



# BEYOND CREATIVE

Transforming the Workplace

Dana Cuff  
Carla Salehian

citylab

SUMMER 2016  
[citylab.aud.ucla.edu](http://citylab.aud.ucla.edu)

First published in the United States of America in 2016  
by cityLAB-UCLA.

UCLA Department of Architecture +Urban Design  
1317 Perloff Hall, Los Angeles, CA 90095-1467  
www.citylab.aud.ucla.edu

Copyright © 2016 cityLAB-UCLA  
All rights reserved.

No part of this report may be used or reproduced in any  
manner, without written permission from the publishers,  
except in the context of reviews.

Every reasonable attempt has been made to identify  
owners of copyright. Errors or omissions will be  
corrected in subsequent editions.

Authors: Dr. Dana Cuff and Carla Salehian  
Research: Carla Salehian, Corina Ocanto, and Yang Yang  
Report Design: Carla Salehian and Corina Ocanto

Funding for this study was provided by  
Jet Propulsion Laboratory

# CONTENTS

01

**PREFACE**  
page 1

02

**INTRODUCTION**  
page 3

03

**CURRENT DISCOURSE  
IN WORKPLACE DESIGN**  
page 7

04

**cityLAB's  
OFFICE RESEARCH**  
page 13

05

**WORKSPACE JPL:  
DESIGN SCHEMES**  
page 17

06

**KEY FINDINGS AND  
RECOMMENDATIONS**  
page 43

07

**ACKNOWLEDGEMENTS**  
page 47

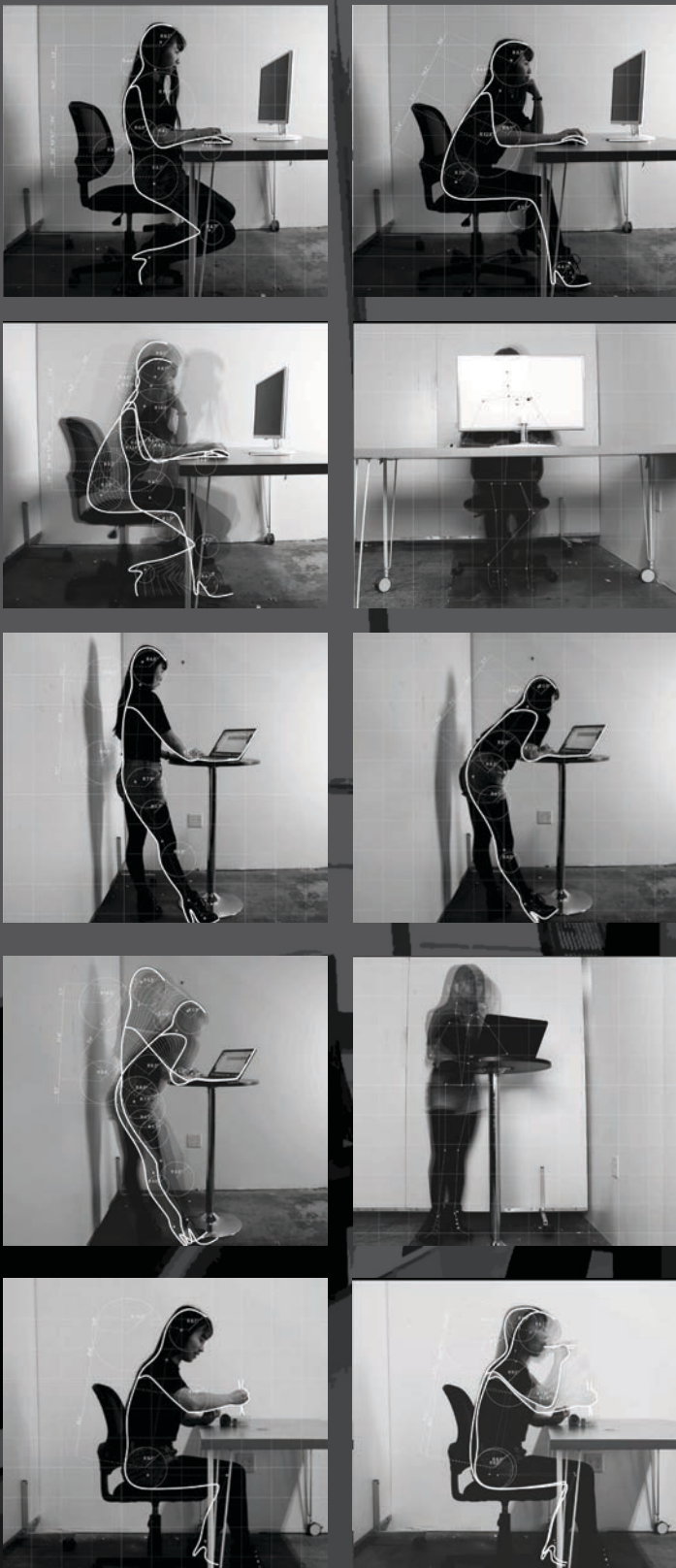
08

**PHOTO CREDITS**  
page 47

09

**NOTES**  
page 49





**Figure 1:** Marta Nowak/AN-ONYMOUS, Studies of the human form in the office, working on a desktop computer, working from a standing position, and eating lunch.

## PREFACE

In cities today, people seem to work anywhere and everywhere. For knowledge workers untethered from a factory and even from their desks, a chair and Wi-Fi are the only necessities. A park bench, cafe, or bus will suffice. Where does this leave architecture, if the office building and the office itself are in decline? In downtown Los Angeles in 2015, for example, the office vacancy rate was over 18%, a couple of points above the national average. Until the arrival of the immense, mixed-use Wilshire Grand Center, no office tower had been built in downtown for twenty years.

Although the office building is hardly extinct, its architecture has been almost mind-numbing in its formulaic approach to design. Dominated by optimized core-to-perimeter depths, floor plate square footages, LEED certification, and utilization rates, the speculative commercial real estate market restricts architects to the building skin and more recently, the office tower's shape. New ideas about sustainability, information technology, flexibility, or trends in work patterns hold little weight. It should be no wonder, then, that the so-called creative office has evolved to displace the anonymity of the glass box. Professional offices, tech firms, design industries, and start-ups are among the tenants creating demand for architectural alternatives.

At cityLAB-UCLA, over the past five years we have partnered with a wide range of organizations that are interested in new alternatives for office design. We have studied contemporary work patterns, information technology, work space, and workplace trends. That research is documented here, along with several design proposals that demonstrate a range of architectural alternatives to conventional office design. These are not meant as definitive or singular solutions, but as conceptual strategies that offer new directions based on enhancing technologies that are either currently available or in beta stage.

This book models cityLAB's operating strategy to address contemporary urban issues in which architectural design can have a broad impact on the quality of our environment and our everyday lives. This is a summary of our thinking about design for the future of work. It culminates our successful collaboration with Gensler, IS Associates, and JPL, and lays the foundation for our own future work.

Dana Cuff  
Director, cityLAB-UCLA



## INTRODUCTION

Over the past decade, the “creative office” has emerged as the new standard for progressive office design. Popularized by Silicon Valley technology industry giants, the creative office rejects the traditional partitioned office model and is instead characterized by open-floor-plan layouts, an emphasis on collaborative or shared space, modern furnishings, and leisure amenities. The so-called creative office has its own aesthetic, which is more like a domestic loft in a repurposed industrial building than a corporate tower, more playful than a standardized 9-to-5 work world, and has more exposed duct-work and wall graphics than wall-to-wall carpet in wood-paneled waiting rooms. Instead of corner offices and rows of cubicles, the creative office goes beyond the generic definitions of work and hierarchy and often includes amenities such as gymnasiums and fully-stocked kitchens. There are several well-known examples of the ways in which major corporations have adopted the creative or collaborative office. Yahoo famously revoked work-from-home privileges in an attempt to encourage staff to work alongside one another and have more face-to-face interactions. Apple is constructing its new headquarters designed by British architect, Norman Foster: a single, circular building surrounding a large outdoor park complete with extensive jogging and cycling trails (See Figure 2). Facebook’s new headquarters, designed by Frank Gehry, include plans for a single quarter-mile-long room with movable desks that can be easily rearranged by its employees (See Figure 3).

There are several reasons behind these companies’ collective embrace of the creative office. It is believed to encourage collaboration, promote learning among employees, and nurture a strong and unified culture.<sup>1</sup> However, some studies suggest that organizations have struggled to fully execute these ideals and that workers may be resistant to accepting this office type. In one example, longitudinal studies of employees who switched from partitioned offices to open-floor-plan offices revealed decreased levels of satisfaction in team member relations, increased levels of physical stress, and lower perceived job performance.<sup>2</sup> Specifically, workplace distractions such as noise and lighting have been cited as a predominant concern for employees working in open-floor-plan offices and recent technological trends suggest that these dis-



**Figure 2:** Norman Foster, “Apple Campus 2” Rendering

**Figure 3:** Frank Gehry, Facebook West Campus Model



**“More than 70% of employees work in an open office environment, and the size of their individual workspaces are shrinking.”**

tractions may only proliferate in the future.<sup>3</sup> With the workday punctuated by calendar alerts and notifications, attention distracted by steady streams of digital communication, and the 24/7 workflow made possible by mobile technology, it is increasingly difficult for employees find the time and space for heads-down, concentrated, and disconnected work.

Despite these concerns and challenges, the open-floor-plan office is becoming more prevalent across the country. According to one survey, more than 70% of employees work in an open office environment, and the size of their individual workspaces are shrinking. While the average individual workspace measured approximately 225 square feet in the year 2010, it dropped to 190 square feet in 2013.<sup>4</sup> There are some indications that this open-office trend is here to stay. As more organizations are plagued by limited space as well as resources to accommodate a growing workforce, the open floor plan office presents a logical, cost-effective solution by decreasing the average square footage per office worker.



**Figure 4:** Clive Wilkenson, “Continuous Desk” office design for The Barbarian Group advertising agency in New York.

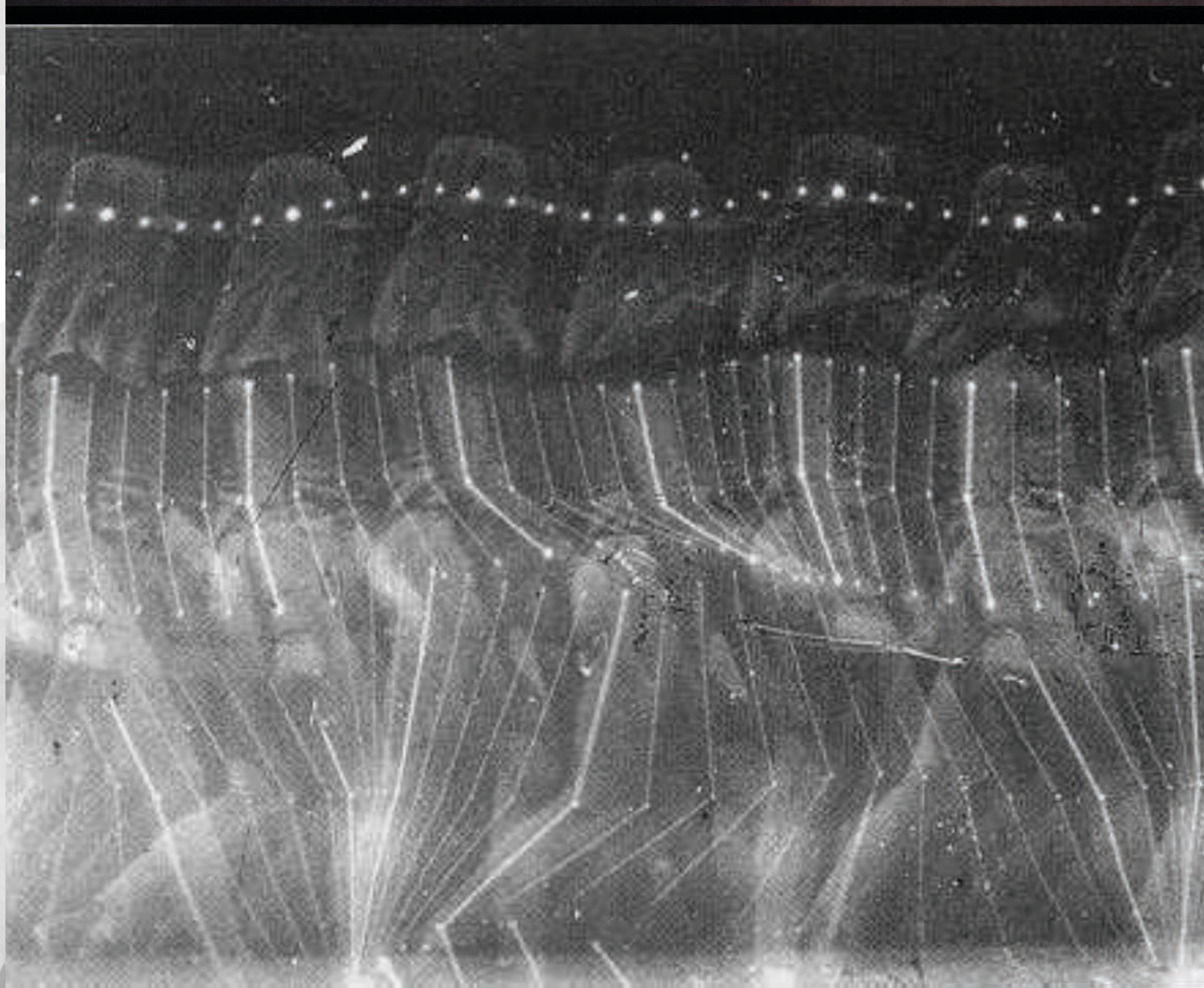
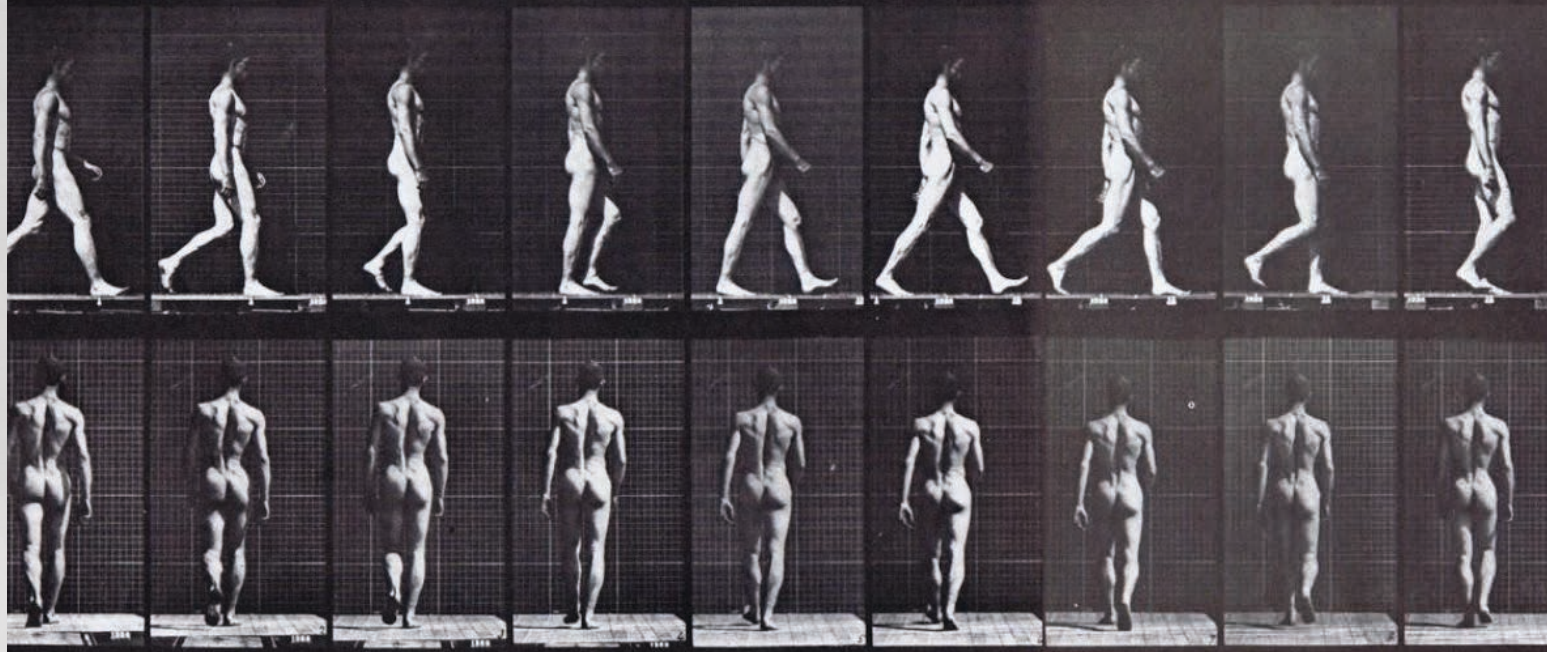


