

EPIC2016

Case Studies 1 – Ethnographic Approaches in & for Organizations

Disrupting Workspace: Designing an Office that Inspires Collaboration and Innovation

RYOKO IMAI
Hitachi America

MASAHIDE BAN
Hitachi America

Hitachi America's R&D, comprised of five technical laboratories, opened the Center for Social Innovation in January, 2016. When the new office project emerged, the R&D group used the opportunity to reflect on and strengthen collaborative practices, organizational culture, and our customer engagement approach. We conducted an internal ethnographic study to investigate how space was used in our previous office, and based on our findings designed a new office space to facilitate collaboration and innovation for our group.

INTRODUCTION

The idea of using space as a way to inspire people, influence behavior, and facilitate collective action is by no means novel. Spaces specialized for activities involving multiple individuals have historically been built to support the complex decision-making and task performance required by human social life, and have since evolved in sync with our ever-changing ambitions.

Frederick Taylor is credited as the first to design a “modern” office space in the early 20th century. Taylor was very much inspired by Henry Ford’s factory design, and focused on efficiency; with desks in a perfectly lined formation, he literally brought the assembly line to clerical work. Over the years that followed, workspace evolved to be increasingly more segregated to accommodate growing specialization, resulting in more individualized, private compartments: cubicles (Frederick, 2014). More recently, we have seen trends to remove walls and adopt a more “open” layout. With this conceptual shift, workspace has been receiving renewed attention as part of the powerful organizational mechanisms that generate innovation.

In Silicon Valley, workspace has recently garnered a high level of interest. In addition to unconventional hiring practices and generous perks, large corporations in Silicon Valley leverage their office spaces for organizational success. Many highlight open layouts (as opposed to cubicles), setting a workspace standard for admirers and competitors alike. At the heart of the enthusiasm around workspace design lies the notion that workspace can be generative, even essential, for creativity and productivity. This conceptually connects workspace design and organizational revenue, positioning workspace design as a strategic move toward company success rather than merely a matter of capacity and aesthetics.

In workspace design, one thing many researchers seem to agree on is the positive impact of face-to-face and informal interactions (Waber, Magnolfi & Lidsay, 2014; Pentland, 2014; Kraut, Egido & Galegher, 1990; Kraut, Fish, Root, & Chalfonte, 1990). This is hardly difficult to imagine; informal and face-to-face interactions can engender distinct connections

and opportunities for critical information exchange, collaboration, networking, problem-solving, resource allocation, and more. While face-to-face interactions may be hard to *assign* to employees - especially knowledge workers, who tend to enjoy a relatively high level of freedom in structuring where and how they work - they *can* be facilitated by space design and its amenities. An environment, when designed carefully, can both encourage and inhibit certain behaviors.

That is far from saying, however, that workspace design is “the” solution for firms seeking improved innovation or collaborative practices. We often use words like “innovation” and “disruption” to refer to technologies that effectively change our lives for the better. The stories of innovation and disruption are often told in a simplified linear progression, originating with a couple of young entrepreneurs, often highly educated Caucasian males, with a single bright idea that blossoms into a business worth billions. The “garages” that many companies are said to have *started* from – most famously HP, Apple, and Microsoft – have become cultural symbols of entrepreneurship, and have built a compelling cultural narrative of the triumph of “lone pioneer” innovators. Yet, as Audia and Rider (2005) argue, the crucially defining elements of their subsequent success can be traced back to these individuals’ experience, assets, knowledge, social connections, and confidence – all born and/or nurtured in their prior working experience in high profile organizations, far before the “garage” came into the picture. As compelling as the “garage myth” may be, it is not true in a literal sense.

Innovation is a long term process, involving a meticulously orchestrated flow of individual and collaborative effort, organizational processes, and sizable resources ranging from cutting-edge tools and technical experts to the organizational culture that fosters every element and step; a space is only one aspect of that. Allen and Henn (2007) explain: “[i]nnovative ideas seldom come full blown from a single source, but from a variety of sources. An organization succeeds with innovation when it makes it possible to share information and then integrate knowledge into what becomes the innovative idea.” Workspace is not a silver bullet, but an important part of the orchestrated process that inspires innovation.

Organizational growth and change, however, require nearly as many elements as the innovation process itself: commitment, energy, resources, and, above all, opportunity.

In January of 2016, a North American subsidiary of Hitachi, Ltd. - Hitachi America, Ltd. (HAL) - opened the Center for Social Innovation in Santa Clara, California. The Center brought together five Hitachi America R&D laboratories specializing, respectively, in big data analytics, automotive technology, IT platform systems, network systems, and user experience design. Instead of entirely leaving the design of this space to architects, contractors, and movers, our R&D group decided to take this unprecedented opportunity to reflect on and strengthen collaborative practices, organizational culture, and approach to customer engagement.

R&D, RESEARCH AND DEVELOP THYSELF

This year, Hitachi celebrates 106 years of business. The company’s group consolidated revenues exceeded 88 billion dollars last year, and it employs over 330,000 employees worldwide. The company’s commitment is to resolve societal challenges through innovation; its core values are sincerity, harmony, and pioneering spirit. All of this, most

employees could tell you, but if asked casually at a social gathering nearly all struggle to answer the simple question: “what does Hitachi make?” We make many things that allow cities and businesses to function – everything from construction machinery, automotive technologies, to data storage hardware and medical equipment. But the most iconic Hitachi innovation is probably the bullet train, which has served over ten billion people in their fifty plus years of operation without a single collision or fatality.

At Hitachi America Limited (HAL) Research and Development, we work with customers in a vast array of major industries: IT, mining, healthcare, and automotive, to name a few. Each lab member has highly specialized training, but day to day, we work as generalists - we bring our horizontal expertise to solve problems in different industry verticals. The flagship analytics developed by our data scientists for IT, for instance, are recalibrated to address algorithmically similar challenges in healthcare. Social scientists and interaction designers offer insights on how users interact with technologies and environments in all the industries we serve.

In the past, Hitachi was focused on products – technologies that helped address specific sets of problems at home, in cities, and in the world at large. While that commitment still remains strong, our focus has been redefined to include the connections *among* things - linking conventionally segregated infrastructural systems, allowing information exchange between systems and sub-systems, integrating critical data from a large number of sources, and fortifying information actionability with data analytics.

