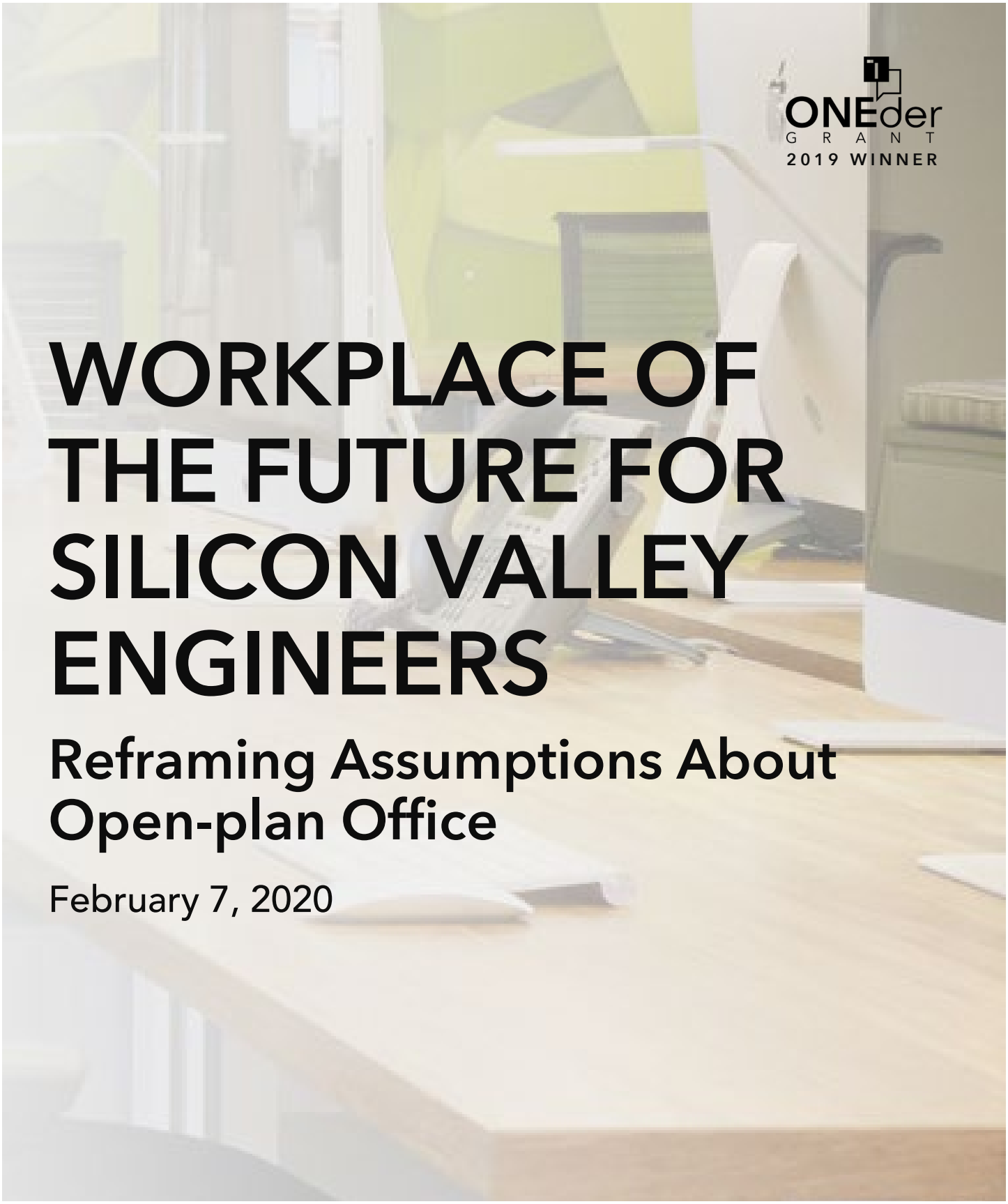

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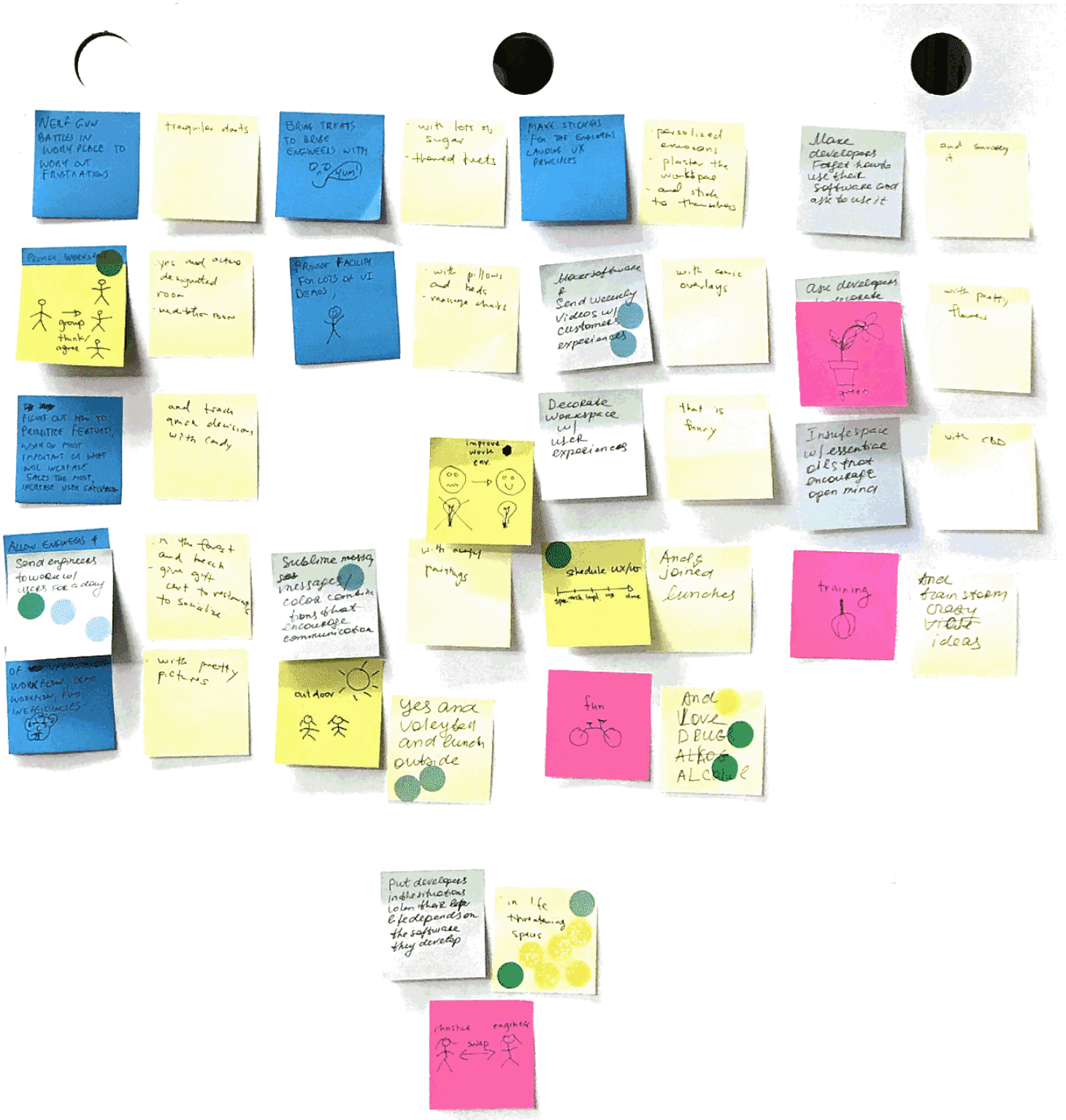
WORKPLACE OF THE FUTURE FOR SILICON VALLEY ENGINEERS

