Requirement Documentation

Our team has examined the requirements that most faculties require to reserve a space. We collected the requirements from real staff and students all over the campus through a number of interviews and document analysis. You can find our analysis as follows.

Issues of the Current System

In the current workflow, there are many steps to creating a reservation request. This may create a lot of difficulties to space requesters. So, administrators need some helper methods to process all the many requests. For example, writing it down on a big whiteboard; filling it into the Outlook service and many other methods.

Workflow of the Current System

<table>
<tr><th colspan="3">STEP 1: ASK AN ADMINISTRATOR ABOUT A SPACE'S AVAILABILITY</th></tr>
<tr><td colspan="3">A requester needs to ask a relevant administrator about his desired space's availability and gives his requirements to the administrator to choose a space that is right for the requester.

Administrators will have their own constraints and space selection procedures–they might choose one space over the others.</td></tr>
<tr><th colspan="3">STEP 2: FILL-IN A FORM</th></tr>
<tr><td>via a proposal</td><td>via a form</td><td>via a proposal & a fee</td></tr>
<tr><td>The proposal includes reasons to use the space, equipment requirements and a brief time schedule.</td><td>The form includes structured questions that are required in order to request a space.</td><td>An outsider is required to make a payment in addition to writing a proposal.</td></tr>
<tr><th colspan="3">STEP 3: ASK FOR AN APPROVAL FROM AUTHORITIES</th></tr>
<tr><td colspan="3">The forms will be forwarded to the dean and/or head of academic-support staff (depending on each faculty's reservation guidelines. If the request does not conflict or does not contravene the faculty's reservation guidelines, it is approved.

Then, the approver will be notified by the administrator for the approval.</td></tr>
</table>

STEP 4: CONFIRM AND VERIFY
After the approval, the requester may use the space as requested. All of the equipment is supplied to the space. But some of the authorities are not notified about the room usage, so an approval copy of the form is given to the authorities to confirm. The authorities are maids, security guards, head of the subject and other faculty administrators.

Rules and Conditions

- The current reservation process varies by each authority.
- The current reservation process requires physical signatures from an authority.
- Each reservation requires various formats of request forms.

Issues of the Current System

- Too many steps in order to reserve.
- Form fragmentation among faculties.
- Reservation information redundancy may lead to conflicts and overrides.
- Unnecessarily exporting a schedule consumes too much time.

Wanted Features

- A feature that will reduce the workload of administrators on the system.
- Reserving without physical contact and approval from approvers.
- Administrators can provision every part of the service easily and can export transaction results.

Features of the New System

- Users can quickly search for a space.
- Users can reserve a space using any internet-connected device.
- Users can report issues to administrative staff faster.
- Administrators can manage users and service freely.
- Administrators can export the new schedule for further usage and logging.

Data Storage Requirements of the New System

1. A relational database for keeping service data.
2. A time series database for logging and further audits.
3. File systems for other file formats that are not supported by the relational database system.

Documents Needed in the Old System

TYPE OF DOCUMENT	A REQUESTER	AN AUTHORITY	AN APPROVER
Schedules	-	A new timetable (brief)	A new timetable
Reservation validation	A reservation form	-	A reservation form
History logging	Reservation history	-	Reservation history

As we can see, the current process seems to be complicated. Moreover, this also varies across faculties. The next section is our summarized analysis of each administrative area.

Reservation Processes for Each Administrative Area

Below are the reservation processes of six sampled administrative areas.

1. Faculty of Information Technology

1.1 Academic Support

An authority will receive a timetable from the Central Office. The authority will store the data in Microsoft Outlook and Google Calendar to further make a public timetable.

<table>
<tr><th></th><th>M03</th><th>M04</th><th>203</th><th>204</th><th>207</th></tr>
<tr><td>9:00 – 10:00</td><td rowspan="5">Database</td><td rowspan="5">ISAD</td><td rowspan="6">Physics 101</td><td></td><td></td></tr>
<tr><td>10:00 – 11:00</td><td></td><td></td></tr>
<tr><td>11:00 – 12:00</td><td></td><td></td></tr>
<tr><td>12:00 – 13:00</td><td></td><td></td></tr>
<tr><td>13:00 – 14:00</td><td></td><td></td><td></td><td></td></tr>
</table>

A brief timetable for demonstration purpose from IT's Administrative Department.

For the timetables of the maids, the authority will need to re-input the same data in Microsoft Excel so that all data can fit tightly on a single page.

