meeting or do other activities in use case 1.

```

573 -----
574 EXTENSIONS
575 2a Meeting initiator is attendee:
576     2a1 System does not send invitation to initiator
577 2b Meeting time cannot be found within date range that doesn't overlap one or more attendees'
578 exclusion sets:
579     2b1 System reports names of attendees with exclusion-set violation
580     2b2 System doubles the date range from the given start date and searches for availability &
581 suggests an alternative that would succeed if such a date is found.
582 -----
583 SUB-VARIATIONS
584 <put here the sub-variations that will cause eventual bifurcation in the scenario>
585 <step or variation # > <list of sub-variations>
586 <step or variation # > <list of sub-variations>
587 -----
588 RELATED INFORMATION (optional)
589 Priority: Must
590 Performance Target: <the amount of time this use case should take>
591 Frequency:
592 Superordinate Use Case: <optional, name of use case that includes this one>
593 Subordinate Use Cases: <optional, depending on tools, links to sub.use cases>
594 Channel to primary actor: <e.g. interactive, static files, database>
595 Secondary Actors: <list of other systems needed to accomplish use case>
596 Channel to Secondary Actors: <e.g. interactive, static, file, database, timeout>
597 -----
598 OPEN ISSUES (optional)
599     1. What does it mean to "send an invitation"? Is there an email link? Or is it only sending to
600 the account on this tool?
601     2. In step 2, meeting initiator doesn't get to confirm that system's choice of date, location etc is
602 suitable.
603 -----
604 NOTES
605     1. Participants shall have a static preferred location
606 -----

```

607 eractive, static, file, database, timeout>

608
609 See section 4 for the process used to analyze the requirements, and to generate the modified system
610 requirements below. Each requirement below has a trace back to the line number in the original
611 requirements specification, which is shown in section 4. They also note if there is a dependency
612 diagram object related to the requirement. Each requirement below that was modified from the
613 original has a Note in the requirement description, which describes how it was modified.
614 SynergySoft reviewers need to review the changes that were made to the delivered requirements, to
615 ensure they are agreeable.

616 **3.2.3 System Functional Requirements**

617 618 **3.2.3.1) Assist planning meetings [FUN51787 Version: 5.9]**

619
620 The system shall assist users in planning meetings under the constraints expressed by
621 participants
622 Traces from System Functional Requirements lines: 35
623 Functional Dependency Diagram:

624 625 **Requirement Tracing:**

626 FUN51821 Meeting Notice Requirement BouchierCs6361 Direct TO
627
628 FUN51812 Business & Personal use Requirement BouchierCs6361 Direct TO
629
630 FUN51792 Bound on replanning Requirement BouchierCs6361 Direct TO
631
632 NONFUN51800 Concurrent meetings Requirement BouchierCs6361 Direct TO
633
634 NONFUN51809 Performance Requirement BouchierCs6361 Direct TO
635
636 NONFUN51810 Privacy Requirement BouchierCs6361 Direct TO
637
638 FUN51785 Support organization of meetings Requirement BouchierCs6361 Direct TO
639
640 POS51775 Meeting Initiator Requirement BouchierCs6361 Direct FROM
641
642 NONFUN51811 Usability Requirement BouchierCs6361 Direct TO
643

644 **3.2.3.1.1) Support organization of meetings [FUN51785 Version: 7.2]**

645
646 The system shall determine, for each meeting request, a meeting date and location so
647 that most of theintended participants will effectively participate
648 Traces from System Functional Requirements lines: 31-33
649 Functional Dependency Diagram: Meeting Request, Meeting Date, Meeting Location
650

651 **Requirement Tracing:**

652 FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM
653
654 NONFUN51800 Concurrent meetings Requirement BouchierCs6361 Direct TO
655

656 **3.2.3.1.2) Meeting Notice [FUN51821 Version: 1.2]**

657

A lower bound of 24 hours should be fixed between the time at which the meeting date is determined and the time at which the meeting is actually taking place;
 Traces from System Non-functional Requirements lines 77-78
 Functional Dependency Diagram: Lower bound on time between calculation & meeting date
 Notes: this requirement was part of the performance requirement in the SynergySoft spec. It was mis-categorized - it is actually a "not earlier than" functional requirement on the meeting date selection. We recategorized it, and after consultation with subject rep, set the bound to 24 hours.

Requirement Tracing:

FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM

NONFUN51806 Convenient location available early Requirement BouchierCs6361 Direct TO

3.2.3.2) Assist replanning meetings [FUN51788 Version: 4.7]

SDMSshall assist users in replanning a meeting to support the changing user constraints, for instance :

* to modify the exclusion set, preference set and/or preferred location before a meetingdate/location is proposed; and

* to take some external constraints into account after a date and location have been proposed - e.g., due to the need to accommodate a more important meeting. here, the original meeting date or location may then need to be changed; sometimes the meeting may even be cancelled.

