(19) World Intellectual Property Organization

International Bureau





(43) International Publication Date

29 May 2008 (29.05.2008)

(51) International Patent Classification: G06Q 10/00 (2006.01)

(21) International Application Number:

PCT/EP2007/060184

(22) International Filing Date:

26 September 2007 (26.09.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

06124368.9

20 November 2006 (20.11.2006)

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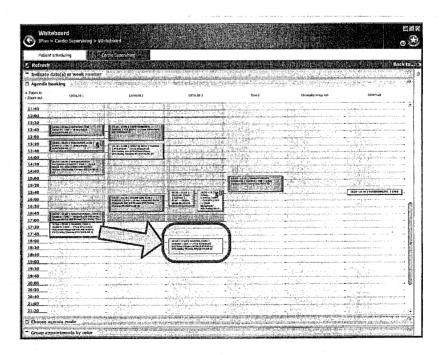
(10) International Publication Number WO 2008/061833 A1

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

with international search report

(54) Title: ELECTRONIC WHITEBOARD FOR APPOINTMENT MANAGEMENT



(57) Abstract: A system for managing appointments wherein appointments can be scheduled, rescheduled, deleted etc. by drag and drop actions on an electronic whiteboard.



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Electronic whiteboard for appointment management.

[DESCRIPTION]

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FIELD OF THE INVENTION

The present invention relates to an appointment scheduling system. More specifically the invention relates to a system for managing appointment schedules on an electronic whiteboard.

BACKGROUND OF THE INVENTION

A virtual or electronic whiteboard that displays an integrated view of patient data, derived from an electronic scheduling system, and room status information has been described in an article by David A Berkowicz M.D., G. Octo Barnett M.D. and Henry C. Chueh M.D. of Laboratory of Computer Science, Massachusetts General Hospital,

Boston, MA, entitled: eWhiteboard: A real Time Clinical Scheduler.

User interface systems for scheduling applications are known that are similar to electronic calendars. An example of such a system is the scheduling system marketed under the trade name CARDIOSCHEDULE by LUMEDX Corporation.

These systems however do not allow direct appointment management on the user interface.

It is an aspect of the present invention to provide a system for direct appointment management such as scheduling, rescheduling, deleting etc. in an agenda overview spanning several resources (such as people, rooms, material).

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The above-mentioned aspects are realized by a system for managing appointment schedules having the specific features set out in claim 1.

5 The system comprises

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- means for displaying in the form of an electronic whiteboard an overview table comprising available and unavailable time slots for each of a number of resources (e.g. cathlabs, echo rooms...) involved in an application (e.g. cardiology) subject of supervision,
- means for displaying at least one scheduled appointment on a position on this overview that is linked to a particular time slot and a particular resource,
- means for dragging and dropping a displayed appointment on the electronic whiteboard,
- means for blocking un-available time slots so that the displayed scheduled appointments can be dragged to and dropped on a time slot that is available for a particular resource but cannot be dropped on a time slot where a particular resource is unavailable.
- The means for blocking un-available time slots provide visual blocking of the draggable panel over columns of the table that are unavailable. The data from which this can be deduced are available on a client computer.
- 25 Preferably the available and unavailable time slots are displayed in a distinct manner such as in a distinct colour.

A scheduling engine is arranged so that, as a box relating to an appointment is dragged to and dropped on a new location on the electronic whiteboard corresponding with at least one of an alternative time period and an alternative resource for the appointment, the alternative data are transferred to the scheduling engine to check whether planning constraints are met at the position where the appointment is dropped, and wherein an appointment is rescheduled when all constraints are met.

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Further advantages and embodiments of the present invention will become apparent from the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

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- Fig. 1 shows an example of a whiteboard system for supervising a cardiology planning according to the present invention,
- Fig. 2 illustrates the default (un)availabilities in a system for supervising a cardiology planning provided with a timeline
- indicating the actual point of time of the day,
 - Fig. 3 illustrates re-scheduling an appointment,
 - Fig. 4 shows the other resources involved in an appointment besides the visible agendas of the resources,
 - Fig. 5 illustrates how to monitor and modify appointment statuses.

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DETAILED DESCRIPTION OF THE INVENTION

By means of a system according to the present invention direct appointment management can be performed in an agenda overview, i.e. an electronic whiteboard, spanning several resources (people, rooms, materials). The agenda overview or electronic whiteboard can be displayed on any VGA, DVI or HDI compatible hardware.

