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Vishaan Chakrabarti  
Holliday Professor,  
Real Estate Development Program,  
Columbia University  
Director, CURE

Jesse M. Keenan  
Research Director, CURE.

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INTRODUCTION

The goal of this paper is to lay the conceptual groundwork for the Building the Digital City research initiative by providing a stimulating, challenging and provocative series of propositions that can be explored over the course of the initiative.

Our starting point is the fundamental sea change in information technology and patterns of working, living and learning that are resetting expectations for what developers, planners, architects and city policy makers should be providing for workspaces and workplaces within commercial buildings in our cities. We explore how these ideas apply specifically in the context of New York City (NYC) and in relationship to the tech sector in particular.

The tech sector plays a unique role in these changes of patterns of work and in the new demands for types of working spaces and buildings. The enormous and revolutionary changes in how we work and use space have been pioneered in and advanced by the tech sector, which has for a long time led the way in the use of its own products and software to reimagine how and where work happens and in reinventing what workplaces, buildings and the urban environment should be providing for users.

In the case of NYC, there is an exciting synergy between the innovative products and applications being developed by the tech sector which are geared to urban users and consumers and the city’s dense collaborative working culture. Furthermore, the tech sector in New York exemplifies and prefigures many of the attributes of emerging workplace design, planning and place making that developers, architects and designers will need to respond to in the future. In this sense, we explore the double role that the tech sector plays: (i) as an instigator of the tools and software that have enabled new ways of working, living and using space, and; (ii) as a critical demander or consumer of workspaces and buildings in which the sector can most successfully build knowledge and create products.
The tech sector in NYC faces new problems associated with its own accelerated and momentous growth. Much of the growth in the sector has been accommodated successfully in relatively inexpensive co-working, incubator and accelerator spaces—many at least partly funded by the city. But, as the sector matures and graduates out of these spaces, it is now competing for space with other sectors that have recently emerged from recession. In addition, the sector is now competing for Class B and C office space against the conversion of much of this stock of real estate into residential and retail uses. These cyclical growth challenges demand more creative solutions within the existing real estate paradigm to take advantage of the new ways of working and using space that the information tech sector itself has both pioneered and enabled.

This paper outlines a high level history of the ways in which information technology has revolutionized ways of working to such an extent that we can make a case for a paradigm shift in the real estate development models used for accommodating these kinds of work activities. We conclude with a series of propositions that will set an agenda for change to stimulate discussion over the course of the research initiative. This paper is supported by a series of short case studies of end users (e.g., corporate organizations) new kinds of workplaces, as well as case studies of urban environments that prefigure the directions of change in development. The case studies are intended to share some of the innovations already apparent in the work of the tech sector and in its workplaces in NYC. We also share some wider international examples of innovation where we believe these offer valuable insights for the future development models within the context of NYC.

The purpose of the paper is to distill what we learn from this history, these trends and these case studies, and to inform our thinking for new directions for real estate development. The paper will lay the ground work for a review and discussion of alternative approaches and models for what we think of as re-mixed ‘space/development types’ based on new patterns of use, forms of technology and new ways of working, living and learning, that impact what buildings and cities should be providing for users.

The conclusions of the paper present a series of propositions to stimulate ideas for the next generation of workspace and real estate development for the tech sector in NYC. The propositions are intended to provoke discussion and to challenge inherited assumptions. Notably, several of the propositions concern not only the physical characteristics of space and buildings to suit the needs of the tech sector, but also address the forms of procurement, and the processes of acquiring and using space which are being revolutionized by some of the very technologies and applications being developed by the tech sector in NYC.

THEORIES OF WORK, TECHNOLOGY AND THE CITY

In 1995, William Mitchell noted his discovery that he no longer had to go to work. In other words, work now came to him via networks of information technology: he could use a laptop or a cell phone to get much of his work done from anywhere. This personal discovery led Mitchell to reimagine architecture and urbanism in the context of a revolution of digital communications. He argued that the civic structures and spatial arrangement of the digital era would transform how we design and use space and buildings:

_The net will play as crucial a role in the twenty-first century urbanity as the centrally located, spatially bounded, architecturally celebrated agora did (according to Aristotle’s Politics in the life of the Greek polis)_. The network is displacing, subverting, and redefining notions of place and urban life. Digital information, he argues, acts as a solvent, decomposing traditional building types resulting in a ‘recombinant’ architecture. Old correspondences between buildings and institutions no longer hold and the representational role of architecture is challenged.

_Post-sedentary space_

The result is a transformation in how we conceptualize and use space. We are living and working in what Mitchell in a later work called “post sedentary space.” With the development of wireless networks, laptops, and what were to become smart phones, it became possible to work across ‘continuous fields of presence.’ These fields of presence extend the locations of work beyond the office and the building, into the outdoors and public spaces. They loosen place-to-place contiguity requirements. They fundamentally alter how the resources of space are used over time.

The idea of post-sedentary space suggests how technology and networks can now be used to support mobile working across many different kinds of environments, some of which would not have been thought of as workplaces in the past. The changes in the relationships between work, technology and space have accelerated as a result of the impact of advances in digital, information technology and telecommunications.
The desktop computer and the workstation

With the innovation of the personal computer on the desktop becoming common after 1980, staff went to the office to work on computers connected to servers with databases of information. The cubicle form of workstation became a fixed point of connection to a server. The purpose of the office became less about staff interacting with others in a physical environment, as it became more focused on how individuals obtained digital information while sitting at the workstation. The early desktop computers acted as tethers of people to their 'workstations'—the word itself a revealing indication of the fixity of work and space. This cubicle landscape was caricatured adroitly in the Dilbert cartoons.

The fixed positioning of work at the open planned cubicle with a desktop computer, particularly in North America in the 1980s, was in contrast to the many other interesting, more dynamic and cybernetic office layouts that had been designed in the 1960s and 1970s as 'Bureaulandschaft' landscape offices in Germany or as the popular Action Office of Herman Miller created by Robert Propst in 1964 in the United States. These earlier office designs in both North America and Europe had assumed an inherent mobility and mutability of work and teams in space over time, a flexibility that was brought to a dead end by the tethering of the individual to the computer on the desk top in the 1980s.

The innovations in information technology that have created what Mitchell called post-sedentary space and which have broken the chain of the individual to the desktop computer are doing more than extending the possible locations of work inside and outside the office. They are also challenging our inherited ideas about the planning, organization and use of cities. Mitchell noted how the industrial cities of the nineteenth and early twentieth century created rigid demarcations between work in the factory—or, office—and the home, segregating functions across time and space in new ways which were further reinforced by the functionalist zoning and planning policies of Modern Movement architects and planners. Early innovations in communication technologies, such as the telegraph and telephone allowed management to be separated from the sites of industrial production. The telephone in particular facilitated the modern city with its concentrated downtown core, dispersed suburban sprawl, and even the

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6. In the era before digital information technology, staff went to work in an office to access paper files and to be personally managed in a hierarchy of administrative command that was clearly expressed in the spatial design and layout of the office environment. For an illuminating insight into the innovations of the early forms of office design intended to increase administration efficiency, refer to the history of the Larkin Building designed by Frank Lloyd Wright in 1904; see, Jack Quinan, *Frank Lloyd Wright’s Larkin Building: Myth and Fact* (The University of Chicago Press, 2006).
8. Robert Propst, *The Office: A Facility Based on Change* (Herman Miller, 1968); for a wider history of these various evolutions of European office design, see van Meel (2000); and for an overview of the 'bureaulandschaft' movement see Duffy (1992).
building type of the skyscraper which was “only possible once the telephone had made the messenger boys obsolete.” An urban infrastructure of central business districts with associated mass transportation for commuters was created. The industrial logic of Frederick Taylor and his theories of scientific management had further encouraged the centralization of administrative functions, designed and implemented through a new architecture of the office building and the downtown cityscape, as pioneered in Chicago and New York.

THE NETWORKED OFFICE AND THE KNOWLEDGE WORKPLACE

Duffy in Work and the City, explores how the impacts of information technology are challenging long taken for granted conventions about work time and work space. The use of information technology has overturned the two great ‘iron laws’ of twentieth century work and the office buildings and cities that were built to accommodate them: the synchrony and collocation of work activities. Information technology is ending the industrially based culture which underpinned the nature of urban development and the formal spatial logic of the modern city.