Traces from System Functional Requirements lines: 36-41

Functional Dependency Diagram: Meeting Replanning, changing user constraints

Enterprise Dependency Diagram: Exclusion set, inclusion set,

Requirement Tracing:

NONFUN51802 Dynamic flexible replanning Requirement BouchierCs6361 Direct TO

FUN51819 Meeting Importance Requirement BouchierCs6361 Direct TO

NONFUN51809 Performance Requirement BouchierCs6361 Direct TO

NONFUN51810 Privacy Requirement BouchierCs6361 Direct TO

NONFUN51813 Flexibly accommodate evolving data Requirement BouchierCs6361 Direct TO

POS51775 Meeting Initiator Requirement BouchierCs6361 Direct FROM

NONFUN51811 Usability Requirement BouchierCs6361 Direct TO

3.2.3.2.1) Bound on replanning [FUN51792 Version: 4.1]

After replanning has resulted in 3 changes to a meeting, no more automatic changes will be made, but the initiator can cancel the meeting. Also, the system will not change the meeting date within 24 hours of the meeting start time.

Traces from System Functional Requirements lines: 42

Functional Dependency Diagram: Bound on replanning

Notes: This requirement used to read: In all cases some bound on replanning should be set up. It has been changed to explicitly state the bound, after consultation with user & subject reps.

Requirement Tracing:

FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM

3.2.3.2.2) Meeting Importance [FUN51819 Version: 2.1]

The initiator shall state the importance of the meeting on a scale of 1 - 10.

Rationale: The importance shall be used to prioritize meetings when a more important meeting is to take precedence, which may force cancellation of the meeting (line 41).

Notes: The SynergySoft spec didn't contain this requirement, but implied the need for it in line 41. After consultation we have added this requirement.

Requirement Tracing:

FUN51788 Assist replanning meetings Requirement BouchierCs6361 Direct FROM

3.2.3.3) Business & Personal use [FUN51812 Version: 3.2]

The system should be customizable to professional as well as private meetings - these two modes of use are characterized by different restrictions on the time periods that may be allocated (e.g., meetings during office hours, private activities during leisure time). The system shall allow the initiator to set a time of day range that is allowed for the meeting start time. The default shall be 9am - 5pm.

Traces from System Non-functional Requirements lines: 82-84

Functional Dependency Diagram: Initiate Meeting

Notes: This was a non-functional requirement in the SynergySoft spec. After consultation with subject rep, we decided it is not actually a non-functional requirement for customizability, but a functional requirement to be able to set the range of hours for starting the meeting. Accordingly, it is moved to functional requirements.

Requirement Tracing:

FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM

3.2.3.4) Conflict Resolution Policies [FUN51793 Version: 2.2]

The system shall support conflict resolution according to resolution policies stated by the initiator

Traces from System Functional Requirements lines: 43

Functional Dependency Diagram: Resolution policies, Client

Notes: changed ".. by the client" to "... by the initiator". There's no other mention of a client in the SynergySoft spec, and our user rep thinks it makes most sense for an initiator to specify conflict resolution policies.

Requirement Tracing:

POS51770 Conflict Resolution Policies Requirement BouchierCs6361 Direct FROM

NONFUN51808 Physical constraints not broken Requirement BouchierCs6361 Direct TO

3.2.3.5) Manage Participant Interactions [FUN51794 Version: 2.7]

The system shall manage all the interactions among participants required during the organization of the meeting

Traces from System Functional Requirements lines: 44

Functional Dependency Diagram:

Requirement Tracing:

FUN51795 Communicate Requests Requirement BouchierCs6361 Direct TO

FUN51796 Get replies Requirement BouchierCs6361 Direct TO

FUN51798 Keep participants informed Requirement BouchierCs6361 Direct TO

NONFUN51803 Minimize interactions Requirement BouchierCs6361 Direct TO

NONFUN51799 Instill confidence Requirement BouchierCs6361 Direct TO

POS51815 Any user can create meeting Requirement BouchierCs6361 Direct FROM

FUN51797 Negotiation & conflict resolution Requirement BouchierCs6361 Direct TO

3.2.3.5.1) Communicate Requests [FUN51795 Version: 3.2]

The system shall communicate meeting requests to participants by sending email and by showing meeting requests on the scheduler web page

Traces from System Functional Requirements lines: 45

Functional Dependency Diagram:

Notes: The SynergySoft spec didn't specify how communication should occur. After consultation with user & subject reps, we agreed that email and display on the scheduler web page should be the methods used. We will alert SynergySoft that this requirement modification implies an interface to email systems, which may be a significant effort. We believe this is important to making the product useful.

Requirement Tracing:

NONFUN51806 Convenient location available early Requirement BouchierCs6361 Direct TO

FUN51794 Manage Participant Interactions Requirement BouchierCs6361 Direct FROM

3.2.3.5.2) Get replies [FUN51796 Version: 3.1]

The system shall remind participants who haven't responded promptly to a meeting invitation, by sending them email and cc'ing the meeting initiator.

Traces from System Functional Requirements lines: 46

Functional Dependency Diagram:

Notes:

This requirement used to say, "system shall get replies even from participants not reacting promptly". It was not feasible as stated - the system can't bang someone on the head and make them reply. We rewrote it after consultation with user & subject reps, to send reminder email and to alert the initiator, who can bang someone on the head.