A primary dilemma is described above: increasingly open offices where workers have less personal space thwart workers’ ability to concentrate on focused work. One organization that has voiced the need for what it calls “deep think” workspace is Jet Propulsion Laboratory (JPL) in Pasadena, California. As its workforce continues to grow, management has been forced to consider ways to strike a balance between increasing productivity and collaboration while reducing the office footprint. In any organization, focused work takes place at various points in the day, but it isn’t surprising that JPL’s mixture of science, technology, and engineering might demand and prioritize intense concentration. Yet, like the strategies adopted in other organizations, JPL plans to transition more workers to open workspace environments. In doing so, however, the question remains as to how to achieve this balance most effectively, while also incorporating the technologically advanced and forward-thinking solutions for which JPL is recognized. For these reasons, JPL became a key partner in cityLAB’s study of workplace potential and of the design of spaces for knowledge-work that go beyond the current fad surrounding the creative office.



During four years of research about workplace design, cityLAB has studied a range of different types of knowledge-work organizations located in the Southern California region. The first investigations were undertaken with architecture firm Gensler, focusing on historical and contemporary office spaces and technologies as well as the future implications for downtown Los Angeles. This work is documented in a series of publications.<sup>5</sup> The multi-year Gensler collaboration was followed by a study of the workspaces of information technology staff in six varied organizations.<sup>6</sup> This research, including cityLAB's 18-month collaboration with JPL, is summarized here and leads to some innovative design solutions for the workplace of the coming decade.

In the following pages, a brief review of the current discourse in workplace studies leads to an overview of cityLAB's studies of workspace design. After this, the focus shifts to a series of design schemes that incorporate innovative architectural and technological strategies for deep think and collaboration. These projects were created in partnership with three different designers and with JPL, as a response to the latter's workplace needs but also to those of other organizations, worldwide that are facing similar challenges. The report concludes with an outline of key findings on modern workplace trends and design recommendations for creating effective change in the office of tomorrow.



**Figure 5:** "Walk (1886)" by Eadweard Muybridge.



## CURRENT DISCOURSE IN WORKPLACE DESIGN

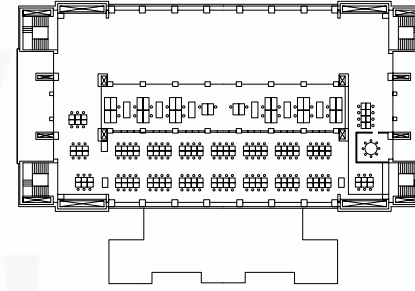
### Emergence of the 'Contemporary' Office

Open-floor-plan offices are recognized for their flexibility as they allow for the reconfiguration and fluctuation of workstation arrangements and offer the most fluid means of communication. While these characteristics are often cited as a promising new alternative to the traditional cellular office plan or rigid cubicle layout, the open-floor-plan is anything but new, and furthermore, recent studies have demonstrated that workers might not be as accepting of this office design option as one might expect. Among the first open-floor-plan offices in the United States was the Larkin Administration Building, by Frank Lloyd Wright in 1904-6. Designed, in part, for clerical work, this office building featured uninterrupted floor plates (made possible by its steel frame) surrounding a five-story tall atrium (See Figure 6). The design was also known, however, for the rigid behavioral control it enabled. Its lack of walls made it easier for managers to supervise their employees and conversation was "forbidden."<sup>7</sup>

Over the next several decades, the open-floor-plan grew in popularity and with this, the behavioral attitudes attributed to it became more relaxed. Technological advancements such as fluorescent lighting and suspended ceiling tiles provided architects with more flexibility, which allowed them the opportunity to begin to experimenting with new office floor-plan layouts. The most prominent and perhaps experimental example of this was the Bürolandschaft or "office landscape." Demonstrated in buildings such as the Osram GmbH administration building (constructed in Munich in 1962), the office landscape model was intended to open communication channels among workers, to allow desks to be reconfigured, and by extension, to allow workers to become more "human."<sup>8</sup> Developed by the German office consultants called the Quickborner Team in the early 1950s, the Bürolandschaft allocated floor space for plants, leisure furniture, and large circulation spaces as a way to encourage informal interactions among workers (See Figure 7). At first, this innovation in office design was met with much praise. Anecdotes circulated in the popular press about outstanding improvements in performance, a reduction in space requirements, a decrease in maintenance costs, reduction in setup and renovation times, improved staff morale, and decreased absenteeism.<sup>9</sup>

"...the open floor plan is anything but new"

**Figure 6:** Larkin Administration Building (1904), Buffalo, NY. Architect: Frank Lloyd Wright.

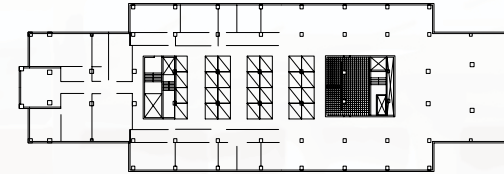


### LARKIN BUILDING, 1904

*Frank Lloyd Wright*

Spatial Characteristics:  
Open floors and central court

Typological Basis:  
Controlled environment with central illumination

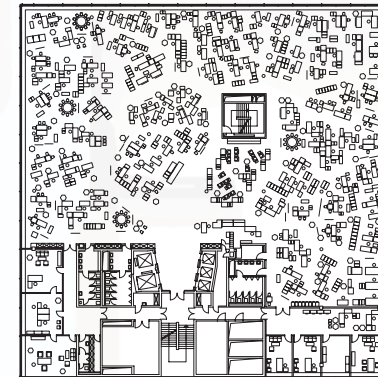


### RCA BUILDING, 1933

*Raymond Hood*

Spatial Characteristics:  
Uniform alignment of workstations

Typological Basis:  
Modernist ideal schemes

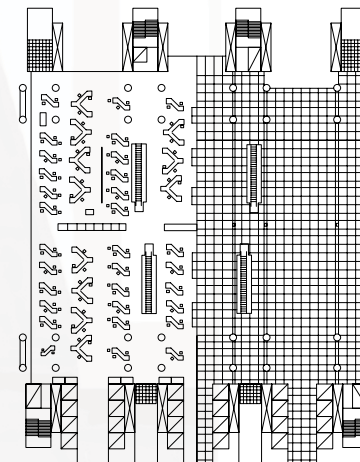


### OSRAM GmbH ADMINISTRATION BUILDING, 1962

*Walter Henn*

Spatial Characteristics:  
Autonomous configurations of workstations with few interior subdivisions

Typological Basis:  
Fluid circulation of information, workspace independent from exterior environment



### HONG KONG AND SHANGHAI BANK, 1986

*Foster Associates*

Spatial Characteristics:  
Absence of spatial program, reintroduction of cellular office

Typological Basis:  
Subjective labor more independent from physical environment, the mobility of both labor and the city

**Figure 7:** Evolution of the Spatial Organization of the Workplace



Soon after its development, however, workers began to notice the negative effects of the open-floor-plan and began to complain about issues of noise, distraction, and lack of personal space, which eventually led to its decline. Further, with the rise of computer integration and communication technologies in the office, spatial relations between office workers began to diminish in importance.<sup>10</sup> As a result, architects began to design increasingly unique office buildings that featured more variation in floor plan shapes, façades, and core-to-perimeter building depths. Foster Associates' Hong Kong and Shanghai Bank headquarters, for example, features decreasing building depths on each floor as ascends (See Figure 8). The larger, lower level floors feature more open office landscape floor plans while upper level floors are narrower in scale and feature combined open-plan and cellular office floor plans.<sup>11</sup>

### Reactions to the Open Floor Plan Model

Contemporary employees in open floor plan offices continue to struggle with issues of distraction in the workplace. The most salient problems are loss of privacy, high incidence of visual and aural distractions, frequent interruptions by other employees, and problems with the ambient conditions. One study found that there was no evidence to claim that open planning leads to any improvements in productivity, but rather, if anything, the reverse. Additionally, although the open-plan office provides flexible accommodation, the study found little evidence that it was being used in this way at either the personal or organizational level. Once a desk layout was set up, the office remained relatively static for several years.<sup>12</sup>

Similar and even more extreme reactions were found in longitudinal studies of employees who switched from traditional partitioned offices to open-plan offices. Researchers found that employees were significantly less satisfied with the physical environment of the open office design and that the dissatisfaction remained constant indicating that the employees did not adapt to the change. Employees were also less satisfied with team member relations. This did not lessen after the participants had been in their new offices for six months. Instead, the touted benefits of open-plan office design accrue to management in terms of easier supervision and lower costs, while workers experience negative effects. Overall, employees reported decreases in satisfaction with the physical environment, increases in physical stress, decreased team member relations, and lower perceived job performance.<sup>13</sup>

### Challenges of the Contemporary Office

#### 1. Excess Distraction (Noise)

Existing research indicates that excess distraction, particularly with regard to noise, has consistently ranked high among problems in the contemporary office. One study measured the effects of these distractions (acoustics, room climate, lighting, and air) on worker performance by testing cognitive skills (verbal and short term memory, reasoning ability, text comprehension, etc.) under multiple office conditions. They found that acoustical distractions had a much higher impact on cognition compared to visual distraction such as lighting. Additionally, optimal conditions for concentrated work can only be achieved by a combination of acoustical adaptations such as masking, insulation, and absorption to decrease sound intelligibility.<sup>14</sup>



**Figure 8:** Foster Associates' Hong Kong and Shanghai Bank Headquarters

**Figure 9:** 'Central Working' co-working space. Located in the heart of "London's own Silicon Valley." The workhub is home to several technology companies including Google.



**“One study found that there was no evidence to claim that open planning leads to any improvements in productivity...”**

Other studies found that noise and distraction varied among office types, and as a result, office design has a major effect on worker perceptions. Occupants of private offices were most satisfied in terms of distraction and noise. Most dissatisfied were those working in an open plan configuration. Environmental stressors such as noise and lack of privacy occur more often in offices where workspace and facilities are shared. However, another office type that received surprisingly positive results within this group was the “flex office,” in which employees do not have assigned personal workstations, but instead have ample access to backup spaces for concentrated work and meetings, and are able to work from home.<sup>15</sup> In other words, workers benefited the most from having a variety of options for locations in which to conduct work.

To further investigate office noise and employee concentration, one field study assessed subjective reports of distraction among 88 employees at two sites and compiled a typology of auditory disturbances including telephones, printers, typewriters and keyboards, computers, and other people talking. While almost every person in the study said they were disturbed by noise to at least some degree, a full 57% of respondents reported that one or more noise sources caused a ‘major deterioration’ in their concentration. No evidence for habituation to these sounds was found.<sup>16</sup>

#### 2. Lack of Privacy/Control

Research also indicates that a lack of privacy and a lack of control over personal workspaces creates additional challenges in the contemporary office. A lack of privacy can impede work in various ways including interruptions, concentration problems, crowding, and a lack of confidential space for meetings or phone calls. On the other hand, privacy features facilitating work include isolation, having a door, avoiding interruptions, and solid, floor-to-ceiling walls. Even though many workers anecdotally told our study team that younger staff needed less privacy, research shows that these features remain consistent among multiple age work groups. In fact, older and younger workers do not differ in their perceptions about types of physical features that impact workers and increase productivity.<sup>17</sup>



Another workplace feature that facilitates work and productivity is having personal control over the physical environment. To investigate this issue further, one study analyzed 384 questionnaires collected from employees in the corporate offices of three manufacturing companies in Michigan.<sup>18</sup> The results showed that workers' sense of control over physical aspects of their environment (determining the organization of workstations, personalization of work areas, control over social contact, control over temperature, lighting, and work process, etc.) mediated the relationship between perceived distractions and perceived job performance.<sup>19</sup> These results suggest that increasing personal control over the physical work environment may serve to link positive work attitudes and work outcomes.

### 3. Hyper-connectivity

As mobile technology continues to advance and impact worker capabilities, some researchers have raised the question as to whether employers should consider the negative impacts this could have on worker health and productivity. As noted by one study, while various technologies benefit organizations and aid employees in performing their jobs, they also contribute to workplace stress, the feeling of being overworked, and a sense of not being able to focus on one task and do a quality job.<sup>20</sup> This research sheds light on the ethical dilemmas that may arise from these challenges and notes that organizations and management have a responsibility to question the invasiveness of information and communication system applications and their impact upon an employee's life-work balance.