By the end of the twentieth century, the patterns of use of information technology by knowledge workers had broken down the strict synchronicity of work associated with a central office building and its colocation of functional activities in a standard 9a.m. to 5p.m. working day. The older centralized patterns of office work had been intended for what now became increasingly obsolescent face-to-face supervision of clerical tasks that depended on information processes using paper files and archives. Knowledge work now increasingly involves not only face to face collaboration in office buildings with multiple teams but also wider distributed virtual collaboration with many teams in remote locations. The scale of global enterprises has also resulted in more work taking place across multiple time zones.

Evidence of the disintegration of what Duffy calls the Taylorist model of office work and office design, and of the reality that work has now in a sense escaped from the box of the office building (or, at least, escaped from the individually assigned desk or personal office) are the data from many observational studies showing that on average workspaces of all kinds are only occupied 42% of the typical day. As Duffy notes, the office building no longer maintains a monopoly on accommodating office work, and the office building, as such, is therefore now a misleading unit of analysis. The boundaries of work and space have shifted to such an extent that work has in a sense “spilled out into wider and more complex spatial and temporal landscapes.”

_The Networked Office_

Duffy proposes an alternative typology that he calls ‘The Networked Office’ to describe these new ways of working that came into being with late twentieth century knowledge work supported by ubiquitous networked information technology. He describes how the Networked Office has eroded all of the spatial and temporal conventions of twentieth century work, as mobility and ubiquitous technological connectivity mean that ‘the office’ is no longer a stable entity of place, given that work can be carried in multiple kinds of places.

This multiplicity of the locations of work complements the plural nature of knowledge work, as work itself escapes organizational boundaries. Duffy points out that the essential character of knowledge work in developing, communicating and sharing ideas reinforces its communal rather than solitary characteristics. The routine individual tasks of office work are increasingly automated while solitary intellectual tasks can be carried out in many other places besides the office.

Duffy argues that the Networked Office transcends the boundaries of conventional architecture to take advantage of “entirely different kinds of relationship between technology and people and between time and place.” In so doing, these new ways of working and using space provide three major advantages: knowledge work is more compatible with other activities; buildings and cities can be used more effectively; and, cities are more sustainable.

Yet, the precise ways in which information technology is ending the industrial logic that prescribed the temporal and spatial boundaries of work and space are complex. There was a period between the 1960’s and 1990’s when it was thought that information technology

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10. Ithiel De Sola Pool, _Forecasting the Telephone: A Retrospective Technology Assessment of the Telephone_ (Abelx Publishing Corp, 1982).
12. Frank Duffy, _Work and the City_ (Black Dog publishers, 2008).
13. _Id. at pg. 46._
15. See, Duffy (2008) at pg. 16.
would undermine the centripetal economic logic of metropolitan regions and lead to a dispersal of functions and activities.\textsuperscript{18} The telecottage would replace the office and telecommuting would replace mass transit. To the contrary—and perhaps ironically—the increasing power and effectiveness of information technology and telecommunications since the 1970’s have reinforced the global economic stature of major metropolitan regions as focal points of value added services.\textsuperscript{19-20}

_ Technology augments the value of cities

It turns out that not only is the infrastructure of information technology far from placeless, the role of information technology has been to augment, re-define and accentuate the central place and locational advantages of major urban areas. The global centers of capitalism are ever more valuable as milieu of innovation. It is in these city regions that the risks of competitive change can be most successfully managed, in no small part due to the particular advantages of the advanced technological infrastructure that is provided in these centers.

What Graham called the ‘fantasy of transcendence’ in which it was theorized that information technologies would threaten the existence of spatial concentration, or overcome the need for geographic proximity by permitting ‘disturbanism and dematerialization’, in fact failed to materialize. So, while information technology and cyberspace did not displace the benefits of spatial proximity, Graham argued that information technology is nevertheless remaking the value of cities and physical spaces and altering substantially how we use them. As Graham noted, the so-called Information Age is best considered not as a revolution but as a complex subtle amalgam of new technologies and media fused on to and ‘remediating old ones’.

One of the most significant ways in which information technology is remediating urban life and redefining its spatial and temporal categories is in allowing for the mobility of work. Mitchell argued

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\textsuperscript{18} Stephen Graham, From Dreams of Transcendence to the Remediation of Urban Life, in The Cybrcities Reader (Routledge, 2004) pg. 3-23.
\textsuperscript{21} See, Duffy (2008) at pg. 16.
that mobility is the essential characteristic of post sedentary work. To be nomadic is now the characteristic way of working. To work is to appropriate multiple diverse sites as workplaces, to breakdown the specialization of spatial requirements and the dichotomies of home/office, café/office and hotel/workplace. The traditional architectural program is therefore increasingly less relevant as activities take place a wider field of operations in which the people-to-place relationships are de-stabilized. The conventional architectural program is replaced by what Mitchell called “flexible, diverse, human habitats for electronically supported nomadic occupation.” 22

**SERENDIPITY AND THE VALUE OF NETWORKED PLACES**

The impacts of post sedentary working and the use of information technology are such that buildings and urban environments need to provide fewer specialized spaces, as knowledge workers behave more like ‘cyborg foragers’ appropriating spaces as they need to. 23 Yet, the design of space and the particularities of location are by no means irrelevant. The most valuable places will be those that are well connected to public transport and which integrate, superimpose, and connect multiple kinds of virtual and social networks. The powerful decomposing qualities of information technology have therefore not minimized the role of the city, or the role of special places within it, which continue to serve the purpose of being what Mitchell called ‘condensers of activity’. These ‘condensers’ maximize accessibility and promote face-to-face interaction. Information technology augments and adds value to such places and changes how we use them, enriching the value of the city as the ultimate network of networks.

**_The persistent value of cities in a virtual world_**

Far from claiming that information technology is eroding the value and purpose of cities, or reducing the significance of place in a virtual world, many theorists, economists and policy makers are proclaiming the persistent irreplaceable qualities of cities as drivers of economic growth, creativity, and innovation—even as information technology enables ubiquitous virtual connectivity. One such influential theorist is Edward Glaeser, who in *The Triumph of the City* argues that the role of cities as the most effective ways to transfer knowledge has actually been reinforced as a result of technology. 24 Urban proximity continues to be an immensely valuable asset to many kinds of communication. Cities also concentrate talent. In a fascinating argument, Glaeser noted the paradoxical logic of how inter-connected global cities and regions mutually reinforce the role of urban places as incubators of knowledge when he noted that, “the software producers in Bangalore haven’t made Silicon Valley obsolete. Instead they’ve made it cheaper and thus easier for Silicon Valley firms to develop software.” 25 Glaeser explores the history of relationships of investment and talent between Silicon Valley and Bangalore and confirms that “proximity matters as much as ever.” 26 He argues that the technology industry itself is the world’s best example of the benefits of geographical concentration and of the power of proximity.

**THE MOST VALUABLE PLACES WILL BE THOSE THAT ARE WELL CONNECTED TO PUBLIC TRANSPORT AND WHICH INTEGRATE, SUPERIMPOSE, AND CONNECT MULTIPLE KINDS OF VIRTUAL AND SOCIAL NETWORKS.**

The behavior of users of technology reveals that virtual interactions and face to face interactions reinforce one another. Much of the value of dense urban work environments comes from unplanned meetings. Information technology creates a more relationship intensive world and reinforces the fundamental purpose and logic of the city as an intellectual dynamo of growth. In a sense, technology is enabling us to rediscover what Duffy has called the intellectual potential of cities, as he noted the “apparently contradictory phenomenon that city life is also becoming increasingly networked perhaps even more intensely but at a much more local scale. Virtuality seems to be complementary to physicality.” 27

But it is not simply that technology is complementary with or augmenting of the value of physical places. Duffy also makes the point that if we were to imagine a completely virtual world, and had to somehow justify the purpose of physical places, that some of the most compelling arguments in favor of real places in the city would be their emotional resonance, their beauty and the pleasure we take in such distinctive environments. The best kinds of urban places also open up possibilities, they connect us to wider networks and they engender serendipity.

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23. Id. at pg. 159.
25. Id. at pg. 29.
26. Id. at pg. 26.
27. See, Duffy (2008) at pg. 49.
Engineering serendipity

The spatial and social engineering of serendipity, especially the planning of serendipitous encounters in the workplace, has almost become a cult within the technology industry itself. This is ironic, given that the original concept of serendipity is that such encounters are ‘happy accidents’ rather than planned meetings.