Requirement Tracing:

FUN51794 Manage Participant Interactions Requirement BouchierCs6361 Direct
FROM

3.2.3.5.3) Negotiation & conflict resolution [FUN51797 Version: 3.1]

The system shall support the negotiation and conflict resolution processes
Traces from System Functional Requirements lines: 47
Functional Dependency Diagram: Conflict resolution, Resolution policies

Requirement Tracing:

POS51769 Date Conflict Requirement BouchierCs6361 Direct FROM

FUN51794 Manage Participant Interactions Requirement BouchierCs6361 Direct
FROM

3.2.3.5.4) Keep participants informed [FUN51798 Version: 2.1]

The system shall make participants aware of what's going on during the planning
process; keep participants informed about schedules and their changes;
Traces from System Functional Requirements lines: 48-49
Functional Dependency Diagram:

Requirement Tracing:

FUN51794 Manage Participant Interactions Requirement BouchierCs6361 Direct
FROM

3.2.3.6) Administrative Account [FUN51820 Version: 3.1]

There shall be an administrative user account, which shall be authorized to add and remove
and modify user accounts, rooms, equipment, and virtual meeting characteristics from the
system.

Notes: The whole administration area was not addressed in the SynergySoft spec. After
consultation with the domain rep we decided these are the functions that should be
performed by an administrator.

Requirement Tracing:

POS51818 System Administrator Requirement BouchierCs6361 Direct FROM

3.2.4 Nonfunctional Requirements

3.2.4.1) Dynamic flexible replanning [NONFUN51802 Version: 7.1]

Replanning of a meeting should be done as dynamically and with as much flexibility as
possible

Traces from System Non-functional Requirements lines: 58

Non-functional Dependency Diagram: Flexible to changing data

Requirement Tracing:

FUN51788 Assist replanning meetings Requirement BouchierCs6361 Direct FROM

3.2.4.2) Concurrent meetings [NONFUN51800 Version: 3.2]

The meeting scheduler system must in general handle several meeting requests in parallel. Meeting requests can be competing when they overlap in time or space. Concurrency must thus be managed

Traces from System Functional Requirements lines: 52-53

Functional Dependency Diagram:

Notes: This requirement was in the functional requirements section of the SynergySoft spec, but it was mis-categorized - it is a non-functional requirement. It has been moved to the non-functional requirements section.

Requirement Tracing:

FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM

FUN51785 Support organization of meetings Requirement BouchierCs6361 Direct FROM

3.2.4.3) Minimize interactions [NONFUN51803 Version: 3.1]

The amount of interaction among participants (e.g., number and length of messages, amount of negotiation required) should be kept minimal

Traces from System Non-functional Requirements lines: 59-60

Non-functional Dependency Diagram: Minimal interaction

Requirement Tracing:

FUN51794 Manage Participant Interactions Requirement BouchierCs6361 Direct FROM

3.2.4.4) Instill confidence [NONFUN51799 Version: 3.1]

The system shall make participants confident about the reliability of the communications

Traces from System Functional Requirements lines: 50

Functional Dependency Diagram:

Notes: This requirement was in the functional requirements section of the SynergySoft spec, but it was mis-categorized - it is a non-functional requirement. It has been moved to the non-functional requirements section.

Requirement Tracing:

FUN51794 Manage Participant Interactions Requirement BouchierCs6361 Direct FROM

3.2.4.5) Reflects current meeting management [NONFUN51805 Version: 3.1]

The system should reflect as closely as possible the way meetings are typically managed (see the domain theory above)

Traces from System Non-functional Requirements lines: 64

Non-functional Dependency Diagram:

Requirement Tracing:

POS51815 Any user can create meeting Requirement BouchierCs6361 Direct FROM

3.2.4.6) Convenient location available early [NONFUN51806 Version: 4.1]

The meeting date and location should be as convenient as possible, and available as early as possible, to all invitees

Traces from System Non-functional Requirements lines: 66-67

Non-functional Dependency Diagram: Convenient meetings

Notes: We changed "(potential) participants" to "invitees" for consistency of terminology

Requirement Tracing:

FUN51795 Communicate Requests Requirement BouchierCs6361 Direct FROM

FUN51821 Meeting Notice Requirement BouchierCs6361 Direct FROM

3.2.4.7) Decentralized requests [NONFUN51807 Version: 3.1]

The system should accommodate as much decentralized requests as possible; any authorized user should be able to request a meeting independently of her whereabouts

Traces from System Non-functional Requirements lines: 68-69

Non-functional Dependency Diagram: Decentralized

Requirement Tracing:

POS51815 Any user can create meeting Requirement BouchierCs6361 Direct FROM

3.2.4.8) Physical constraints not broken [NONFUN51808 Version: 3.1]

Physical constraints should not be broken - e.g., a person may not be at two different places at the same time; a meeting room may not be allocated to more than one meeting at the same time; etc.