Automotive technology is a perfect example. Cars today, and increasingly into the future, are equipped with sensors, analytics, and the ability to autonomously respond to objects and environment. The mechanical excellence that historically set Hitachi apart has to now come with connective competence and analytic precision. Hence, it is critical that our automotive researchers work closely with specialists in data science, IoT, IT, user interaction, and so on. There are many interdependencies to consider in any given project, and human safety is at stake in most of the industries we serve. Technical specialization and a “silo” style organization may have been efficient in the past, but it creates vulnerability in the present context.

This shift has drastically reshaped relationships and our approach to innovation with customers. We need their knowledge in identifying, understanding, and designing for interdependencies to build solutions carefully calibrated to their specific challenges. Therefore, they are in every sense invaluable contributors and partners in the solution design process. We conduct customer-inspired research, and innovate not just for our customers, but *with* them. When the idea of a new office dedicated to our group emerged, we wanted to leverage workspace to facilitate and improve our co-innovation approach: to evolve from an R&D department into a Center for Social Innovation.

RESEARCH METHODS: INTERACTION DESIGNER + ANTHROPOLOGIST = DIY ARCHITECTS

It started as a thought exercise. The lab manager of the User Experience Design lab in the R&D floated the idea of using the principle of “discover & design” (our data-based, user-centric design approach) in designing the new office. Internal employees knew our own use cases, challenges, and culture intimately - an absolute luxury when compared to other projects, where we typically only manage a glimpse of how users operate through interviews

and observation. As for design, of course, we eventually needed to hire real architects to materialize the design into architecturally sound plans and details for construction. But we were determined to create a research-based office design on our own even before selecting a firm.

As an interaction designer and an anthropologist, we had no experience or expertise in architecture; with hope and skepticism, we began.

Methods: The Power and Limits of Studying Your Own

We decided to take an ethnographic approach for two reasons: 1) we wanted to take an inclusive approach to designing the office, and 2) we lacked knowledge on how diverse our work styles and demands were. We began with a literature review to organize our research, but an additional researcher took over and continued the literature research for the entire duration of the design process, even after data collection.

Although there is no shortage of studies relevant for workspace design, as an anthropologist, it felt nearly impossible to account for the many variables that ultimately influence workers' productivity, creativity, and innovation. The whole range of work styles, generations, business types, use cases, etc. is involved in past studies; the extent to which the findings from these studies can be generalized was hard to assess. This was equally challenging for the designer, who wanted to base the design on as many clear use cases as possible with a focus on what really worked for us, rather than give into the peer pressure of what others value in their workspace. Yes, Google has a spectacular campus, but we are not Google. The literature research was mainly used to inform ourselves of the conceptual framework, key issues, and debates involved in workspace design.



Figure 1. Interviewing an informant in his cubicle

Our research data came from interviews, observations, and map exercises. All members of HAL R&D were notified of the research and asked to participate on a voluntary basis. With senior management's support, lab managers were strongly encouraged to offer their input so that the final office design would meet their operational needs. The study was conducted mainly in the previous office in Santa Clara, CA, and in our automotive lab in Farmington Hills, MI. We prepared a themed interview guide for interviews, but interviewees were given freedom to determine the course and content of the conversation. We were interested in five major areas:

1. **Spatial niche:** Where individuals worked, socialized, and engaged in other activities in their workspace.
2. **Network:** Whom individuals collaborated, socialized, and engaged in other activities with.
3. **Customer engagement:** Where and how engagement took place, and challenges to those activities.
4. **Conceptual framework:** What workspace, collaboration, and customer engagement meant to team members.
5. **Hope & vision for the future:** What would our work be like in 2018 and beyond?

Most interviews were conducted in the individual cubicles of the interviewees, with some walk-along activities as they explained what spaces they used. Interviews were not audio-recorded to maintain an informal tone, but with interviewees' permission, we photographed their space and anything else discussed with special interest. We also recorded spaces and objects by drawing them during the interview, in order to preserve specific references to specific objects or amenities.

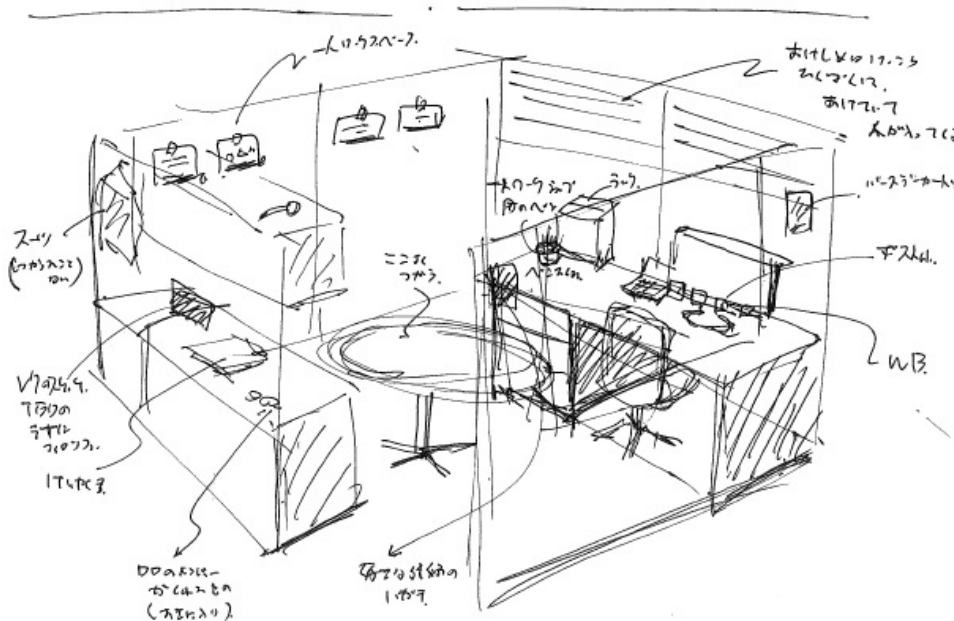


Figure 2. Recording the space manually to add specific references

During each interview, we presented the floor plan for all floors of the current office (two separate buildings with two floors each). Using a marker, interviewees were asked to draw which spaces they used, such as their own cubicle, conference rooms, cafeteria, and restrooms, and routes they used to get there. We wanted to determine the overall pattern of traffic between individuals and between labs.