Reframing Assumptions About Open-plan Office

February 7, 2020

HGA



WORKPLACE OF THE FUTURE FOR SILICON VALLEY ENGINEERS: REFRAMING ASSUMPTIONS ABOUT OPEN-PLAN OFFICE

HGA one workplace

WORKPLACE OF THE FUTURE FOR SILICON VALLEY ENGINEERS: REFRAMING ASSUMPTIONS ABOUT OPEN-PLAN OFFICE

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| INTRODUCTION

To what extent can we rely on the existing body of research to shape open-plan offices?

When it comes to open-plan office, the literature is not exactly filling the audience with confidence. It either suggests a trade-off between most important workplace qualities – such as privacy and collaborative behavior – or offers mixed results (see Bernstein & Turban, 2018; Mojtahedi et al., 2017; Kim & de Dear, 2013; Davis et al., 2011; Rashid et al., 2009).

Differences in work processes and company cultures across industries also thickens the plot. Even within one industry, what works for one company and culture might sink another. This makes research results that rely on samples from one industry hardly transferrable across industries, let alone generalizable to all. For example, work processes that make a call center successful are different from those of a software company. Each of these companies require different quantities and types of spaces to support their distinct workflows. Therefore, employees' responses to research enquiries become highly context-specific.

In addition to cultural and operational differences, nuances in method, tools, and even controlled variables across studies also yield mixed results. For example, a study published in the journal of Royal Society in 2018 argued that open-plan office has a negative impact on collaboration. Alternatively, a 2017 research study, and recipient of Certificate of Research Excellence from Environmental Design Research Association, showed the positive impact of open-plan office on collaborative behavior. Both studies used sensor network technology to measure collaboration before and after moving from closed office to open-plan office.

This should make us cautious about relying on broad generalizations such as *"open-plan office is killing your privacy and safety"* or *"open-plan office decreases collaboration"*.

That all being said, engineering companies can rise above this uncertain landscape by reframing assumptions about key workplace qualities. To generate new, tailored choices they also need to tap into the expert knowledge and creative potential of those who have deep insight into how engineers work – engineers themselves!

The approach rendered in this project couples research on engineers' thoughts and emotions underlying their behaviors with co-creation processes that elevate users from research subjects to research and design partners.

| GOAL

The future is not easy to measure or predict. In fact, it is impossible to prove analytically that a fresh idea about the future is going to work or is going to be sustainable. Therefore, the goal of this project is to provide engineering companies with insights and methods for framing, imagining, and creating the future workplace in a way that is tailored to their culture and workflow. The project does so by:

1. Demonstrating the effectiveness of co-creation methods for designing tailored solutions: Change in the workplace goes hand-in-hand with change in ways work is accomplished. Considering this, the project shows how engaging users in the process of redesigning workplace can result in redesigning work. In this scenario, users are elevated to agents of change as opposed to subjects of it.

   Exploratory in nature, and not driven by a hypothesis, this part of the study also proposes planning and furniture solutions in response to Silicon Valley engineers' perceived challenges and potentials regarding open-plan workplace.

2. Providing fresh insight into open-plan offices' two widely discussed topics – privacy and collaboration: As the project reframes the common understanding of these concepts, it also explores the following two hypotheses:

   Hypothesis (a): Lack of acoustical and visual privacy in open offices are main disruptors of engineers' work.

   Hypothesis (b): Teams in engineering companies need a diverse range of open and closed spaces to get their work done.

| SCOPE AND METHODOLOGY

Workplace is a complex phenomenon. One way of dealing with and scoping a complex phenomenon is to break it down into smaller pieces and then evaluate and solve those pieces individually. This approach is popular because the research and design team's capacity to tackle highly complex situations is limited. They must first make it digestible to be able to wrap their heads around it.

We did not use this popular approach.

We kept the problem in its holistic, complex, and mysterious form. Instead, we increased the research and design team's creative capacity by bringing representatives of user groups on board. Then we used the art and science of Design Thinking to orchestrate the process of tackling the complex project from diverse angles and simultaneously generating and testing ideas that are in concert with one another.