- Figure 1 is a screen print showing an example of a whiteboard system for a cardiologic department. For such a department the resources that are represented on the whiteboard are typically 'rooms' such as Cathlabs, echo room, laboratory (lab) etc.
 - However, it is also possible to represent other resources such as the physicians that are involved in cardiologic examination.

 The electronic whiteboard is managed by a whiteboard supervisor.

On such an electronic whiteboard the available and non-available time slots for each of the resources (the rooms) involved in a particular department (in this example: the cardiology department) are displayed.

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The available/non-available time slots of these resources are retrieved from lists that are composed in advance. These lists are generated by a scheduling engine running on a server computer. The lists are initially fed with data regarding the availability and non-availability of the rooms that are involved in cardiology. Rooms may for example be non-available due to maintenance.

Resources and time slots are for example arranged in a matrix configuration wherein columns correspond with different resources and rows correspond with time slots.

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It is preferable that the available and unavailable periods of time for each of the resources that are part of the cardiology application are displayed in a distinct manner such as different colors, different type of hatching or shading etc. so that the user can immediately visually discriminate between periods of time that are/are not available for scheduling an appointment in a certain cardiology room.

On the whiteboard of the illustrated embodiment, the availability and non-availability of the resources is indicated by means of light (originally red) and dark (originally green) background area.

In the described embodiment, the whiteboard is presented by default with the right pane available.

When selecting an appointment, the details are shown on this right pane.

The user then has the current options to manage the appointment (delete, reschedule, print).

In the embodiment shown, today's date is shown by default on the whiteboard. By means of the calendar expander, the supervisor can modify the day shown on the whiteboard overview.

It is possible to have a timeline indicating the current moment on the whiteboard as is shown in figure 2 (horizontal line at a specific point on the time axis).

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Add a new appointment:

Appointments involving one of the resources shown on top of the whiteboard can be scheduled on the electronic whiteboard.

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To add a new appointment the supervisor clicks somewhere on the whiteboard. At that moment, an action 'Create an appointment' becomes available. This action is displayed on a link panel of the scheduling application.

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When selecting that action, it is possible to select a procedure from a filtered list, only related to the selected resource. Through a manual booking screen, it's still possible to drag and drop a box relating to this appointment.

When the appointment is confirmed, by 'dropping' the box and clicking on a link 'confirm appointment', the supervisor is brought back to the whiteboard overview and the new appointment is added.

When an appointment is being scheduled, the data regarding this appointment (time, resource, patient related constraints ...) are retrieved by the scheduling engine and the scheduling engine computes whether all criteria for this appointment are met. The scheduling engine checks in addition to the availability of the resource displayed on the whiteboard, also the availability of all other, hidden resources that are involved in the appointment (such as availability of a certain physician for a specific examination) and checks whether the constrains involved in the examination are met. These constraints typically are patient related constraints such as whether a prescribed amount of time has passed between two successive examinations of the patient.

If all necessary resources are available and all constraints are met, the appointment can be made. The appointment is shown in the form of a small box comprising i.a. identification data of the patient on the electronic whiteboard at a location corresponding with the period of time of the appointment and in the column

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pertaining to the room involved in the appointment. The data lists associated with the scheduling system in which the available time slots for each of the resources are stored, are updated with the new information regarding the time slots(s) occupied by the scheduled appointment.

Rescheduling an appointment:

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The supervisor can reschedule an appointment on means of the electronic whiteboard by drag and drop of (a box regarding) a selected appointment.

In accordance with this invention the system is arranged so that the box relating to an appointment cannot be dragged towards resources that, according to the definition, are not part of the procedure.

For example, as soon as a procedure within a Cathlab is selected, only the availabilities of each Cathlab are shown in dark colour (originally green colour), the columns pertaining to other resources become light coloured (originally red) (see figure 3).

In case a cathlab is not available (e.g. due to maintenance), it will also be shown partially in light color (originally red).

The supervisor can drag a box relating to an appointment throughout the area relating to the cathlabs, but when trying to drag and drop outside the area on the whiteboard pertaining to cathlabs, this will not be possible and the box relating to the appointment will jump back to its original location.