An enormous amount of public interest was generated this year (2013) when the chief executive of Yahoo, Marissa Mayer, recommended that their employees no longer work from home, making the argument that “some of the best decisions and insights come from hallway and cafeteria discussions, meeting new people, and impromptu team meetings.”28 Other tech sector firms have also been keen to engender fortuitous encounters among their employees to promote knowledge, sharing and innovation. Greg Lindsay reported in the New York Times that Google’s most recent design of its new headquarters in Mountain View, CA, is intended to maximize ‘casual collisions of the workforce.’29 The architect Frank Gehry is designing the new Facebook headquarters as essentially a gigantic hangar space with desks on wheels to encourage mobility and freewheeling encounters. Several research studies have highlighted the benefits of proximity in generating ideas and for nurturing collaborative work.30

The renewed focus on the benefits of interaction and serendipitous face to face encounters in the technology workplace, and the push by some firms against policies that allow full time remote working or telecommuting, have of course not meant that technology workers no longer use virtual tools of communication or have ceased to work with distributed teams. The arguments against full time telecommuting and remote working have tended to over simplify the issue as one of a simple dichotomy between work in the office or work from home.31

Working physically and virtually

The arguments in favor of more flexible or nomadic work patterns involving some telecommuting and mobile working are powerful. Findings suggest that such workers gain better work life balance, are more productive, can concentrate better and experience reduced stress and commuting times. The environmental benefits of less travel are significant. Flexible ways of working also enable office buildings to be used more intensively, as workspace is used on a shared, as-needed basis, a major environmental benefit. Many flexible workers claim that they are significantly more productive when they are able to work at least part of the time away from the office.32

Users are becoming familiar with using virtual technologies for communication (e.g., mobile video) and working in a more mobile way. They are frustrated with long commute times and with the environmental unsustainability of daily commuting patterns. Access to portable devices with high speed connectivity, the delivery of software as a service, and cloud computing, mean that many of the old reasons to go to work in the office are declining.33 But the best outcomes of telecommuting and remote working are when these patterns of work are combined with working from an office or other collaborative work environments, for at least some of the time. For many, the optimal solutions are those that enable

Virtual Work and Physical Place Transform Each Other

As virtual distributed work increases, role of physical design changes

Virtual work ‘space’ re-designed, richer, more meaningful, engaging, personal

Design of physical space focused on values, meaning, brand and culture

Physical spaces used more intermittently and intensively

Collaboration - Office as social condenser

Source: Strategy+ at AECOM

workers to blend their work lives and their home lives, to take advantage of both the home and the office (or, other intermediary or ‘third’places) as settings for different tasks at different times of the day or week.

For many knowledge workers, working virtually is already part of their everyday experience, whether they happen to be working from home, in the office, in third places, or in transit. They are already working through distributed networks of information technology and data streams that connect teams within office buildings and across time zones. Our work tools have become lighter, with mobile devices and applications that do not depend on being in the office to get work done.

Yet, of course, the central places of connectivity and collaboration for organizations remain very significant. The places where people can work together face to face are still fundamental to many critical aspects of work performance and creativity, therefore explaining the renewed attention being paid to social networks and the serendipitous encounters that may spark creative outcomes. This is why Marissa Mayer wants more people back in the office. Technology has not replaced place, rather it is augmenting the value of physical places as the most valuable hubs of both physical and virtual networks.

The benefits of socially networked environments that will stimulate accidental discoveries and creative collisions are driving the design of many large scale corporate technology workplaces and campuses. Yet it is the same impetus that is also driving the smaller scale but fast growing popularity of co-working environments in which individuals or small groups, rather than large corporations, are coming together to mingle, socialize, learn, share thinking and collaborate. In fact, there is a trend for large firms and smaller organizations, as well as individual contributors, to work alongside each other in spaces and buildings designed to accommodate different scales of organizations working together.

Re-thinking organizational scale and the value of space

One of the impacts of the large scale networking and ‘disintermediation’ of relationships made possible by the internet is that the so-called transaction costs of information are reduced, enabling some organizations to operate at a smaller scale in a more disaggregated form.34 As a result, some knowledge work is outsourced or crowd-sourced. As larger firms seek to optimize serendipity and casual collisions internally, many smaller organizations and individual contributors are operating as a kind of periphery of contingent workers, linked together through online outsourcing platforms and more permeable organizational structures. Both the large firms and the contingent individual co-workers are seeking to scale learning and innovation in new ways.

The larger firms want to intensify the opportunities for networking knowledge and ideas in their own physical workplaces (to mimic the advantages of the richness of communications found in smaller organizations), while the contingent peripheral workforce and smaller organizations are also seeking workplaces to connect and collaborate in. There is therefore a mutual interdependency between the larger firms and the periphery of smaller firms and individual contributors, with both seeking to use combinations of virtual and physical networks to be successful. This interdependency suggests that the demands for new kinds of workspaces, buildings, and working neighborhoods will need to respond to this multi-scaled permeable network of enterprises and activities; and, nowhere is this phenomena more insistently evolving than in the tech sector itself.

Optimizing social networks in space: virtual propinquity

These kinds of social networks of work relationships are not only being planned for in the physical design of large corporate workspaces and campuses, they are being facilitated, tracked and observed online in the virtual world as well. New ways of mapping social networks through websites and platforms such as LinkedIn and Facebook allow organizations to understand ‘structural holes’ in networks within their organizations. Applications have been developed, for example, using technologies such as Radio Frequency ID tags that are physically worn by employees to track both online and social and communicative behaviors within the organization, creating performance data to monitor team interaction and styles of verbal communication.35

Others are developing mobile applications that notify users of when people they know are close by, a kind of intelligenor or enhancer for serendipity. The intention is that ubiquitous networks and mobile devices will enable implicit contextual sharing related to where people are, what they are doing or are interested in, and who they are near. Within large organizations, software tools are being used to augment or replicate the advantages of physical proximity. For example, John Stepper a Managing Director at the global investment bank Deutsche Bank is working on ways to virtually complement physical proximity by using online collaboration platforms that encourage staff to ‘work out loud.’ By making their work observable, searchable, and discoverable online, they are eliciting feedback and comment on their work in progress. He describes this way of working as ‘virtual propinquity’—a form of frictionless sharing.  

37. Id.
39. Id.
41. See, Bowles (2012) at pg. 29.
THE SENTIENT CITY

Ironically, it is the power of information technology that is amplifying and augmenting the richness of social networks that were already immensely valuable aspects of the historic architecture of cities. Technology is enabling the uses of space over time to be extended and intensified, multiplying the advantages of cities as centers of the richest multi-layered networks of knowledge, creativity and innovation.\(^{42}\) Super-imposing a layer of geo-locative intelligence onto how we navigate and optimize our relationships in the city adds more value to cities as the central places that drive creativity in our economy.

Situated technology

The nature of places and urban areas is changing, Mitchell argued as a result of the embedding of technology into both our environments and into our personal behaviors and experiences.\(^{43}\) Technology, far from replacing urban life, is increasingly woven deeply into its fabric, creating the sentient city.\(^{44}\) The same technology that connects people to people is also connecting people to the ‘internet of things,’ in which objects are embedded with devices that communicate, facilitating marketplaces based on the intelligence of physical proximity. Varnelis and Friedberg describe how information technology networks are changing our concepts of place, in particular, through the superimposition of real and virtual spaces with mapping tools that connect geolocation to the network.\(^{45}\) These new developments enabled through GPS accessed through smart phones are as significant in their social impact as the telephone and television were in creating new senses of belonging and new kinds of relationships between the individual and the public to space, the city and society. Of course, there are also concerns that the commercialization of networked information also poses significant risks to individual privacy.

Given these new conditions in which technology augments how we experience and use space in the city, what then are the emerging drivers for the successful performance of buildings and places? What are the characteristics of buildings and places that perform very well as networking environments? What makes them particularly desirable and attractive? Why do places matter now in a world in which we are so continuously connected virtually?

Mitchell suggested that the new criteria for high performing places are that they should be heterogeneous rather monocultural, designed around encounter rather than separation, and

They should provide for simultaneity rather than for sequential activities. Such places and spaces will allow for nomadic ways of mobile working and provide for naturally occurring serendipitous encounters. They will support new ways of living and working that are more loosely programmed, more flexible and less routine. Such places will allow for chance and play to be celebrated as part of daily urban experience.