Figure 3. Tracing informants' movement and activities in the space using floor plans

Our informants were also asked about their experience engaging with customers. It is important to explain here what we mean by “customers.” Our customers are organizations, both Hitachi group companies and others, who partner with us to develop solutions for their business problems – typically operational problems that impact millions-of-dollars-worth of cost, and human health and safety to a great extent; for instance, the dense, complex operation and management of a city subway system.

We asked our informants about where and how they communicated with customers, their access to appropriate amenities for customer visits (e.g., conference rooms, projectors, catering, demo space, etc.), and anything else they felt either facilitated or intervened with productive discussions with customers in an entire project cycle.

We conducted observations in common spaces such as break rooms, recreation rooms, the cafeteria, and patio spaces as well. Observations were performed sporadically during the first three weeks of the project to understand how and when common spaces were used and what type of activities they supported.

We took extra safety measures to ensure that data were anonymous in this study. We wanted to prevent any specifics about collaborative formations in our organization from impacting any employees' reputation, relationships, or perceived performance. Going in, we had very little knowledge of who was supposed to be working on what with whom, nor what information would favorably or unfavorably bias managers about ongoing projects. With the final recipients of the research study and design deliverables being senior managers, who

supervise most of the informants we talked to, we wanted to be careful about data management: we wanted to avoid inadvertently assigning blame to anyone.

Removing personally sensitive data for this study was much more difficult than in external client projects. Informants, researchers, and “clients” were all internal, which meant a lot of information – anything a group member could quickly identify or associate with - needed to be hidden to protect the identities of our interviewees. Quotes and information offered by individuals who either felt comfortable with or even requested to be on record were noted as such in the database. Photos, interview records, maps, and reviewed literature were all entered into Dedoose for coding and analysis.

When conducting ethnographic studies for customers, we love serving as a fresh set of eyes - cutting through the clutter in the messy context to offer a level of domain expertise, intellectual depth, and clarity that in many ways, only third party observers can bring to the table. But we were no impartial observers in this case. Most of our informants had either never worked with us before, or conversely, closely worked with us as fellow problem solvers for customers. Having our analytical eyes turned on them, however, raised some eyebrows. Simple prompts of “why?” or “tell me more” might index genuine curiosity in a context foreign to the observers, but asking “why” of those close to you – people you see every day at work - can register as passive aggressive criticism.

Social science 101: context matters.

RESULTS: OUR KEY FINDINGS FOR WORKSPACE DESIGN

The physical distance between workers has dramatic impact on productivity and collaboration (Allen, 1977; Kraut, Egidio, & Galegher, 1990; Kraut, Fussell, Brennan, & Siegel, 2002). In a seminal research project, Allen (1977) showed the inverse correlational relationship between physical distance and communication in a large R&D organization, with information exchange between employees completely plunging as distance reached only thirty meters – a curve later known in the literature as the “Allen curve.” While the overall takeaway of the study – the negative association between distance and human interaction – is intuitive to most, just how quickly interaction deteriorates and almost completely ceases at thirty meters is remarkable.

As tenants in our sister company’s building – a campus comprised of two bi-level buildings with an outside patio and recreational space in between – our labs were divided by sizable distance: far more than thirty meters. Unless we had specific meetings or were headed to the cafeteria or gym, we rarely travelled between the buildings. Taking a short walk in between was refreshing, but not spontaneous travel for most. The division was not by choice, but by necessity; as the organization has grown quickly since 2012, we occupied whatever space was available. The labs constantly moved and reconfigured to accommodate new members.

This meant our workspace was, for most, not a single space, but a collection of “neighborhoods”: approximate groupings of work areas and amenities, each serving its own group of employees. The neighborhood was clearly marked by some landmarks, as one informant explained, “I don’t go far. I don’t go past the executive conference rooms. There’s no one I know beyond that.” Most people had their favorite conference rooms based on proximity, amenities, and aesthetics, preferred bathrooms, go-to break room, and regular

entrances, exits, and parking areas of their choice. In effect, they had an extended “personal space” where most, if not all, work day needs were met.

This was certainly efficient and comfortable, but it created geographical silos that rarely overlapped. Even common areas failed to connect people. We had no metaphorical “water cooler”; we had *literal* water coolers, but there were too many – they were everywhere. Unless you went out of your way to visit to an “exotic” break room, you never saw anyone other than your neighbors – or anyone at all.

The face-to-face interactions are said to be productive for organizations (*see* Waber, Magnolfi, & Lidsay, 2014; Pentland, 2014). Even with an abundance of technological options for communication, interaction via phone and emails still follow the same pattern; their use is positively associated with physical proximity (Allen & Henn, 2007; Waber, Magnolfi, Lidsay, 2014; Kraut, Egidio, & Galegher, 1990). Clearly, this is not to be taken to mean remote communication does not work; it only means that the power of such technologies to fully replace face-to-face interaction should be, and is being, challenged.

Needless to say, just having a dedicated office for our organization was going to impressively increase face-to-face interaction, but there were several additional space-related findings that influenced our subsequent design:

1. **Work continuity:** Many individuals spent a large portion of their work hours in conference rooms, meeting with colleagues or customers. Since conference rooms were limited and hard to reserve, finding a large enough space for attendees was a quest. Moreover, compared to a cubicle, where the occupant had control over work materials, conference rooms needed to be emptied out after each meeting.