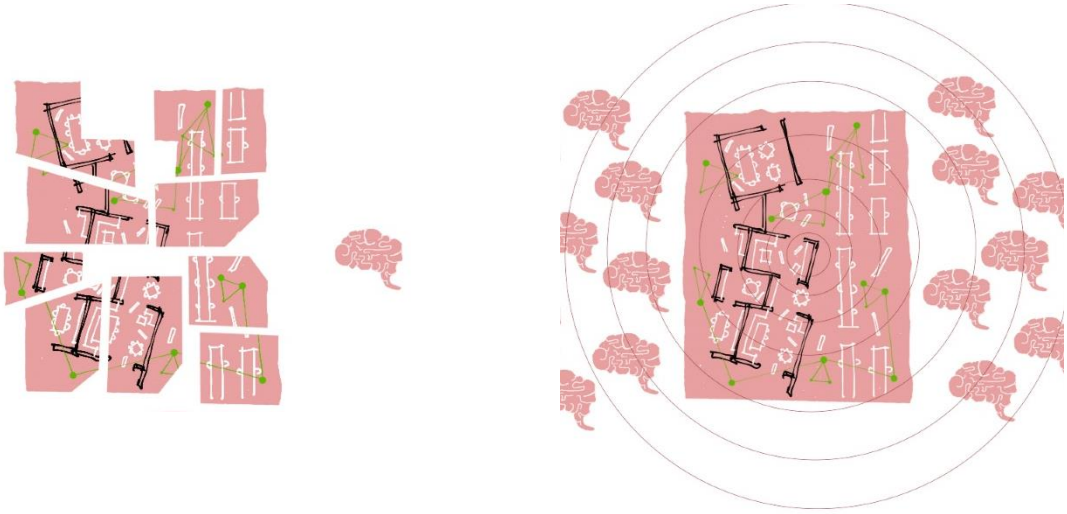


Figure 1. *Left – breaking down a complex problem to make it digestible for one brain; Right – keeping the problem in its complex form but increasing the creative capacity through participation*

To shape the methodology, the project team used two complementary research and design activities:

1. Co-Creation Workshop: The co-creation workshops reframed the role of users from research subject to research and design partner. This was done by engaging users to also generate and interpret data about their workflow and workplace.

   For this phase, we used Design Thinking, as a participatory research and design process, to explore and reframe challenges and build new possibilities for open-plan workplaces. As a form of Participatory Action Research (PAR), Design Thinking integrates the design process into research and discovery process (Mojtahedi et al., 2019; Mojtahedi, 2017).

   The workshop, conducted in the following five steps, engaged thirteen software engineers from Fortune 500 companies in generating fresh insights and ideas pertaining to the workplace of the future:

Empathy. Participants conducted in-depth, one-to-one interviews with one another to go beyond conventional assumptions about a stereotypical software engineer and develop fresh perspective into their thoughts and emotions.

Define. Participants analyzed the results of their interviews in smaller teams, identified challenges and moments that mattered in the life of engineers, and developed opportunity areas in the form of generative design questions.

Ideate. Teams of participants brainstormed a wide range of ideas as solutions in response to design questions that were generated in the previous step.

Prototype. In their teams, participants voted for ideas that would make the highest impact with the least amount of effort. After selecting an idea, each team proceeded with mocking up a life-size prototype.

Test. Each team presented their prototype to the rest of participants and received feedback for further iteration

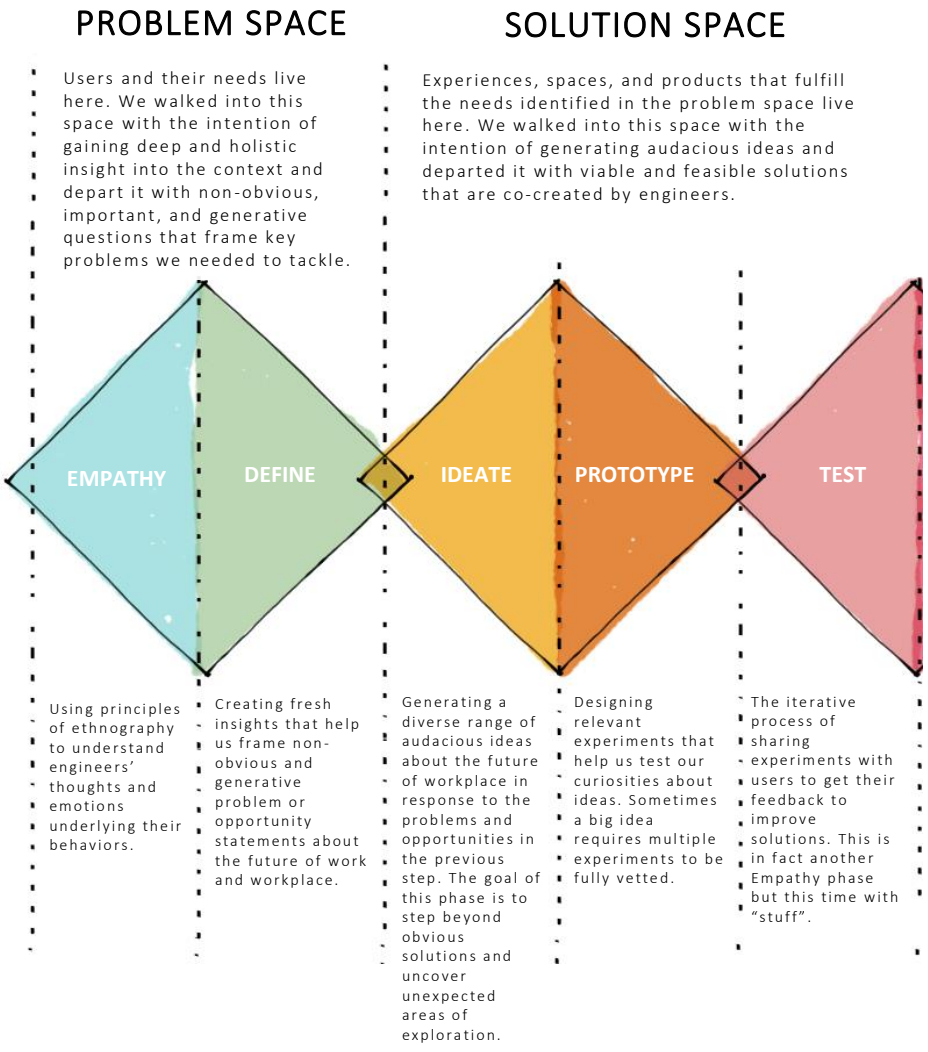


Figure 2. *Co-creation process*

2. **Online Survey:** An online questionnaire was launched to further explore the insights generated in the co-creation workshop as well as the study's two hypotheses. 217 engineers from two different engineering companies participated in the survey to deepen the understanding about key areas of curiosity hinted at during the workshop. Survey participants had moved from a cubicle office to an open-plan office in 2018. This step can also be considered as a second round of defining insights that provides opportunity for future work.