### 4. Telecommuting

Telecommuting offers another interesting challenge for the modern workplace as it continues to spark debate with regard to its effectiveness. While some studies claim productivity gains of 20% or more, other more recent studies have questioned telecommuting's effectiveness.<sup>21</sup> For example, with regard to assertions about telecommuting's environmental benefits (such as the reduction of air pollution by eliminating some employees' daily commutes), Westfall argues that telecommuting's participation levels must be extremely high and bolstered with strong support at the organizational level to produce a real environmental impact.<sup>22</sup> Further, with regard to claims that time saved on commuting leads toward increased productivity and efficiency, there are no guarantees that employees actually devote all the extra time to work.<sup>23</sup>

Regardless of these concerns, telecommuting remains a popular option for employees but the way that it is implemented within organizational policies requires careful attention. While some employers argue that telecommuting options are a powerful incentive to attract top talent, they also stress the importance of maintaining regular face-to-face meetings and interactions for workers to maintain relationships with their coworkers.<sup>24</sup>

**As mobile technology continues to advance and impact worker capabilities, some researchers have posited the negative implications on worker health and productivity.**



**Figure 10:** Marta Nowak/AN-ONYMOUS, Studies of the human form in the office while working on a mobile phone (email, texting, and teleconferencing).

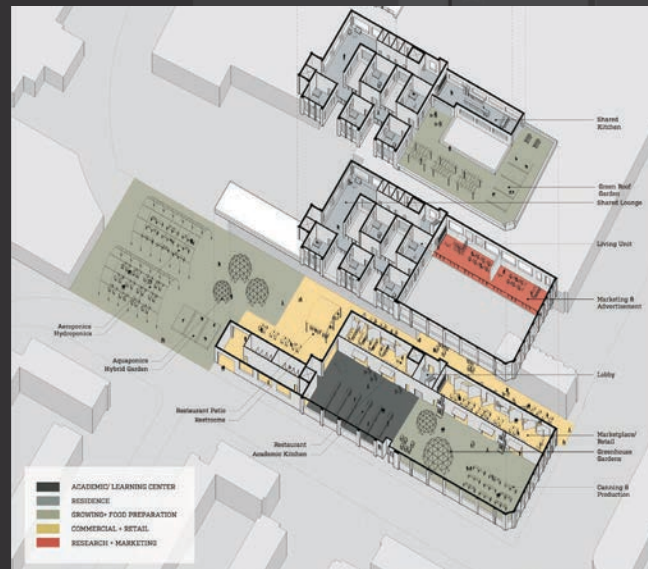


## cityLAB's OFFICE RESEARCH

Existing research on the creative office covers a wide breadth of topics related to both concentration and privacy. However, little research exists on evaluating recent design and technological trends in the workplace. Even fewer studies examine potential design interventions or practical solutions that could be implemented to improve worker focus and satisfaction in the office. To address these deficiencies, cityLAB-UCLA engaged in a multi-year series of research investigations to further explore these trends and demonstrate the opportunities in which architectural and technology design can respond to the challenges facing the modern office worker. Descriptions of each of these studies are provided below.

### “Future of Work” Studies

In a three-year research collaboration with Gensler Los Angeles, cityLAB-UCLA observed office design in downtown Los Angeles and began to speculate about the “Future of Work” by studying the development of the office at three scales: the city, the building, and the desk. The first year of the project reviewed the planning history of downtown Los Angeles as well as the historical evolution of office work. Year two of this investigation explored an array of innovative ideas, technological advances, and design opportunities for office work in the coming decades. The third year focused on conceptual design solutions to address these opportunities (See Figure 11). These studies made it abundantly apparent that office design has evolved far more slowly than the technologies it deploys. Further, while an array of innovative spatial ideas can be imagined for the future of work, implementation remains elusive.



**Figure 11:** “Slip City,” a workplace design concept that adapts new program into derelict sites—vacant office floors, abandoned warehouses, hazardous runis—as a means of creating new workspaces and creating community engagements.

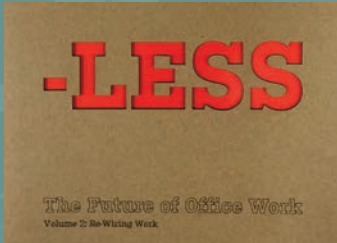


**Figure 12:** cityLAB-UCLA/Gensler “Work on Work” exhibition opening at the A+D Museum in Downtown Los Angeles.

### SUPPLEMENTAL READING



**The Future of Office Work vol. 1: How We Got Here** (2013, cityLAB-UCLA & Gensler Publication)



**The Future of Office Work vol. 2: Re-Wiring Work** (2015, cityLAB-UCLA & Gensler Publication)

### I.T. Workplace Futures

In order to further explore the discrepancy between office design and technology, cityLAB next collaborated with UCLA's I.S. Associates to study “Information Technology Workplace Futures.” The study reflected an increasing need for senior administrators who manage information technology systems and staff to re-evaluate their current workplace assets and better understand future trends in order to enhance productivity, increase innovation, and recruit and retain their desired workforce. The project focused on discovering general trends in IT workplace challenges and identifying future needs as observed in eight very different organizations and their workspaces (see table, below). For each of the eight case studies, cityLAB researchers studied the organizations’ physical office spaces and interviewed Chief Information Officers and Chief Technology Officers, in addition to junior IT staff members.

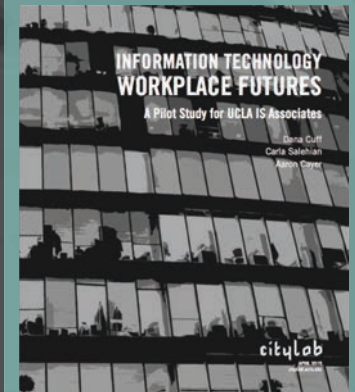
#### Research Participants

1. Sony Pictures Entertainment	5. Univ. of California, Los Angeles
2. Broadcom Corporation	6. Avery Dennison
3. LA County Public Health Dept.	7. Northgate González Markets
4. City of Los Angeles	8. Jet Propulsion Laboratory

Research revealed that regardless of their size or sector type, the eight organizations face similar IT workplace design challenges and opportunities. Common challenges include a lack of exclusively designated IT space and inefficient design and spatial distribution. It was found that IT staff and clients are generally wary of the unorthodox settings of the creative-office. Instead, office designs that reflect the priorities of the organization, as well as the values of the IT workforce are the most functional. At the same time, it is important for these workspaces to remain flexible enough to adapt to evolving technologies and the ever-changing role of IT in the workplace.<sup>25</sup>

Together, the study of knowledge work in downtown Los Angeles and research about IT workspace built a foundation for a more in depth project with a single, if complex, organization: NASA Jet Propulsion Laboratory.

### SUPPLEMENTAL READING



**Information Technology Workplace Futures: A Pilot Study for UCLA I.S. Associates** (2015, cityLAB-UCLA Publication)



## Spaces for Deep Think

In 2015-2016, cityLAB-UCLA partnered with Jet Propulsion Laboratory to further examine how to bring the workplace itself in line with contemporary office technologies, particularly to enhance concentrated work or what JPL calls “deep think.” The guiding thesis was that space and technology must be considered from the outset in an integral way for innovative office design to result. Too often, conventional office space is retrofitted to accommodate new forms of personal and organizational IT. Instead, the goal of this study would be to develop a range of innovative solutions that combine advanced, yet accessible technology with enhanced work settings. The first step was to learn about current work spaces at JPL as well as employees’ needs. Based on those findings, three teams of designers joined the team to create several types of deep think space: for individuals and for small groups, in both an interior office context as well as an outdoor landscape.

### *Why study JPL and spaces for “deep think”?*

Workplace design trends over the past fifty years remain somewhat unremarkable, in spite of the fact that work-related technologies have undergone radical transformation. This gap is glaring at JPL, with its reputation for advancing space exploration through the highest levels of engineering and information technology. Moreover, the very technology necessary to conduct the exciting, complex work at JPL held the potential to be a distraction that undermined the organization’s core mission. For example, the always-on, 24/7 conditions brought about by personal, mobile, digital technology could make it difficult to concentrate and focus on critically important tasks. As such, JPL is an ideal site to study the potentials for deep think workplace design. Perhaps most important is the fact that while the work conducted there is highly specialized, the issues and obstacles they face with regard to office design are far from unique, but are shared with other organizations cityLAB has studied in the past. First, multiple groups within JPL are experiencing aggressive growth in terms of personnel. Lack of facilities to accommodate the growing workforce has become a critical issue. Second, the buildings constructed on its 177-acre site range widely in terms of their age of construction (the oldest building was built in 1943), resulting in continuous retrofitting of interiors.<sup>26</sup> Third, because current workspace is inflexible, there is constant and costly shuffling of workers moving to different offices when new teams form or work is reorganized. Lastly, much of their interior office space, similar to other organizations, is occupied by standard “cubicle farms.” From an architectural point of view, the paradox was palpable: JPL’s notable creative, exploratory work takes place in some of the most conventional office settings. The situation was ripe for study and design.

### *Parameters of the study*

In partnership with JPL’s Office of the CIO, cityLAB engaged in a series of field studies which included interviews and workshops with IT and engineering management and staff. After gathering background materials, study began in two particular areas on the campus (or “on lab” as the campus is called at JPL) that might benefit from introducing innovative workplace prototypes. The first area, selected because it was on JPL’s docket for interior remodeling, is a portion of a

crowded office floor organized by a field of standard cubicles (see Figure 13). This space is primarily used by spacecraft engineers whose ingenious drawings and parts-prototyping spills incongruously into the drab circulation spaces. The engineers appreciate what privacy individual cubicles afford, but acknowledge that group work is difficult to accommodate with collaborative space in short supply. As a result, design ideas would be developed for concentrated work by both individuals and small, collaborative teams.



**Figure 13:** Prototype Area 1, Building 303, 4th Floor

The second area of study is an outdoor space on lab, in the JPL mall that currently features a coffee cart, café tables, green space, and hardscape (See Figure 14). The focus on exterior workspace came from JPL employees who responded to cityLAB surveys that escape from the cubicle farms into the outdoors was a common and pleasurable means to accomplish concentrated work. Design schemes for this space would be planned for individual or collaborative work tasks, and would be “unassigned” (not affiliated with any particular work group) so that they could be reserved or used by anyone at JPL.



**Figure 14:** Prototype Area 2, Outdoor Mall

In collaboration with three design teams with specific, unique orientations, conceptual schemes are presented in the following section. While these ideas were created for JPL, they hold the potential to be replicated and reinterpreted elsewhere.

**“Workplace design trends over the past fifty years remain somewhat unremarkable, in spite of the fact that work-related technologies have undergone radical transformation.”**

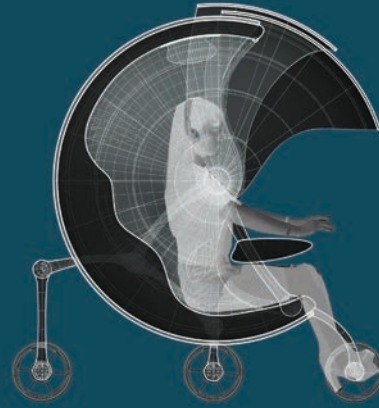


## WORKSPACE JPL: DEEP THINK & COLLABORATION DESIGN SCHEMES

### PRODUCTIVITY

Lead Designer: Marta Nowak, AN-ONYMOUS Studio

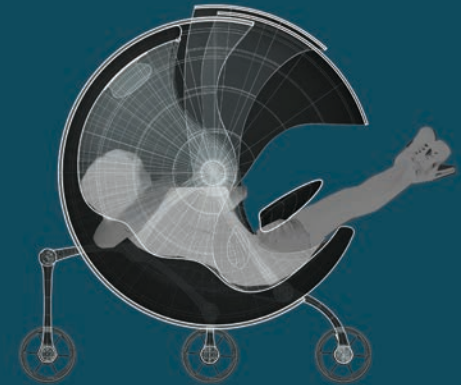
PRODUCTIVITY is a mobile personal working space that seeks to rethink and reinvent the office environment. Seen as an alternative office cubicles and benches, and at the same time challenging the conventional office duo chair and desk in favor of a hybrid machine that is at once a vehicle, a prosthetic device, and micro-environment. Derived from a series of ergonomic studies, the interior topography of the pod accommodates a variety of functions and conditions for its working body: from reading and responding emails on a desktop computer, teleconferencing or speaking on the phone, to listening to music, texting or having a private phone conversation with friends or family, taking a coffee or lunch break at one's desk, or even simply relaxing for a few minutes within the busy working schedule.



1. Working-section



2. Relaxing-section



3. Lying-section



Interior View



## Relative Wheel Sizes

Typical Office Chair



D=2.4"/6.10cm

Sojourner



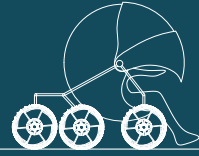
D=5"/12.5cm

Spirit and Opportunity

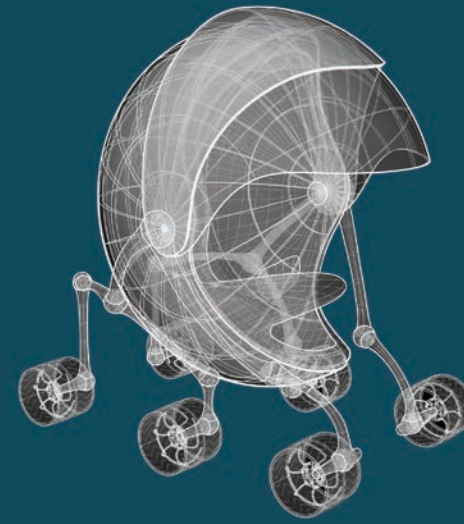


D=10"/25cm

Curiosity

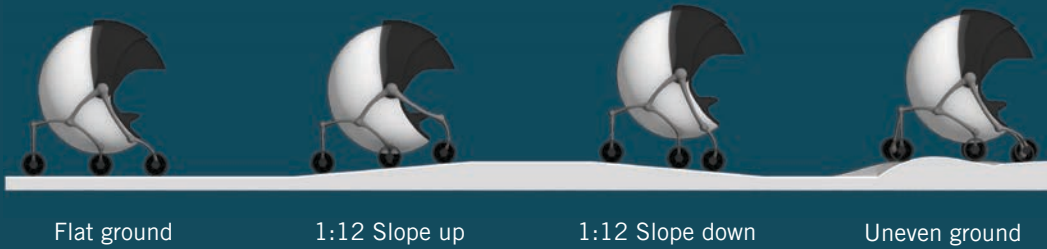


D=1.6'/50cm



“...the pod allows for three different levels of privacy: open condition, semi-enclosed, and fully-closed.”