Buildings and places are therefore becoming sites for integrated, embedded technologies, in which the distinctions between architecture, media and computing are increasingly blurred. Some of the operations are invisible, capturing the data of our daily lives in ways that are invasive and controversial—thus the controversy over so-called ‘big data’. Others are highly visible, creating display surfaces across the landscape of the city, enabling the façade to be a kind of giant computer or movie screen, empowering buildings to be communicators, to interact with users, neighbors and the public in entirely new ways.\(^{46}\)\(^{47}\)

Fusion space

Mitchell proclaimed and celebrated this kind of imbrication of information technology with architecture and the city as a kind of ‘fusion space’ in which the digital and the real are superimposed upon each other.\(^{48}\) His challenge to us, as architects and real estate developers, was:

[It is] not the engineering of building to accommodate networks and computers; that isn’t so hard. Nor is it the exploration of the formal and cultural possibilities of immersive virtual reality—which can be fascinating but, as we have seen, only engages the limit case of a spectrum of possibilities. The challenge, instead, is to start thinking like creative fusion chefs, to create spaces that satisfy important human needs in effective new ways, and that surprise and delight us through digital enabled combinations of the unexpected.\(^{49}\)

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\(^{42}\) See, Glasser (2011) at pg. 34.

\(^{43}\) See, Mitchell (2005) at pg. 21.

\(^{44}\) See, Shepard (2010).

\(^{45}\) See, Varnelis, in Situated Technologies, Pamphlet Number 6 (Architectural League of New York, Spring 2010).

\(^{46}\) See, Shepard (2010).

\(^{47}\) Marc Bohlen and Hans Frei, Micro Public Plazas, in Situated Technologies, Pamphlet Number 6 (Architectural League of New York, Spring 2010).

\(^{48}\) See, Mitchell (2005) at pg. 23.

\(^{49}\) Id.
RE-DESIGNING THE TYPOLOGY OF BUILDINGS AND PLACES

Technology is doing more than merely enriching and augmenting the value of physical places, it is helping us to re-imagine a future of urban living and working as a new kind of blended experience of everyday life. It suggests that we can plan cities to be more multi-functional and mixed in uses, which challenges the segregated Euclidean zoning of twentieth century Modernist city planning. Technology is enabling us to rethink how we work and live across all kinds of spaces in ways that are both liberating and challenging—when do you switch off, when do you stop working? It is enabling us to re-purpose single user under-occupied office buildings into dense intensively used hubs of social connectivity and interaction. It is enabling us to re-purpose our homes as workspaces for part of the day or the week, whenever it suits our work processes and our personal lives. The separation of living and working spaces, building types and neighborhoods is increasingly unnecessary and is ready for re-thinking architecturally, urbanistically and in terms of real estate development. Technology is enabling us to not only intensify and densify the use of the office and other kinds of workspaces, it suggests we can also re-design the very categories of building types and urban places.

Yet, the physical design characteristics of the networked office and the places in which networked work activities occur are still emerging. A definitive typology of networked spaces does not yet exist for the very good reason that information technology is dissolving any simple correspondences between work activities and functionalist spatial categories.50

_A vocabulary of networked places: workscape

A new vocabulary of such networked places and activities is emerging. It is a language that describes different work styles and degrees of mobility; of ‘anchors’ versus ‘residents’; of the ‘super-mobile’ versus the ‘mobile’. It is a language that defines types of places for ‘concentrated’ versus ‘collaborative’ work; and deals with the fact that knowledge workers are themselves defining where, when and with whom they do they work.51 The vocabulary recognizes that the knowledge worker in the networked world of work is making choices about the relative values of virtual and physical activities and forms of ‘presence’ according to their changing needs. Users are choosing the degree of permeability and access they want for their work environments. Fayard and Weeks have explored how individuals are in a sense curating their own spatial and virtual experiences by selecting specific types of spaces and levels of virtual and physical accessibility to suit their changing needs.52

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One way of describing this distributed workplace of many different kinds of settings is as a landscape of work: this concept of a ‘workscape’ was developed by DEGW in the early 2000’s.\(^{53}\) \(^{54}\)

Even as work is becoming mobile and distributed, physical work environments remain a vital part of an organization’s infrastructure. The question is how to optimize the range and variety of work environment for a dispersed workforce in a less location-centric approach? Harrison and others suggested what they describe as a ‘space environment model’. The model proposes a parallel layering of virtual and physical spaces in terms of their degrees of accessibility and of user or corporate control and the degrees to which they are “private, privileged or public.”\(^{55}\)

The model suggests a corresponding typology of work environments: the Café, the Club and the Cloister.\(^{56}\)

An important aspect of this exploration is to recognize the equivalence of the virtual workspace in relation to the physical workspace. It suggests that as we plan and design for work now, we must consider equivalently the technological (e.g., virtual) and the spatial requirements. The distinction between being ‘at work’ and ‘on work’ in a technological sense is disappearing. Stan Allen has suggested that we therefore must create an architecture and urbanism that accounts for the interplay of the virtual and the real as our urban experience is augmented increasingly by digital information.\(^{57}\)

Harrison, Wheeler and Whitehead suggest that different qualities of physical and virtual or distributed environments are likely to be associated with different stages in the growth, development or maturity of the life cycle of the organization. The model also recognizes the shift towards creating a flexible, variable cost model for space and real estate, which is shifting to the acquisition of space on an as-needed basis rather than being provided only as a long-term lease or asset purchase. They suggest that developers and landlords should provide high value workplace services, rather than simply space. The range of work spaces that the organization or the individual will need therefore responds to a variety of knowledge worker user demands or task requirements, such as privacy, collaboration, technological needs, social activities, inter-organizational interaction and so on. Each of these can be mapped onto a landscape or ‘workscape’ of diverse physical and virtual work settings.

The office as a container of the organization has thereby dissolved into a broader landscape of places of work in the city and the region. The city itself has also become increasingly networked with virtual work activities overlapping and intersecting with the multiple physical places of work. Duffy argued that perhaps it is this feature that should be the criterion of the most successful cities—greatest density of overlapping networks, both physical and electronic.\(^{58}\)

The impacts of new ways of working and using space that we have described are both quantitative and qualitative. Less space is required by the organization overall, as staff work remotely part of the time and share space in a flexible way facilitated by their mobility within the office for the balance of their time. The range of spaces used within the workplace is also changing, from a predominance of individual private offices, workstations or cubicles, to increased proportions of shared support, project and collaborative spaces and meeting rooms of many different kinds used in more flexible itinerant ways. The total amount of space

### Virtual and Physical Space

<table>
<thead>
<tr>
<th>Virtual Space</th>
<th>Physical Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge systems</td>
<td>Cloister individual / concentrated workspace</td>
</tr>
<tr>
<td>Intranet</td>
<td>Private</td>
</tr>
<tr>
<td>Extranet sites, knowledge communities</td>
<td>Privileged (clients and other consultants)</td>
</tr>
<tr>
<td>Internet sites</td>
<td>Club / Collaborative project and meeting space</td>
</tr>
<tr>
<td>Cafe, informal interaction and workspace</td>
<td>Public (shop front / branding / information display)</td>
</tr>
</tbody>
</table>

Source: Harrison (2004) at pg. 44.

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56. Id.
allocated to individual work is reduced and the total allocated to collaboration is increased. The logic of new ways of working and using technology is that workspace can be used more intensively and in more varied patterns of overlapping uses that share spatial assets over time.

**Office Is The City, City Is The Office**

> Office Is The City, City Is The Office

If we take this pioneering approach of a landscape of work, or a workscape, we can explore what are the emerging characteristics of the design and architecture of the spaces, buildings and even urban areas, to support these different kinds of organizational needs and patterns of work. The most significant issues can be clustered together in the following themes presented at scale, each of which we will explore in turn:

- An emerging typology of workplaces: Co-working, Open Houses, and Cohabiting
- Collaborative consumption of space and workplace as a service
- A connective and permeable urban architecture of hybrid mixed use buildings and districts

**Workspace at an urban scale**

This logic can apply at scales larger than the individual organization’s workspace, to whole buildings and urban areas. It suggests that buildings can be used by a greater variety of functions and activities that are less homogeneous. It also suggests that as work—and all other activities supported by networked technology—spill out of the conventional office space, that the space in-between buildings becomes part of the programmable area of ‘workspaces’ in this new sense. The wider urban area becomes part of the program of workspace.

