「Asia-Pacific Medical Network Project in Kyushu University Hospital」TEMDEC (Telemedicine Development Center of Asia) Annual Report : Vol.11

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3. New Instruments and Technical Tips

3.1 Technology Available at TEMDEC

We use several systems for our purposes. For instructions on how to use each, please refer to our homepage (http://www.temdec.med.kyushu-u.ac.jp/eng/equipment_available.html).

Our equipment is also available for hire. Please inquire for further details.

1. Teleconferencing

We use three systems for teleconferencing: the DVTS, H.323, and Vidyo systems. Which system we choose depends on the purpose, the situation and the specifications of the system (Chart 1).

Chart 1. Systems comparison（TEMDEC at March, 2015）

System	DVTS	H.323		Vidyo	
Type	Software	Hardware	Software	Hardware	Software
Resolution	SD	SD or HD	SD or HD	HD	HD
Bandwidth	30 Mbps	1–10 Mbps	2 Mbps	6 Mbps	4 Mbps
Camera	Video camera	Video camera	Web camera	Video camera	Web camera
Content-Sharing	Yes	Yes	Partial	Yes	Partial
Global IP	Required	Required	Required	Not required	Not required
Price (USD)	Free	$10000	$200	$10000	$2 (Client)
Scale	8 sites	20 sites	20 sites	20 sites	20 sites
Difficulty level	Engineer required	Easy	Easy	Easy	Very easy

1-1. DVTS (Digital Video Transport System)

(Figure 1)

Terminal type, software (free)

Resolution: SD

Bandwidth: 30 Mbps
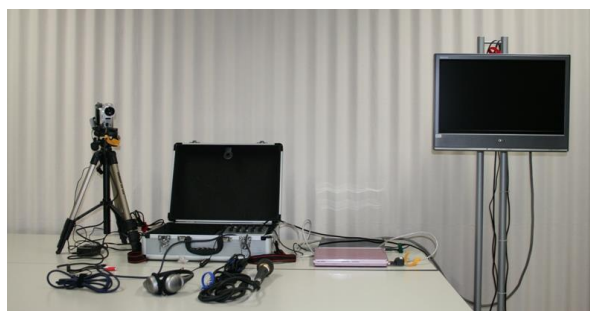
Public IP: Required

Low compression

Figure 1. DVTS setup

1-1-2. DVTS-MCU

- APAN-JP apanmed1:4 sites(GUI), 16 sites(CUI), VPN
- APAN-JP apanmed2: 4 sites(GUI), 16 sites(CUI)
- TEMDEC: 7 sites(GUI)

1-2. H.323 Video Conference System (Figure 2)

This is a general teleconference system that can connect with video conferencing products by many manufacturers such as Polycom, Sony, Cisco, LifeSize, Panasonic and others. These products (H.323 standards) are basically compatible with one another.

Terminal type, hardware

Resolution: SD/HD

Bandwidth: 1–4 Mbps

Public IP: Required

compressed

Figure 2. H.323 hardware

Available to TEMDEC

- Polycom HDX9001
- Sony PCS-XG80 (× 2)
- Lifesize Team HD 220
- Cisco SX20

1-2-1. MCU for H.323

- Polycom RMX 1500 : HD, 4 Mbps, 12 sites
- Cisco TelePresence MCU 5300 : HD, 4 Mbps, 20 sites (belongs to Kyushu University, reservation required)

1-2-2. Software for H.323 endpoint

- Lifesize Softphone (×20): SD/HD, 2 Mbps/30 fps/H.264/1080p

1-3. Vidyo: Client-server style video conferencing software (Figure 3)

Client – server type, software /hardware

SD/HD, several hundred kbps - several Mbps

H.264/SVC

Figure 3. Vidyo desktop

1-3-1. Server: VidyoPortal

- TEMDEC VidyoPortal

  23 sites, streaming/recording, gateway connection, AES encryption, VPN

  Endpoint software download license (×2600)

- Child Cancer Project VidyoPortal

  20 sites, AES encryption

  Endpoint software download license (×1000)

1-3-2. Endpoint hardware: VidyoRoom (Figure 4)

- VidyoRoom HD230 (×1)
- VidyoRoom HD220 (×1)
- VidyoRoom HD100 (×1)
- VidyoRoom HD40 (×1)

2. Annotation

An overwrite system for transmitting images, to fill in slide details and make teleconferencing more interactive with layered text and illustrations.

Figure 4. VidyoRoom

2-1. Telepointer

A cursor position sharing system

Client-Server type

Windows-compliant software

Need ID, password for login and Global IP address for reception

2-2. Annotation tool

Server system for drawing on images on a PC

Drawn with a graphics tablet

Figure 5. Telepointer

3. Streaming

One-way teleconference streaming via Vidyo systems.