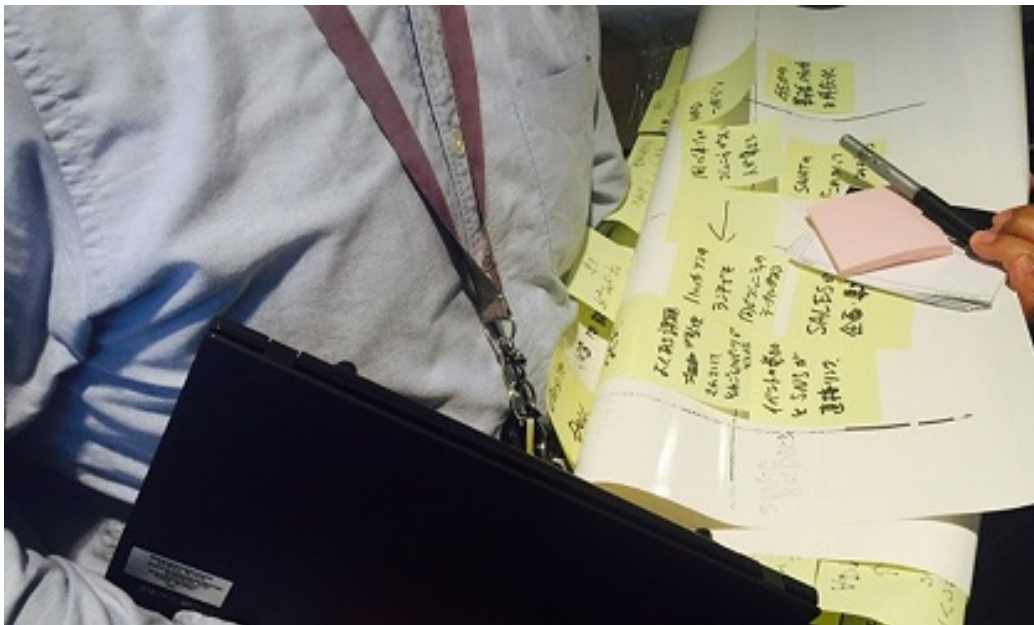


Figure 4. Informant carrying a lot of materials to and from conference rooms

Moving between rooms was not too disruptive, but preserving and transporting work-in-progress materials was. Photos were often used to preserve the progress at the end of the meeting, and physical materials with notes were transported back to individual work areas, only to be brought to another conference room once the group's work resumed.

2. **Work visibility:** During an interview with multiple researchers at one point, one particularly frustrated researcher told the story of his quest to find a domain expert to help with his project. "There's always someone who has answers to your questions in Hitachi. You just don't know who," he explained. Then, another researcher chimed in, utterly amazed that he never knew this project was even happening; he had inherited a wealth of materials from another researcher last year that solved the very problem in question. Three people had been working on the same problem over the course of a year, and none of them were aware of the others' work. As this example illustrates, lab members knew there were experts with crucial skills and knowledge in the organization, but were at a loss for how to locate and engage them. Outside formalized meetings to learn about others' work, visibility of work and expertise in general was limited: researchers were often unsure or unaware of fellow researchers' abilities, particularly outside their respective labs' boundaries.

This posed a problem for customer engagement: customers are rarely interested in only a single field of expertise. Since we are an R&D group, we have, by default, a number of technologies in development; the more exposure work receives, the more potential for innovative contributions to that work from a diverse array of experts. Even experimental technologies that may not reach the general market could prove invaluable in meeting a given client's needs; without visibility, we were failing to leverage our internal strengths.

3. **Informal interactions:** Social activities such as meals, sports, celebrations of colleagues' milestones, etc. tended to be organized within each lab, not across. This was exacerbated by the physical distance dividing the labs, but there were logistical reasons as well. Members of respective labs shared more than a workspace; they also tended to move in sync in terms of schedule, both throughout the day and throughout the year, opening up shared opportunities for informal interactions. Because chance encounters with those outside our own labs were infrequent, these interactions were often ineffective in advancing relationships beyond a courteous greeting. In turn, we observed that snack food and smoking breaks did present opportunities for impromptu conversation, with some reporting that it led to collaboration on projects.
4. **Sacred cubicles:** In contrast to collective work in conference rooms or other "public" spaces, what people called "focused work" was typically done in their own cubicles. Being researchers, most of us did intensive reading, writing, and most importantly, thinking in the comfort and solitude of our own cubicles. The dichotomy between private and public was superimposed on cubicles and the rest of the office. Often stocked with personal comfort items, familiar references, favorite tools, etc., a dedicated private space served as a sacred space to rejuvenate and

regroup for many of our colleagues. This directly contradicted the trend toward an “open” office setup, and presented a challenge to adopting the popular “open” style workspace for our group.

5. **Innovation space:** The previous office was equipped with impressive space reserved for meeting with customers – a space typically referred to as Executive Briefing Center (EBC) in many technology companies. As beautiful and comfortable as the space was, it was designed mostly for sales presentations, leaving other key activities of ours such as prototyping, demonstrations, simulations, and usability testing hard to perform. Researchers brought in monitors, equipment, sensors, cameras, and servers to rooms reserved in advance to show demos to customers, which presented a number of logistical challenges, not to mention safety, each time. We also lacked space dedicated to learning about customer challenges in-depth, and to ideate with them on possible solutions. In ideation workshops, designers created a make-shift workshop space out of a conference room by covering the wall space with journey maps, ideation canvases, etc., all of which had to be photographed, removed, and transported after.
6. **Facilitators:** There were a few individuals who did an exceptional job of connecting and encouraging people to collaborate. They were not managers, but were well connected to people regardless of technical expertise or lab affiliation, finding opportunities for collaboration in day-to-day activities and actively connecting people who could benefit from each other’s expertise. They were also cheerleaders, bringing a positive and optimistic energy to the group, charming others into wanting to work together. We called these people “facilitators.” The idea of key individuals maximizing productivity, performance, and communication has been discussed by other researchers: Lewin’s (1947) notion of “gatekeepers” and Pentland’s (2010) “charismatic connectors” are good examples. Facilitators contributed significantly to their organizations by filling in the gaps evident in our space, our organizational processes, and our culture, bypassing these hurdles and fostering an environment for collaboration. And they did so without responsibilities or recognition attached.

COMMUNICATION: THE POWER OF CONCEPTS, METAPHORS AND SYMBOLISM

As this was an internal research project, we had to be careful how we discussed our findings. The challenge was how to discuss change without sounding critical of the status quo; our audience was, to a greater or lesser degree, responsible for many of the structures and styles of work we were proposing to change. Hence, framing our findings and the internal conversation to follow was almost as crucial as the space we designed. Because a countless number of stakeholders across time zones and language were involved in the office project, we needed the content to be particularly clear and consistent, minimizing potential misinterpretation. Through the deliverables we prepared, we aimed to foster a sense of ownership; if this solution was going to lead to real and lasting change, it would require engagement, excitement, and sincere commitment. We used concepts, symbolism, metaphors, and a lot of visualization to anchor the conversation with senior management.

Concepts

First and foremost, we conceptualized workspace as a *tool* to for our business objectives, and consistently communicated it as such. Bakke (2007) calls this “strategic workplace design” – the idea of designing a space as a catalyst for organizational processes and its success. Conceptualizing the workspace as a tool ensured that our time was spent figuring out *how* to support each critical activity in the space, making for goal-oriented conversations. Once conceptualized as a tool, it was also easy to imagine both spatial and non-spatial implications. This steered conversations away from personal preferences and redirected discussion to how the space would aid in achieving our business objectives.