## Terrain Configurations



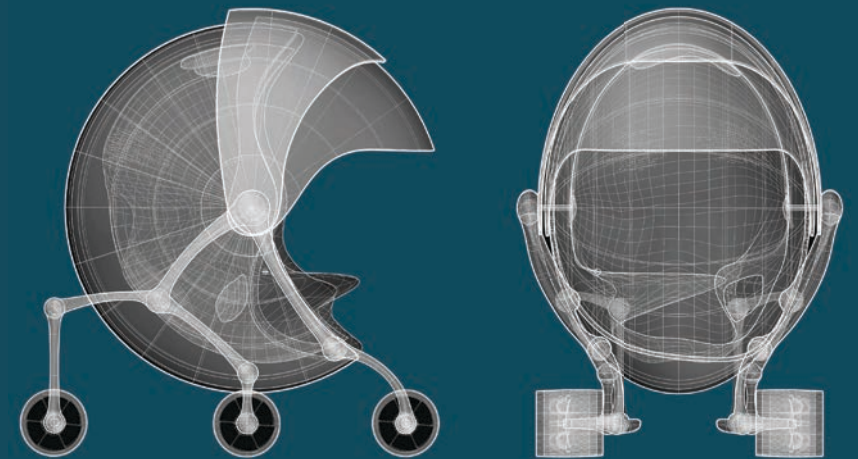
Flat ground

1:12 Slope up

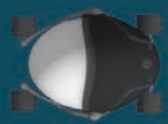
1:12 Slope down

Uneven ground

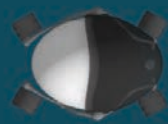
Equipped with a retractable hood, the pod also allows for three different levels of privacy: open condition, providing the user the visual and spatial access to the office environment; semi-enclosed condition, allowing for partial connection with the office floor yet providing some level of privacy; and the fully-enclosed condition, providing an immersive experience of a micro-environment within the office space that could be used as a deep thinking space, personal private space, or a quiet resting space. The fully-enclosed condition provides an acoustic barrier from the outside and allows for personal audio and customized lighting systems.



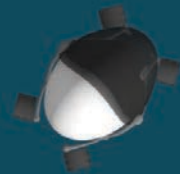
## Movement of Wheels and Rotation in Place



1. Stationary pod

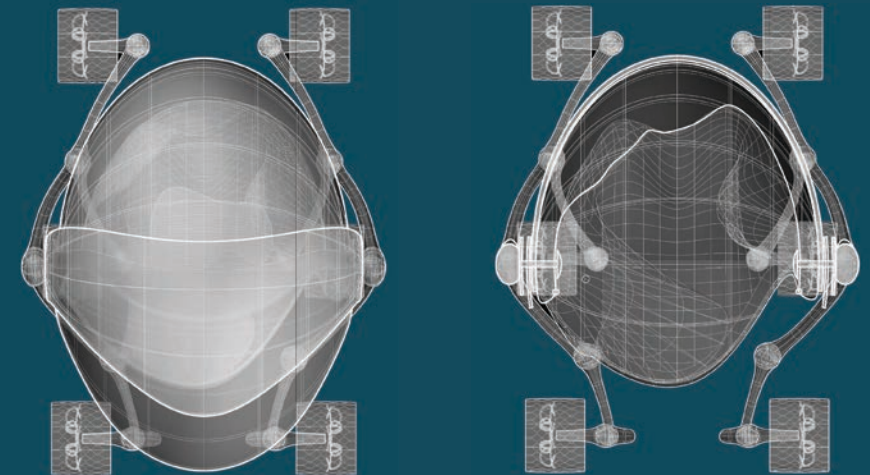


2. Wheels turn inwards



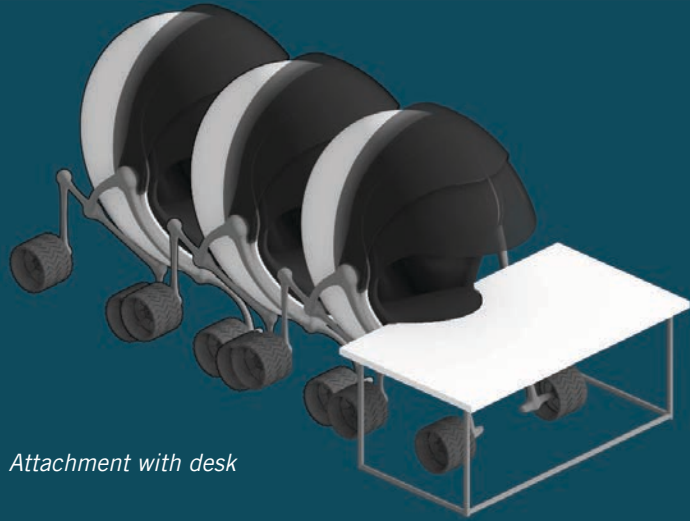
3. Pod rotates in place

4. Wheels return to original alignment

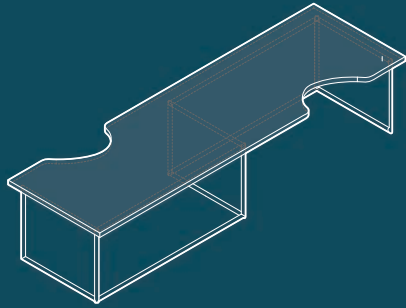




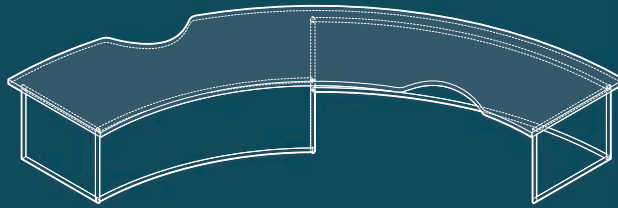
## Desk Segments



Attachment with desk



One straight segment



Two curved segments

## Desk Configuration Types



Bench



S-shaped



C-shaped



Freeform layout

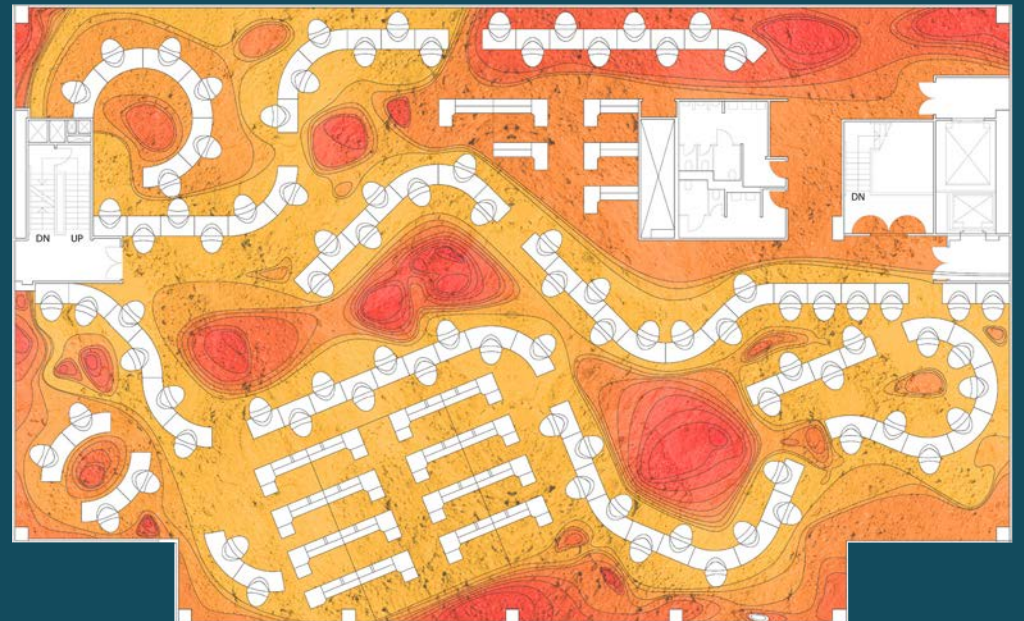
## User Customization



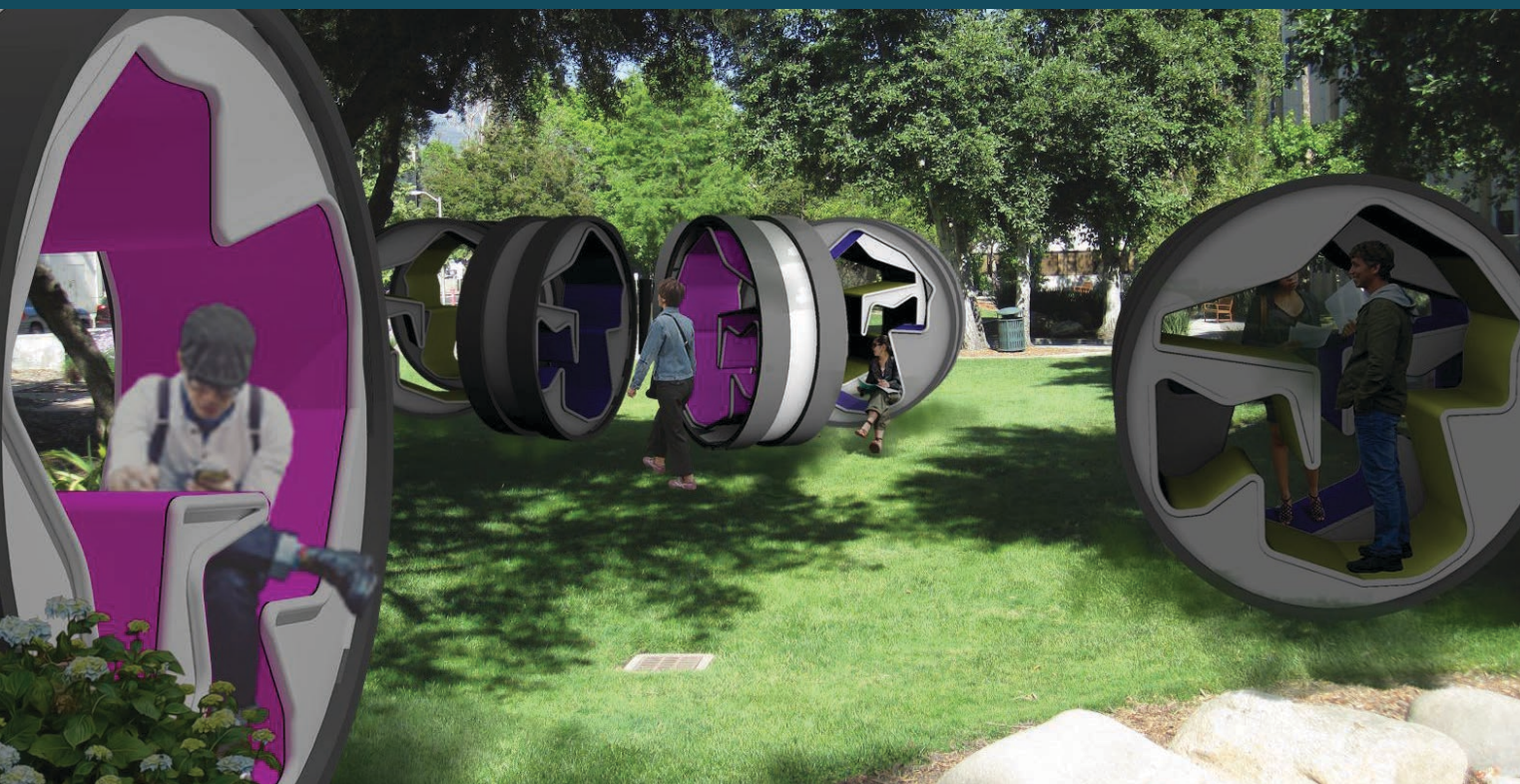
**“This new vehicle can encourage new ways of thinking about office terrain and most importantly challenge our basic assumptions about office ‘space’ in general.”**

Seen as an physical and spatial extension of the office worker, the pod can be customized by the user with preferred interior colors and finishes, personal photos, notes, etc. without affecting the professional setting of the larger office environment itself. Much like the rovers that came before it, PRODUCTIVITY can also provide new ways to interact with the environment--albeit a familiar one. Utilizing JPL's own rover wheels systems, this new vehicle can also encourage new ways of thinking about the office terrain, the nature of the office environment itself, and most importantly, challenge our basic assumptions about office 'space' in general.

## Office Layout







## ZERO GRAVITY COLLABORATION SPACE

Lead Designer: Marta Nowak, AN-ONYMOUS Studio

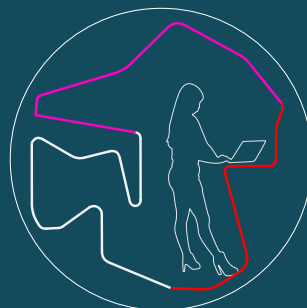
Zero Gravity Collaboration Space is an outdoor individual and collaborative work space organized within a large wheel. The project celebrates JPL's campus, set in a beautiful southern California landscape, and aims to extend the office environment into the outdoors and encourage collaboration and interaction in the outside environment. The space accommodates three main working conditions: standing, sitting, and laying. All these three configurations are placed within a continuous loop inside a wheel that can be moved and turned to provide the desired position. Conceived as a mobile unit and reduced to a single wheel, Zero Gravity Collaboration Space can be moved around, on hard or softscape, simply by pushing the wheel.