The new ways of working (and living) enabled by networked technology create opportunities to mix up the scales of units of space and their rental levels, thereby also supporting a more vibrant, diverse, and inter-connected range of scales of organizations and related activities.

From a developer, landholder, or owner’s perspective, this approach is also one that mitigates the risk of the large scale mono-functional office building, with its preponderance of single user tenant or occupiers all using space in the same way, with little opportunity for change or diversity in tenant types and patterns of use. Duffy referenced Richard Sennett’s critique of the Modern Movement’s over reliance on ‘brittle’, large scale, single use buildings set in homogenous business neighborhoods which lack the resilience and sustainability provided by more varied uses and scales of activity.59
AN EMERGING TYPOLOGY OF WORKPLACES:
CO-WORKING, OPEN HOUSES, AND COHABITING

Co-working

The phenomenon of co-working (shared environments in which individuals and small groups gather together to work in a community, usually paid for on a membership basis invoiced either monthly or daily) has been expanding rapidly in the United States and globally, with estimated numbers of coworker practitioners at more than 90,000. These spaces provide a community workspace with shared services that let individuals and small groups share ideas and mutually support each other’s work. They are usually managed in a participatory way, with high levels of social engagement in running the workplace and creating a shared workplace culture. They provide a nurturing environment for start-ups and offer access to mentors and investors. Individual workspaces may be assigned or unassigned. Different co-working spaces cater to different kinds of communities, for example in New York there are many co-working spaces that are focused on the broad based technology community but others are geared towards specialized fields such as applied environmental science, or creative writing, for example.

Workers in the tech sector in NYC have pioneered creating and using many of these co-working spaces. They have also been the major participants in New York’s active accelerator and incubator programs designed to support growth in the tech sector. There are at least a dozen accelerator programs for tech start-ups in New York providing support for the very fast growth in early stage business formation across the five boroughs. New Tech City estimated that the co-working spaces, incubators and accelerator sites have housed almost 500 tech start-ups.

Corporate organizations are also encouraging their own employees to work in co-working spaces as an alternative to their regular workspace, not to save on costs primarily but to facilitate their interaction and knowledge sharing with others and to inspire creativity.

SAP’s App Haus project is an example of how this co-working approach is also now impacting the corporate workplace. The App Haus project in San Francisco’s Bay Area was created when a group of SAP’s software developers felt that to meet an accelerated deadline for product development, they needed to go outside of the usual workspace provided by the company and create their own much more informal and collaborative workplace which they chose to do by renting a suburban house. This informal self-created work environment enabled the engineers to work together in faster more productive way than before, successfully supporting an accelerated deadline for creating a new application. SAP has since then incorporated this kind of open informal collaborative workspace as a new kind of work environment for their developer teams on a worldwide basis. Similarly, and on a larger scale, Serendipity Labs, for example, offers corporate memberships for its kind of co-working spaces in multiple locations.

What we observe in these co-working environments is a range of spaces that correspond to a ‘workscape’ providing for a variety of different settings allowing for concentrative work, collaboration and social activities. One example, Think Coffee in New York, provides for:

- Quiet zone for concentrative work
- Phone booths
- Social area
- Café and service area
- Bar for informal collaboration
- Small group meetings
- Laptop zone for individual work

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60. See, Lindsay (2013).
61. See, Bowles (2012).
62. Id.
63. DEGW Workplace Innovation Collaborative, SAP Case Study (2012).
64. See, Lindsay (2013).
_Open House_

But aside from the large number of different kinds of co-working spaces, there is a related trend for organizations to open up their own workspaces to a wider community and to invite others in to share their work space. We have defined this kind of environment as an ‘Open House’. Accenture’s recent office in Paris, re-focused the whole office environment on collaborative activities for staff—assuming that much individual work can be completed outside of the office— and opened up the office for clients and others in the city to use. The BBC in the UK has for many years created workplaces that are designed around the assumption that their collaborators in creating television programs should be invited to work together in shared environments. Microsoft’s sales offices have been designed to open up the office to their customers, to invite them into the workplace to experience more fully their technology and services. The open flexible workplace that Microsoft created at Schipol in the Netherlands has been widely referenced as an example of this ‘open house’ approach to the workplace.

_Cohabiting_

There is a further type of workspace in which, rather than the individual organization opening up to others or to the wider community, several organizations together share a work environment with the purpose of gaining from each other’s knowledge and experience. We have defined this kind of

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environment as ‘Cohabiting’. Google in London is supporting a co-working space called Campus in which Google will occupy one floor and two others will be available for co-working. Steelcase, for example, is participating in a ‘cohabiting’ space called GRid70 in Grand Rapids with several other organizations.

Another characteristic of co-working environments is that they very often provide not only work spaces but also a combination of other kinds of spaces for learning and training, as well as social spaces for events and other collective activities. A great example of this is the well-known General Assembly environment in NYC which combines co-working, training and classes in entrepreneurship in lecture halls, as well as spaces for large events. General Assembly had 350 members in 2012 and 16 of its member start-ups have graduated out of the space since it was founded in 2011. They now attract 3,000 attendees per month for classes and other events.

**General Assembly: Co-Working Classroom**

General Assembly is an educational organization founded in New York in 2011. They offer short and long-term courses as well as workshops. The curriculum is geared toward preparing students with skills in three core areas of technology, business and design. Courses from web development and user experience, to business fundamentals and data science prepare students with relevant job skills.

A large component of the model is the fostering of a community of students, graduates and professionals within the campus spaces and throughout the network of locations that now includes San Francisco, Los Angeles, Washington DC, Boston, London, Sydney, Hong Kong and Berlin. GA also assists these graduates with work placement opportunities in their 1,500 company, 65,000 person network.

The current GA spaces offer a combination of classrooms, meeting rooms, co-working spaces and an event space, as well as offering a variety of amenities. Recently GA has decided to focus its attention on the educational aspect of its business and will shut-down the co-working aspect of their mission. The current GA locations offer a dynamic combination of different space types and an array of individual and collaborative workspaces that help foster this interactive community.

The WeWork organization provides co-working spaces in several locations in the New York area and describes itself as the ‘physical social network’. Central to its successful growth has been the attention paid to the social network between individuals and groups using their spaces. Their keg parties and arcade games are famous.

**The ecosystem of the Tech sector**

The tech sector is known for creating very well attended social meet ups and gatherings. New Tech City reported that New York Tech Meetup had 23,000 members in its community in 2012, double its membership since 2009. The industry is well aware that the creation of a rich community life or cultural ecosystem is critical to its success. In NYC, there are now at least a dozen tech meet-ups every day as well as hackathons, start-up weekends and other tech related events.

The particular ecosystem of New York’s tech sector is driven by particularly urban characteristics. As noted by New Tech City’s observation that,

> Today’s growth is being fueled by the Internet and smart phones, and the creation of new ways of taking advantage of these now widely used platforms to deliver content, sell products, deliver services, play games and simplify life for individuals and businesses. New York’s rich pool of creative, marketing and business talent is well-suited for creating and running these new businesses, all of which can be built with comparatively few engineers.

Many of the technology applications designed in New York are intended to virtually bridge the gap between urban local products and services and their users with geo-location software.

68. See, Lindsay (2013).
69. See, Bowles (2012) at pg. 7.
72. See, Bowles (2012) at pg. 6.
73. Id. at pg. 9.
**WeWork: ‘The Physical Social Network’**

**Concept/Culture:**

WeWork provides a combination of dedicated and shared workspace, conference rooms, Skype rooms and amenities for paying members. WeWork has responded to shifts in the ways that people live and work, and reinvented the concept of the workplace. Referring to itself as ‘The Physical Social Network’, the company has a network of spaces that extends through New York with offices at 175 Varick Street, 345 5th Avenue, 261 Madison and 154 Grand Street, to San Francisco, Boston, Chicago and Los Angeles.74

The Varick Street location accommodates over 800 people. The workplace is clustered on floors of different groups working in key industries: the tech groups are working together; one floor focuses on design, engineers, interiors and graphics groups; and yet another floor gathers film and video groups together. The disciplines run into each other in hallways, elevators and at their events. The culture is more like academia than a conventional workplace.75

**Key Attributes:**

Curating Events: The company organizes events and retreats that are intended to foster connections between members. Pepsi and ConsMr is an example of two companies that have come together as a result of leasing office space at WeWork.76

Corporations in-house: WeWork now has more than 3,000 members, and current tenants include TED, the not-for-profit conference company, Lego and a division of American Express.77

Transit: WeWork has consistently leased property in Lower Manhattan because of proximity to transportation and the ease of commute for many young workers who live in Brooklyn, Hoboken and the East Village.78

Proximity to City Amenities: Recent expansion has targeted city amenities such as park space, and the new location at 54 West 40th Street is adjacent to Bryant Park.

