IoT Rewire: Office Edition

Using connected objects and data visualization to improve your office

> *The Internet of Things (IoT) has exploded when it comes to devices we use in the home. But IoT can have an even bigger impact in the workplace—if it's used properly. Learn how the Clarity Research team leveraged IoT and Skype for Business to make the modern office smarter.*

There's a simple concept behind IoT—give objects the ability to gather and communicate data. This data can then be used to enable people and organizations to make better decisions.

Many of these technologies can already be found in the home. From automation equipment like the Nest thermostat and Philips Hue light bulbs to general-purpose AI assistants like Alexa or Google Home, consumer-grade IoT devices are becoming increasingly commonplace. At Clarity, we've been investigating how to use those same concepts to optimize the workplace.

Give a Voice to the Things

Skype for Business is Microsoft's enterprise communication platform that has found a home in hundreds of thousands of offices, and it's remarkably well-suited to enable communication for objects as well. It offers **real-time presence** information to indicate current activity states such as *available* or *busy*, enhanced text-based activity

details, as well as methods of interaction like instant messaging. Sounds like a great foundation for an IoT-enabled object, doesn't it?

Over the past few years, we have enabled presence and communication for various objects around the office like **conference rooms** by giving them a Skype for Business endpoint to represent their status and give users the ability to interact with them. It has allowed people to find conference rooms more easily as well as book them faster. Rather than trying to find a room's availability via an antiquated Outlook process, individuals can simply check their contact list in Skype for Business.

The combination of passive presence information (is the room available?) and active chat bot interactions ("book my meeting") was crucial to improving the room-booking process so radically, and this tool quickly became ubiquitous at Clarity. For more information about this application, take a look at the Clarity Conference Companion.

However, as more objects gained their own endpoints, the system started to become **cluttered**. The more things around the office able to publish presence through Skype, the less streamlined it was to check them. Even in our relatively small office, an excess of data in the system designed to simplify things ended up being the very thing causing obstructions.

> *The issue we ran into is a common problem – the sheer volume of data from connected devices hinders the kinds of smarter decisions IoT should enable. What we needed was an interface to help us interpret the large amount of data in a simple and easily understandable way.*

Bots, bots, and more bots!

We faced a challenge. Could we find a better way to view the information being pushed out by all of these connected things?

Filter the Noise to Make it Beautiful

The answer involved a clever combination of data visualization and streamlined UI to densely populate a space with data while making it effortless to consume.

After referencing the office map printout tacked on the wall for the umpteenth time to figure out where a meeting's conference room was located, we were struck with the idea—what if the single view we wanted to create was structured as a map? A single view of the whole office, using colors and familiar data representation methods, would make the significant amount of data **simple and easily accessible**.

No longer would we be buried under a cacophony of separate controls for each entity we wanted data for! A real-life equivalent of the Marauder's Map from *Harry Potter*—a magical map that showed the location of every person who appeared on it. We wouldn't be using ours to save the school from less-than-magnanimous forces, but we could build a map using software that felt nearly as magical.

The solution we created is a single page web application that uses the Skype Web SDK to pull in information about anything that publishes presence. While we started with just the conference rooms, we ultimately pulled in everything from individuals in the office to the restrooms and coffee machines.

Once we had the data for the objects we wanted, Clarity research team member developer-slash-designer Christopher Thomas took the concept and ran. Starting with floor plan of the office, his design used **familiar** iconography and color palettes to make the interface inviting and **discoverable**. Profile pictures pulled in from Skype added a personal touch and proved particularly useful when trying to identify new hires.

Partnered with the map is a companion interface that shows each conference room's daily schedule at a glance, including current availability. You can also interact with the map—it allows you to book a conference room for today or start an IM, phone call, or email with

any object displayed. Given the amount of data included in the display, there was a huge design focus on simplicity, and the result makes the data superbly consumable.

This aggregation of information into a single map application has had a significant positive effect on efficiency and room utilization. People are spending less time searching for rooms, and fewer meetings are being held in the middle of our open plan office because the participants gave up on finding a space to hold it—that task is now trivial.

Schedule a meeting or contact someone with the click of a mouse.