Another concept that required clarification was that of privacy – a Western concept originally so foreign to Japan that there is no Japanese word for it. A fair amount of workspace design literature touches on the debate over open vs. closed office design, with each approach posing its own unique, context-dependent problems and benefits. While the open office approach offers proximity, collaboration, and face-to-face interactions, it also comes with the documented drawbacks of noise and other disruptions (Kim & De Dear, 2013). And perhaps most importantly, our colleagues expressed a strong affinity for the notion of individually partitioned cubicles for solitary work.

Cangdon, Flynn, and Redman (2014) redefine privacy in a way that was crucially relevant. They argue that privacy, traditionally described as a spatial feature, is really about “the individual’s ability to control *information* (what information others need to know, both personal and professional) and *stimulation* (any sort of disruption).” This inspired us to think about privacy not only in terms of individual workstations, but as a range of work style options that office design could support, effectively leading us to focus on the ultimate goal of “privacy” rather than specific means to achieve that goal. As a famous quote by professor Theodore Levitt at Harvard Business School goes, “People don't want to buy a quarter-inch drill. They want a quarter-inch hole.”

Symbolism

Bakke (2007) explains that symbolism can play a key role in office design, anchoring and organizing the context during the process. The actual spatial details of office design can be very complicated. We wanted to offer a symbolic concept to serve as an organizing and guiding principle in our discussions with all stakeholders: to bring the coherence to the process, as Bakke suggests.

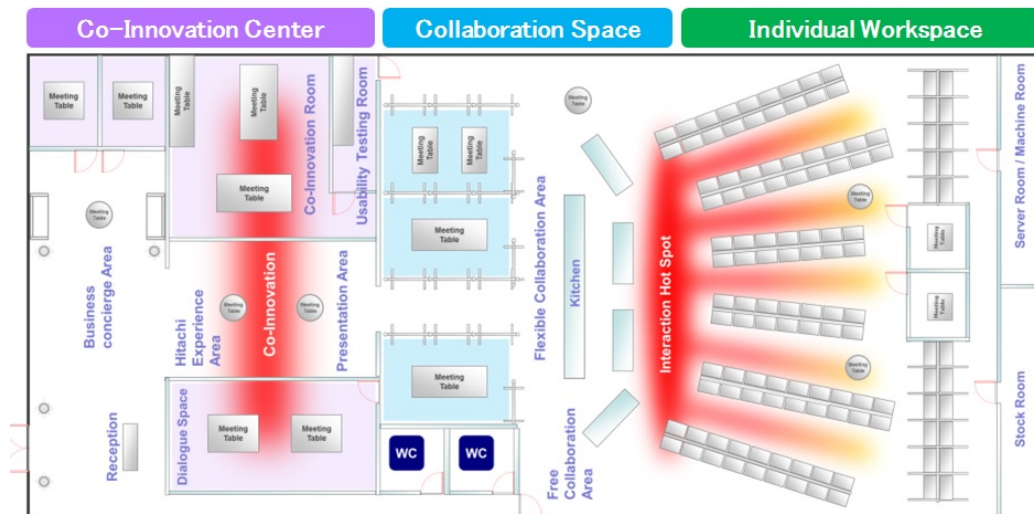


Figure 5. Early concept of the office with three distinct spaces: co-innovation customer area, collaboration space, and individual workspace

Hitachi’s symbol is a tree. Hitachi has run a tree-themed TV commercial in Japan for decades which has become somewhat of an advertising icon in Japan. In it, there stands a single, wonderfully lush tree against a backdrop of blue sky. A hypnotic song comes on, asking “What is this tree? There’s something about this tree. It’s a nameless tree.” The tree symbolizes the growth, resilience, and versatility of Hitachi. Many Japanese employees were familiar with “the tree” before they ever knew about Hitachi as a company. It is an image we hold near and dear to our work, and it is a concept that conveys positive meaning for us all.

In search of a metaphor that captured three key activities that led to our organizational success: technical expertise, interdisciplinary collaboration, and customer co-innovation, we together brainstormed and tested many random concepts, before finally reaching the tree – the Hitachi tree. If the roots underground were our technical, solitary work behind the scenes, the trunk was the collaboration with customers that led to the flowers and fruits of our technology solutions.

The tree became our core design concept for the new office.

Metaphor

If the tree helped us ground our findings and design, we still lacked a means to explain the transition from innovating to co-innovating. We wanted to communicate the importance of promoting collaborative work internally to support successful co-innovation effort. Ultimately, our capacity to offer superb solutions to our customers increasingly depended on our abilities and willingness to synergize between multiple domains of expertise. We wanted to communicate this with an engaging, positive tone, without blame on the current process. To provide a clear but accessible way to illustrate our point, we used a nerd-friendly metaphor: the Justice League vs. the X-men.

The Justice League was a group of established heroes who came together to face foes too great to handle alone. They built an orbital space station, the Watchtower, and enrolled

more heroes. The goal was to monitor global disasters and dispatch heroes as needed. Teams were assembled for the disaster – the project – but members were often strangers; they might have run into each other in the Watchtower cafeteria, but they had established careers in separate cities, even separate parts of the globe. Heroes were recognized for individual performance on particular missions, inadvertently encouraging competition.

The X-Men were organized completely differently. The original X-Men were mutant teenagers recruited by Professor Xavier, a powerful telepath. Their world was dangerous for mutants; alone, each was vulnerable to kidnapping, persecution, and secret research programs. Professor X gave them a safe haven – the School for Gifted Youngsters – but more than that, provided them with a common purpose and identity: as the X-Men, they trained to save other mutants and promote understanding between mutants and a fearful public. The team lived, learned, played, worked, and trained together in the Danger Room, where they faced all manners of simulated challenges *as a team*. In battle, they covered for each other's weaknesses and vulnerabilities by leveraging every team member's strengths.

For a long time, technology experts in Hitachi functioned like heroes of the Justice League. They brought their in-depth expertise, and tirelessly improved on the technical specs, driving our products bigger, faster, and better. We produced patented technologies, generated publications, and conducted highly domain specific research projects, and we were historically evaluated on the basis of these metrics. But the expectations were changing because the world was changing. As one of our informants eloquently described,

The concept of research is going to evolve from one based on the number of reports, patents, technology evaluation to that of finding business opportunities and tackling complex social problems. We can't keep doing the same research methods for every problem. Being creative means questioning our approach every single time. Workspace needs to accommodate that.