Users receive video stream to their PC via web browser.
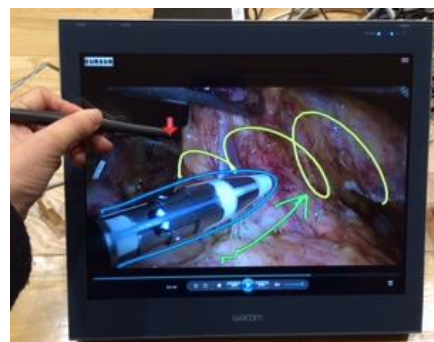
1–2 Mbps for HD

Up to 300 users can receive stream

Figure 6. Annotation tool

4. Chat tools

For simultaneous communication during the teleconference.

4-1. Adobe Connect

Web application based on Flash Player. TEMDEC hosts five meeting rooms. Each room can connect with 100 sites.

4-2. Skype

Teleconferencing software, primarily used for casual chatting and calling.

Figure 7. Streaming

3.2 What is Med-hok?

Med-hok
Teleconference Management System Designed for the APAN Medical Working Group

Outline
 Med-hok is a teleconference management database system specifically designed for Asia-Pacific Advanced Network (APAN) Medical Working Group. The aim is to build up and store a variety of information correctly and to make preparations for teleconferencing easier and more precise. With the potential advantages of this system, we would like to modify the current TEMDEC-centered communication style to a more independent style throughout our community, such that each institution can join and act more effectively.

When accessing Med-hok as a guest, you can check the date, time and type of past and future events, as well as which institutions joined or will join by accessing the "Past event" and "Coming event" pages. If you are a member of Med-hok, you can login your "Institution User ID" to access upcoming events that your institution will join, or to edit the member list of your institution. You can also review your institution's activities on the "Past event" page. If you are an "Event Administrator", you can plan events and edit programs.

We have designed Med-hok for smooth communication in telemedicine. The beta version has now been released for testing. Our aim is the Systemization of workflow for teleconferencing; to work more efficiently without errors in communication. By reaching this goal, activities of telemedicine can be carried out worldwide via the Internet.

1. Introduction
 The Kyushu University Hospital team (TEMDEC) began our telemedicine activities in 2002 and we have expanded over the last 10 years. Today, our role is not only to host telemedicine events but also to support our partners' activities. Through such activities, we have automated the workflow of telemedicine, to secure good connections and provide attractive content. For each event, we compile mailing lists, provide programs, and test communications connections. After the event, we gather and share feedback for review and archive it in the event list, with images and videos published as websites or articles (Figure 1). However, our activities have been so frequent that we have often had difficulties with smooth and clear communication. Therefore, for better teleconference management, the latest unified information must be collected and shared among all our partners.

2. Purpose
 Med-hok is a teleconference management database system specifically designed for the Asia-Pacific Advanced Network (APAN) Medical Working Group. The aim is to build up and store a variety of correct information and to make preparations easier and more precise. With the potential advantages of this system, we would like to modify the current TEMDEC-centered communication style to a more independent style in our community, such that each institution can join and act more

effectively (Figure 2).

Med-hok stores information about each medical teleconference event, based on the institutions that are connected to the event. When accessing Med-hok as a guest, you can check the date/time and type of past and future events, as well as which institutions joined or will join by accessing the "Coming event" and "Past event" pages. If you are a member of Med-hok, you can login your "Institution User ID" to access upcoming events that your institution will join, or to edit the member list of your institution. You can also review your institution's activities on the "Past event" page. If you are an "Event Administrator", you can plan events and edit programs.