As soon as a box relating to an appointment is dropped, the scheduling engine calculates whether planning constraints regarding this new location (which corresponds to a new period of time) are met.

Planning constraints are multiple and different in nature.

Typical natures include:

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time: availability all involved resources, including the patient procedure attributes: limits on patient age, gender, combination with other procedures

amount : maximum per day or per resource or combinations

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If all constraints are met, a message 'Appointment has been rescheduled' is generated in the described embodiment and again, the data lists regarding the availabilities (time slots) of each of the resources are updated with the new information.

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If constraints are broken, this is indicated through a message and list of broken constraints is given.

If the supervisor has forcing rights for the selected procedure, he/she has the possibility to force the appointment.

The conceived whiteboard and underlying scheduling engine handles more than just the visible agenda's of the resources. It handles all of the resource involved with the appointment including the hidden resources involved in an appointment.

In case other resources besides the resource present on the whiteboard are involved in the appointment, they can be managed through a right mouse click on the appointment box. A right mouse click will generate display of a small menu comprising a list of the other involved resource groups.

When selecting a resource group, a possibly involved resource is marked with a "V".

Other resources can be selected by clicking upon.

At that moment, the scheduling engine checks the availability of that resource and may notify the supervisor of any broken constraints (see above).

A procedure can be added to existing appointments by clicking on the action 'Add procedure to the selected appointment'.

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It is then possible to select a procedure from a filtered list, only related to the resources of the existing appointment.

The lists are stored in a database and the setup of the application determines which resources can perform a certain examination.

The list are filtered by evaluating of all resources are available for an examination.

It is possible to modify the duration of the procedure.

When the procedure is added, appointment status of this procedure

(see below) behaves as the existing procedure.

It is also possible to add a new appointment as described higher.

Finally, it's also possible to monitor and modify appointment statuses (see figure 5).

In a pane 'Group appointments by color', it is possible to select the 'procedure status' radiobutton. At that moment, a legend of statuses and related color (or density, hatching or the like) is shown. The procedural statuses are stored in a database and the link between a status an a certain colour is stored in an XML file. This helps to know the exact meaning of every color (density, hatching or the like) on the appointment.

The supervisor can modify a status by selecting an appointment. At that moment, in the action box, the possible 'next statuses' become available. When selecting one of the actions, the status is changed.

The status colors can be configured to indicate ongoing or emergency appointments. For example, 'emergency' status appointments can be assigned a bright red color in the setup.

Finally, it's also possible to print out the agenda's of the resources on the whiteboard. Agenda's are printed out sequentially.

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An example of scheduling engine that may be used for determining the available/non-available time slots of the resources involved in a type of examination has been described in the published PCT application WO2006/094890. The described scheduling engine computes for each resource a set of available/non-available time slots. An inductive logic method is employed to control the processing of time slots.

First relationships between actions (appointment, exam, dressing, undressing etc.) of resources are defined. These relations ships are for example comprising, relational or sequential relationships.

A first set of resources of which action constraints are known and a second set of resources for which action constraints are unknown are identified.

Next, the actions of the resources of the first and second set of resources are described by means of time windows (belonging to the set of action, start time of an action or end time of an action) comprising a linked list of time segments.

Then a resource out of the second set is identified and the time windows are processed to determine the action of the identified resource. This processing comprises at least one inductive processing step.

The inductive logic step generally comprises one of the following - obtaining a time window of start times of an action by processing a time window of end times of said action and a time window of a previous action.

- obtaining a time window of end times of an action by processing a time window of said action, a time window of a following action and a slack time,
- o btaining a time window of an action by processing the time windows of actions that are either a parent action or related actions.

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The inductive step of obtaining a time window of start times of an action by processing a time window of end times of the action and a time window of a previous action may comprise the following steps:

- adding the duration of the previous action to the start times of the time segments of the time window of the previous action to obtain a time window of the end times of the previous action;
- shifting the time segments of the time window of the end times of the action backward by the duration of the action to obtain a time window of the start times of the action;
- obtaining a time window of the start times of the action of which the segments are the cross section of the segments of the time window of the end times of the previous action and the segments of the time window of the start times of said action.