Traces from System Non-functional Requirements lines: 70-71

Non-functional Dependency Diagram: Physical constraints not broken

Requirement Tracing:

FUN51793 Conflict Resolution Policies Requirement BouchierCs6361 Direct FROM

3.2.4.9) Performance [NONFUN51809 Version: 4.1]

The system should provide an appropriate level of performance:

* the elapsed time between the submission of a meeting request and the determination of the corresponding date/location should be minimal; and

* the elapsed time between the determination of a meeting date/location and the communication of this information to all participants concerned should be minimal;

Traces from System Non-functional Requirements lines: 72-78

Non-functional Dependency Diagram: Quick communication to participants, Appropriate level of performance, Minimal time to determine meeting info,

Notes: The 1st & 2nd bullet used to say "OR". We changed it to "AND" because both requirements must be met. The 3rd bullet in the SynergySoft spec (lines 77-78) was actually a functional requirement, so we created a new functional requirement, "Meeting Notice" and moved the 3rd bullet into it.

Requirement Tracing:

FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM

FUN51788 Assist replanning meetings Requirement BouchierCs6361 Direct FROM

3.2.4.10) Privacy [NONFUN51810 Version: 4.1]

Privacy rules should be enforced; no participant is allowed to see constraints stated by other participants

Traces from System Non-functional Requirements lines: 79-80

Non-functional Dependency Diagram: Privacy

Notes: The synergysoft spec called for non-privileged participants to be unable to see constraints set by other users. However, the concept of who a privileged participant is, and what privileges they have was not stated. After consultation with subject rep we decided all participants are non-privileged - none of them can be allowed to see other participants' constraints.

Requirement Tracing:

FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM

FUN51788 Assist replanning meetings Requirement BouchierCs6361 Direct FROM

3.2.4.11) Usability [NONFUN51811 Version: 2.1]

The system should be usable by non-experts

Traces from System Non-functional Requirements lines: 81

Non-functional Dependency Diagram: User Friendly

Requirement Tracing:

FUN51787 Assist planning meetings Requirement BouchierCs6361 Direct FROM

FUN51788 Assist replanning meetings Requirement BouchierCs6361 Direct FROM

3.2.4.12) Flexibly accommodate evolving data [NONFUN51813 Version: 2.1]

The system should be flexible enough to accommodate evolving data - e.g., the sets of concerned participants may be varying, the address at which a participant can be reached may be varying, etc.

Traces from System Non-functional Requirements lines: 85-86

Non-functional Dependency Diagram: Flexible to changing data

Requirement Tracing:

FUN51788 Assist replanning meetings Requirement BouchierCs6361 Direct FROM

3.2.4.13) Extensible [NONFUN51814 Version: 2.1]

The system should be easily extensible to accommodate the following typical variations:

- * handling of explicit priorities among dates in preference sets;

- * handling of explicit dependencies between meeting date and meeting location;

- * participation through delegation - a participant may ask another person to represent her/him at the meeting;

- * variations in date formats, address formats, interface language, etc.; and

- * partial reuse in other contexts - e.g., to help establish course schedule

Traces from System Non-functional Requirements lines: 87-93

Non-functional Dependency Diagram: Extensible

Requirement Tracing:

POS51815 Any user can create meeting Requirement BouchierCs6361 Direct FROM

3.2.5 Deleted Requirements**3.2.5.1) Monitor meetings [DLTD51786 Version: 4.0]**

System shall assist users in Monitoring meetings, especially when they are held in a distributed manner

Traces from Enterprise Requirements lines: 34

Enterprise Dependency Diagram: Meeting Monitoring

Notes: After discussion with developer, user & subject reps, we decided monitoring should not be part of a scheduling system. If a monitoring system is needed, it should be a separate system. Therefore this requirement and the associated non-functional requirement are deleted from the requirement set. We will point this out to SynergySoft.

Rationale:

1) It was suggested in the review that "monitoring" could be interpreted as meaning monitoring changes in user schedules, exclusion sets etc. and how they interact with

1085 scheduled meetings. We don't think the SynergySoft spec supports that interpretation - it
1086 says, "Monitor meetings, especially when they are held in a distributed manner" so it is
1087 talking about monitoring meetings, not monitoring participant schedule changes.
1088 2) the functions of monitoring are too different from the functions of scheduling that they
1089 should not be combined.
1090 3) the monitoring function is not described in the SynergySoft spec. SynergySoft needs to
1091 describe what this feature should do.

1092 **3.2.5.2) Accurate Monitoring [DLTD51801 Version: 5.0]**

1093 A meeting should be accurately monitored, especially when it is held in a virtual place.
1094 Here, nomadicity will then be important to consider;
1095 Traces from System Non-functional Requirements lines: 56-57
1096 Non-functional Dependency Diagram: Accurate
1097 Notes: This requirement is deleted. See DLTD1786 - Monitor Meetings for an explanation
1100

1101 **3.2.5.3) Reduce overhead [DLTD51804 Version: 4.0]**

1102 The intended system should considerably reduce the amount of overhead usually incurred in
1103 * organizing meetings where potential attendees are distributed over many different places
1104 and
1105
1106 * communicate with each other, for example, via Internet
1107 Traces from System Non-functional Requirements lines: 61-63
1108 Non-functional Dependency Diagram: Reduced overhead
1109 Notes: We are deleting this requirement because it is redundant with "Minimize
1110 Interactions" non-functional requirement
1111
1112

1113 **3.2.6 System Non-functional Requirements**

1114

1115 **3.2.7 Deleted Requirements**

1116

1117 **4. Requirements Analysis – Paul & Shaun**

1118 This section describes the team, their roles, and the process used to analyze the requirements and
1119 create the dependency analysis. It lists the requirements issues that were discovered, and how they
1120 were resolved. It includes the original specification, annotated with line numbers. These line
1121 numbers are referenced in the issue resolutions and in the improved requirements in section 3.