	M03	M04	203	204	207	303	304	AUDI
9:00								
10:00								
11:00								
12:00								
13:00								

Black: IT Grey: Aeronautics Light grey: outside lecturers

Based on this timetable, if there is an immediate reservation cancellation, the maids will not acknowledge the timetable change. This means academic-support resources will be left unused and not available for use in other rooms.

Moreover, many authorities do not have the same schedule; they might overbook the room and the conflicts will be dealt with difficulties.

Additionally, there are repair forms present in all rooms for the lecturers to fill in, so they can report to the repair authorities with ease. But based on history, most of them were not acknowledged. So, the lecturers or the users that used the room would still use broken equipment, resulting in a non-learning-friendly environment, and the lecturers might need to buy a replacement upfront on their own.

1.2 IT Support

IT Support maintains the faculty's computers and laboratories. Information reported to IT Support is mostly repair tickets, which are organized by the Academic Support team.

Another type of requests made by lecturers is software installation. For example, an English lecturer wants to install teaching material software. He cannot do it by himself, so he has to call IT Support and teaching time is then wasted by the delay of the support request.

Many times, IT Support does not get any information about how and why a computer is broken, because they don't directly talk with the lecturers that encounter the problem. Instead, Academic Support will contact IT Support, so many issues are left unknown and may not be resolved.

We asked them how we could enhance the service with our system, and they came up with these ideas:

- An ability to contact IT Support directly and give a precise detail about an issue.
- An ability to contact IT Support for software installation before a usage period.
- An ability to note what an actual issue is and what equipment is currently broken.

They hoped that the system had reporting features to let users contact them directly and understand what was happening.

1.3 The Maids

We were told that the maids were having an issue with cancellation. First, a cancellation occurred at Educational Support and after the reservation was canceled within a day, they did not get any notification on the schedule change.

The maids normally have their own schedules (which are Educational Support's printed schedules). They will unlock a room and switch on the air conditioners before the scheduled time. So, if they are notified of a reservation cancellation before the scheduled time, energy can be saved, and they will not have to unlock the room or recheck the room.

Sometimes, lecturers that are trustworthy to the maids can tell them to open a room before they get their reservation confirmed. This is a violation of the policy as the reservation is not yet confirmed.

1.4 The Request Form

Faculty of Information Technology's request form is not derived from other faculties' form. The form asks for:

- a requester's name, surname, and student or staff identification number
- a reservation purpose
- a space name, time to reserve, date to reserve, recurrences
- a contact number

The faculty will approve the reservation when these conditions are met:

- It has a signature of an assistant lecturer (or a lecturer can self-sign this block).
- It has a signature of Academic Support staff.
- It has a signature of the Vice President of Faculty of Information Technology (for students and lecturers who will use a space multiple times).

For lecturers and students not from Faculty of Information Technology or its tenants, a formal form is required, and a reservation must be placed in advance. All instantaneous requests are mostly rejected.

The problem of using a form is that students need to walk through the process manually and get staff's signatures physically. The one who submits the form first is the one that gets the space. This process can cause schedule overlaps.

2. Administration and Management College (AMC)

2.1 Overview

Normally, this college/faculty has a very few classrooms, so their schedule is quite reused and not much run into trouble of needing a room. In need of more rooms, they will use a room in *Princess Sirindhorn's General Instruction Building.*

Based on their request form, they have the same procedures and form requirements as other faculties. This means other faculties' forms or written-type form can be used with AMC seamlessly.

They also have a room usage schedule in front of every room that can be reserved. We have seen this format of schedule at *Princess Sirindhorn's General Instruction Building* Educational Support, which was exported and printed from Office of Registrar website.

Room 403, AMC Building | Seat capacity: 42 seats (6 x 7)

<table>
<tr><th>Day</th><th>9:00 – 10:00</th><th>10:00 – 11:00</th><th>11:00 – 12:00</th><th>12:00 – 13:00</th><th>13:00 – 14:00</th><th>14:00 – 15:00</th><th>15:00 – 16:00</th><th>16:00 – 17:00</th><th>17:30 – 18:00</th><th>18:00 – 18:00</th><th>19:00 – 19:30</th></tr>
<tr><td>Sun</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mon</td><td></td><td colspan="2">IM</td><td></td><td colspan="3">POM</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tue</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Wed</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">SCLM</td><td></td><td></td><td></td></tr>
<tr><td>Thu</td><td></td><td colspan="3">MIS</td><td></td><td colspan="3">MIS</td><td colspan="3">MIS</td></tr>
<tr><td>Fri</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sat</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

An example schedule of Administration and Management College.