Corporate Support -- The WeWork Labs Soho location is sponsored in order to keep overhead low for entrepreneurs - PepsiCo, Microsoft’s Bing.com, legal firm Wilmer Hale and JWT have subsidized rents. Sponsors may also share their areas of expertise; hosting seminars and happy hour events. In return they gain access to new ideas within a start-up culture and first-look at new technologies and applications.79

Shared Resources: The network of small business that operate within WeWork spaces also benefit from sharing resources such as Health Care plans, car rental membership, credit card processing as well as office amenities.80

**Collaborative Consumption of Space and Workplace as a Service**

The sharing economy of collaborative consumption enabled by new applications and geo-location services is beginning to revolutionize the ways that firms and individuals procure and obtain workspaces, challenging the supply-side driven mentality of landlords, developers and the real estate industry.81 Our case studies suggest that the future of the workplace will be transformed both in terms of how and where work happens and also in terms of how the workplace is procured and consumed by end users. In both cases, information technology is enabling more virtual and mobile ways of working as well as revolutionizing the modes of obtaining and supplying space.

74. WeWork, available at www.wework.com (last accessed October 21, 2013).
co-create their own workspace. Organizations and individuals can obtain space by the hour, when and where they need it, through such applications at LiquidSpace. Such services not only open up many choices for end users of workspace, they also enable tenants and landlords to better utilize their own under-occupied space.\textsuperscript{82}

The ability to obtain workspace in a more flexible as-needed way is being further enhanced by emphasizing the provision of workspace as a service. New kinds of workplace providers are entering this marketplace. Examples include the collaboration between Steelcase and Marriott to offer a service called Workspring providing workspace services within hotel environments. Similarly, Westin hotels offers a workspace service called Tangent.

These co-working and workspace-as-a-service models offer services that are responsive to user demands in contrast to the limited services associated with the real estate conventions of leasing or buying office space. They respond to users’ attempts to work around the normal real estate and facilities processes by self-designing and procuring their own spaces to support their needs for faster, better, more engaging and more flexible work processes. Such users are increasingly empowered to procure their own physical and virtual environments. In so doing, they are achieving what Duffy has proposed, which is to reinvent the supply chain or, following Groak to create a so-called ‘demand chain’ intended to reverse the wastefulness of the Taylorist model of office work and its associated models of space and building development.\textsuperscript{88, 89}

These kinds of solutions transcend the conventional boundaries of landlord and tenant, user and designer. They take advantage of the great flexibility provided by networked technology and its ability to disrupt supply chains.

This shift to self-created, collaboratively consumed ways of getting workspace, can be seen as one response to an important question: what is the purpose of workspace when we have ubiquitous technology and mobile work behaviors? As Philip Ross and Mark Dixon suggest, we should also be asking: what “is the purpose of property?”—given that digital communications and cloud computing are emptying the office building of everything except people.\textsuperscript{90} Office buildings no longer need to accommodate computing infrastructure, as this is in many cases moved to the cloud. So the vestigial and unique purpose of the office building and workspace is essentially as a special place for certain kinds of privileged collaboration. Such workspaces no longer have to be supplied in conventional ways. What, then, should the new workplace be like and what is the new workscape?

\textbf{LiquidSpace}

**Concept:**
LiquidSpace is an online platform that organizes the rental of on-demand, hourly, daily or weekly work and meeting spaces. These spaces include private offices, boardrooms, meeting rooms, conference rooms and co-working desks.

**Attributes:**
The site allows owners to add their spaces to a database and share with a network of mobile workers. The company offers self-service reservation and booking and users can search by proximity, prices, and preferred amenities ranging from secured wi-fi or video conferencing to catering and coffee. LiquidSpace creates a community of members on both the demand and supply side who comment and vote on their rental experiences.

LiquidSpace exists in 250 cities within the US and has more than 220 active locations in NYC alone.\textsuperscript{83} The company reveals the extent to which workspace, and space generally, is being consumed as users make choices on a daily or hourly basis about the type and the location of the space they wish to use. LiquidSpace is also altering organization’s own real estate portfolio by expanding where employees can work.\textsuperscript{84} A recent survey by CoreNet of 500 American Companies found that 40% expected to allot 100 sq. ft. or less per worker in 5 years. In 2010, this average was 225 sq. ft. per worker.\textsuperscript{85} A stream of data from Liquidspace transactions will begin to reveal people preferences as they rent and interact in this growing network of on-demand workspaces.

\textsuperscript{82.} LiquidSpace, available at www.liquidspace.com (last accessed October 22, 2013).
\textsuperscript{84.} LiquidSpace, available at www.liquidspace.com (last accessed October 22, 2013).
\textsuperscript{85.} See, White (2013).
\textsuperscript{86.} See, LiquidSpace (2013).
\textsuperscript{87.} See, White (2013).
\textsuperscript{88.} See, Duffy (2008).
\textsuperscript{90.} See, Dixon (2011).
**Accenture: Opening Up The Office to The City**

Accenture has long been a pioneer in developing new models for the office, challenging workplace assumptions and transforming how people work. The Paris office, in particular, has been instrumental in the evolution of the Accenture workplace. In 1995, the Accenture hoteling model was created in the Paris, Avenue des Champs-Elysées location, making news in France and abroad. A few years later, the Paris office moved again. In its second location, the team institutionalized the hoteling model by creating tools and developing a strategy for broader implementation. The current and third phase of workplace evolution at Accenture is a strategy that incorporates and responds directly to technology – mobile phones and the internet. The local team chose to take advantage of an expiring lease to do something new. As an alternative to moving, the team chose to stay in place and leverage the mobility allowed by technology in order to lease significantly less space.

By increasing density of the work space, implementing home working and desk sharing, utilization was shifted so that significant square footage could be released for a range of new collaborative spaces. These include places for work activities and connection to the internal Accenture network, but also include spaces for events and exhibitions — a way to connect to the community outside.

The Moving Forward project is about sustainability and the environment, but also about the relationship between Accenture and subcontractors, clients, and the city as part of a greater ecosystem. This is expressed through the building by designing for activities related to this ecosystem (e.g., art exhibitions, galas, etc.) whether or not directly related to work.

**Develop the “social footprint” of the organization**

How can an organization create community and a sense of belonging for its staff, especially within the context of mobility, client-focused work and working from home? The Happen Space, a destination space located on the second floor of the office equipped with the latest technology to support a range of work and non-work activities (e.g., making music, giving a presentation, exhibiting art). The space is reconfigurable in order to easily accommodate a range of events and memorable experiences.

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93. See, Carrington (2013).
97. DEGW Workplace Innovation Collaborative, Accenture Case Study (2012).
A CONNECTIVE AND PERMEABLE URBAN ARCHITECTURE OF HYBRID MIXED USE BUILDINGS AND DISTRICTS

As work has escaped from the tether of the desktop computer and the office building, becoming a nomadic experience across many different kinds of spaces and settings, it creates the opportunity to re-think how we design buildings and places in an urban context. Duffy has highlighted some of the design and use characteristics that grow out of these new ways of working and living, all of which are relevant for the tech sector in NYC.98

- Interconnected spaces used in more dynamic ways over time
- Closer adjacencies of buildings of different scales
- Public or semi-public places provided for working collectively
- Multi-functional buildings
- Planned juxtaposition of complementary and mutually supportive uses
- Diverse and attractive interstitial spaces
- Permeable buildings and places that support many kinds of serendipitous interactions between businesses and other users

The direction is towards a more permeable architecture of complex forms that provides layers of privacy and privilege in degrees of accessibility. This is an architecture and urbanism that blur the boundaries between the building and the city. It also suggests programs for spaces that are amenable to change and adaptation by users in self-organized and open ended strategies for design and use. These environments will be suitable for hosting many different kinds of social events and curated experiences, some of which are likely to be ephemeral or ‘pop up’ activities that create buzz and attract particular communities or subcultures.