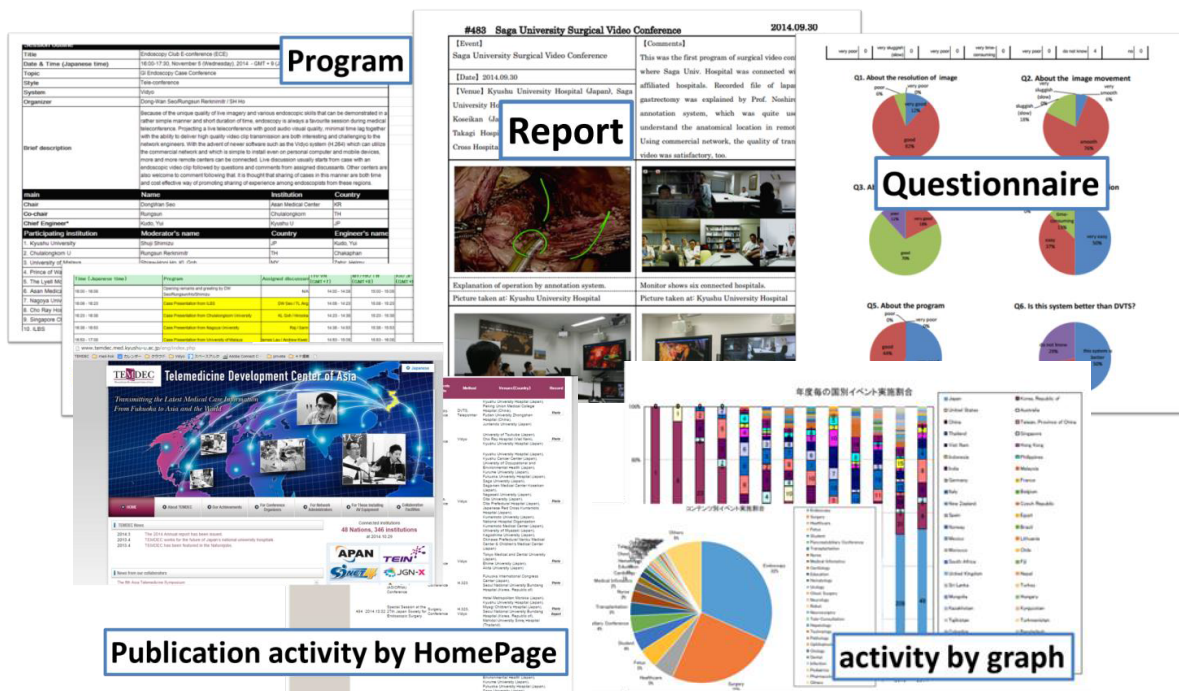For more information about creating a user ID, please refer to the "How to Join" page.
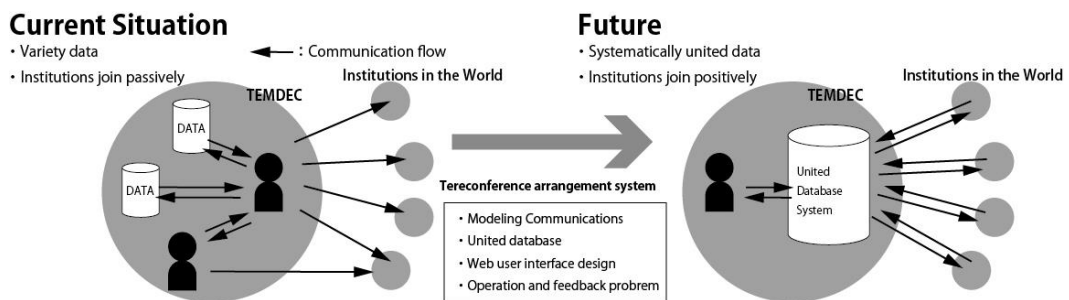

Figure 1.   Teleconference data

Figure 2. Purpose of Med-hok

3. Method

Med-hok is made up of three parts; the database, teleconference management model, and user interface design. The database stores information about each teleconference and its results. These include the mailing list, program, technical tips, reports, and others. The "teleconference management model" algorithm is an automation of TEMDEC's telemedicine workflow, based on our activities over the last 10 years. The third component is the user interface design. Med-hok is designed as web-based system. It is English-based with time-zone support, to best provide the most comprehensive information.

