Finding a place to learn
A mobile study room guide with integrated room occupancy rate indicator
45,000 students

9,000 employees

300 buildings
Motivation
# List on official website

![List on official website](image)

<table>
<thead>
<tr>
<th>Room</th>
<th>Workstations</th>
<th>Opening Hours</th>
<th>Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Library</td>
<td>286</td>
<td>Mon to Fri: 8:00am - 12:00pm, Sat: 9:00am - 12:00pm, Sun: 11:00am - 12:00pm</td>
<td>The building closes at 6pm.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library 2</td>
<td>377</td>
<td>Mon to Fri: 8:00am - 12:00pm, Sat: 9:00am - 12:00pm, Sun: 11:00am - 12:00pm</td>
<td>The building closes at 6pm.</td>
</tr>
</tbody>
</table>
Design process

- Context of use
- User stories
- Design
- Evaluation
Occupancy

![Occupancy Graph]

NOW: Highly Frequent

OCCUPANCY CORRECT?

- 9am
- 12am
- 3pm
- 6pm
- 9pm

Max
### Wi-Fi access point data

<table>
<thead>
<tr>
<th>Room</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
</tr>
</tbody>
</table>

```json

[{
    "name": "ap-2540-cafel8",
    "device_count": 18
}, {
    "name": "ap-4280-26c0flur",
    "device_count": 2
}]
```
## Mapping to users

<table>
<thead>
<tr>
<th>Room</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11</td>
</tr>
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<td>B</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Room</th>
<th>Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
</tr>
</tbody>
</table>
Predictions
Prediction algorithm
Infrastructure for study room information

- Room information
  - Room information
  - Opening hours, room features, ...

- Access point information
  - Access point information
  - Access point occupancy data

- Access point occupancy data
  - Mapping table: access point to room
  - Calculated occupancy rates
  - Occupancy feedback

- Mapping table: access point to room
  - Added manually
  - Sync every 10 min

- Server with occupancy rate algorithm
  - Provides: access point ID, occupancy data, opening hours
  - Occupancy rates for 7 days
  - Server per day for each AP

RWTHApp

Infrastructure for current/future occupancy rates

- Database
  - Provides information
  - Sends occupancy feedback
Many systems involved
Room information not always up-to-date
Devices per access point -> devices per room
-> users per room
Conclusion

• Focus on use cases

• Privacy

• Future application:
  – Canteens
  – Lecture rooms
  – Meeting rooms
  – …

• Available data has potential
Thank you