2.2 The Request Form

The request form requires:

- a requester's name, major, year
- a space name
- required seats
- a reservation purpose
- a duration
- additional equipment

3. Supplies Division

3.1 Overview

Supplies Division supports external and internal reservations for a variety of uses. They deal with requesters directly and contact the teams in each building about the requesters' requirements. They manage:

1. 5,000-Seat Convention Hall
2. Faculty of Engineering's Auditorium
3. KMITL's sports facilities
4. KMITL's dormitory
5. Innovation building
6. The areas around the Office of President

Reservation of the Convention Hall and the Auditorium requires a small fee for students and lecturers for educational uses. For external sources or profit-based events, there is another rate of charge.

The division tries to bring in companies that want to use its facilities and collects them with a charge, so it deals with external sources directly. The companies, the lecturers and the students wanting to make a reservation must write a formal agreement and send it directly to the division. The division will try to manage and find a schedule that matches their requirements. Then, the requester must make an upfront payment for the reservation. These procedures can take weeks to process, so most instantaneous requests are much likely to be rejected.

The division told us that they had no service to show the schedules to external sources. Requesters who want to make a reservation must call them first to check the schedules. They are still finding a way to let requesters view the schedules by themselves. They are currently using Google Calendar to manage reservations.

Another issue in their workflow is an additional requirement. Some requesters want a maid and a guard, so the division must collaborate with those staff for an overtime agreement and payment. In this type of requests, the requester must make a reservation in advance of weeks prior to the reserved date and must detail it in the agreement.

3.1 5,000-Seat Convention Hall Form Analysis

To reserve the Convention Hall, the form requires basic information such as

- a requester's name
- a requester's information
- a reservation purpose
- number of attendees
- additional equipment
- additional staff

With an additional question for

- additional security guards and audio technicians
- tables, chairs
- an additional reception room

As the request is counted as non-educational or/and overtime, one who wish to use the convention hall, they might need to pay for additional cost for hiring a security guards and maid, as they will take it as overtime work.

4. Faculty of Engineering, ECC Building

4.1 Electrical Engineering

Every room in the second and the third floors of *ECC* building is managed by Electrical Engineering. They are all laboratories and no lecture room in this building. All lecture rooms are in the 12-floor building and many other buildings. With these few rooms in this building, there is no need for a reservation. Lecturers are assigned to each laboratory and schedules are managed by the Faculty of Engineering instead. There is no case for overlapping or out-of-schedule reservations; all of those reservations are forwarded to other buildings instead.

They normally write down schedules on a big whiteboard, filled with names of the laboratories, schedule times and classes that use that laboratory. Those are for dealing with staff from the Faculty of Engineering and for the maids to open the rooms.

This building also has lecture rooms for Graduate and Ph.D. students. Those who want to use the room can reserve them in an instant and it will be approved immediately when there is a lecturer actually using the room. There is no case for overlapping reservation because those lecture rooms are rarely used.

4.2 Computer Engineering

In *ECC* building, the rooms on floors 7 to 9 are under Computer Engineering. Ten of them are laboratories and two are lecture rooms for Graduate and Ph.D. students. Based on their uses, there are very few conflicts of reservation time—mostly with the computer laboratories that are generally used in multiple subjects.

They used to have a service that lectures can check for room availability, but unfortunately, it was discontinued. With the old service:

- Users could check for room availability by clicking a drop-down button, which asked for a duration, a room, and a date.
- After filling in the form, it would return “Available” or “Not Available”.
- Lecturers and staff could add their own lab schedule.
- The service resided on the faculty’s website and was login-based, which blocked access from students and lecturers outside of Computer Engineering.
- The staff could see the schedules of each room in a time schedule format.

They told us that the service was unpopular, so we asked them why lecturers avoided using it.

- The service was hard to use.
- Lecturers could just walk to the staff and make a reservation.
- Most lecturers wanted to find a schedule on their phones, but the service’s user interface did not support small screens.
- The service was slow to load, thus walking was faster.
- Lecturers wanted to talk instead of using the service on-line.
- There were a very few overlapping reservations, so most reservations would be approved.

Ultimately, they decided to use Microsoft Excel instead of using the old service. It was easier, and they could customize it whatever they like their schedule to be. And they came up with this format of showing time schedules.

Date / Time	**ROOM 802**	
	9.00 – 12.00	13.00 – 16.00
Monday		Entrepreneurship
Tuesday	Design	Computer Programming
Wednesday	Probability	Probability
Thursday	Data Structures	
Friday	Calculus	Computer Programming

An example schedule from Computer Engineering.