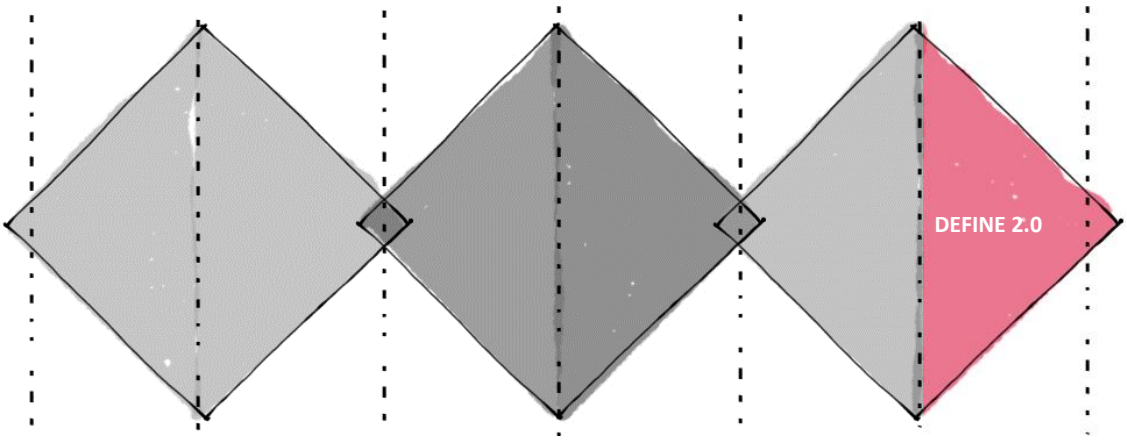


Figure 3. *Online survey as a complement to co-creation process to further define insights and hypotheses*

>> RESULTS

Results from the three activities included a wide range of insights and design solutions impacting scales of individual, team, and the larger organization. These results are categorized under four key findings followed by their corresponding design solution(s).

INSIGHT 1. Pivot from Privacy to Flow State

When it comes to acoustical and visual privacy, open-plan offices are often reported to be disruptive. That said, findings from the workshop and the online survey showed that the attempt to explain all forms of distraction using the concept of privacy leaves out important nuances key to designing workplaces. So, workshop participants were encouraged to explore engineers' expectations and dentitions of the concept. They did so by interviewing one another and carefully examining thoughts and emotions as they expand on their experiences and behaviors throughout a typical day.

Figure 4. *Co-creation workshop with a group of Fortune 500 Silicon Valley engineers*

Findings from the workshop and 217 survey participants suggested that engineers experience two major types of interruption – by individuals and by schedule.

Interruptions by individuals included (a) unexpected walk ups, for example, to ask questions or socialize; (b) identifiable nearby conversation, for example, neighbors sharing a story of discussing a work-related topic; and (c) sudden changes in the sound level, for example, neighbors talking loudly over the phone or car alarms. Interruptions by schedule mostly included scattered meetings throughout the day.

During the workshop, a key insight emerged when one engineer expressed that *"the worst thing you can do to an engineer is to disrupt their flow state"*. Echoed by everybody in the workshop, the conversation about acoustical and visual privacy was then elevated to something more. Workshop participants used examples from their time in coffeeshops or airports where they got to experience flow state and focus despite the lack of acoustical and visual privacy. In fact, when experiencing the flow state, they unconsciously blocked out acoustical and visual distractions.

Responses from the survey also indicated that when engineers experience flow state, they are at peak of their productivity, their brain and body are relaxed, they feel focused, comfortable, and even happy. The following are quotes from engineers explaining flow state in their words:

> *"If I'm in a state of flow, I'm working to the best of my ability and capacity and do not want to be interrupted at any cost as it takes a while to get into, and it's easy to lose. This is where I do my best work."*

> *"When I take up a task, and it may need only 10 mins of my focus, and if I have that 10 mins without disruption and my brain/body is relaxed, consider it done."*

> *"Being able to stay in the zone and deliver without distractions."*

> *"[It's a] comfortable and happy place."*

Moreover, unlike privacy, flow state seems to be as important during group activities as it is during individual work. Survey respondents indicated that that flow state is not solely achieved during individual and focused work. There are moments that the team transcends to this state as members collaborate and concentrate on a task together. The following definition of flow state from an engineer further illustrates this point:

> *"Concentrating with my team on tasks at hand without random interruptions."*

DESIGN SOLUTIONS 1

Solutions generated during the co-creation workshop varied from products to planning strategies useful for protecting the flow state for both individuals and teams.

Figure 5. *Engineers creating life-size prototypes of their solutions. Left – Enclosure Adjustable Desk; and Right – the Headspace*

> HEADSPACE <

This idea was proposed by a team at the workshop and in response to the following opportunity area: *"How might we make it obvious when an engineer is in the flow state?"*

Headspace was inspired by the role of 'doors' in traditional offices: *"When you have a closed office and the door is closed, nobody's coming in. We don't have that in the open plan, so we need other means to make it obvious to everybody that now the door is closed"*. Headspace was described by the team as a furniture accessory that mimics the role of a closed (or open) door. When an engineer lowers and places the Headspace over their head, it is a signal to others that they are in flow state and should not be disturbed. Others can approach the engineer when the Headspace is adjusted two or more feet above their head. Headspace is also equipped with sound masking, noise canceling, and in some cases, Bluetooth for the engineer to be able to take calls or communicate with others at their desk without disturbing their neighbors.