The inductive step of obtaining a time window of end times of an action by processing a time window of the action, a time window of a following action and a slack time may comprise the following steps:

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- subtracting the duration from the end times of the time segments of the time window of the following action to obtain a time window of start times of the following action;
- adding the slack time to the end times of the time segments of the time window of the action to obtain a time window of the action plus slack;
 - adding the duration to the start times of the time segments of the time window of the action plus slack to obtain a time window of end times of the action;
 - obtaining a time window of end times of the action of which the time segments are the cross section of the time segments of a time window of start times of the following action and the time segments of a time window of end times of the action.
- The inductive step of obtaining a time window of an action by processing the time windows of actions that are either a parent action or related actions may comprise the following steps:
 - replacing the time segments of time windows of related actions by time segments that are the cross sections of the original time segments of the time windows of the related actions;

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- adjusting the begin and end times of time segments of children actions so that are comprised in the time segments of the time window of the parent action.

Having described in detail preferred embodiments of the current invention, it will now be apparent to those skilled in the art that numerous modifications can be made therein without departing from the scope of the invention as defined in the appending claims.

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[CLAIMS]

1. A system for managing appointment schedules comprising

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- means for displaying in the form of an electronic whiteboard an overview table comprising available and unavailable time slots for each of a number of resources (e.g. cathlabs, echo rooms...) involved in an application (e.g. cardiology) subject of supervision,

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- means for displaying at least one scheduled appointment on a position on this overview that is linked to a particular time slot and a particular resource,

- means for dragging and dropping a displayed appointment on the electronic whiteboard,

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- means for blocking un-available time slots so that the displayed scheduled appointments can be dragged to and dropped on a time slot that is available for a particular resource but cannot be dropped on a time slot where a particular resource is unavailable.

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2. A system according to claim 1 wherein said available and unavailable time slots are displayed in a distinct manner.

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3. A system according to claim 1 wherein said different manner is a different colour.

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4. A system according to claim 1 comprising a scheduling engine arranged so that as a box relating to an appointment is dragged to and dropped on a new location on the electronic whiteboard corresponding with at least one of an alternative time period and an alternative resource for the appointment, the alternative data are retrieved by the scheduling engine to check whether planning constraints are met at the position where the appointment is dropped, and wherein an appointment is rescheduled when all constraints are met.

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5. A system according to claim 4 comprising means for generating a message indicating that an appointment is re-scheduled or indicating that not all constraints are met.

6. A system according to claim 1 arranged so that upon an user interaction (RMC) a list of originally hidden resources involved in an appointment is displayed and can be managed.

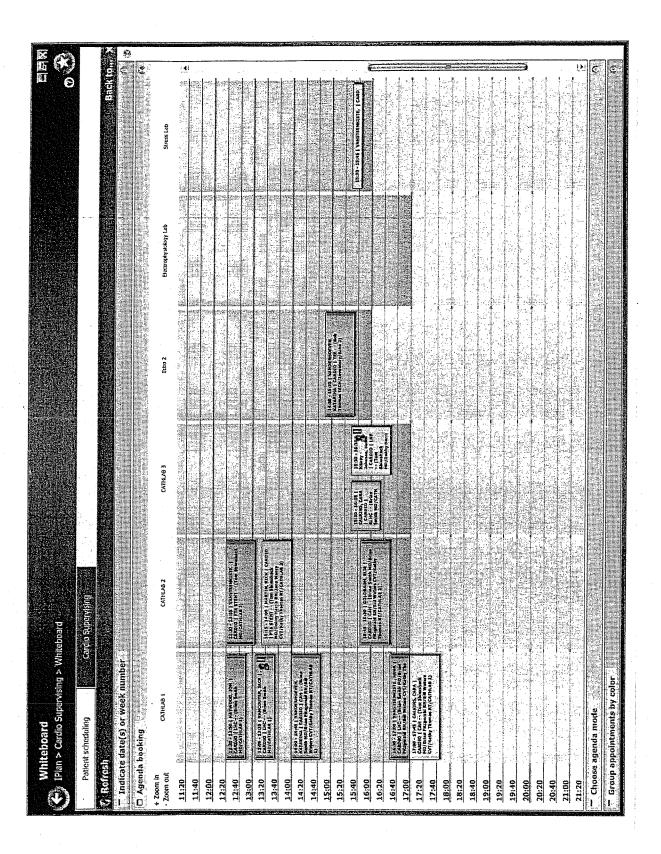
7. A system according to claim 1 arranged so that upon user interaction a procedure can be added to an appointment.