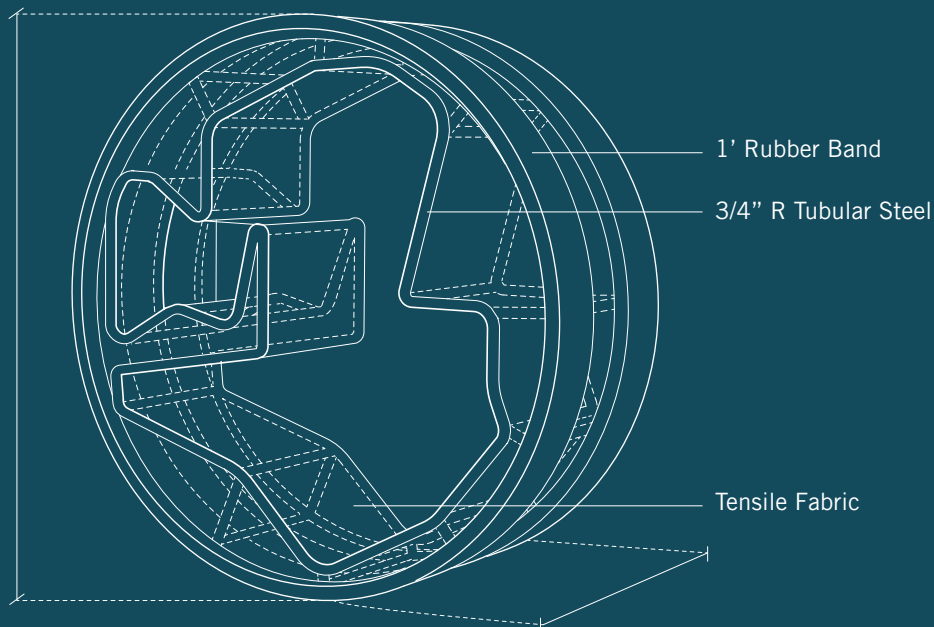
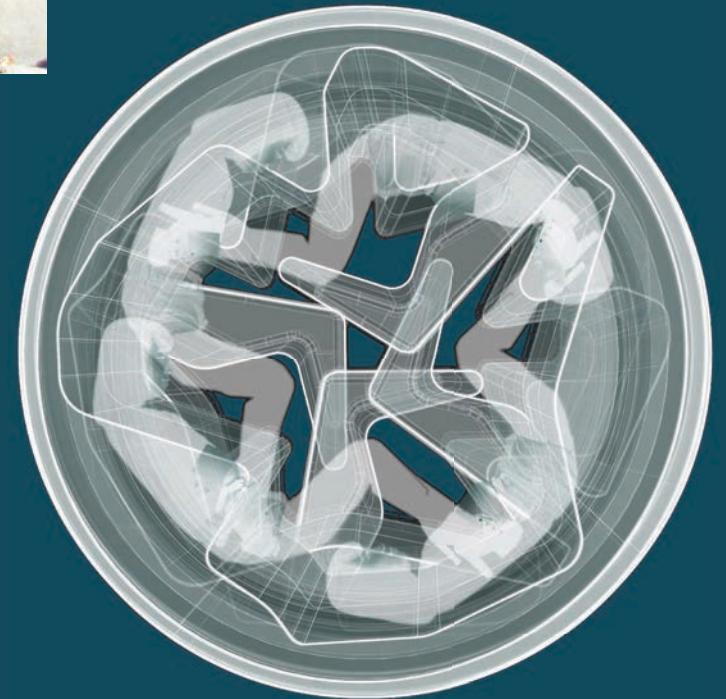
Relax



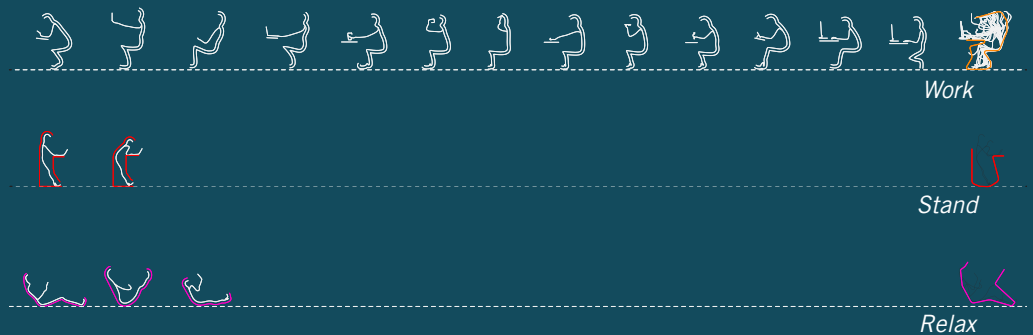
Work



Stand



### Deriving Curvature

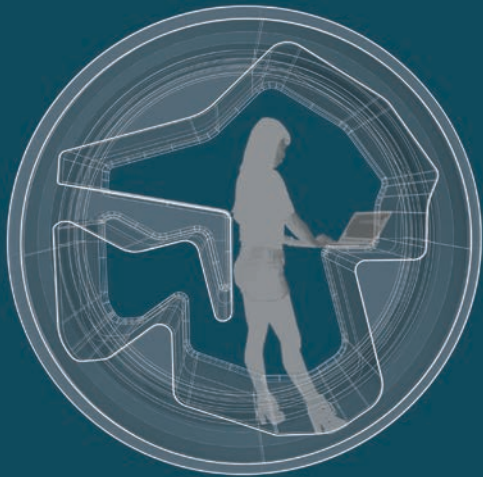




## Orientation and Function



1. Relaxing



2. Standing/Working



3. Sitting/Working

Made with a tubular steel frame and tensile fabric surfaces, the units are light enough to be moved around, but also strong and comfortable for different uses. The tensile fabrics would come in different vibrant playful colors that would activate and animate the green landscape they occupy. These units can also come together to form larger spaces, providing dynamic collaboration spaces where different individuals can work and interact with one another each in their own favorite position within their own personal space.



## Combining Curvature



Linear Arrangement



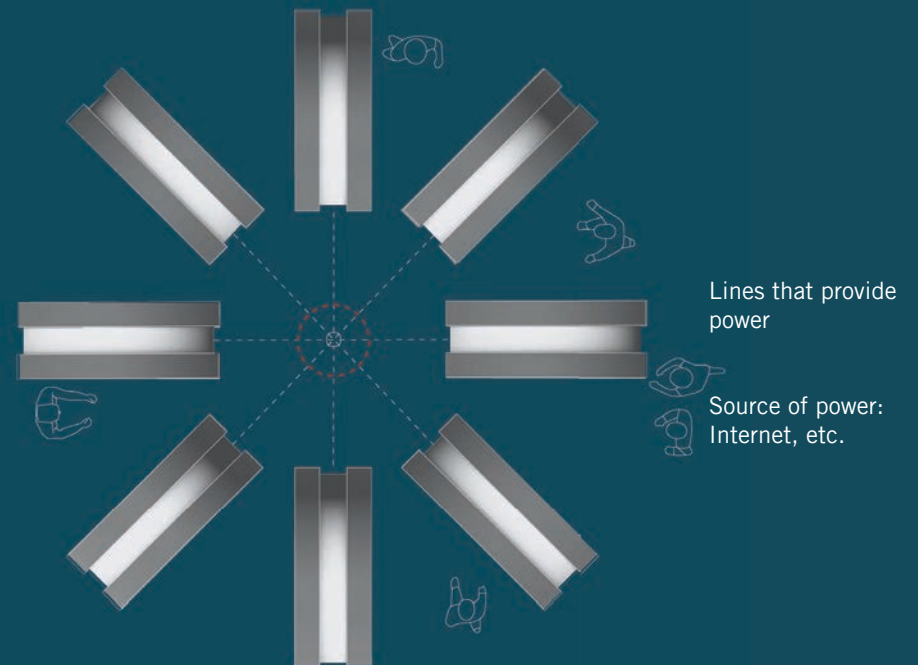
Combining Position 1



Combining Positions 1 and 2



## Power Station

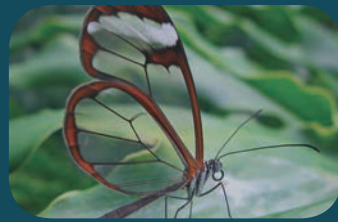




## LIGHT BOXES: REVISITING THE CUBICLE

Lead Designers: Jeff Burke & Randy Illum

An often cited design approach is to pave the cowpaths—that is, to observe what people do and build processes around those actions. Light Boxes provides a visually appealing and pragmatic experimental environment for understanding cubicle privacy preferences. It turns cubicle walls for the existing configuration of 303 into active surfaces that combine configurable privacy, internal and external display, and ambient display of information about each cubicle's occupant. Cubicle walls are replaced by privacy glass with patterns of opacity controlled by each user of a wall – in the case of a shared wall, the person on each side is given control over a unique and different pattern. Intermingled within these controllable patterns are embedded OLED, holographic, and e-ink displays that can replace rarely-updated posters (on the outside) and provide additional display surfaces (on the inside). To support the research function, we anticipate networking the controllers of each cube wall to record configuration data over time for later analysis.



Ref. 1

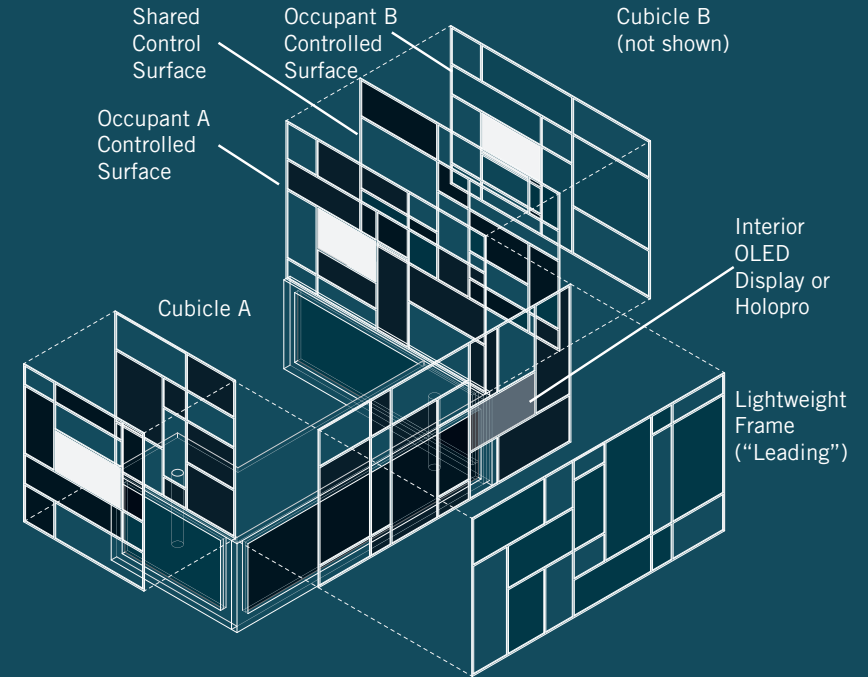


Ref. 2



Ref. 3

## Axonomic View



Interior View

Ref. 1 Greta Oto (Glasswing butterfly). [https://en.wikipedia.org/wiki/Greta\\_oto](https://en.wikipedia.org/wiki/Greta_oto).  
Ref. 2 & 3 From Corning's A Day Made of Glass 2. Capture from this article:  
<http://www.fastcodesign.com/1669170/corning-concept-video-please-use-more-glass-touchscreens-please>  
Original video: <https://www.youtube.com/watch?v=jZkHpNnXLBO>

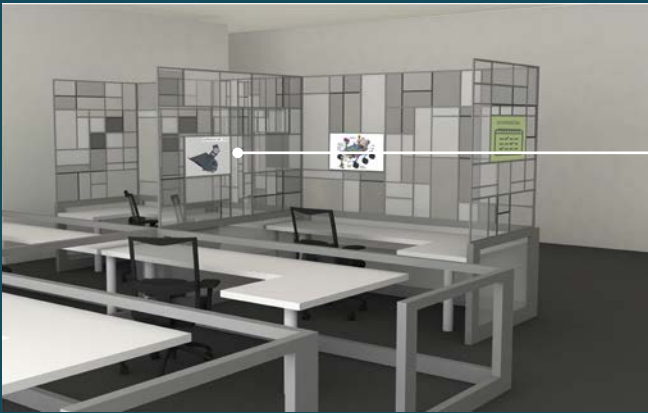




Ambient Information Display



OLED Display



E-ink Display

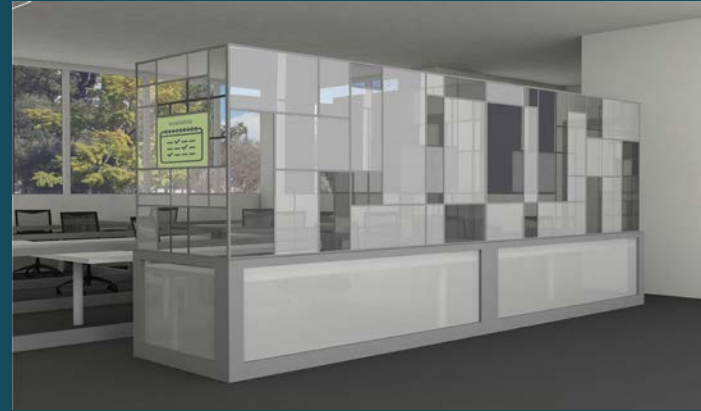


We envision in each space that a network-connected, Raspberry PI-class embedded controller manages the smart surfaces based on a variety of inputs: occupancy sensors, web-based user interface, power monitoring, display signal sensing, etc. OLED displays and holographic projection act as standard “extended desktops” for user’s laptops, while e-ink display surfaces are destinations for Airdrop-style local sharing of images and text and used for low-power, reflective ambient information displays.

## Opacity Configurations



All privacy screens switched off



Only low-opacity frames switched on.



Only high-opacity frames switched on.



Both low and high opacity frames switched on.