Figure 6. *Headspace is a furniture accessory equipped with sound masking, noise cancelling, and Bluetooth. When the engineer lowers and places it over their head, it is a signal to others that they are in flow state and should not be disturbed. Ironman's helmet was used by participants as an analogy for Headspace's capabilities.*

> ENCLOSURE ADJUSTABLE DESK <

Introduction of height adjustable desks to the workplace allowed employees to choose a working position that is perfect for their body. Enclosure Adjustable Desks, introduced by another team at the co-creation workshop, is a type of furniture that allows for the engineer to have more control over their level of engagement with their surroundings. Like height adjustable desks, the degree of enclosure changes with a push of button.

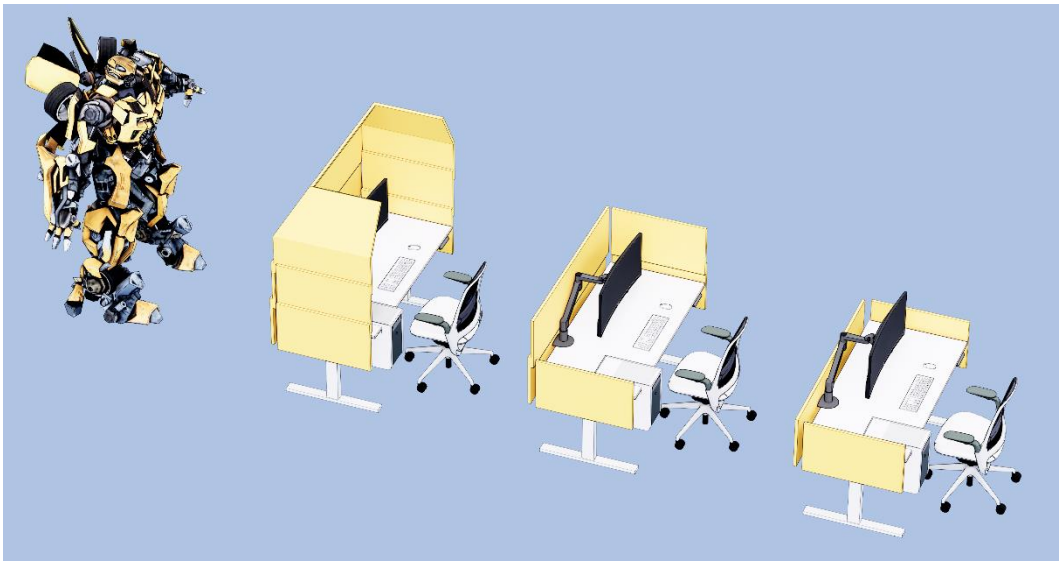


Figure 7. *Like height adjustable desks, the degree of enclosure in this furniture changes with a push of a button. Transformer was used as an analogy by workshop participants.*

> MAGNETIC MEMORY PAD <

It was also reported by engineers that “not feeling ownership over one’s desk is disruptive”. Being able to maintain a sense of continuity by “creating a home base” especially when moving to a project room, a booth or shared areas in the workplace, a meeting, or a hoteling station is key to safeguarding the flow state. One team ideated around a personal, foldable, and portable furniture accessory, named Magnetic Memory Pad, that includes the engineer’s post-its, notes, calendar, or

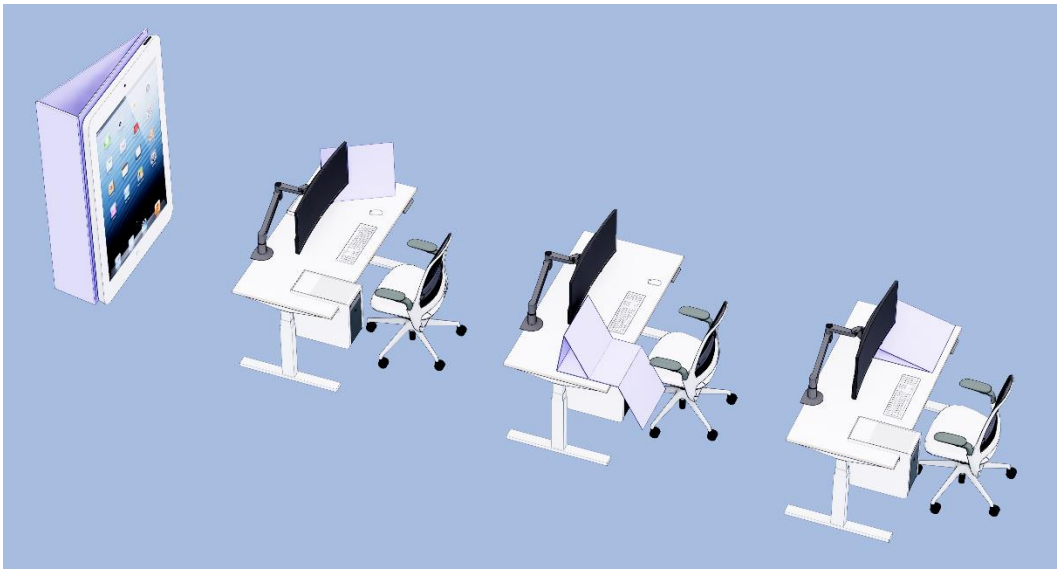


Figure 8. *Magnetic Memory Pad is a furniture accessory that allows for flexibility of personalization.*

even family photos. User sets up the Magnetic Memory Pad on their desk upon arriving at a project room or hoteling station and fold and store it back in a nearby library when leaving the workplace. In other words, it makes personalization movable.

> MATRYOSHKA <

Many engineers reported that the act of looking and *"hunting for"* places where they can collaborate away from others is a major disruptor to team flow state. Statements like *"we constantly have to go outside or wander the building looking for private [teaming] space that is unoccupied"* or *"my team needs dedicated quiet spaces where we can concentrate on tasks … without interruption"* show that engineers' flow state on a team level can be best protected if the transition to collaboration state is almost seamless.

Inspired by this problem statement, another team in the workshop asked: *"How might we help engineers to move from individual mode of work to collaborative mode seamlessly and without hassle? It's hard to switch the brain from problem solving to logistics (like finding a room) and back to problem solving"* The seamless transition would be possible if the need to leave the individual workstation to find a meeting space was removed. Yet, would it be possible for the engineers' individual workstations to flex into a protected collaboration space and vice versa? A potential solution offered to provide such environment, inspired by Matryoshka dolls, involved creating self-sufficient mini-workplaces for teams inside enclosed meeting rooms. Inside each mini-workplace, the team is provided with resources required to conduct their best work.