The world we work in is becoming more like that of the X-Men, posing challenges which require a more united and creative response.

IMPLEMENTATION – HOME WRECKER, HOME MAKER: CREATING TRANSFORMATIVE SPACE AND CULTURE

The issue of physically being scattered would be resolved almost on its own. Having our own space as an R&D meant that we would consolidate into one floor of the same building, which was a huge step in the right direction. That was still far from encouraging regular, “natural,” informal encounters and sparking conversation, however. Everyone's work had to become more visible and accessible. It also had to be easy – even fun! – to stumble upon others' work.

Hitachi Tree Materialized: Workspace Built on Three Areas

First, based on the tree concept, we divided up the entire space into three different sections: individual workstations (roots), collaboration spaces (trunk), and co-innovation areas (flowers), respectively.

Roots: The individual work areas were comprised of offices, workstations, and internal conference rooms. Each workstation became smaller than our previous ones, and the

partitions were a good few feet shorter or removed altogether, facilitating visibility. To alleviate the issues of disruption and noise, we scattered several small pods that fit 1-3 people for solitary work. These spaces cannot be reserved, but are readily available for anyone in need of individual, focused time, private phone calls, or impromptu meetings with just a couple of people.



Figure 6. Unreservable "phone booth" for solitary work or small group meetings

All the senior management offices along with conference rooms of various sizes were given glass walls to provide visibility without compromising auditory privacy. Many of the walls in the workstation area became either glass or equipped with writable film to encourage spontaneous conversation to turn technical at any time.

Trunk: The collaboration areas consist of project rooms, different from conference rooms in that they are reserved and dedicated to short-term, intensive projects. Because they are reserved for longer periods of time, project members can leave knowing their work in progress will be preserved for the next day. For highly confidential projects, each room has a shade that can be pulled down, but these rooms too have glass walls – again, promoting the visibility of our shared work. We also equipped one of the project rooms with one of the iconic innovation essentials - a ping pong table.



Figure 7. Photocopy area as work area: utilizing everyday activities as conversation starters and chance to be exposed to others' work.

Flowers: The co-innovation center is where we meet with customers. Here we designed facilities that allow us to engage customers in specific tasks to co-innovate: 1) foresight workshops; 2) understanding customer challenges; 3) prototyping; 4) simulating solutions; and 5) testing solutions. We wanted to build spaces to support our specific activities, graduating from all-purpose conference room setup. Our demos and work-in-progress technologies are showcased in the same area, offering an opportunity for visitors to browse and potentially find inspiration.

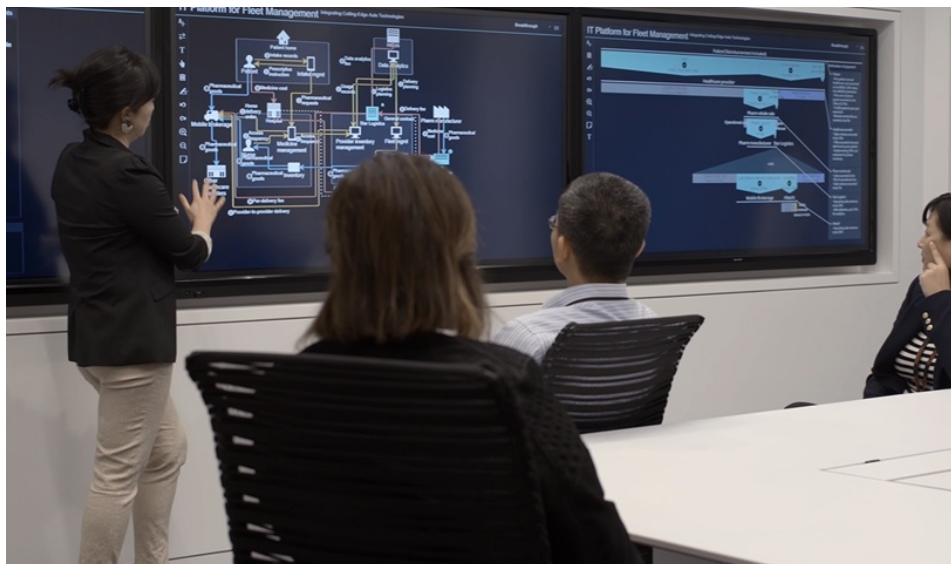


Figure 8. Co-innovation space with built-in design thinking tools

The foresight and prototyping room was given an octagon shape, symbolizing “all directions” (all “eight sides”) in Japanese, and was built to stand as an independent architectural object floating at the center of the co-innovation area. To create movement and flow, demos are displayed on the wall of this structure; visitors have to physically walk around to see our work. As they progress from ideation to prototyping to simulation, they use different spaces designed for each step.

The tree: All these three spaces are connected via a “townhall” space, the best real estate on the floor: a spot where all foot traffic converges, with plenty of sun, light, and a view. All the amenities that bring people together – coffee, espresso, snacks, bar-height tables, bright and comfortable furniture – are concentrated here.



Figure 9. Townhall area that includes collaboration space and kitchen/dining area

The townhall sits adjacent to individual workstations, collaboration spaces, and the co-innovation center. The collaboration spaces all face the townhall with glass walls, allowing passerby to peek in and register what is being worked on – and for those inside to peek out and join activities in the common space. Being the brightest spot with an unobstructed view through floor-to-ceiling windows, it was designed to be a natural people magnet.

Imagining Users’ Perspectives

We imagined three key user groups for the workspace: employees, managers, and customers, and considered how the space would benefit them and help them achieve their goals. We sketched three separate journey maps to describe their hypothetical experience in this space, in order to ensure their respective goals would be met. This allowed us to both see and communicate to the management every aspect of the space not only from our own vantage point, but the others who stood to benefit from improved design.

From an employee's perspective, the space provides a lot of flexibility and control over how and where you want to work. You can either work at a workstation or in a pod when you want to be left alone, but you can also work with others in a more informal setting in the townhall dining area, or strike up conversations with whomever is passing by. As you sit in the townhall, you can see into the project rooms, watching the progress of others' projects, and walk in to ask questions or propose suggestions. If a spontaneous conversation turns into something that you want to take notes on, there are writable walls everywhere. You almost always run into someone while getting a cup of morning coffee. Engaging with customers in the co-innovation center is easy, with all the equipment you need to advance the conversation – showing demos, prototyping, to usability testing.