3-1. Database

The database structure is shown in Figure 3. Data are sorted into 15 categories: Country, Area, Time zone, Time offset, Meeting plan, Institution, Network, System, Member, Mailing list, Event, Schedule, Event accumulation, Record, and Login account. The items indicated in blue are numerical data; items in green are text data; and items in red are special text, such as comma-delimited numbers.
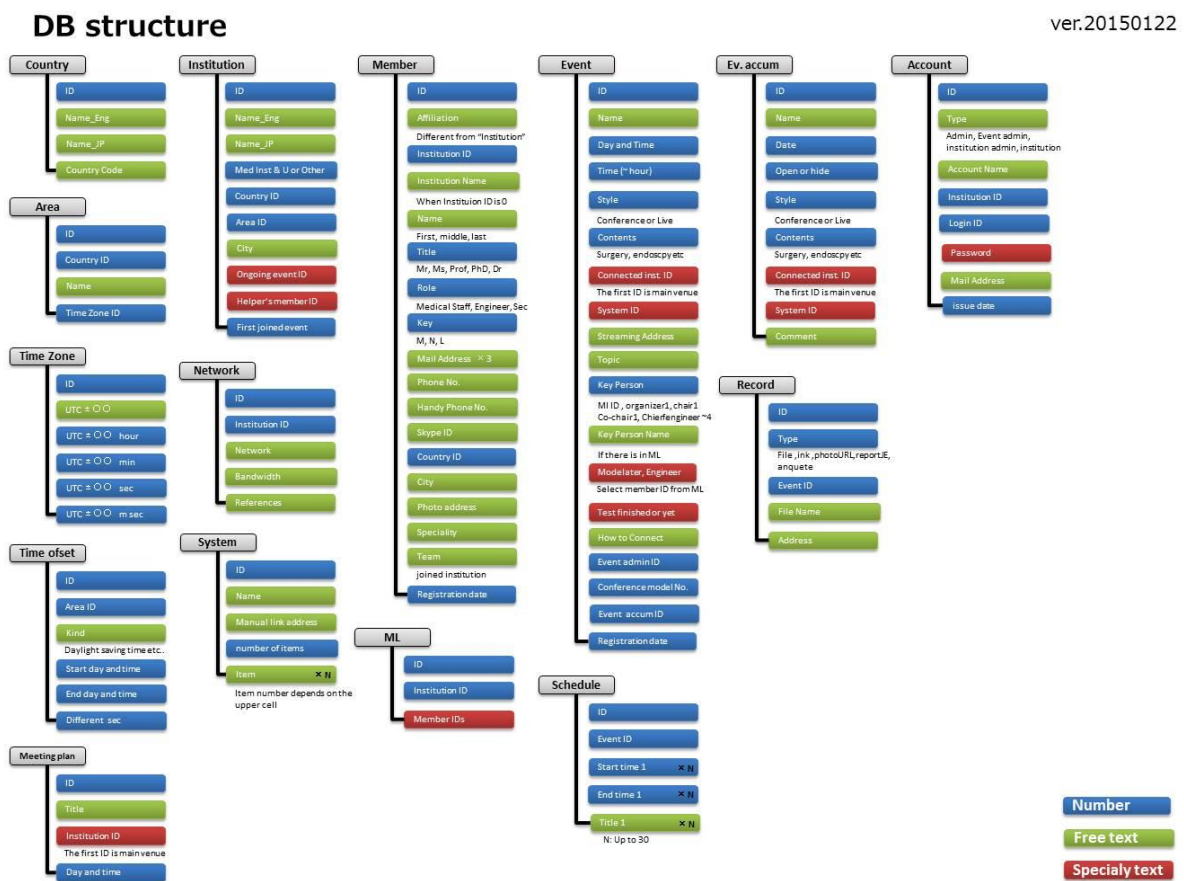

Figure 3. Database structure

3-2. Teleconference management model

Teleconferencing using Med-hok involves five processes (Figure 4). This flow is based on our previous experiences. For those at the level of "Event Administrator", this model supports the realization of teleconference plans.

Process 0 is designated as "Basement". The system requests the institution for general information and member information, network and system availability, and some other parameters. Process 1 is entitled "Ready". A program and mailing list for the event are suggested, and the institution can connect to check and update the information. Engineers test all connections. Process 2 is referred to as "Event". Telemedicine activities are performed in this process, such as live demonstration and case teleconferences. Process 4 is "Review". A report of the event is created, as well as a questionnaire to be completed by participants. In this way, we can review the event for quality enhancement. Finally, Process 4 is designated "Achievement". Event records, such as photos and video recordings, are archived. These data are also used for publication, such as on websites, in articles or in annual reports.
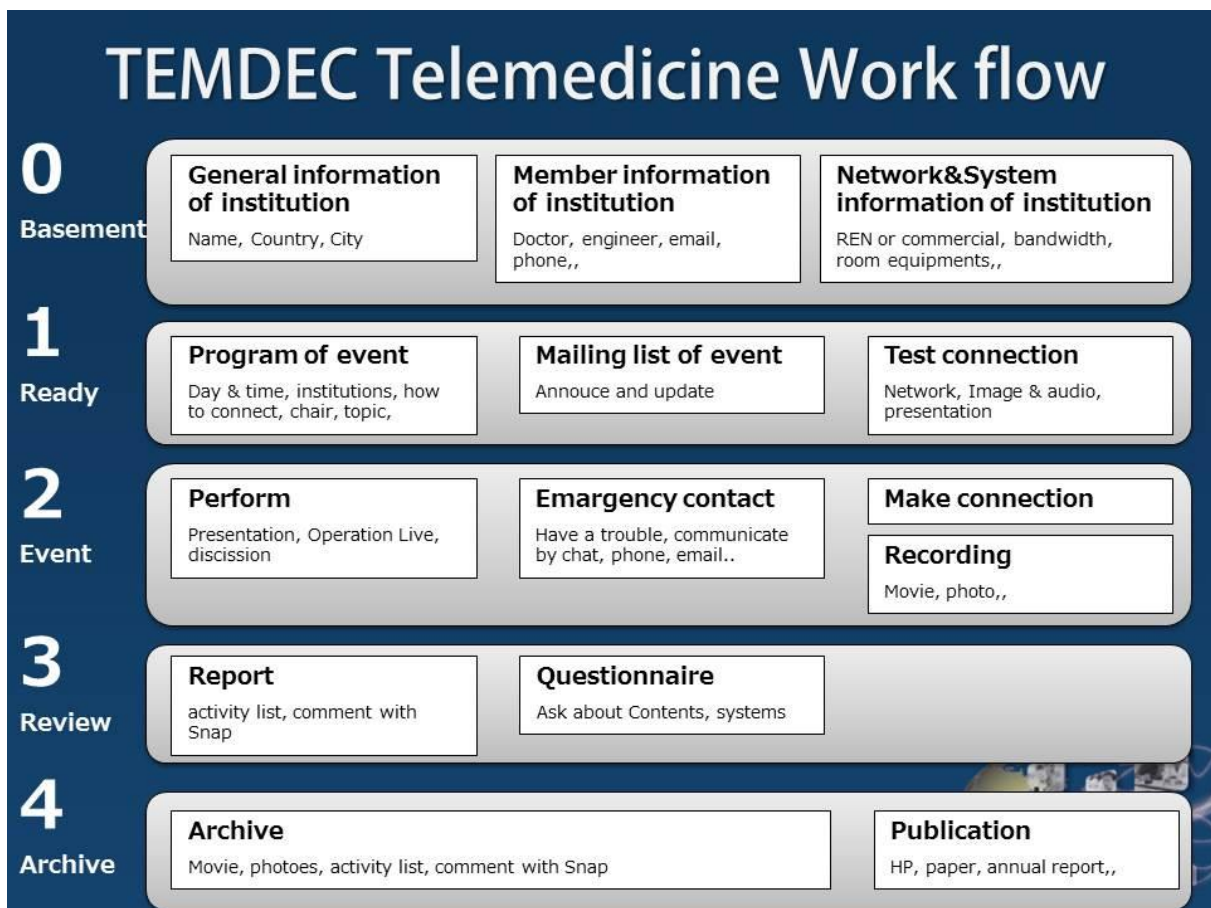