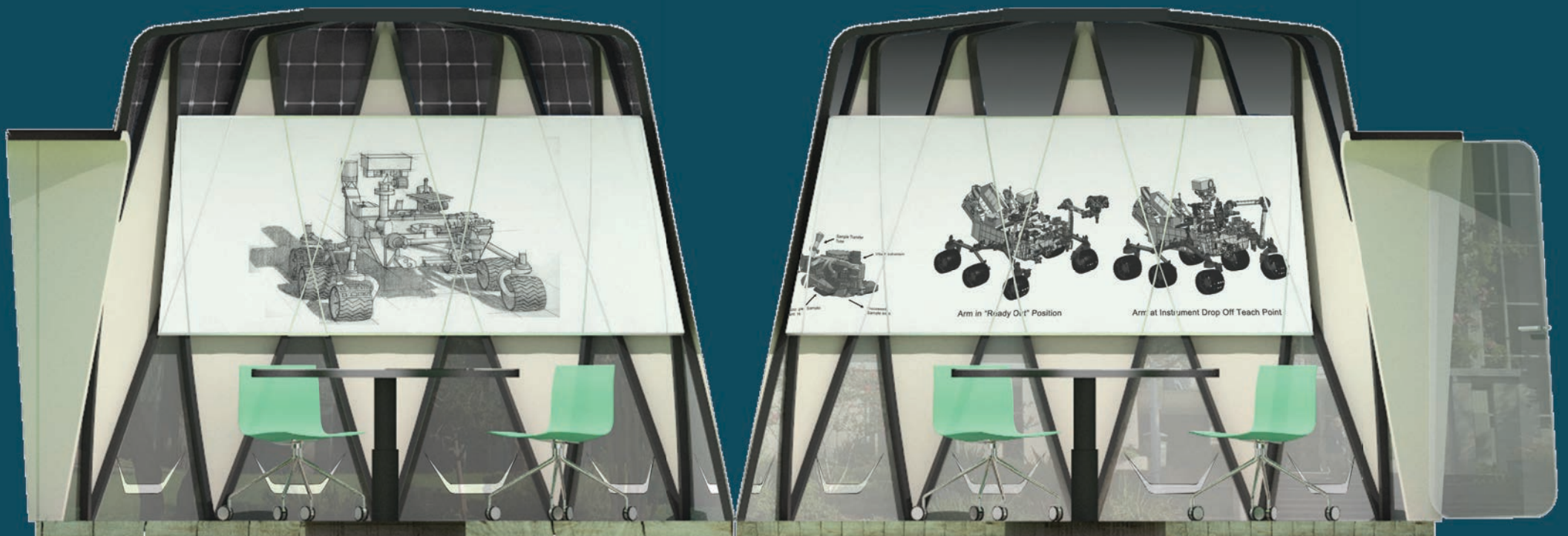


Evening View

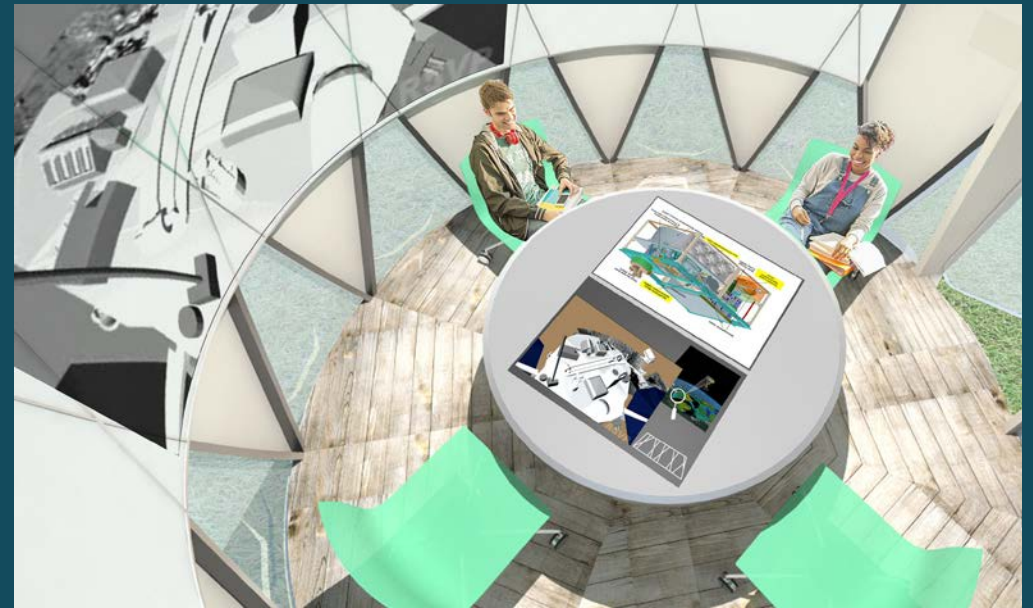
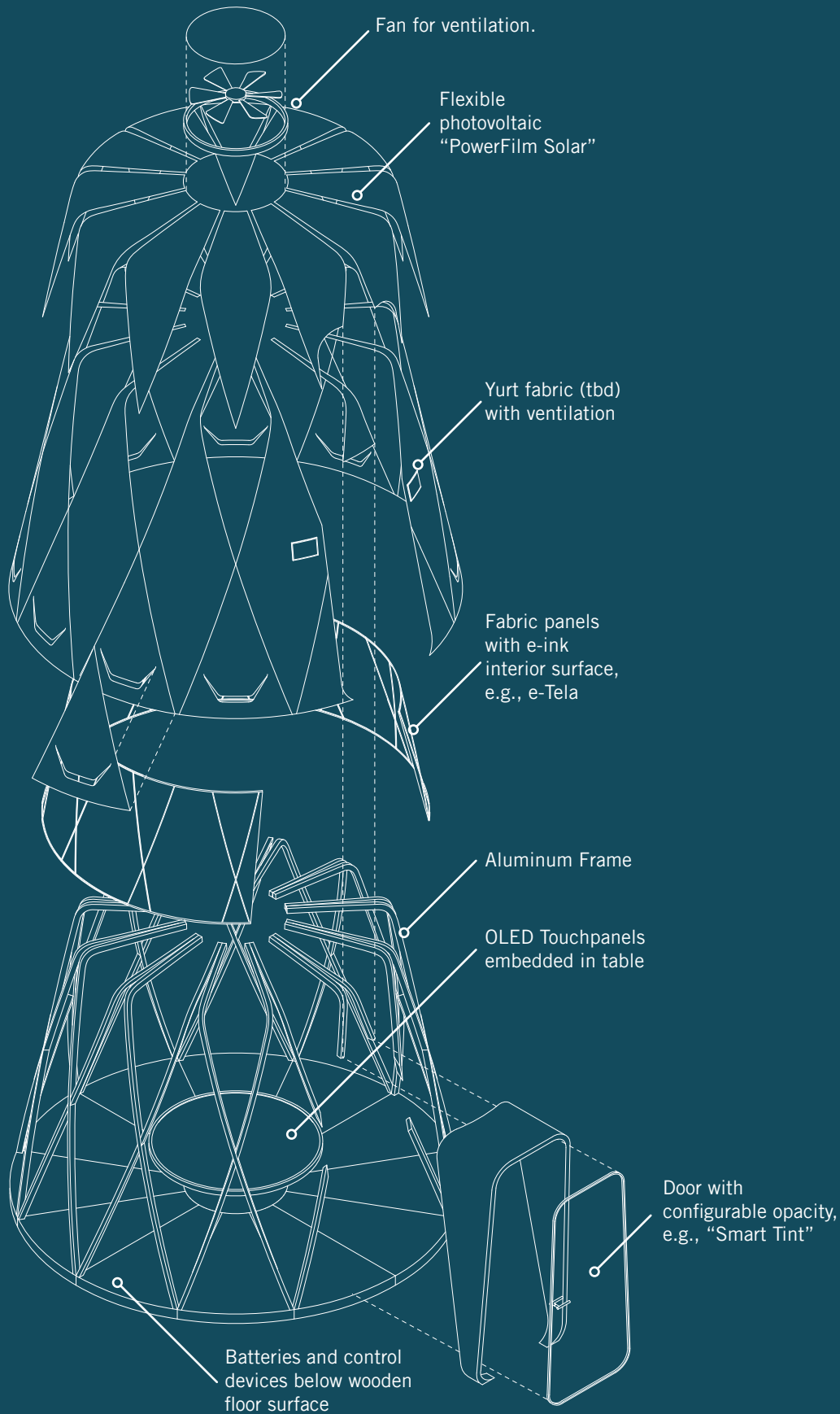
## TERRAFORMING JPL: THE ESCAPE YURT

Lead Designers: Jeff Burke & Randy Illium

A self-contained outdoor collaborative environment, the Escape Yurt is an expeditionary, pod-like space for ad hoc meetings, deep think time, and lunch. It is designed to function in the high ambient light and heat of Pasadena days, with a combination of active and passive cooling. Providing space for groups of four to six people, as currently sized, it offers interior e-ink display surfaces as “corkboards” for drawings and ideas and a central touch-screen display table for live images. On the outside, photovoltaics are used to charge batteries under the floor of the yurt, which power the high-efficiency display surfaces on the inside. Also on the exterior, e-ink is used to provide “ambient” information about occupancy, meeting type, and other metadata too be discovered. Multiple yurts with different seating height, table and screen configurations could be constructed to provide variety. Privacy film is used on some surfaces to provide configurable transparency to the outside world. The Escape Yurt is inspired by visions for inhabiting other planets, portable expeditionary spaces here on Earth, the potential and limitations of electronic ink, and self-reported dreams of more small group meeting spaces.







Ref. 1



Ref. 2



*OLED Touchpanels embedded in table*



*Fabric panels with e-ink interior surface, e.g., e-Tela*

Ref. 1 Yurt in Desert. See <https://flic.kr/p/5uomKx> for Creative Commons Licensing  
 Ref. 2 Sci-Fi Terraforming. Project Moon Colony - Concept. (n.d.).

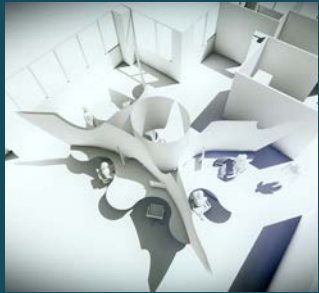




## E-VEIL

Lead Designer: Guvenc Ozel

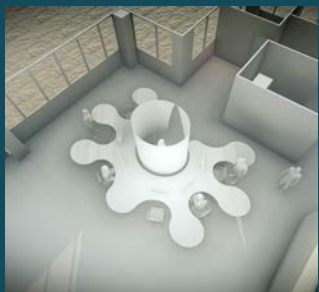
This indoor scheme aims to create a versatile preprogrammed variation of office territories controlled by the user. As contemporary workplace requires professionals to constantly change teams, work in collaboration as well as in isolation, the traditional layout of a personal cubicle as the organizing principle of office architecture is no longer practical. In order to face the demand for constant reconfiguration meanwhile allowing the worker to maintain an individual identity and privacy for personal work space, the EVeil proposes to create user controlled flexible clusters through the use of layered smart fabrics. At the center of the space, a room with a touch screen table serves as the anchor that fulfills both the challenge of individual isolation and small collaboration. The large continuous table can either be used for big group meetings or can be subdivided into individual work stations by reconfiguring the curtains as needed.



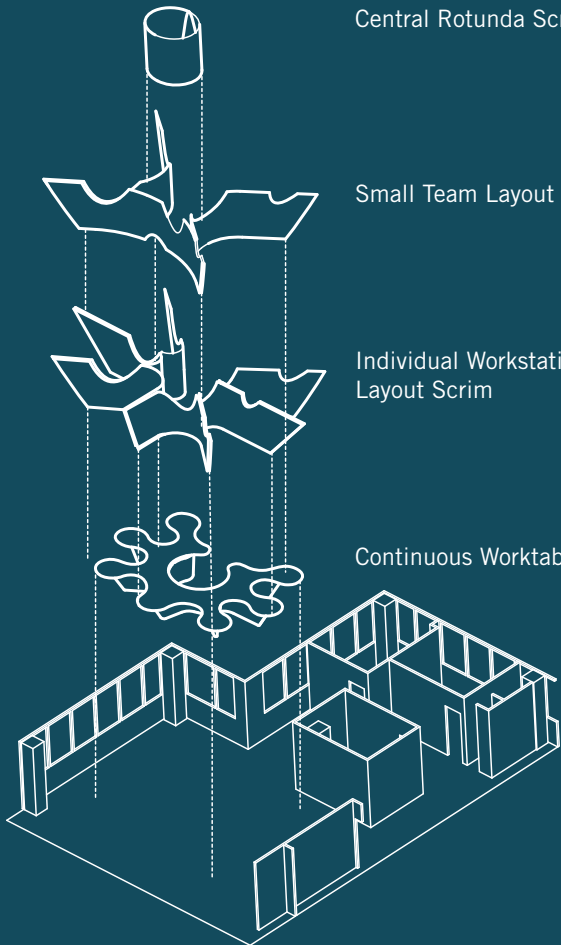
Central Rotunda Scrim



Small Team Layout Scrim



Individual Workstation Layout Scrim



Continuous Worktable





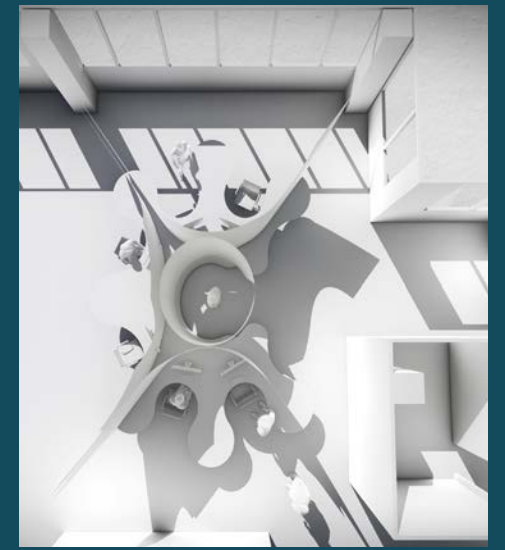
When the curtains are not present in the space, the continuous furniture piece allows for an introverted layout where the users can face each other. Through the help of stationary tracks, the furniture surface can be subdivided into 3 subgroups, or 6 individual workstation surfaces as needed. The translucency of the fabric can be adjusted in order to maintain visual privacy or control lighting. The fabric surface operates as a scrim for an array of permanently ceilingmounted projectors, allowing every partition to turn into a collaborative workboard when needed.



*Large Team Workstation Configuration*

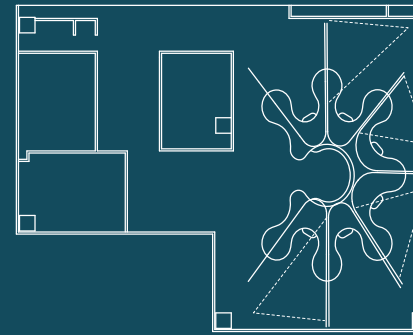


*Individual Workstation Configuration*

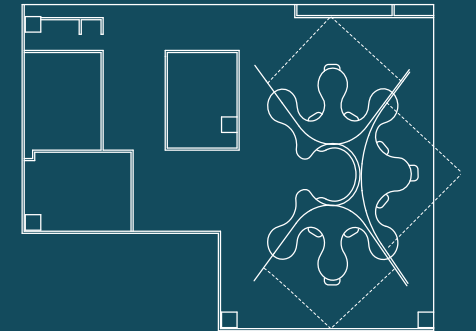


*Small Group Workstation Configuration*

**“In order to face the demand for constant reconfiguration while maintaining individual identity and privacy, the E-Veil proposes to create user controlled flexible clusters through the use of layered smart fabrics.”**