From a senior manager's perspective, the space provides plenty of visibility, and you are in the center of office life. Your office is glass-walled, allowing you to have private conversations while staying in touch with office traffic and letting others see when you're available. The only thing that's turned *away* from the glass wall is your monitors, making it possible for you to work with confidential information without the fear of others being able to peek through. Your offices are centrally located within the workstation area near high-traffic conference rooms. From a security stand point, the co-innovation center and its facilities, concentrated in one space, offer tremendous ease for managing different levels of access. Sharing the center's work in progress is easy: simply walk visitors along the project rooms, letting them see what sparks their interest.

From a customer's perspective, the space allows you to get to know the organization and what's in the works. Rather than being cooped up in the conference room all day, physically being in the space provides many opportunities to stumble upon innovations: either physical materials or the people who work on them. From sharing input about your industry and business challenges to testing the solutions you've built together, you have a chance to move forward in the full cycle of the solution in the space. The spacious townhall area provides an opportunity to get out of the conference room and connect with people in a less structured manner, chatting casually with researchers who can leverage insight to help you achieve your goals – a much needed change of pace for visitors.

Software Considerations

Allen and Henn (2007) explain that there are three structures that influence the network of communication in a technical organization: formal organizational structure (i.e., org chart), physical structure (i.e., workspace), and informal organizational structure (i.e., relationships between people). Notice, space is only one of the three. As we collected and analyzed our data, it became quickly evident that our research extended well beyond the bounds of space; much of what we wanted to see in the new space was concerned with things outside the impact of space alone.

As an interaction designer and researcher, we often make a distinction between hardware and software in our work. The distinction is not as literal as it might sound, as in a computer (hardware) and the applications (software) that run on top of it. We tend to refer to anything physical as hardware, and the rest as software – interdependent components that need to work in sync to succeed. The workspace design in terms of spatial amenities was a matter of hardware, but we knew that the best case scenario required software considerations as well. The design of the workspace might be the best it could be, but how

we used the hardware – the operation – had to be determined, tested, and improved continuously. Just like in other hardware and software projects, software is often more urgent to upgrade.

Because after all, putting a large, open space kitchen in the middle of the office to incentivize gatherings is not the same as people actually taking the time to get together. Availability neither equals invitation nor participation. Ensuring users use the products as intended is often an essential design challenge in itself.

For improving face-to-face interactions and informal interactions, building the concept of legitimacy into the design was absolutely critical. Fayard & Weeks, (2007) argue that in order to effectively encourage a particular interaction, the interaction must be and feel legitimate – it must be socially appropriate to engage in the action given the affordance and limitations of the space. Who has the right to use which space and when is an important determinant of social action. This social meaning must be crafted through both space and practice; it was one thing to build the space the way we did, but we had to make sure the interactions we designed for actually *felt* legitimate.

Thus, we spent a significant amount of time discussing with the senior management *how* to use this space not just today or tomorrow, but for years to come. The townhall, especially, was an exciting but also risky experiment for our group; nothing was going to be worse than leaving a beautiful open space for collaboration unused. It was necessary to socialize employees to know the townhall was open and available for informal interactions and collaboration.

But valuing and encouraging inter-lab conversations had to be built with a cultural tradition. We began hosting Friday afternoon happy hour in the townhall, inviting all members to get together with over food, drinks, and music. This was the very first inter-lab, regular tradition that we started. Friday being the least busy day of the week, as it is Saturday in Japan, it is legitimately low key for people to participate. At the same time, organizationally, it presented a regular and predictable opportunity to meet new members, check in with each other, follow up on project progress, and to have fun. In no time, labs started to volunteer hosting duties, and the hors d'oeuvres served increasingly reflecting everyone's dietary restrictions and preferences.

In addition to a new tradition, one of the most powerful software insights from this study was the presence of facilitators. As mentioned in the results section, facilitators are well-connected and well-liked individuals who were making a significant contribution to collaborative activities. They served as “hubs” in the group, and successfully played expertise matchmakers for individuals who may have never found each other. This was particularly invaluable within Hitachi where there is a strong cultural custom of mediating any new relationships with someone who knows both parties. Finding a collaboration partner is often not matter of you finding the person, but of being connected to someone who can introduce you to the right people. Facilitators were doing exactly that, though hidden in plain sight, until this study.

We speculated that over the years, these well-connected individuals would be even more valuable in disseminating knowledge and information, socializing new members, and perhaps most importantly, bringing a positive can-do atmosphere to our challenging projects. This inspired us to rethink how we communicate, learn, and innovate as an R&D organization. What if we strategically positioned these facilitators in certain spots in the office to stimulate more collaborative conversations? How can we improve the organization-wide learning by

selectively developing facilitators? And what additional resources and support do they need as the group grows in numbers, technical diversity, and client load? We are yet to experiment with these ideas, but the very presence of these facilitators alone was eye-opening and encouraging, opening up possibilities for the future.

A New Life in the New Office

We moved in only several months ago. Our journey to transform the way we work is still very much underway. At our R&D group, everything is work in progress, including how we innovate. If anything, the new space taught us that we were even *more* different than we thought. Faced with the same problem, we employ wildly different perspectives, expertise and tools, but we see this as an opportunity to augment each other's superpowers. Informally, the researchers and designers in the new office report an increase in interdisciplinary collaboration, increase in informal interaction, and increase in the quality and ease of working with customers.

In addition to the workspace amenities, the move itself, disruption of routine, presented an excellent chance to try new things; people are open to exploration. With our pioneering spirit newly charged, we tried things we never did before. We created a documentary style film about our center, started hosting meet-up groups in our co-innovation area, and even partnered with a local high school to mentor students interested in innovation and design. The creative and expansive energy is flowing in the space.

At one Friday happy hour in our townhall kitchen, a group of engineers, scientists, and designers sprawled around the table with snacks and drinks. We built a wireless mp3 player. Just like that. Others started chiming in with more ideas – a cloud-controlled coffee machine, a parking spot detector with image analysis technology, a motion-sensor visitor check-in interface. We could add data analytics to them too – why not?