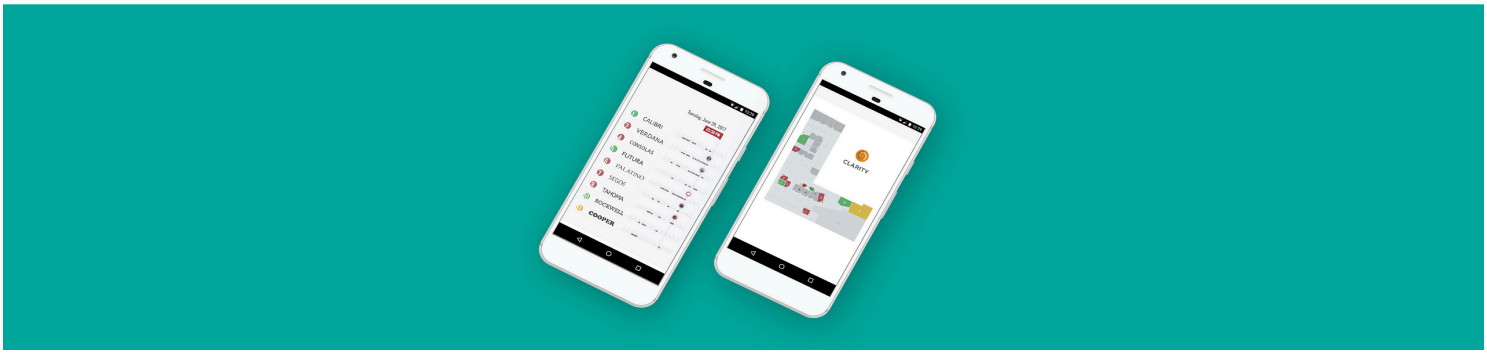
An added benefit of this has been the ease with which people can be found. As a consulting firm, we frequently have people moving from seat to seat as they change project teams. Prior to the map, this was managed through an antiquated Excel document or just by walking around looking for seats.

> *There's no need to ask around to see if anyone knows where so-and-so sits or what meeting room they happen to be in; it's all clearly visible and searchable on the map. Type in the name of the person you're looking for, and their profile pic pulses on the map in their current location.*

For those of us that still can't remember where the conference rooms are, it can also help us find Tahoma for the eighth time this week.

In addition, conference rooms that were out of the way or rarely used are no longer sitting idle all the time. The old adage "out of sight, out of mind" holds true, but if you show a room's empty schedule in a commonly referenced place alongside the busy ones, it's no longer out of sight.

As an added benefit, this whole web application was designed to be **responsive.** It works as well on a mobile device as it does on a giant touchscreen mounted on the wall, expanding the potential applications and serving as a beautiful talking piece for office visitors looking for their meeting space.



A simplified mobile interface allows smaller screens to get maximum benefit.

Is That It?

The application is by no means complete—it's a living project that has the potential to be expanded in a multitude of ways. Here are some of the next steps we've been considering:

- Deploy **motion sensors** in rooms to identify if a room is *actually* in use, making presence reporting even more accurate
- Build **reports** that help planners decide how many rooms are needed based on attendance data and seating capacity
- Integrate with **network hardware** like managed switches to automatically determine who is at each desk based on the computer connected at each desk's network port
- Analyze the conference room data using **machine learning** to identify trends and seek ways to improve utilization of the least used rooms

The implementation we created is built for and most readily applicable to office environments, whether implemented by an individual company or at scale by a commercial real estate management firm. However, office spaces are not the only places where a map like this could be useful. An interactive map that's powered by connected objects could have applications in a wide variety of industries.

- **Amusement parks** could create applications that allow visitors to monitor the length of lines for various attractions in the context of the park as a whole—perhaps there's a ride nearby with no wait time that you haven't tried yet! Like we've seen with conference rooms, park owners may find that patronage increases for otherwise lightly used attractions and wait-times decrease on heavily used rides.
- **Factories** could create digital representations of their facilities that aggregate the vast multitudes of IoT data generated by manufacturing equipment, allowing them to identify patterns and trends quickly and increase throughput.
- **Hospitals** could use an interactive application to monitor large numbers of patients simultaneously, allowing issues to rapidly be identified before the need arises for emergency protocols.

The applications for this concept are real and far-reaching—and the possibilities are only going to expand with the explosion of IoT data available. **Specialized user experiences** will be critical to

humanizing the large volume of data, making it **interactive** and **actionable.** If you are able to capitalize on it, IoT can provide **meaningful productivity enhancements** in the modern office.

Do you have ideas for what would make your office smarter? Let us know in the comments! Interested in exploring what's possible with IoT in the modern office? Drop us a line, we'd love to chat.