*Scrim and projection plan for individual workstation layout.*



*Scrim and projection plan for 3 people groups layout.*



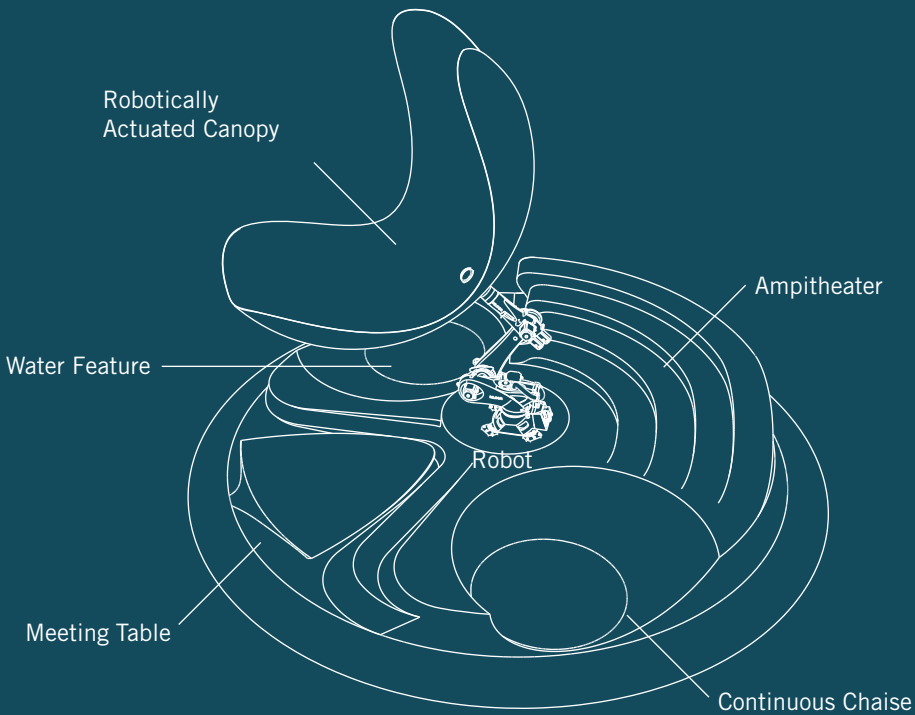
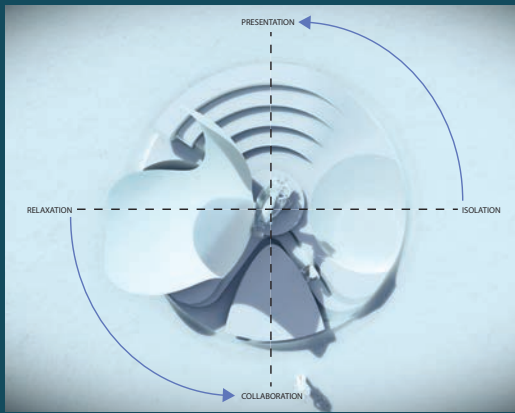


## ROBOTIC STONEHENGE

Lead Designer: Guvenc Ozel

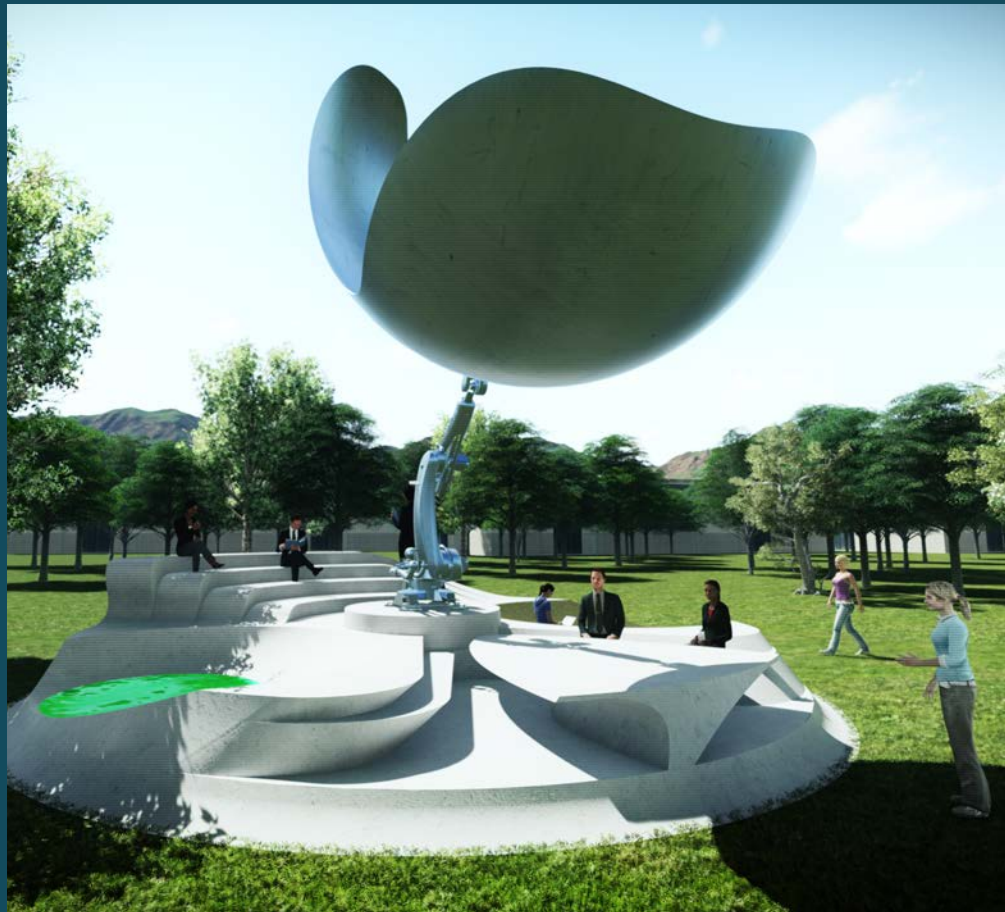
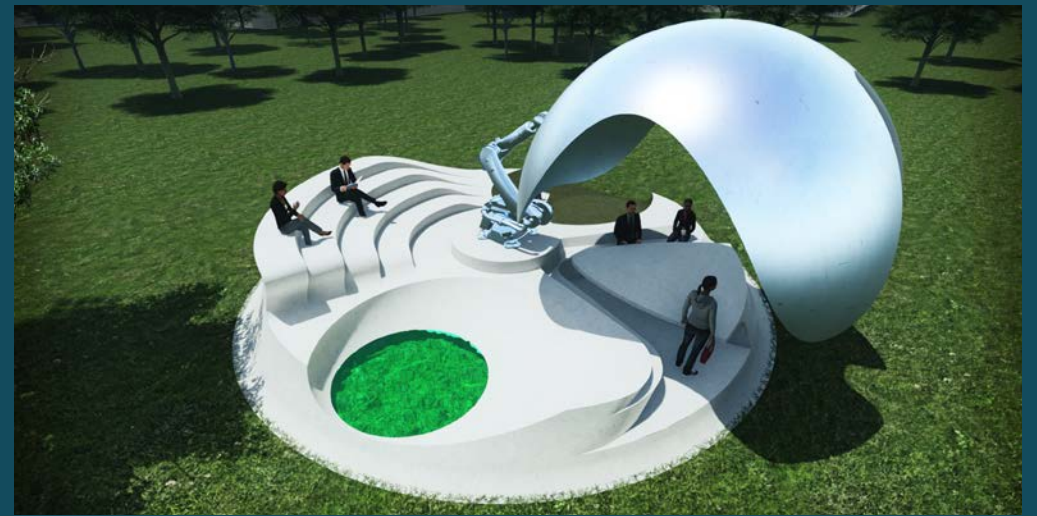
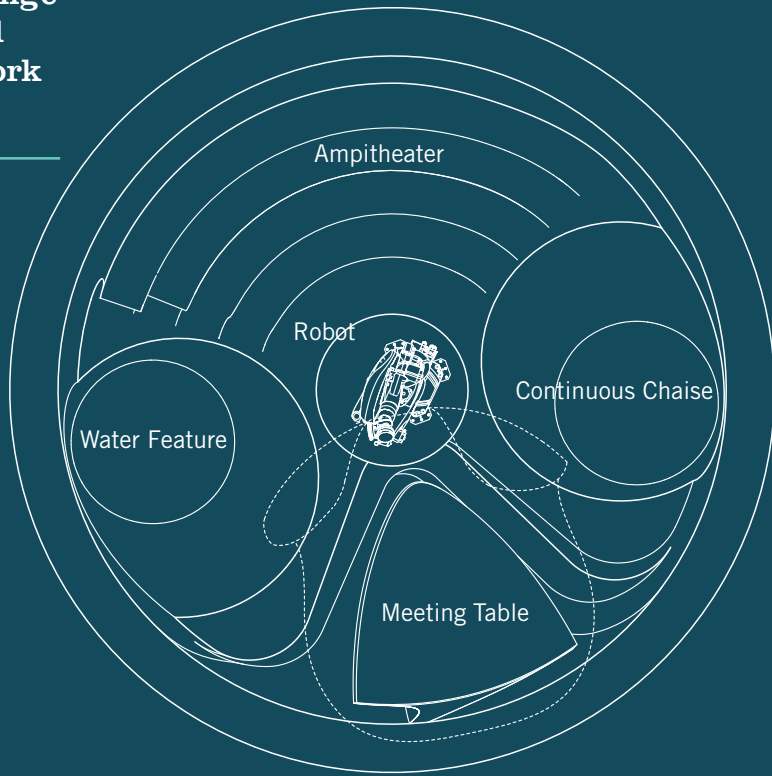
The outdoor scheme focuses on the interchangeable fluctuating relationship between work and leisure in a day. Digital media and extreme mobility reconstructs the relationship between what is considered to be labor and leisure. As work is no longer confined in the traditional business hours, a professional's day is no longer segmented between work time and downtime. As going in and out of focus is constantly in flux through direct access to emails, spreadsheets, colleagues and social media, productivity becomes a moving target. In this new work context of extreme mobility, intense focus and inevitable time wasting, new environments need to provide a multiplicity of contexts simultaneously in order to create potential scenarios of intense activity and spontaneous recreation.

### Work Type Configurations





“Robotic Stonehenge is a functional monument to work and leisure.”



Operating within the context of cyclical productivity, the Robotic Stonehenge is a functional monument to work and leisure. Organized in a circular form subdivided into 4 distinct activities, a robotically actuated canopy allows for ondemand transforming modes of privacy and shade. As the distinct zones of isolated focus, hedonistic relaxation, public presentation and team collaboration is formally conjoined, the probability to achieve mental zones of productivity is enhanced.



## KEY FINDINGS AND RECOMMENDATIONS

### Workplace Trends and Observations

#### 1 'Creative Offices' are Often Standard Offices

While the open floor plan office grows increasingly common because of its economic efficiency and branded identity as “creative” space, closer investigation shows that these offices are neither new nor distinctive. Many creative office developments have simply re-packaged conventional office buildings with a series of superficial design characteristics such as exposed brick walls and open ductwork overhead, along with an array of amenities ranging from kitchens to recreation lounges. While some increase the variety of collaborative spaces and introduce concepts such as flexible work hours, few adopt permanent changes in the organization or structure of the building itself. Even when it comes to office furniture, desk configurations—from group clusters to mobile hot-desks—have been showcased as inventive office solutions yet historical examples suggest they are hardly new (See Figure 15).<sup>27</sup> As it turns out, the creative office is not all that creative.



**Figure 15:** CBRE Los Angeles HQ (above) and Avery Dennison Los Angeles HQ (below)

#### 2 Inefficient Use of Space is Prevalent

Across all work sectors, a lack of space continues to be one of the most common and significant concerns for organizations. Upon closer investigation, the problem is more likely to be an *inefficient use* of space than an *inadequate amount* of space.<sup>28</sup> While some offices were packed with employees, others would be empty for most of the day. In cubicle farms, it was not uncommon to find half unoccupied. Moreover, it was often stated that conference rooms or huddle spaces (small collaborative workspaces for 3-6 people) were difficult to reserve, yet such collaboration areas go unused for long periods of time. Other studies indicate that this is not a unique situation. Strategy Plus, a consulting and design firm, recently estimated that office utilization peaks at an occupancy rate of 42% on any given day.<sup>29</sup>

“...office utilization peaks at an occupancy rate of 42% on any given day”

#### 3 Inefficient Design Creates Inefficient Communication

Inefficient design frequently leads to the distribution of project teams or employees across an office floor, building, or even a campus. As a result, this creates a domino-like effect of negative consequences throughout the entire organization. One of the most significant of these consequences is that of inefficient communication. When physical barriers separate management from their

“...technological advances and global connectivity have changed where and when we are able to work”

staff, it prevents opportunities for important face-to-face conversations leaving these individuals to communicate primarily through electronic means of communication. While effective electronic communication is a necessity in the contemporary workplace, employees who experience long stretches of time without seeing their colleagues can feel an increased sense of detachment from their work-unit at large.<sup>30</sup>

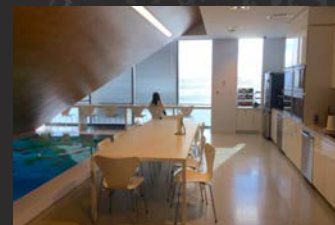
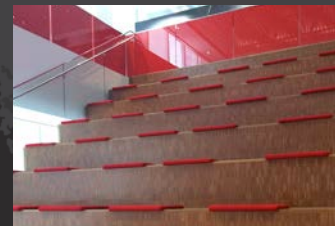
#### 4 The Office is Everywhere – Physically and Temporally

Perhaps one of the most significant workplace trends of the past decade is that technological advances and global connectivity have changed where and when we are able to work. As described by cityLAB and Gensler: “Where office work was once conducted in office buildings equipped with almost tailor-made technologies, those technologies have been miniaturized and have become portable. Moving from infrastructure to atmosphere, the territory claimed by the office and its work has encroached upon the airport, café, public park and plaza, cinema, the automobile, and –most poignantly— the home where the home office, cell phone, and laptop colonize a once revered (now denigrated) domestic sphere.”<sup>31</sup>

### Workplace Design Recommendations

#### 1 Encourage Active Use of All Spaces in Building

In order to combat inefficient uses of space in the workplace, organizations must re-examine the spatial organization and active usage of all spaces available, considering all spaces as potential valuable workspaces for their employees. In order to best achieve this, dual usage, multi-functional, and casual spaces should be given a high priority. This provides employees with the most flexibility in occupying several workspaces throughout the day according to their specific needs at any given time.



**Figure 16:** Multi-functional Spaces in Avery Dennison's Los Angeles HQ

#### 2 When Designing Collaborative Workspaces, Variety is Key

While assigned personal workspaces are likely to be more conducive for individual work tasks, it remains challenging for employees to access appropriate collaborative workspaces that accommodate multiple group sizes. While conference rooms were once the go-to space to accommodate group work, workers today often find these spaces too large or too formal to perform their work most effectively. Instead, providing a variety of spaces, particularly mid-size spaces (accommodating groups of 6-8 people) is ideal. Additionally, it is important to note that scheduled meetings or group working sessions are not the only times collaboration occurs. Many studies emphasize the importance of facilitating opportunities for “collisions”, or informal chance encounters or interactions among employees.



These encounters are said to provide the best opportunities for creative thought and idea sharing, improving overall worker performance.<sup>32</sup> To this end, likely spaces of encounter such as elevator lobbies, circulation spaces, and building entries can be designed accordingly with casual seating, informal conversation areas, power outlets, Wi-Fi, daylight, and so on.