Room Usage Schedule System Analysis

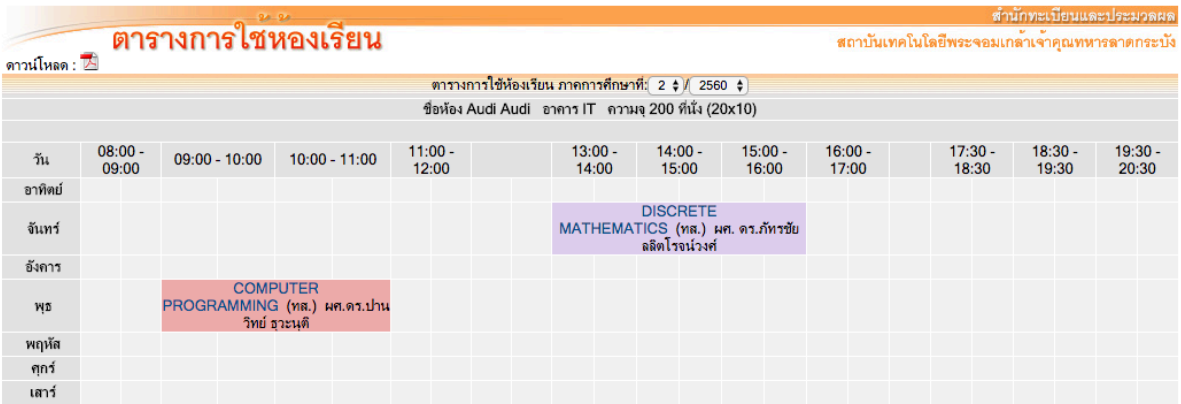
The *Room Usage Schedule System* displays a schedule of room usage of each faculty. Most faculties either don't update their room usage or have them hidden, forcing all faculties to create their own schedules by themselves.

Rooms that are visible to all users are mostly large lecture halls and are from the faculties that constantly push new information to the service (for example, *Prince Sirindhorn's General Instruction Building*).

The schedule gives information about:

- subjects that will use a room for a whole semester
- dates and times of use

The schedule, on the contrary, does not give information about events that will use a room only once or twice.



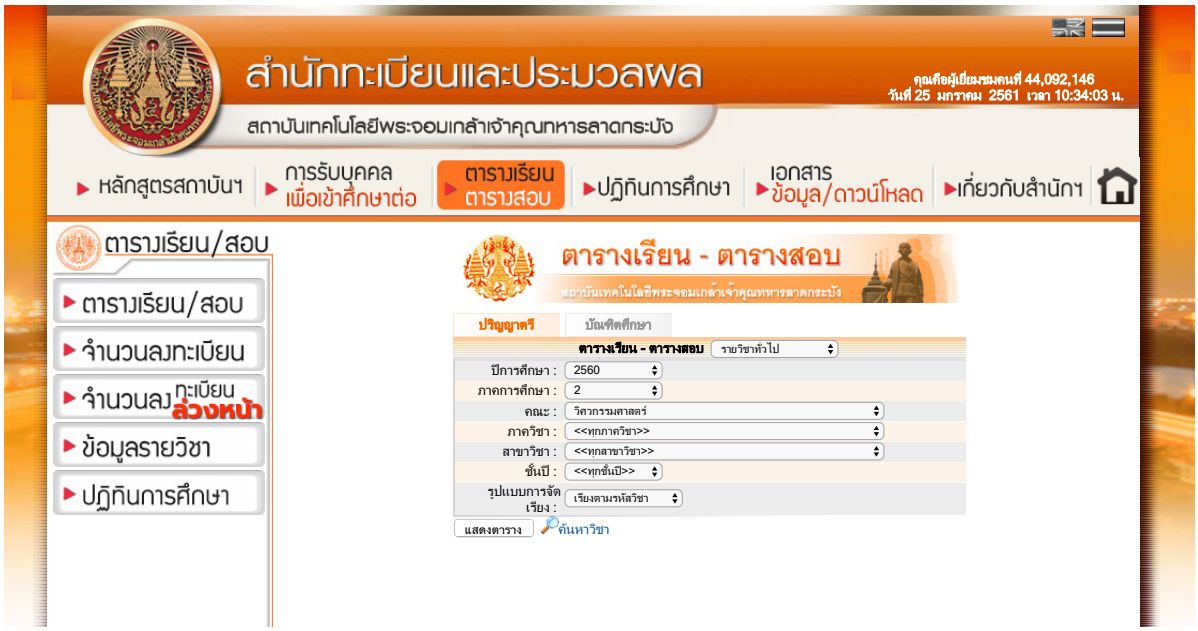
Faculty of Information Technology's Auditorium usage schedule. (From http://www.reg.kmitl.ac.th/room_v20/index.php)

Students' Study Schedules

The study schedules inform students of which room a subject uses. Based on this information, each space schedule can be constructed.