The 5M project in San Francisco developed by Forest City Ratner is a good example of this kind of complex place-making in which physical spaces at different scales are deliberately intended to optimize serendipitous encounters and experimentation for varied scales of enterprise with complementary business models. The mix of existing and renovated spaces is intended to allow for pop-up shops, labs, studios, event stages, all planned to create a dense collaborative community.

_**Landscape urbanism**_

The technological enablement of mobile and nomadic ways of working is encouraging higher expectations from users for greater control and flexibility in how they use workspaces, buildings and the city. It also suggests some fundamental re-thinking of our approaches to the design and planning of cities on a wider scale. In contrast to the Modernist ideas of functionalist city planning and zoning, in which the architecture of the discrete building was

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98. See Duffy (2008), also see Duffy (2009) and Duffy (2011).
100. Forest City Ratner, 5M Project, available at [www.5mproject.com](http://www.5mproject.com) (last accessed October 22, 2013).
101. Id.
expected to fulfill a program of designated activities, an alternative approach to planning the city now might consider architecture and urbanism as a continuous field of operations. It suggests that the city be viewed less as a rigid object-based spatial frame of activities, as in the Modernist tradition, and more as a site of dynamic spatio-temporal production. The city is therefore now better viewed as a “terra fluxus” or a “living arena of processes and exchanges over time” allowing for new forces and relationships, which prepare the ground for changing activities and patterns of occupancy.

This approach has developed into the idea of the city as a ‘landscape urbanism,’ a large scale performative infrastructure that can be reconfigured, revitalized, and reimagined over time in a fluid program. Stan Allen has described this as a process of radical incrementalism in which the city and buildings should allow for activities and behaviors to be ‘re-jiggered’ and in which formerly distinct terrains of design and experience are merged. The Modernist functionalist program is replaced by contingent planning that allows for restaging patterns of living and working. This way of planning would take account of the provisional allegiances of metro-urbanites, who move iterantly from location to location over the course of a day to the various communities of which they are members. Architects and planners are responding to these demands by designing new kinds of hybrid mixed use towers and networked urban areas that combine living, working, retail, learning and social spaces, often located close to public transport infrastructure.

These ideas are also being used in large scale downtown urban regeneration projects, as in Las Vegas and to some extent in Detroit. In Las Vegas, the urban development plan is driven by aspirations for serendipity and connectivity. An abundance of ground-level gathering spaces, pop-up stores and multi-use shipping containers will provide spaces for entrepreneurs where there are currently significant space and real estate limitations. The key investments are being made in education, renovating buildings, supporting entrepreneurship, improving and extending modes of transportation and bringing numerous events programs to downtown.

**The Downtown Project: Urban Open House**

The Downtown Project is an initiative intended to transform Las Vegas into a community focused city. The project is spearheaded by Tony Hsieh, CEO of Zappos, and is supported by the moving of Zappos’ Headquarters from Henderson, Nevada to the old City Hall building in downtown Las Vegas.

The relocation of Zappos will bring approximately 1,500 employees to the area and in concert with this move Hsieh is investing a further $350m to fund real-estate, small businesses, education and tech start-ups in the area. The overall design calls on a variety of partnerships from Teach for America, to General Assembly and Tech Stars. These organizations and others will help the growth of the community with a goal to increase density to about 100 people per acre.

The urban development plan is driven by aspirations for serendipity and connectivity. An abundance of ground-level gathering spaces, pop-up stores and multi-use shipping containers will provide spaces for entrepreneurs where there are currently significant space and real estate limitations. The key investments are being made in education, renovating buildings, supporting entrepreneurship, improving and extending modes of transportation and bringing numerous events programs to downtown.


**WE ACTUALLY MAKE DECISIONS ON A REGULAR BASIS THAT COULD IN SOME CAPACITY INCONVENIENCE EMPLOYEES, BUT WHAT THEY’RE REALLY DESIGNED TO DO IS CREATE MORE COLLISIONS BETWEEN PEOPLE.**

-- ZACH WARE, ZAPPOS

103. See Allen (2011).


105. Id. at pg. 30.

106. See Allen (2011) at pg. 30.

107. Aurora Fernandez Per, Javier Mozas and Javier Arpa, This is Hybrid (a + t Architecture Publishers, 2011).


110. See, Zappos.


PROPOSITIONS FOR THE FUTURE

What are the implications of these trends in work and technology for how we think about the future kinds of spaces, places, and buildings that should be provided to serve the needs of the tech sector in NYC? Our research suggests a series of propositions that may guide the future design and development of space, buildings and even the character of urban areas. The research also suggests that in alignment with these new patterns of use of buildings and urban areas, new ways of providing for the supply and servicing of workplace solutions will also be needed.

Emerging patterns of work and use of space: from single use buildings to heterogeneous urban places

Given the trends in technology, ways of working and using space and buildings that we have observed, we suggest that organizations will work in increasingly heterogeneous workplaces and in increasingly collaborative and urban environments. In the first diagram below, we suggest a direction of change for patterns of use for the workplace, suggesting a dual progression of new ways of working towards more heterogeneity of patterns of use and changes from individually focused environments to spaces and places that are social, collective and increasingly urban in character.

The direction of change suggests a series of step changes in how organizations are working and how they use technology, spaces, buildings and the city at large. The major changes are highlighted below.

1. ‘Open House’, and ‘Cohabited’ and ‘Co-working’ spaces

Breaking away from the Taylorist office and single use business districts, we see organizations re-using, reinventing, and transforming the existing stock of workspaces. They are creating ‘Open Houses’ in which the organization opens up its workspace to collaborators, partners and even the public. They are co-creating ‘Cohabited’ workspaces in which groups of organizations share environments and actively encourage the intermingling of their workforces. They are designing many kinds of Co-working spaces in which individuals and smaller organizations work together in communities.

2. Densify and re-use existing buildings

But more than the invention of these more shared and collaborative workspaces of different kinds, there are also fundamental changes in the patterns of overall demand for workspace, given the more widespread mobility of work and that many workers no longer

![Emerging Patterns of Work and Use of Space](image-url)
need to be collocated in office buildings on a regular daily basis. These more intermittent patterns of occupancy of workspaces mean that workspaces can be densified overall and their patterns of use intensified over time.

Given that the programmatic requirements of workspaces are also simplified, many types of existing buildings can be re-purposed as workspaces. Assuming an overall reduction in average space requirements for office users given intermittent patterns of occupancy and increased sharing of space over time, we can therefore plan for less real estate to be more intelligently used. This densification approach can be used as part of a wider strategy to make such workspaces more valuable and perhaps command higher rents.

In the case of NYC, even with densification and the potential for higher rentals for such workspaces, it will probably be necessary for the city government to incentivize the preservation and upgrading of more class B and C office spaces. The intention would be to prevent this kind of building stock in NYC from being converted to residential uses.

This market preference highlights a larger paradox of supporting entrepreneurship in the face of a very real housing crisis. This would prevent neighborhoods such as Williamsburg, which is home to many technology workers, from becoming devoid of workspaces, as the many industrial lofts in these areas are now being converted to residential and retail uses. It also suggests that wider scale urban plans will be needed to enlarge and extend areas attractive for the tech sector workplaces. A good example of this way of thinking is the recently completed Brooklyn Tech Triangle urban strategy that creates a larger scale vision for the tech sector across several connected Brooklyn neighborhoods.

3. Mix up scales and functions in buildings and urban areas: engineer serendipity

Given more mobile patterns of work and the opportunity to work in different kinds of environments, it will be possible to increasingly mix different kinds of work and non-work functions within buildings. It will also be beneficial to mix different scales of buildings and workspaces in close proximity so as to encourage collaboration and interaction between and among organizations of different scales and at different stages of their developmental and organizational life cycle. This suggests that workspaces should be planned alongside and linked to complementary functions and supporting activities, including living, educational, retail, entertainment and service spaces of many kinds. Workspaces should be designed as part of urban places in which the probability of many different kinds of interactions (i.e., social, intellectual, commercial, etc...) are enhanced and facilitated. Recent technology start-ups have been able to find space in Manhattan and the boroughs, but what they have often sacrificed in favor of space in lower rent districts are places to meet and network, to have meet-ups, and environments in which start-ups can congregate. In other words, workspaces and urban areas should be designed for serendipity, creating opportunities for networking, socializing and interacting in many different ways.