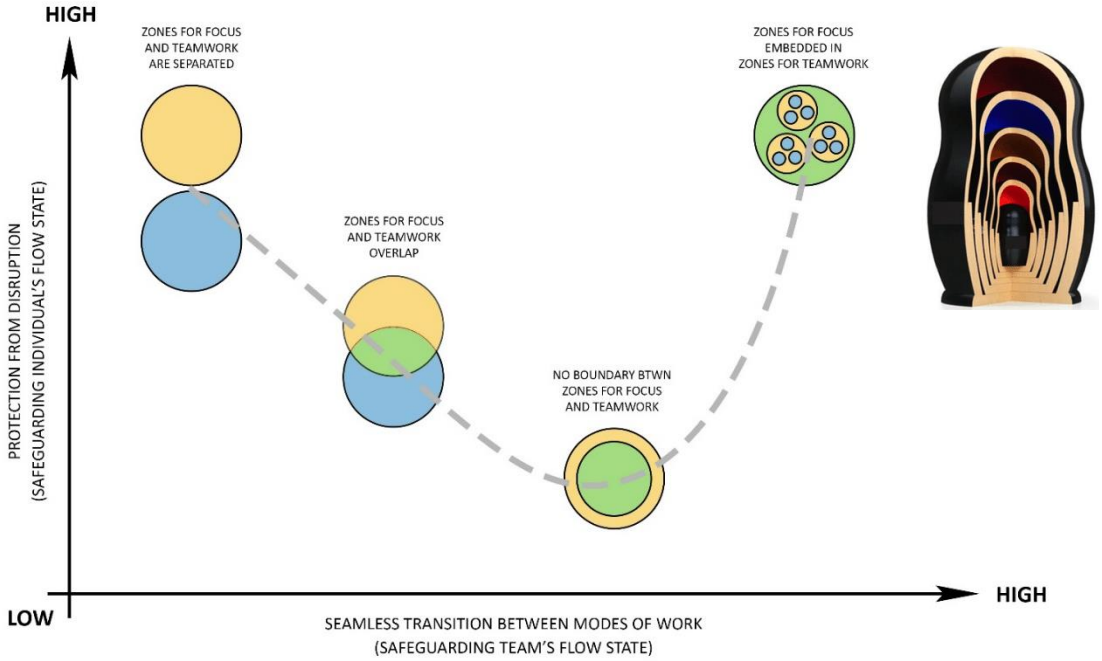


Figure 9. *Flow state is not specific to individuals. Team's flow state should also be protected. Matryoshka concept safeguards flow state on both scales.*

	FOCUS	TEAMWORK	DEDICATED	SHARED	OPEN	CLOSED
		X	X			X
	X		X		X	
	X	X		X	X	

> PLACE TO STAY ANONYMOUS <

The research team also investigated strategies that survey respondents employed to protect their flow state. The most popular strategy was the use of noise canceling headsets, but according to respondents, *"even with headphones on, co-workers interrupt with random questions"*. Other ways of protecting the flow state suggested by employees included *"booking a conference room"*, which is not the most efficient way of using real estate, *"finding a phone room"*, or even staying afterhours and *"waiting for people to leave office"*. A considerable group of employees, however, reported that during their flow state, they would go to another floor away from the people they know, find a coffeeshop, or use a nearby library to stay in control of their interactions with others. These places, although not quieter in noise level, allow for engineers to stay close to their work area but not being interrupted by others.

INSIGHT 2. Recognizing Project Life Cycle as an Alternative Unit of Analysis

In any research, the unit of analysis is the main entity that is analyzed. In most workplace research studies, the unit of analysis is or is defined in relation to individual employee or groups. This has motivated the large number of studies on privacy, productivity, happiness, biophilic design, planned and unplanned encounters, and collaboration. Workplace designers' response to such studies often includes workplaces that provide a diverse range of spaces varying in size, openness, flexibility, comfort, and ambiance. However, would it be possible that there are alternative units of analysis that have not been fully studied?

This shift in perspective was inspired by one of the engineers in the workshop:

> *"Physical design engineers deal with the same problem … physically, we try to put memory and standard cells of different sizes in a two-dimensional space … they're connected by wires, like corridors between spaces … then we work on it until we achieve the best optimization on a chip … we optimize the chip for power and performance … in the workplace [however], the best optimization is the best flow of work."*

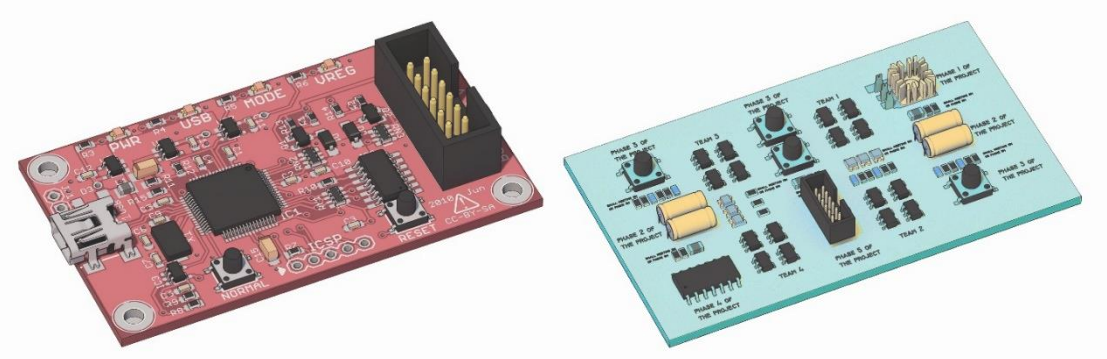


Figure 10. *Left – optimizing the chip for power and performance; Right – optimizing the workplace for the best flow of work and operation*

Following the clue provided by the workshop participant, the project team decided to shift the unit of analysis from people to work and explore spatial needs for different stages of work.