1122 **4.1 Analysis Team and Roles - Paul**

1123 Paul Bouchier: Requirements Engineer & team lead
1124 Jon Fischer: User world representative
1125 Chris Nina: Developer world representative
1126 Shaun Herschbach: Subject world representative

1127 **4.2 Analysis Process**

1128 This section describes how we analyzed the requirements, and what the dependencies mean.

1129
1130 Each line in the Enterprise requirements was analyzed and recast where necessary to fix issues. The
1131 SynergySoft requirements document was scanned & OCR'd, and the text extracted into the
1132 requirements management tool CaliberRM. After requirements were inserted, the requirements were
1133 analyzed for consistency, completeness, testability, correct categorization, and other requirements
1134 faults. Faults were corrected after consultation with subject & user representatives. The notes
1135 section of each requirement tells how it was modified from the original. The original requirements
1136 can be seen, along with line numbers, in section 4. Tracing was added to connect requirements.
1137

1138 **4.3 Dependency Analysis**

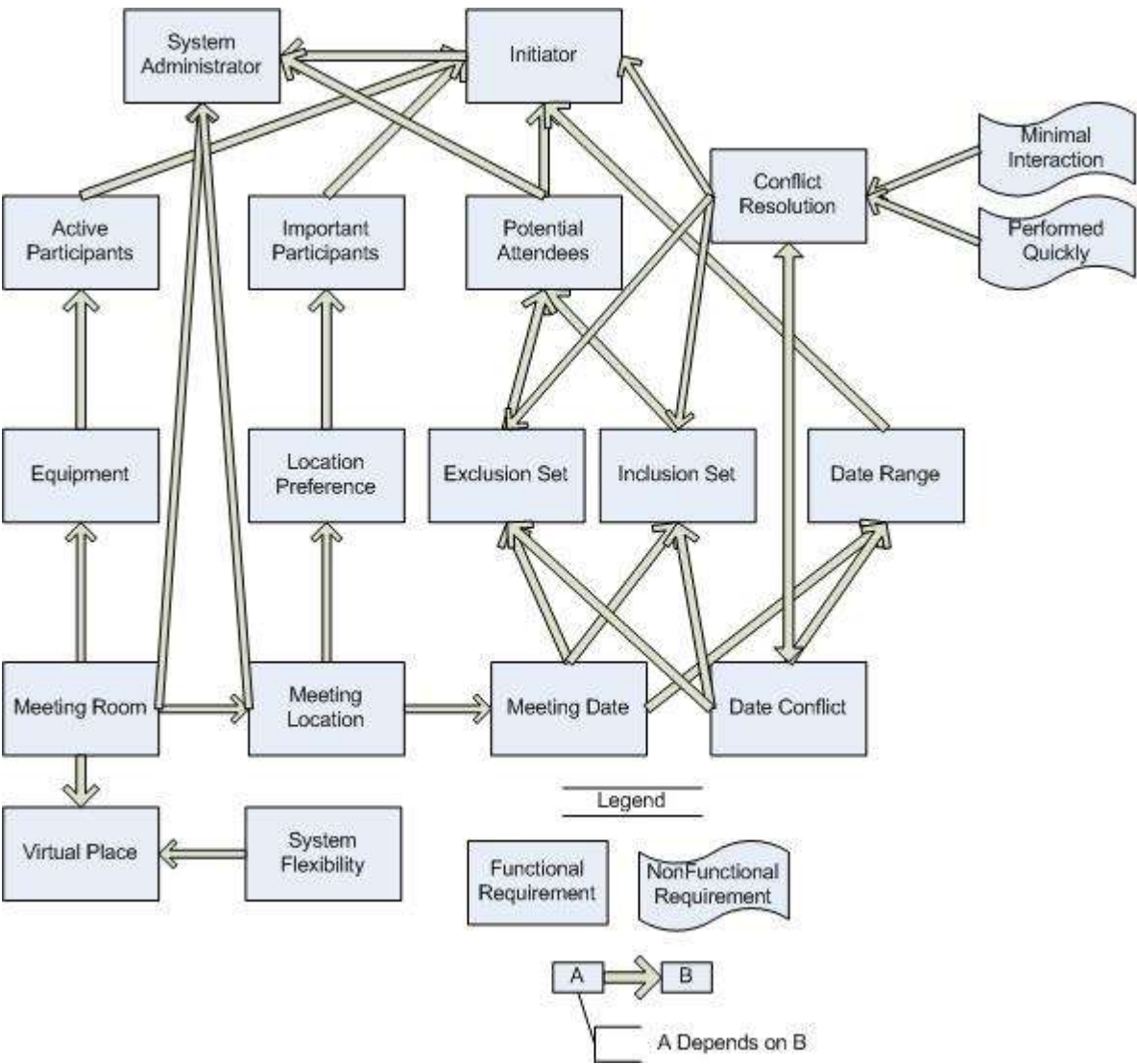
1139 Each concept in the Enterprise requirements was analyzed for meaning and dependencies and
1140 unresolved issues (dependencies could not be identified). The figure below shows which concepts or
1141 actions depend on each other in the enterprise requirements after the requirements refinement and
1142 issue resolution. A depends on B means without B there can be no A

1143 **4.3.1 Enterprise Requirements Analysis**

1144 The refined (better understanding) dependency diagram for concepts in the system functional
1145 requirements is shown below

1146
1147 .