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Fi G. 1

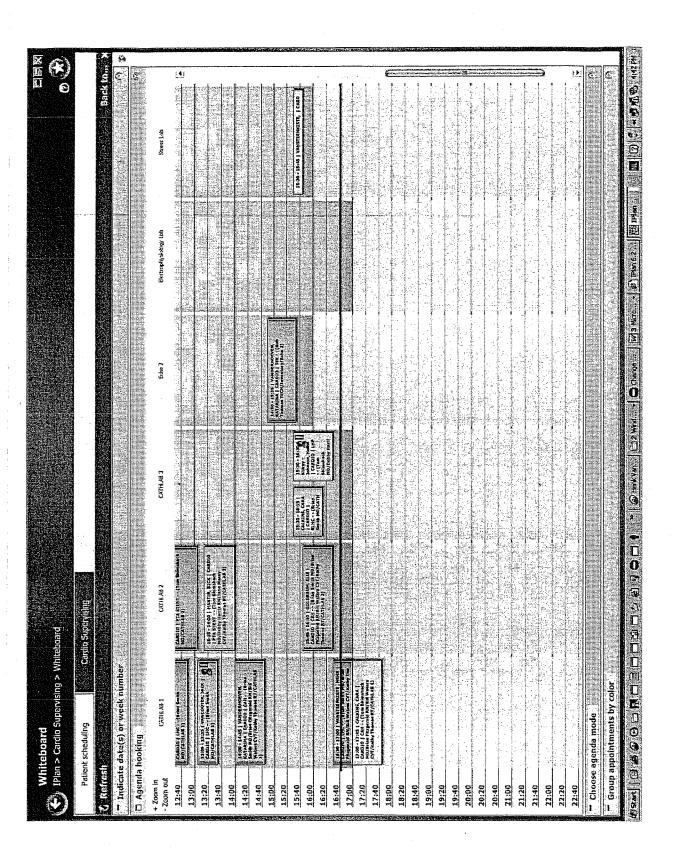
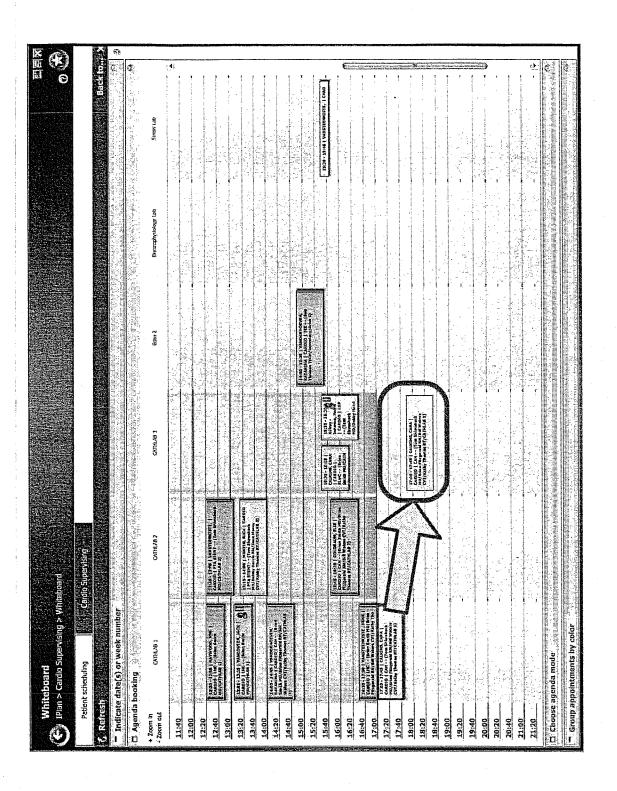
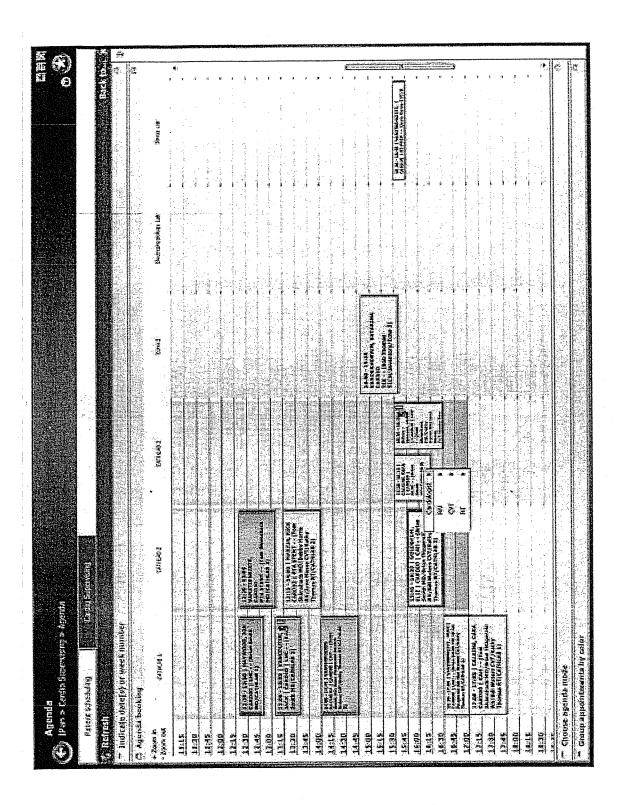