Figure 4. Teleconference management model

3-3. User interface design

  Med-hok is designed as an English web-based system that provides time-zone support, to clearly display all information. On the homepage (Figure 5, left pane), the Med-hok logo and general menu are located at the top. There is also an icon to change text size, a login button, and text box for searching. At the middle of this page, three links to upcoming events are placed next to latest news. Past events are listed at the bottom of the homepage. From each event, there is a link to an "Event detail" page (Figure 5, center pane). On the event detail page, there are submenus for the event program, mailing list, connection information, files, and reports. The program is available to all users; the other menus require login. Only the participating institutions can access the event information. The right pane of Figure 5 shows the design of the personalized "My page". After login, the user can access their member list, and network and system information. Upcoming and past events that the user has joined are also displayed here.
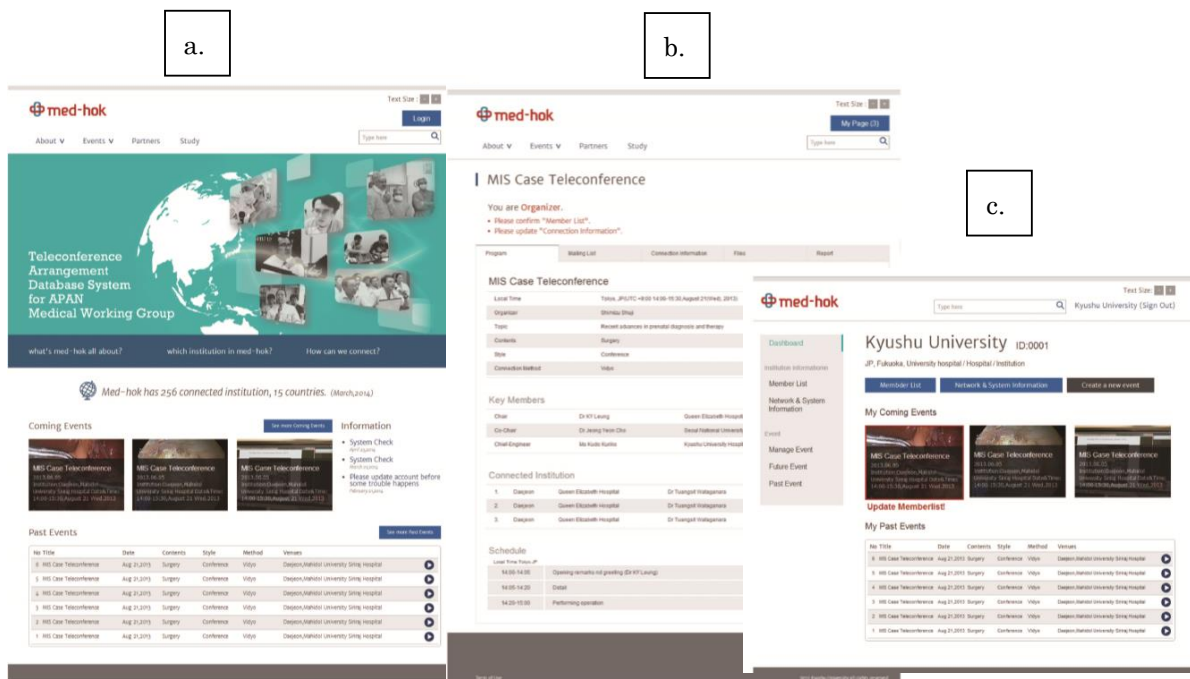