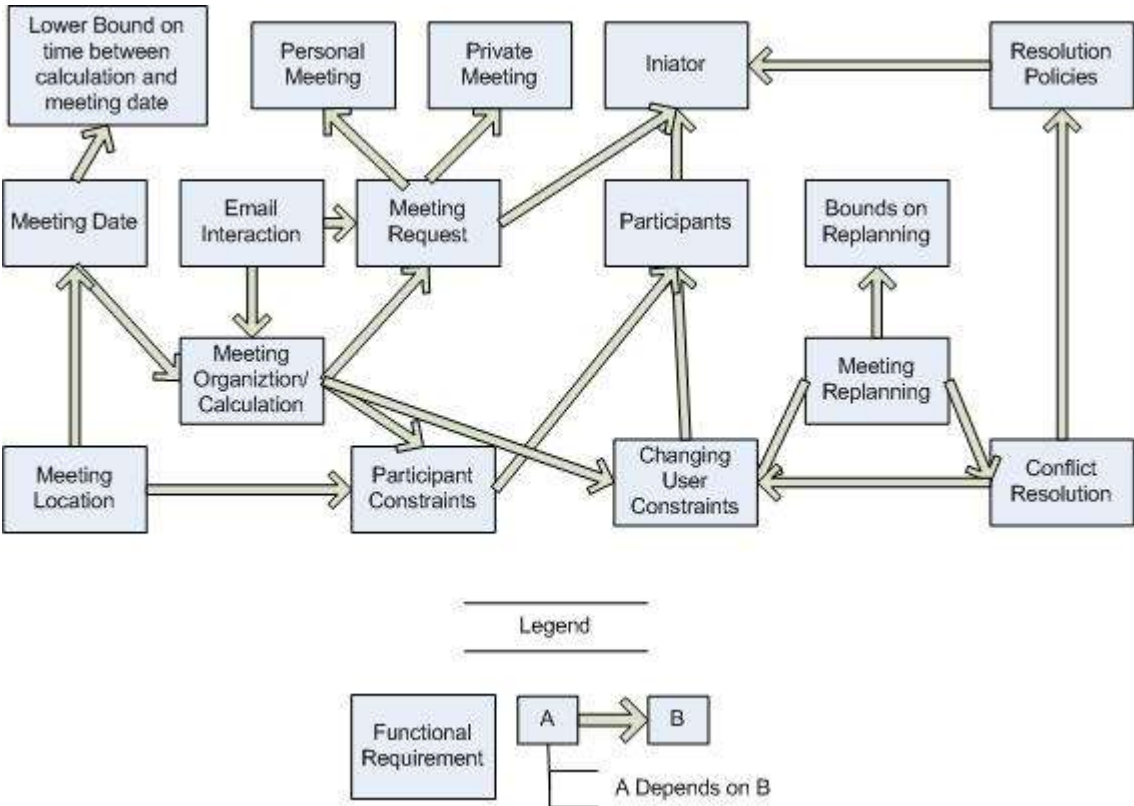
Figure 4: Enterprise Dependency Diagram



4.3.2 System Functional Requirements Analysis

The refined (better understanding) dependency diagram for concepts in the system functional requirements is shown below