The first step in understanding spatial needs was to know all phases involved in a project. The following seven phases where identified after theming survey participants' responses about a typical project life cycle:

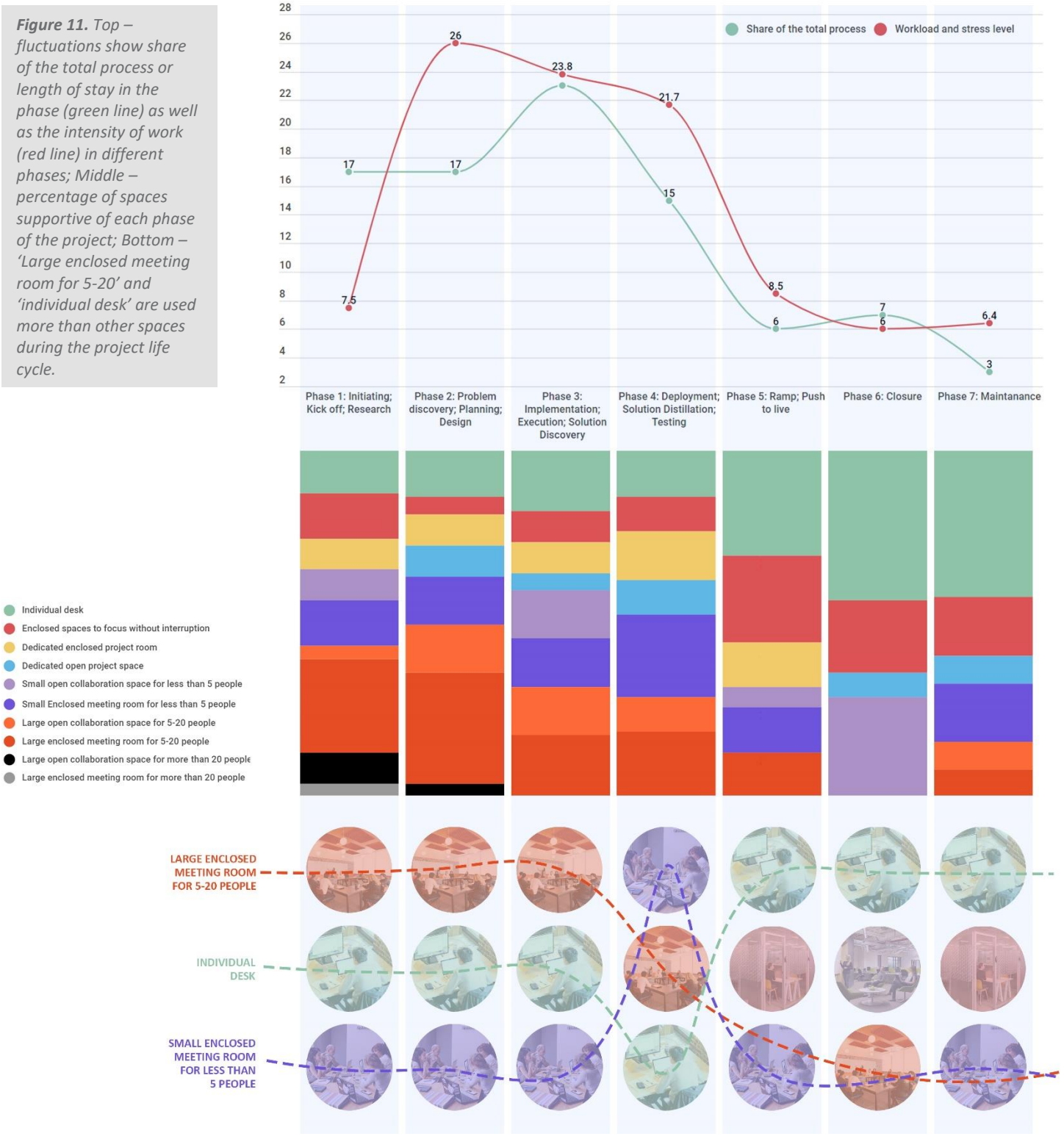
PHASE 1. Initiating; Kick off; Research
PHASE 2. Problem discovery; Planning; Design
PHASE 3. Implementation; Execution; Solution Discovery
PHASE 4. Deployment; Solution Distillation; Testing
PHASE 5. Ramp; Push to live
PHASE 6. Closure
PHASE 7. Maintenance

The second step was to know the share of each phase from the entire process as well as the workload and stress level in each phase. This information is important because it determines which

spaces would be hosting the project team for a longer period and under what level of stress. According to survey respondents, engineers spent most of their time in phase 1, 2, 3 and 4. Phase 2, 3, and 4 also happen to be the most intense phases of the project in terms of workload and stress level. The third and final step was to ask engineers what spaces were most supportive of each phase of the project. A summary of their responses about spaces that are best supportive of each phase of the project are rendered in Figure [11].

The analysis shows ‘large enclosed meeting rooms for 5-20 people’ are in higher demand in the earlier phases of the project which are the most time-consuming and intense phases. Conversely, the individual desk becomes the primary work space in phases 5, 6, and 7.

Figure 11. *Top – fluctuations show share of the total process or length of stay in the phase (green line) as well as the intensity of work (red line) in different phases; Middle – percentage of spaces supportive of each phase of the project; Bottom – 'Large enclosed meeting room for 5-20' and 'individual desk' are used more than other spaces during the project life cycle.*



DESIGN SOLUTIONS 2

This solution offers constellations of spaces that are, in different degrees, supportive of the projects' seven phases. As shown in Figure [11], the two key spaces supportive of almost all phases of the project are the 'Large enclosed meeting room for 5-20 people' and the 'individual desk'. The most basic constellation is comprised of these two components. Figure [12] renders how the constellation grows as secondary and tertiary spaces are included.