Figure 5. Med-hok interface design
a.   Top page (left), b. Event detail page (center), c. My page (right)

3-4. Site structure

  The Med-hok site structure is shown in Figure 6. The site is constructed in three parts. The first is the General portion, which introduces and provides an explanation of the system and ID rules. The second is the Institution section. This is for each institution that is a member of Med-hok, which can be accessed after login. From My page, you can edit your own institution's information including its members, and create a new event. The third part is the Event section. Each upcoming or past event has its own detail page. The Event detail page includes the Program, Mailing list, Connection information, Files, and Report menus.

4. Conclusion

We designed Med-hok for smooth communication of telemedicine activities. The beta version has now been released for testing. We always appreciate user feedback to improve the system. Our aim is the automation of teleconferencing, to work more efficiently without errors in communication. By reaching this goal, activities of telemedicine can be carried out worldwide via the Internet.
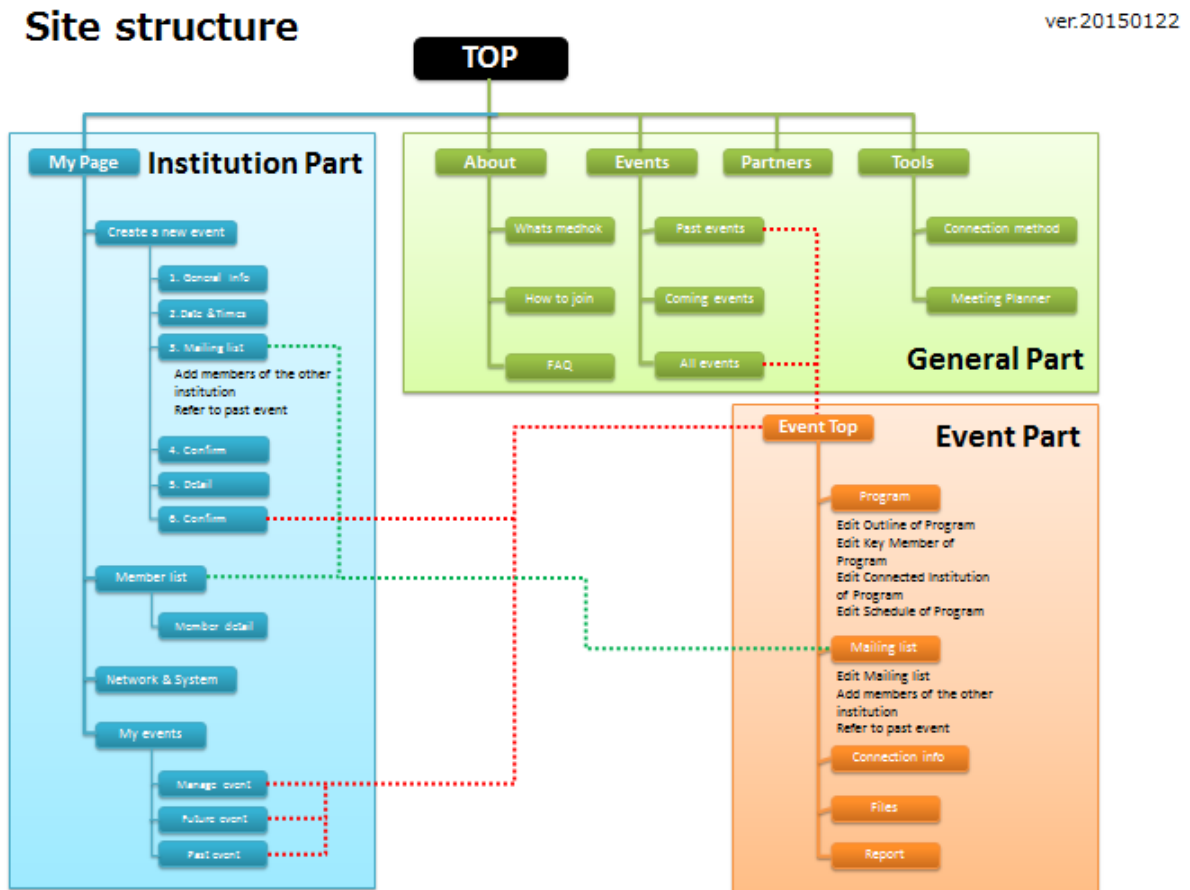

Figure 6. Site structure showing General (green), Institution (blue) and Event (Orange) sections.