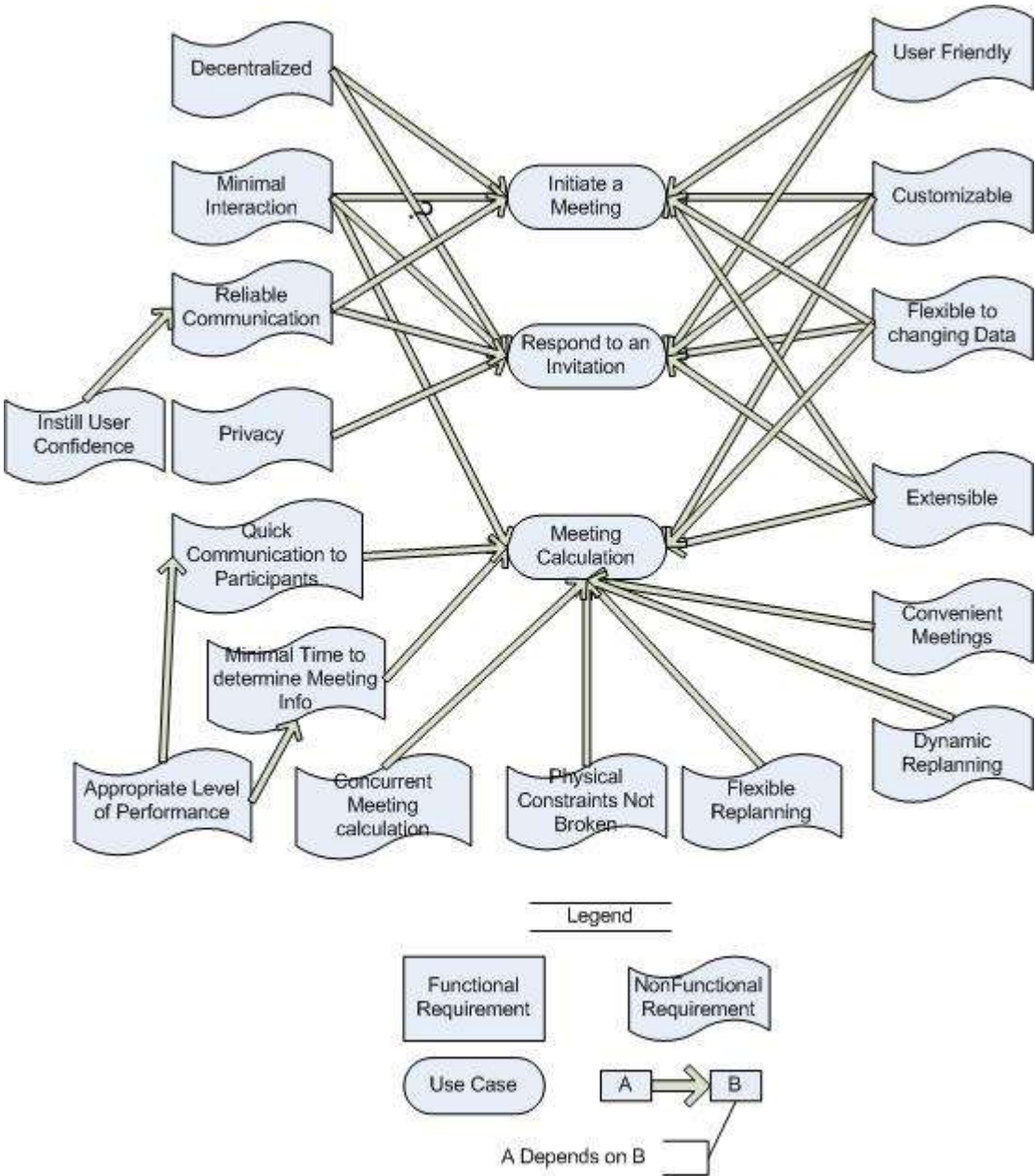
1156 **Figure 5: System Functional Dependencies (refined)**



1158 **4.3.3 System Nonfunctional Requirements Analysis**

1159 The refined (better understanding) dependency diagram for concepts in the system non-functional
1160 requirements is shown below.

1161 **Figure 6: System non-functional dependencies (refined)**



1163 **4.4 Issues Raised to SynergySoft - Shaun**

- 1164 • Drop the Monitoring requirement
- 1165 • Add an email requirement
- 1166 • Perform a market analysis to determine the size of the market and type of user who would
- 1167 use this system, considering it is not integrated with Microsoft Outlook, Novell Netware, or
- 1168 any other calendar system.

1169 **4.5 Original Requirements Delivered by SynergySoft**

1170 This section contains the original requirements set which SynergySoft delivered for analysis. The
1171 requirements have been annotated with line numbers, which are referenced elsewhere in this
1172 document.

1173 **4.5.1 ORIGINAL Enterprise Requirements: Stakeholders, Functional and Non-Functional** 1174 **Objectives**

- 1175 In the application domain, meetings are typically arranged in the following manner. A *meeting initiator* will ask all
1176 *potential meeting attendees* for the following information based on their personal agenda:
- 1177 • a set of dates on which they cannot attend the meeting (hereafter referred to as *exclusion set*; and
 - 1178 • a set of dates on which they would prefer the meeting to take place (hereafter referred to as *preference set*);
- 1179 A meeting date shall be defined perhaps by a pair (calendar date, time period). The exclusion and preference sets
1180 should be contained in some time interval prescribed by the meeting initiator (hereafter referred to as *date range*).
- 1181 The initiator could also ask, in a friendly manner, *active participants* to provide any special equipment
1182 requirements on the meeting location (e.g., overhead projector, workstation, network connection, telephone, etc.). She
1183 may also ask *important participants* to state preferences about the meeting location.
- 1184 The proposed meeting date should belong to the stated date range and to none of the exclusion sets; furthermore it
1185 should ideally belong to as many preference sets as possible. The proposal should be made as early as possible. A *date*
1186 *conflict* occurs when no such date can be found. A conflict is strong when no date can be found within the date range
1187 and outside all exclusion sets; it is weak when dates can be found within the date range and outside all exclusion sets,
1188 but no date can be found at the intersection of all preference sets.
- 1189 Conflicts can be resolved in several ways, including:
- 1190 • the initiator extends the date range; and
 - 1191 • some participants remove some dates from their exclusion set.
 - 1192 • some participants withdraw from the meeting;
 - 1193 • some participants add some new dates to their preference set.
- 1194 Each conflict resolution should be done as quickly as possible and with no more interactions than is
1195 really needed.
- 1196 A meeting room must be available at the selected meeting date. It should meet the equipment requirements;
1197 furthermore it should ideally belong to one of the locations preferred by as many important participants as possible. It
1198 is absolutely necessary, however, to allow each meeting to take place in a virtual place, e.g., through teleconferencing
1199 using laptop computers. This flexibility is considered crucial in future. The number of negotiations should be kept
1200 minimal, but a new round of negotiation may be required when no such room can be found.
- 1201 The meeting initiator can be one of the participants or some representative (e.g., a secretary).