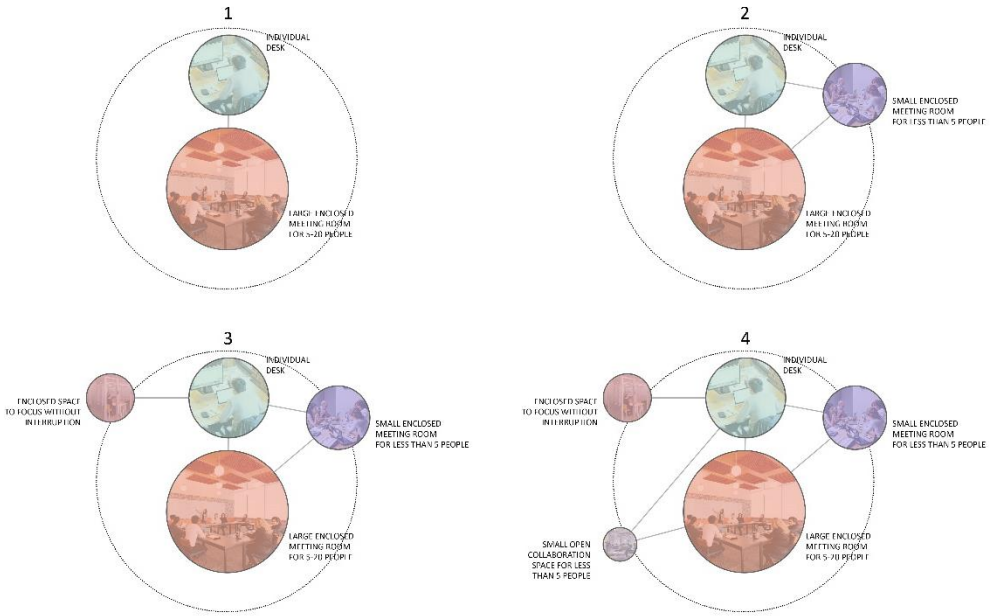


Figure 12. *Four constellations supportive of seven phases of the project life cycle.*

Although spaces in Figure [13] are rendered as distinct and independent spaces, the Matryoshka principle discussed in Solution (2) remains valid. 'Small enclosed meeting room for less than 5', 'Individual desk', and 'small open collaboration space for less than 5' could potentially be embedded inside the 'Large enclosed meeting room for 5-20 people' dedicated to a team of 15 people – as the average number of a project core-team members reported by survey participants.

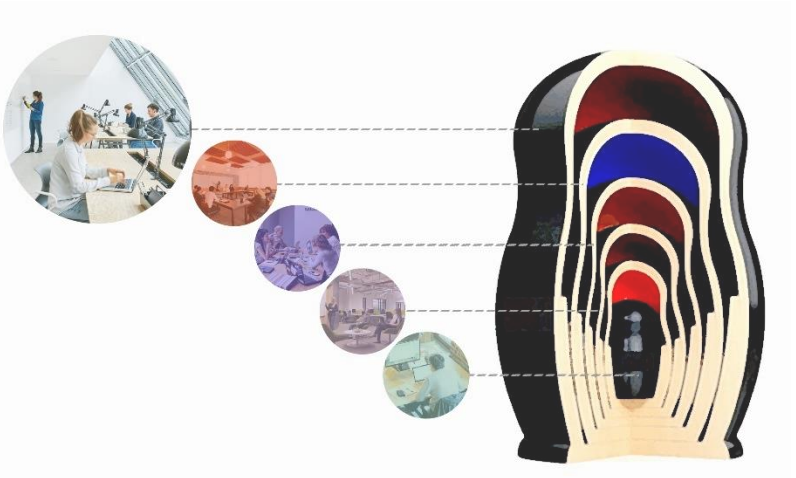


Figure 13. *Matryoshka principle can be applied to the constellation of spaces supportive of the project life cycle.*

>> DISCUSSION

The goal of this project was to (a) demonstrate the effectiveness of co-creation methods for designing tailored solutions: and (b) provide fresh insights into open-plan offices' two widely discussed topics – privacy and collaboration. The project team addressed these two goals by indicating the great generative potential of the following for designing successful open-plan workplaces:

- Substituting the concept of privacy with flow state

  Accordingly, further investigation on disruptors of flow state rejected the study's first hypothesis – lack of acoustical and visual privacy in the open office are main disruptors of engineers' work. Moreover, offering a range of diverse ideas for individuals and teams inspired by safeguarding flow state shows the effectiveness of reframing the problem statement using engineers' expert knowledge.

- Shifting the unit of analysis from individual or team to project life cycle

  The research team's study of spaces supportive of different phases of the project revealed limitations in the study's second hypothesis – teams in engineering companies need a diverse range of open and closed spaces to get their work done. While the constellation of spaces supportive of different project phases could be interpreted as 'a diverse range of open and closed spaces', the concept of Matryoshka could also be frames as an enclosed space capable of hosting diverse project-related activities and behaviors.

The study team was also aware of the fact that to fully realize the goals of this project, leaders of facilities departments in engineering companies need to feel comfortable with adopting a co-creation approach that could potentially result in highly tailored solutions. Therefore, to gauge their confidence and interest, online interviews with four leaders was conducted. The goal of the online interview was not to garner facility leaders' feedback on what was learned from our work with engineers, but to understanding how facility leaders and company executives would react to different ways of approaching the needs of engineers on future projects.

From the facility leaders' perspective, all departments contributed to the success of the company in different ways. So, engineers' input or engagement should not have a higher value over other departments. Moreover, as open-plan workplaces encourage proximity between engineers with other roles such as designers and product managers, creating workspaces that are only unique to one group could create an inequitable work environment. The project team's reaction to this feedback was to expand the co-creation process to include more roles and department. This not only creates a more holistic approach towards the design of the workplace, but also cultivates empathy among various departments.

However, a second concern raised by facility leaders requires further exploration. It was expressed during interviews that there is a constant reorganization on engineering campuses that would sometimes require employees from one department to occupy workspaces of other roles or departments. Although the facility leaders acknowledged that companies should not employ a one-

size-fits-all approach towards workplace design, but the reality of employee churn makes it challenging to create workplaces tailored to a unique workflow or set of behaviors.

Providing modular or flexible work environments that could flex within budget require further research into understanding other roles in engineering companies. Therefore, future research can benefit from co-creation workshops that include a more diverse range of user groups including representatives from other departments in engineering companies or other roles in project teams.

Moreover, sharing this project's findings with company executives can help the research team gauge the overall level of interest in employing co-creation methods as well as proposed planning and design solutions

Finally, solutions in this study were developed in one workshop. Future work should further iterate to fully unpack the practical requirements for implementing similar solutions in workplace research, planning, and design.

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