Since then, several researchers and designers across the labs informally decided to pursue one of these ideas: they are actually building a parking app. Our multi-tenant campus is still being built, and until the parking structure is complete at the end of the year, the competition for spots will remain high. Since the alternative parking is across the street, finding out there are no spots in the designated parking can be annoying. So a few people thought it would be fun to build a solution for it, much like the way we typically do for our customers. They reached out to other experts to help out, and they also got onboard - our very first unsponsored, completely spontaneous inter-lab collaboration project. As of now, another group of researchers is teaming up to hack into our faulty coffee machine. As diverse as our technical expertise may be, at the very core, we are united by our nerdy passion to solve problems.

CONCLUSION: “WE ARE R&D. WE TRY STUFF”

For us, this was a rare opportunity to be part of the entire process of researching, designing, and implementing a solution, from beginning to end, and even reap the benefits of what you designed day to day. And what's more, the legacy of the study lives on; even months after we moved, we still look back at our findings and insights, and talk about what else we can do – what new methods, new tools, and new practices we can experiment with.

As part of the office move project, the initial plan was to measure the impact of the new office on our productivity, ideally before and after the move. Hitachi has wearable sensor badges similar to ones used in studies by Pentland (2014) and Waber, Magnolfi, and Lidsay (2014), and that are used to measure the “happiness” of individuals working together in groups in a work setting (Mochizuki, 2015). We have been considering ways to use this technology to measure our interaction within the office. But the challenge is operationalizing what we consider to be “success” in our organization. While informal interaction or face-to-face interaction may be associated with productivity day to day, our end goal ultimately is to deliver outstanding solutions via co-innovation process with our customers. And we are still trying to figure out the best way to measure this, using these badges in a hybrid approach with ethnographic methods.

The Bay Area is blessed with many architectural firms that specialize in workspace design. Many of them, including ours, are utterly superb and highly knowledgeable of the wide range of space-related challenges; they have no doubt helped countless organizations in Silicon Valley succeed through design. The reason we decided to invest our time and resources to design our space was in no way related to these firms’ design capabilities. Rather, we were committed to the idea of building our own spatial solution to our operational challenges, not adopting the “right” or trendy design.

More than anything, the most valuable asset we gained from this project is our collective attitude about change. We got to redirect the spirit of innovation inward to reflect on and improve how we worked. And we have grown empowered with the concept of change, and inspired to keep moving. “We are R&D. We try stuff,” we say. And there is no better way to be reminded of this than to walk into the workspace we built. Together.

Ryoko Imai, Ph.D. is a cognitive anthropologist and senior research scientist at Hitachi Center for Social Innovation in Santa Clara, CA. She researches the complex and evolving relationship between human, technologies, and society. ryoko.imai@hal.hitachi.com

Masahide Ban is an interaction designer at Hitachi Center for Social Innovation in Tokyo, Japan. Using the principles of human-centered design, he designs software GUI for various industries. masahide.ban.nf@hitachi.com

NOTES

Acknowledgments – Special thanks to Eitaro Ito for managing this project, trusting us to take on the challenge, cheerleading us on, and offering relentless enthusiasm during the entire process. Thank you to Sadanori Horiguchi, Yoshimi Kasai, and Umeshwar Dayal for their editorial guidance and warmest encouragement.

REFERENCES CITED

- Allen, Thomas J. 1977. *Managing the flow of technology: Technology transfer and dissemination of technological information within the R&D organization*. Cambridge, MA: MIT Press.
- Allen, Thomas J. and Gunter W. Henn. 2007. *The organization and architecture of innovation: Managing the flow of technology*. Oxford: Taylor & Francis.
- Audia, Pino G. and Christopher I. Rider. 2005. A garage and an idea: What more does an entrepreneur need? *California Management Review* 48(1): 6-28.

- Bakke, John Willy. 2007. A Nordic guide to workplace design, accessed June 15, 2016, <http://nordicinnovation.org/Publications/a-nordic-guide-to-workplace-design-dekar/>
- Cangdon, Christine, Donna Flynn, and Melanie Redman. 2014. Balancing “We and “Me”: The best collaborative spaces also support solitude. *Harvard Business Review*, accessed June 15, 2016, <https://hbr.org/2014/10/balancing-we-and-me-the-best-collaborative-spaces-also-support-solitude>
- Fayard, Anne-Laure and John Weeks. 2007. Photocopiers and water-coolers: The affordances of informal interaction. *Organization Studies* 28(5): 605-634.
- Frederick, Bob. 2014. What’s old is new in office design. Rios Clementi Hale Studios, accessed June 15, 2016, <http://www.rchstudios.com/old-is-new-office-design/>
- Kim, Jungsoo and Richard de Dear. 2013. Workspace satisfaction: The privacy-communication trade-off in open-plan offices. *Journal of Environmental Psychology* 36: 18-26.
- Kraut, Robert, Carmen Edigo, and Jolene Galegher. 1990. Patterns of contact and communication in scientific research collaboration. In *Intellectual teamwork: Social and technological bases of cooperative work*, edited by Jolene Galegher, Robert Kraut, and Carmen Edigo, 149-171. Hillsdale: Lawrence Erlbaum Associates.
- Kraut, Robert E., Robert S. Fish, Robert W. Root, and Barbara L. Chalfonte. 1990. Informal communication in organizations: Form, function, and technology. In *Human Reactions to Technology: The Claremont Symposium on Applied Social Psychology*, edited by Stuart Oskamp and Shirlynn Spacapan, 145-199. Beverly Hills, CA: Sage Publications.
- Kraut, Robert. E., Susan R. Fussell, Susan E. Brennan, and Jane Siegel. 2002. Understanding effects of proximity on collaboration: Implications for technologies to support remote collaborative work. In *Distributed work*, edited by Pamela Hinds and Sara Kiesler, 137-162. Cambridge, MA: MIT Press.
- Lewin, Kurt. 1947. Frontiers in group dynamics: II. Channels of group life; social planning and action research. *Human Relations* 1:143-153.
- Mochizuki, Takashi. 2015. “Hitachi unlocks the key to happiness,” *The Wall Street Journal*, Feb 29, 2015.
- Pentland, Alex “Sandy.” 2014. “The new science of building great teams,” *Harvard Business Review*, April 2012.
- Waber, Ben, Jennifer Magnolfi, and Greg Lidsay. 2014. “Workspaces that move people,” *Harvard Business Review*, October, 2014.