3.3 Med-hok ID Rules: Based on Institution

All users should login as an institution that will be joining a teleconference event. This ID system is called "Institution-user ID". The institution associated with the Institution-user ID can be different from the user's original affiliation. One institution can have several different Institution-user IDs. Any user who logs in using the Institution-user ID can access information related to the institution, such as its members, systems, and installed equipment (Figure 1).
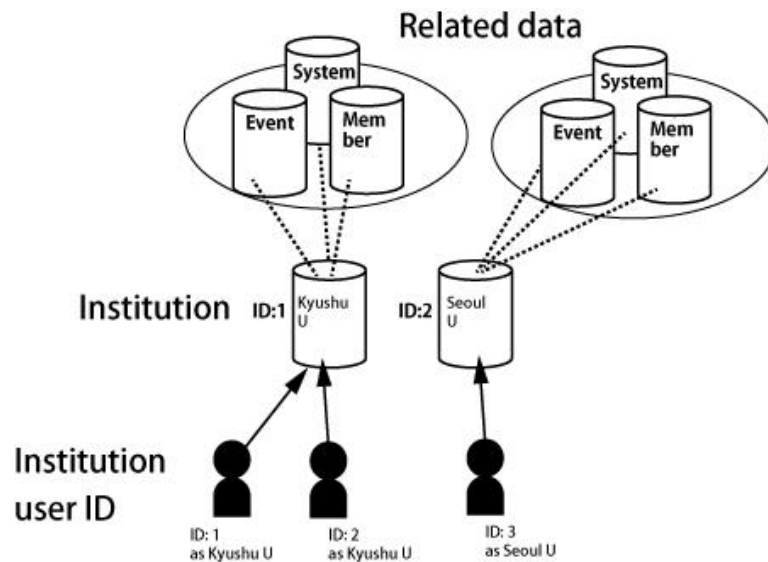

Figure 1. Institution-user ID

Some optional authorized users can be added to an Institution-user ID, such as "Institution-administrator" and "Event-administrator".

The Institution administrator manages the Institution-user IDs. When an Institution-user ID is requested, the Med-hok office issues the ID through the Institution-administrator (Figure 2). The e-mail domain of the Institution-administrator must be the same as that of institution.
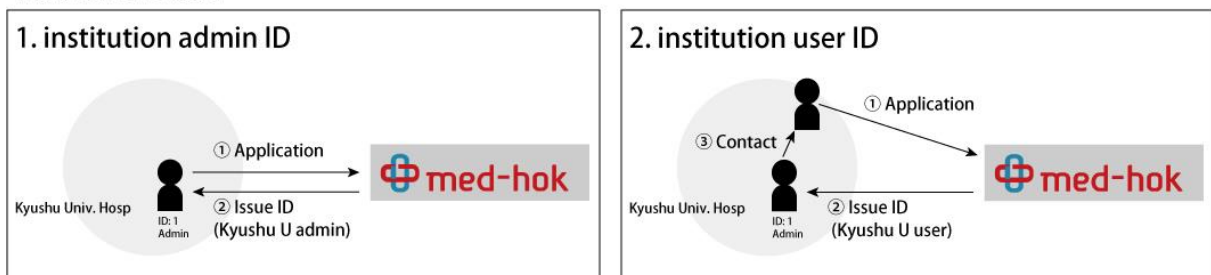