### 3 Privacy is Just as Essential to Performance as Transparency

Access to privacy is also critical in order for employees to accomplish focused work. Traditionally, researchers and architects have defined privacy at work in relation to the employees' physical surroundings: territorial privacy, acoustical privacy, and visual privacy.<sup>33</sup> As more employees make the transition to open floor workspaces, it will be especially important for designers to consider these baseline needs in addition to new dimensions of privacy such as information control (the ability to control and protect access to personal information) and stimulation control (avoiding distractions caused by constant communication streams such as email, calendar alerts, etc.) The design of open bullpen workspaces should include nearby spaces that offer degrees of privacy, such as outdoor space, temporary enclosed workspace, and temporary or casual workspace outside one's immediate setting.

### 4 Capitalize on Outdoor Space

Current technology allows for the outdoors to act as a viable, productive workspace. Aside from providing alternate areas for individuals or small groups to conduct work, larger gathering spaces can also increase the potential for employees from multiple departments to interact. Employees across all job sectors express an overall desire for access to outdoor amenities, claiming that they are an excellent place to concentrate away from the office or to relax. In order to be productive outdoors, there are four requirements: access to Wi-Fi, electrical outlets for charging, seating, and shade (See Figure 18). In temperate climates, organizations that ensure these are present in outdoor areas can assume high levels of use.



Figure 18: Outdoor seating Area at Sony Pictures Entertainment Studios

**“Technology today allows employees to be extremely mobile and flexible in where they accomplish work in the office.”**



Figure 17: Privacy Pods in Google's Zürich Office

### 5 Balance High-Tech Flexibility and Low-Tech Hackability

Employees have different environmental preferences for accomplishing their work tasks. While some prefer to work in open areas with ambient noise, others may work best in enclosed surroundings with little visual distraction. In order to accommodate these varied preferences, workspaces (both for individuals and small groups) should be designed to balance high-tech flexibility and low-tech “hackability.” Technology today allows employees to be extremely mobile and flexible in where they accomplish work in the office. Modern furnishing solutions such as open collaboration bench-desks provide spaces for more fluid work. Yet older office furniture systems (such as standardized cubicles) are often located in retrofitted spaces making the furnishings and layouts very brittle and difficult to customize. Efforts to improve these systems should place an emphasis on allowing for customization or “hackability.” Small details such as control over lighting options, the ability to shield one's computer screen from view, and adjustable wall or desk height levels provide workers with an increased sense of ownership, allow for better use of desks and equipment, and improve overall satisfaction.<sup>34</sup>

### 6 Create Spontaneous, Not Staged, Outlets for Leisure

In the contemporary office, it is increasingly common to find informal gathering spaces such as lounges, game rooms, and cafes. Once seen as contradictory to productive labor, leisure amenities have become a popular means for organizations to promote creative thought and camaraderie between co-workers. Interestingly enough, designers must be cautious of the inadvertent negativities that can arise from an overly prescribed recreation area. When leisure activities are definitively programmed, such as a dedicated room solely for video games or solely for playing Ping-Pong, these spaces often go unused (where employees might be seen as “disengaged”). Instead, use increases when leisure areas or programs are created casually as when part of other spaces like circulation or entryways, or are adapted to employee activity that already exists.

### 7 Use Technology to Give Buildings Agency

The future potential of intelligent workplaces suggests that technology can “inscribe buildings with a sense of agency,” which holds promise for meaningfully connecting workers to one another and for exposing work systems or product information to employees or the public.<sup>35</sup> Walls can become digital screens that display ongoing projects or collective workspace for groups to share screens. Real-time sensor data can regulate lighting systems or can provide building occupancy information to locate vacant desks, conference rooms, or collaboration areas. By recognizing the potential in otherwise inert physical properties of buildings, organizations are increasingly able to embed sophisticated technologies and increase efficiencies, public and employee awareness, and workplace opportunities (See Figure 19).<sup>36</sup>



Figure 19: IBM Software Executive Briefing Center in Rome, Italy provides tools to explore IBM's technology in an interactive atmosphere.



## ACKNOWLEDGEMENTS

Thank you to the following individuals, whose contributions through interviews, workshops, assistance, or as advisors have informed this book: Muhi Bahri, Aaron Cayer, Ryan Conroy, Michael Cox, Jordan Evans, Shawn Gehle, Aaron Gensler, Shawn Goodman, Christina Gray, Rob Jernigan, Rebecca Nash, Gabriel Rangel, Kimberly Serrano, Emmanuel Soriano, Benjamin Thoma, Sergio Valdez, and Li Wen. We are particularly grateful to James Rinaldi and Tomas Soderstrom, our partners at Jet Propulsion Laboratory. Their creative insight, abundant enthusiasm, and generous support provided the momentum behind our research and design efforts.

- Figure 9 “Google Campus” by Paul Miller. Licensed under a Creative Commons Attribution 2.0 Generic (CC-BY2.0). Accessed 12 May 2016. <https://www.flickr.com/photos/paulmiller/7795562112>
- Figure 10 Courtesy of Marta Nowak, AN-ONYMOUS Studio
- Figure 11 Courtesy of Dana Cuff, cityLAB-UCLA
- Figure 12 Photographer: Ezekiel Reed, cityLAB-UCLA
- Figure 13 Photographer: Ben Varela, Jet Propulsion Laboratory
- Figure 14 Photographer: Carla Salehian, cityLAB-UCLA
- Figure 15 Photographers: Carla Salehian and Yang Yang, cityLAB-UCLA
- Figure 16 Photographer: Carla Salehian, cityLAB-UCLA
- Figure 17 “Google office in Zürich” by Marcin Wichary. Licensed under a Creative Commons Attribution 2.0 Generic (CC-BY2.0). Accessed 12 May 2016. <https://www.flickr.com/photos/mwichary/5073760175>
- Figure 18 Photographer: Carla Salehian, cityLAB-UCLA
- Figure 19 IBM Software Executive Briefing Center, Rome, Italy. Photographer: Santi Caleca
- Background Images Photographers: Carla Salehian, Aaron Cayer, and Yang Yang

## PHOTO CREDITS AND PERMISSIONS

- Cover Images Courtesy of Marta Nowak, AN-ONYMOUS Studio
- Figure 1 Courtesy of Marta Nowak, AN-ONYMOUS Studio
- Figure 2 (top) “Norman Foster, Apple Campus 2 Rendering” by Forgemind ArchiMedia Licensed under a Creative Commons Attribution 2.0 Generic (CC-BY2.0). Accessed 12 May 2016. <https://www.flickr.com/photos/eager/7149243527>
- Figure 2 (bottom) “Norman Foster, Apple Campus 2 Rendering” by Forgemind ArchiMedia Licensed under a Creative Commons Attribution 2.0 Generic (CC-BY2.0). Accessed 12 May 2016. <https://www.flickr.com/photos/eager/6056081100>
- Figure 3 “Frank Gehry, FACEBOOK West Campus model” by Forgemind ArchiMedia Licensed under a Creative Commons Attribution 2.0 Generic (CC-BY2.0). Accessed 12 May 2016. <https://www.flickr.com/photos/eager/7855929632>
- Figure 4 The Barbarian Group, New York, 2014 (Permission Requested) Accessed 12 July 2016. [http://www.clivewilkinson.com/portfolio\\_page/the-barbarian-group/](http://www.clivewilkinson.com/portfolio_page/the-barbarian-group/)
- Figure 5 “Walk (1886)” by Eadweard Muybridge. Licensed under a Creative Commons Attribution 4.0 International (CC-BY4.0). Accessed 14 July 2016. <https://commons.wikimedia.org>
- Figure 6 “Larkin Administration Building, Buffalo, NY. c. 1906” (Permission Requested) Source: Private collections and Buffalo & Erie County Historical Society Accessed 12 July 2016. [http://www.officemuseum.com/photo\\_gallery\\_1900s\\_ii.htm](http://www.officemuseum.com/photo_gallery_1900s_ii.htm)
- Figure 7 “Evolution of the Spatial Organization of the Workplace” Traced from: Abalos, Iñaki, and Juan Herreros. *Tower and Office: From Modernist Theory to Contemporary Practice*. Cambridge, MA: MIT Press, 2003. 212-15.
- Figure 8 “HSBC Headquarters” by Tom Mascardo. Licensed under a Creative Commons Attribution 2.0 Generic (CC-BY2.0). Accessed 12 July 2016. <https://www.flickr.com/photos/mascardo3/5671305255/in/photolist-9D9Vt6>



## NOTES

<sup>1</sup> Brennan, Aoife, Jasdeep S. Chugh, and Theresa Kline. "Traditional versus open office design: A longitudinal field study." *Environment and Behavior* 34.3 (2002): 279-299.

<sup>2</sup> Ibid.

<sup>3</sup> Liebl, Andreas, et al. "Combined effects of acoustic and visual distraction on cognitive performance and well-being." *Applied Ergonomics* 43.2 (2012): 424-434.

<sup>4</sup> Congdon, Christine, Donna Flynn, and Melanie Redman. "Balancing 'We' and 'Me' (Digest Summary)." *Harvard Business Review* 92.10 (2014): 51-57.

<sup>5</sup> Two publications are available online: [http://citylab.aud.ucla.edu/files/publications/Future\\_of\\_Work\\_How\\_We\\_Got\\_Here.pdf](http://citylab.aud.ucla.edu/files/publications/Future_of_Work_How_We_Got_Here.pdf); [http://bihome.ucla.edu/wp-content/uploads/2015/07/cityLAB-Gensler\\_Year-2-Book\\_low.pdf](http://bihome.ucla.edu/wp-content/uploads/2015/07/cityLAB-Gensler_Year-2-Book_low.pdf). A related article: Cayer, A and D. Cuff. "Unfit: Los Angeles and the Empty Glass Box." *Thresholds* 44 *Workspace*. Cambridge: MIT Press, 2016. 43-58.

<sup>6</sup> The 2015 research report is available at <http://citylab.aud.ucla.edu/files/isa/ITWorkplaceFuturesSpreads.pdf>

<sup>7</sup> Kellaway, Lucy. "The decline of privacy in open-plan offices." *BBC News*, 2013. Retrieved from <http://www.bbc.com/news/magazine-23502251>

<sup>8</sup> Martin, Reinhold. *The Organizational Complex: Architecture, Media and Corporate Space*. MIT Press, 2003.

<sup>9</sup> Brookes, Malcolm J. and Archie Kaplan. "The office environment: Space planning and affective behavior." *Human Factors: The Journal of the Human Factors and Ergonomics Society* 14.5 (1972): 373-391.

<sup>10</sup> Ábalos, Iñaki and Juan Herreros. "The Evolution of Space Planning in the Workplace." *Tower and Office: From Modernist Theory to Contemporary Practice*. Cambridge, MA: MIT Press, 2005.

<sup>11</sup> Ibid.

<sup>12</sup> Hedge, Alan. "The Open-Plan Office: A systematic investigation of employee reactions to their work environment." *Environment and Behavior* 14.5 (1982): 519-542.

<sup>13</sup> Brennan, Aoife, Jasdeep S. Chugh, and Theresa Kline. "Traditional versus open office design: A longitudinal field study." *Environment and Behavior* 34.3 (2002): 279-299.

<sup>14</sup> Liebl, Andreas, et al. "Combined effects of acoustic and visual distraction on cognitive performance and well-being." *Applied Ergonomics* 43.2 (2012): 424-434.

<sup>15</sup> Danelsson, C. Bodin. "Differences in perception of noise and privacy in different office types." *Proceedings of Acoustics 08 Paris* (2008): 531-536.

<sup>16</sup> Banbury, Simon and Dianne C. Berry. "Disruption of office-related tasks by speech and office noise." *British Journal of Psychology* 89.3 (1998): 499-517.

<sup>17</sup> Kupritz, Virginia. "Aging worker perceptions about design and privacy needs for work." *Journal of Architectural and Planning Research* (2001): 13-22.

<sup>18</sup> Lee, So Young and Jay L. Brand. "Effects of control over office workspace on perceptions of the work environment and work outcomes." *Journal of Environmental Psychology* 25.3 (2005): 323-333.

<sup>19</sup> Ibid.

<sup>20</sup> Piazza, Charles F. "24/7 Workplace Connectivity: A hidden ethical dilemma." *The New York Times* (2004).

<sup>21</sup> Olson, Margrethe H. "Remote office work: Changing work patterns in space and time." *Communications of the ACM* 26.3 (1983): 182-187.

<sup>22</sup> Westfall, Ralph D. "Does telecommuting really increase productivity?" *Communications of the ACM* 47.8 (2004): 93-96.

<sup>23</sup> Ibid.

<sup>24</sup> Olson, Margrethe H. "Remote office work: Changing work patterns in space and time." *Communications of the ACM* 26.3 (1983): 182-187.

<sup>25</sup> Cuff, Dana, Carla Salehian, and Aaron Cayer. *Information Technology Workplace Futures: A pilot study for UCLA IS Associates*, Los Angeles: cityLAB-UCLA, 2015.

<sup>26</sup> Caltech. *Launch Points: The Ultimate JPL Walkabout*, 2015. Retrieved from <https://eands.caltech.edu/2015/03/23/launch-points-the-ultimate-jpl-walkabout/>

<sup>27</sup> cityLAB and Gensler. *The Future of Office Work: Rewiring Work*, Los Angeles: Gensler, 2014.

<sup>28</sup> This was discovered in both our work with JPL and with I.S. Associates.

<sup>29</sup> Waber, Ben, Jennifer Magnolfi, and Greg Lindsay. "Workspaces that Move People." *Harvard Business Review* 92.10 (2014): 68-77.

<sup>30</sup> Cuff, Dana, Carla Salehian, and Aaron Cayer. *Information Technology Workplace Futures: A pilot study for UCLA IS Associates*, Los Angeles: cityLAB-UCLA, 2015.

<sup>31</sup> cityLAB and Gensler. *The Future of Office Work: How We Got Here*, Los Angeles: Gensler, 2013.

<sup>32</sup> Waber, Ben, Jennifer Magnolfi, and Greg Lindsay. "Workspaces that Move People." *Harvard Business Review* 92.10 (2014): 68-77.

<sup>33</sup> Brennan, Aoife, Jasdeep S. Chugh, and Theresa Kline. "Traditional versus open office design: A longitudinal field study." *Environment and Behavior* 34.3 (2002): 279-299.

<sup>34</sup> Cuff, Dana, Carla Salehian, and Aaron Cayer. *Information Technology Workplace Futures: A pilot study for UCLA IS Associates*, Los Angeles: cityLAB-UCLA, 2015.

<sup>35</sup> cityLAB and Gensler. *The Future of Office Work: Rewiring Work*, Los Angeles: Gensler, 2014.

<sup>36</sup> Cuff, Dana, Carla Salehian, and Aaron Cayer. *Information Technology Workplace Futures: A pilot study for UCLA IS Associates*, Los Angeles: cityLAB-UCLA, 2015.