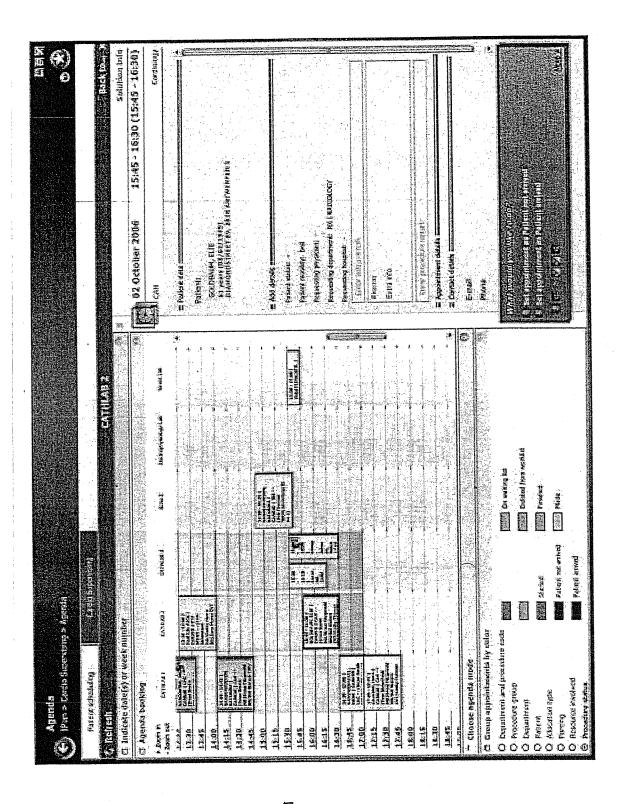
FiG. 2



Fi G. 3



F, G. 4



Fi G. 5

INTERNATIONAL SEARCH REPORT

International application No PCT/EP2007/060184

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According to	h International Patent Classification (IPC) or to both national classification	ation and IPC			
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Documentat	ion searched other than minimum documentation to the extent that s	such documents are included in the fields so	earched		
Electronic d	ata base consulted during the international search (name of data ba	se and, where practical, search terms used	i)		
EPO-In	ternal				
C. DOCUMI	ENTS CONSIDERED TO BE RELEVANT				
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X Furth	ner documents are listed in the continuation of Box C.	X See patent family annex.			
* Special c	ategories of cited documents :	"T" later document published after the inte	ernational filing date		
"A" docume	ent defining the general state of the art which is not ered to be of particular relevance	or priority date and not in conflict with cited to understand the principle or th	the application but		
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"L" docume	nt which may throw doubts on priority claim(s) or is cited to establish the publication date of another	cannot be considered novel or canno involve an inventive step when the do "Y" document of particular relevance; the o	cument is taken alone		
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Date of the a	actual completion of the international search	Date of mailing of the international sea	rch report		
2:	2 November 2007	04/12/2007			
Name and n	nailing address of the ISA/	Authorized officer			
	European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Beatty, John			

INTERNATIONAL SEARCH REPORT

International application No PCT/EP2007/060184

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Category*	Citation of document, with indication, where appropriate, of the relevant passages		Relevant to claim No.		
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Information on patent family members

International application No PCT/EP2007/060184

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