Figure2. Workflow for issuing Institution-user ID

The Event-administrator plans the event, and invites institutions to connect to the teleconference. The Event-administrator can also access information concerning the event such as the program, participating members, method of connection, and others. The Event-administrator can recommend another ID as the Event-administrator of the event (Figure 3).
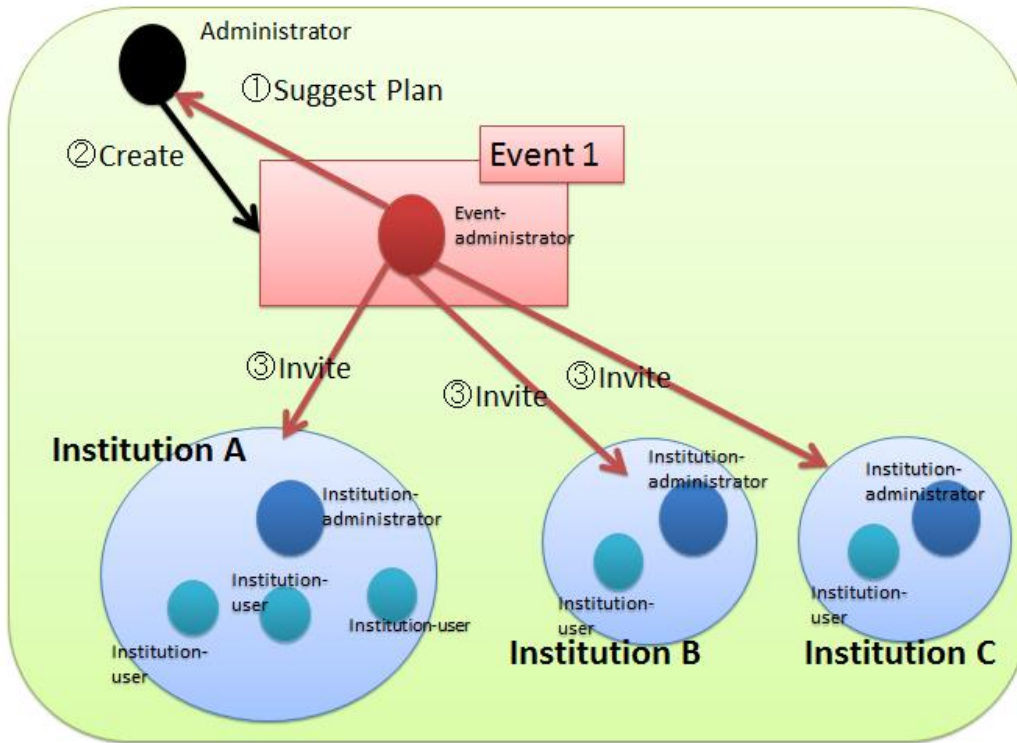

Figure 3. Workflow of event planning

Institution-user ID

1) Institution-user ID: (University name)

Institution-user ID is for login as an institution that is registered as a Med-hok partner.

We can issue more than one ID for an institution.

In the case of Japanese university hospitals, we issue the same ID as the affiliated University.

[Authorized actions]

Action	Browse	Edit	Create	Delete
General information of my institution	Yes	Yes	No	No
Member information of my institution	Yes	Yes	Yes	Yes
Event information of my institution	Yes	No	No	No

[Application form]

Please complete the form and send to med-hok officer.

We will send an ID and password by email to the administrator of your institution.

In the case of a new institution, Med-hok will select the institution ID.

Institution-user ID application form

Dear Med-hok officer:

dd month yyyy

Application: New registration・Edit・Delete (Select one)

Applicant

1) Institution-user ID: (Leave blank for new registration)

2) Institution name:

3) Affiliation:

4) Name:

5) Job title:

6) Address:

7) Telephone:

8) Email:

Institution-administrator ID

2) Institution-administrator ID: University administrator

The Institution-administrator manages Institution-user IDs. When a user ID is requested, we will inform the institution administrator, who will provide the ID to the user.

[Authorized actions]

Action	Browse	Edit	Create	Delete
Same as Institution-user ID				

[Application form]

Please complete the form and send to med-hok officer.

We will send the ID and password by email.

In the case of a new institution, Med-hok will select the institution ID.

Institution- administrator ID application form

Dear Med-hok officer：

dd month yyyy

Application：New registration・Edit・Delete (Select one)

Applicant

1) Director ID: (Leave blank for new registration）

2) Institution ID: (Leave blank for new registration）

3) Institution name:

4) Affiliation:

5) Name:

6) Job title:

7) Address:

8) Telephone:

9) Email: (The mail domain must be the same as that of your institution)

Event-administrator ID

3) Event-administrator ID: University (event administrator)

Event-administrator ID is issued when user is accepted by Med-hok.

[Authorized actions]

Action	Browse	Edit	Create	Delete
Same as Institution-user ID				
My event information including program, connected site's member information, how to connect	Yes	Yes	No	No

[Application form]

Please complete the form and send to med-hok officer.

We will send the ID and password by email to the administrator of your institution.

If the user already has an ID, this authorization will be added to the ID.

In the case of a new institution, Med-hok will select the institution ID.

Institution-user ID application form

Dear Med-hok officer:

dd month yyyy

Application: New registration・Edit・Delete (Select one)

Applicant

1) Institution-user ID: (if you already have an ID)

2) Event name: (if an event has been created)

2) Institution name: (if you don't have an Institution-user ID)

3) Affiliation: (if you don't have an Institution-user ID)

4) Name: (if you don't have an Institution-user ID)

5) Job title: (if you don't have an Institution-user ID)

6) Address: (if you don't have an Institution-user ID)

7) Telephone: (if you don't have an Institution-user ID)

8) Email: (if you don't have an Institution-user ID)