Every faculty opens these schedules to the public where they are accessible from KMITL website. As a lecturer, this is the only on-line way to view room availability.

The schedule is complex, and students cannot create their own timetables easily. They need to use Microsoft Excel or online calendar services to help them make their own timetables. Yet, they still have to do it manually.



A study schedule of an Information Technology student.

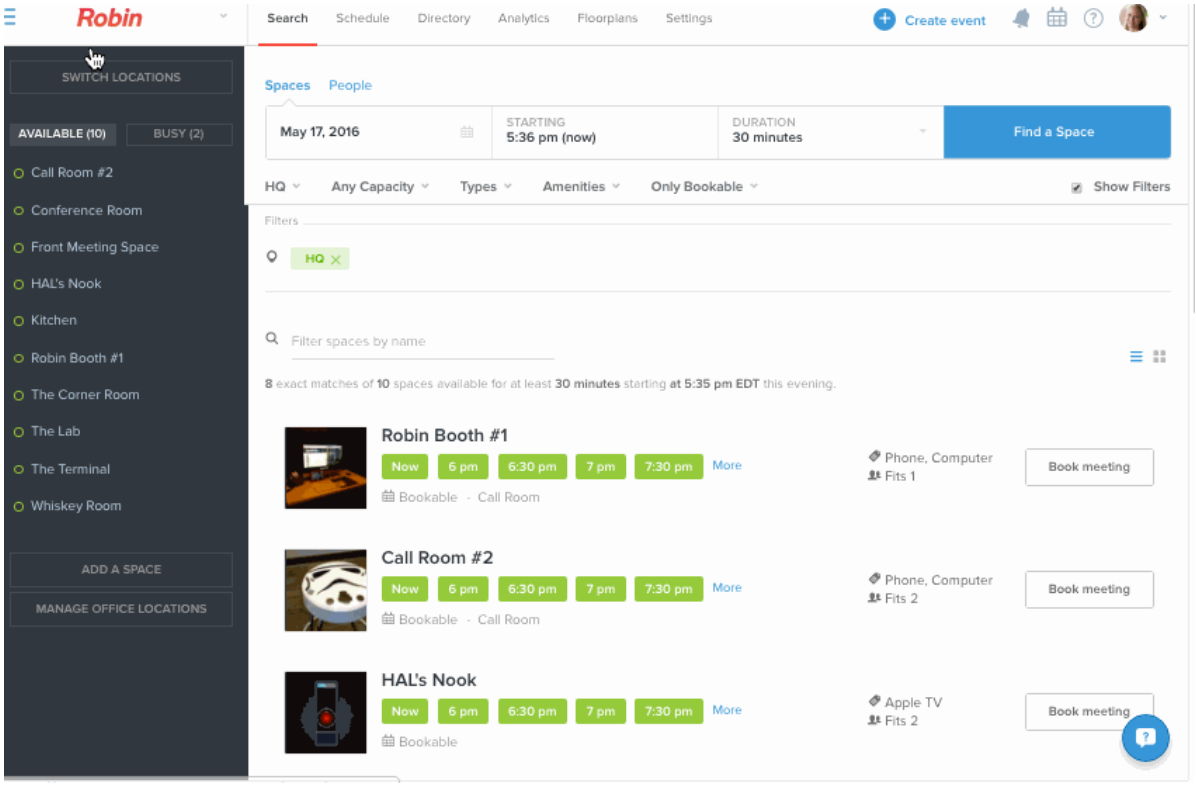
Robin Room Reservation Service

Robin is an enterprise-grade space reservation service. It has the same reservation procedures as our upcoming service, as it lets users search for an available space and reserve it. Their constraints exclude the approver mechanics, but other parts are quite the same.

Robin is a subscription service priced at $5 per month per user, which may rack up to a whopping $100,000 annually.

The service also includes API's that allow Internet of Thing devices to display current room usage and upcoming reservations. It is advertised to work on any screen size and even e-ink screens.

Robin has an easy-to-use user interface. A user can click on a space to see more information about the space or click on a timeframe to reserve it right away.



Robin's user interface