1202 **4.5.2 ORIGINAL System Requirements: Functional Requirements**

- 1203 The purpose of SDMS is to support the organization of meetings - that is, to determine, for each meeting request, a
1204 meeting date and location so that most of the intended participants will effectively participate. SDMS shall assist users
1205 in the following activities:
- 1206 • Monitor meetings, especially when they are held in a distributed manner;
 - 1207 • Plan meetings under the constraints expressed by participants (see domain theory);
 - 1208 • Replan a meeting to support the changing user constraints, for instance:
 - 1209 • to modify the exclusion set, preference set and/or preferred location before a meeting
 - 1210 date/location is proposed; and
 - 1211 • to take some external constraints into account after a date and location have been proposed - e.g., due to
 - 1212 the need to accommodate a more important meeting, here, the original meeting date or location may then
 - 1213 need to be changed; sometimes the meeting may even be cancelled.
- 1214 In all cases some bound on replanning should be set up.
- 1215 • Support conflict resolution according to resolution policies stated by the client;
 - 1216 • Manage all the interactions among participants required during the organization of the meeting, for instance:
 - 1217 ○ to communicate requests;

- 1218 ○ to get replies even from participants not reacting promptly;
- 1219 ○ to support the negotiation and conflict resolution processes;
- 1220 ○ to make participants aware of what's going on during the planning process; - to keep participants
- 1221 informed about schedules and their changes; and
- 1222 ○ to make them confident about the *reliability* of the communications.

1223
1224 The meeting scheduler system must in general handle several meeting requests in parallel. Meeting requests can be
1225 competing when they overlap in time or space. Concurrency must thus be managed.

1226 **4.5.3 ORIGINAL System Non-Functional Requirements**

1227 In meeting the functional requirements, *non-functional requirements* should also be taken account. They include:

- 1228 • A meeting should be *accurately* monitored, especially when it is held in a virtual place. Here, *nomadicity* will
1229 then be important to consider;
- 1230 • Replanning of a meeting should be done as *dynamically* and with as much *flexibility* as possible;
- 1231 • The amount of interaction among participants (e.g., number and length of messages, amount of negotiation
1232 required) should be kept *minimal*;
- 1233 • The intended system should *considerably reduce the amount of overhead* usually incurred in
1234 ○ organizing meetings where potential attendees are distributed over many different places and
1235 ○ communicate with each other, for example, via Internet;
- 1236 • The system should reflect as closely as possible the way meetings are typically managed (see the domain
1237 theory above);
- 1238 • The meeting date and location should be as *convenient* as possible, and available as *early* as possible, to all
1239 (potential) participants;
- 1240 • The system should accommodate as much decentralized requests as possible; any authorized user should be
1241 able to request a meeting independently of her whereabouts;
- 1242 • Physical constraints should not be broken - e.g., a person may not be at two different places at the same time; a
1243 meeting room may not be allocated to more than one meeting at the same time; etc.;
- 1244 • The system should provide an appropriate level of *performance*:
 - 1245 ○ the elapsed time between the submission of a meeting request and the determination of the
1246 corresponding date/location should be *minimal*; or
 - 1247 ○ the elapsed time between the determination of a meeting date/location and the communication of this
1248 information to all participants concerned should be *minimal*; or
 - 1249 ○ a lower bound should be fixed between the time at which the meeting date is determined and the time
1250 at which the meeting is actually taking place;
- 1251 • *Privacy* rules should be enforced; a non-privileged participant should not be aware of constraints stated by
1252 other participants;
- 1253 • The system should be *usable* by non-experts;
- 1254 • The system should be *customizable* to professional as well as private meetings - these two modes of use are
1255 characterized by different restrictions on the time periods that may be allocated (e.g., meetings during office
1256 hours, private activities during leisure time);
- 1257 • The system should be *flexible* enough to accommodate evolving data - e.g., the sets of concerned participants
1258 may be varying, the address at which a participant can be reached may be varying, etc.;
- 1259 • The system should be easily *extensible* to accommodate the following typical variations:
 - 1260 ○ handling of explicit priorities among dates in preference sets;

- 1261 ○ handling of explicit dependencies between meeting date and meeting location;
- 1262 ○ participation through delegation - a participant may ask another person to represent her/him at the
- 1263 meeting;
- 1264 ○ variations in date formats, address formats, interface language, etc.; and
- 1265 ○ partial *reuse* in other contexts - e.g., to help establish course schedule.

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