4. Celebrate the interstitial and in-between spaces: blur the building and the city

Celebrate rather than neglect the interstitial, in-between and peripheral spaces which serve very well as the mixing and socializing spaces between organizations. Allow for such spaces to support and mix up work, leisure, retail, culture, entertainment and educational activities. As mobile working is increasingly the norm, interstitial spaces increase in value as workplaces and as places of intersection and interaction within and between organizations.

As work breaks out of the boundaries of the conventional office workplace, organizations and individuals are seeking public and semi-public environments in which to meet and work collectively. Plan for larger scale co-working spaces that extend beyond the office building type and which blur the distinction between the individual building and the city.

5. Create permeable environments

Allow for managed degrees of accessibility within and between organizations. Given the widespread mobility in how people work, assume that work will also happen in semi-public and public spaces of different kinds. This suggests an architecture and urbanism that is physically networked and connected in complex and stimulating ways. Provide for layers of private, privileged and public access to these new kinds of workplaces.

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114. See Bowles (2013).
115. Id at pg 43.
117. See Duffy (2008).
118. See Bowles (2012).
119. See Harrison (2004) at pg 44.
**6. Plan for ephemeral, curated, transient, pop up experiences and events**

As work patterns are increasingly mobile and also often virtualized, organizations and individuals need to provide for events and activities that create community and awareness in physical places. Face-to-face activities in physical settings that are memorable and distinctive become more significant. Workspaces and urban settings need to be designed and managed to allow for many different kinds of special events: parties, lectures, pop up experiences, meet-ups, and many other kinds of social, cultural and educational activities. The design of these environments needs to support rapidly changing programs of events, led or curated by different organizations and users.

**From owning and leasing real estate to workspace as a service**

In the second diagram below, we suggest a direction of change in how technology organizations and entrepreneurs from all sectors will obtain their workspaces. We suggest they will increasingly move away from owning or leasing space privately in conventional ways in favor of shared forms of workspace used in more collective, self-organized and more responsive environments. Such workplaces will increasingly be provided as serviced environments, with workspace being more often considered as simply another service which may be consumed collaboratively and facilitated by the use of networked geo-location based technology. This shift to workplace as a service indicates users are interested in the provision of services that support the experience of work itself, rather than the acquisition of space as such. Services will therefore include all of the necessary technology infrastructure, notably bandwidth for high speed internet access.

In this shift from privately owned or leased spaces to space being consumed collaboratively or provided as a service, we also see a shift to greater user choice and control over when, where and how work happens. Increasingly, individuals and organizations are empowered, or expect to be empowered, to self-organize and stage their own work experiences. Work is being staged in environments which are performative rather than static, staged rather than leased or owned, and adaptable as scenery or settings which may change as often as work itself changes, by the hour, day and week. Increasingly, workspace will be event driven, a

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**From Real Estate to Workspace as Service**

Source: Strategy+ at AECOM
curated experience in which space, tools, and technologies are provided to support the ever changing daily needs of groups and individuals to create the successful conditions of their own work. The workplace is finally fulfilling the theatrical analogy of ‘services, scenery and sets’ envisaged by Duffy and others, and explored further by Stewart Brand in How Buildings Learn.\textsuperscript{120}

1. The landlord as impresario of work experiences

The shift to Co-working, Open House and Cohabited workspaces indicates a change towards increasingly collaborative and networked work experiences and environments. Co-working spaces are provided by new kinds of landlord/developer/entrepreneurs who are in effect curating and facilitating work and place-based communities of practice. They are becoming impresarios of work experiences. They are providing not only spaces, but tools, technologies, events, activities and business and community support. They are often assisting with education, learning and training activities. They are providing a social infrastructure for knowledge sharing and business development. In the Open House scenario, we see larger scale corporate organizations in effect turning themselves into co-working environments by inviting collaborators and even the public into their own work environments. In the Cohabit environments, we see medium and larger scale organizations deciding to share a work environment in which they pro-actively share knowledge and experience.

2. Collaborative consumption of workspace

As the procurement and supply of spaces for work shifts from the conventional supply chain of developers and landlords to collaborative consumption, individuals and organizations are empowered to obtain workspace when, where and how they need it. They are able to use web based services to identify when and where space is available and obtain space in much more flexible ways. For larger organizations, this also means that they can release under-utilized or un-used spaces to a dynamic market and can thereby offload excess capacity to users who may need it. They are able to use web based services to identify when and where space is available and obtain space in much more flexible ways. For larger organizations, this also means that they can release under-utilized or un-used spaces to a dynamic market and can thereby offload excess capacity to users who may need it. The implications in terms of the larger transfer of leasing risk will eventually be priced into smaller and smaller increments of time consistent with the uniqueness of space user’s workflow. Individuals can use geo-location web based services to find work space instantly wherever they go, and pay for it by the hour, if need be. The balance of power in the supply chain is thereby inexorably shifted. The direction of change is moving to workspace as a service. For larger organizations, this shift may affect only part of their real estate portfolio and some of their workforce; nevertheless, it represents a new dynamic in the real estate market and a big shift in expectations about space and real estate.

3. Bandwidth, bandwidth, bandwidth

Aside from planning mixed neighborhoods and suitable buildings for tech businesses and startups, the city government needs to cooperate with utility companies to ensure that key sites have high levels of the bandwidth infrastructure to support technology companies that are utterly dependent on the internet. High quality broadband connectivity, reliability, and resilience have been raised as a concern by many tech start-ups across New York’s boroughs.\textsuperscript{121}

4. Workspace as a service

As work is increasingly provided for as experience rather than merely accommodated within a real estate asset, then it is no longer necessarily developers, landowners and landlords who provide this service. As work becomes more mobile, collaborative, social, inter-organizational and more often blended with other activities of living, learning, and being entertained in urban areas, other suppliers are emerging to provide for work as a serviced experience. The most significant new players in this field are hotels, some of which are providing highly developed work related services and workspaces. Other players, such as Regus and many other serviced office providers, have for a long time provided various forms of space, services, and technology for users who do not want to own or lease conventional office space. Many other urban players are evolving in this vibrant marketplace. Universities are sharing under-utilized campus facilities, and retailers are combining the high design of branded environments with work space environments.\textsuperscript{122} Airports, train stations, and other transport hubs are providing club-like work environments for commuters and travelers. Libraries, city halls and other municipal facilities are being transformed into work environments. Luxury residential condominium towers are creating highly serviced work clubs alongside the gymnasiums, spas, screening rooms, and other amenities now deemed essential. Of course, the oldest model for this is still relevant: the archetypal nineteenth century membership clubs that Frank Duffy noted were the precursors of the workplace as a Club.\textsuperscript{123}


\textsuperscript{121} See, Bowles (2013) at pg. 38.

\textsuperscript{122} Andrew Baum, Boscherieri Giuseppe, Ben Munn and Christopher Perri, The Workshop/Workplace as a Consumer Good, Henley Centre and CBRE (2013).

\textsuperscript{123} See, Duffy (1998).
REFERENCES


Baum, Andrew, Giuseppe, Bosccherini, Munn, Ben and Perri, Christopher, The Workshop: Workplace as a Consumer Good, Henley Centre and CBRE (2013).


Duffy, Frank, Work and the City (Black Dog publishers, 2008).


Evans, Graeme, Foord, Jo, et al., Strategies for Creative Spaces and Cities: Lessons Learned, Cities Institute, London Metropolitan University and Munk Centre for International Studies (University of Toronto, 2006).


Forest City Ratner, SM Project, available at www.5mproject.com (last accessed October 22, 2013).


Per, Aurora Fernandez, Mozas, Javier and Arpa, Javier, a + t Research Group, *This is Hybrid* (a + t Architecture Publishers, 2011).

Real Estate Executive Board, *The Agile Real Estate Portfolio: Building Flexibility through Greater Worker Mobility* (2009).


Owen, David C., **Green Metropolis** (Riverhead Books, 2009).

Propst, Robert, **The Office: A Facility Based on Change** (Herman Miller, 1968).

Quinan, Jack, **Frank Lloyd Wright’s Larkin Building: Myth and Fact** (The University of Chicago Press, 2006).


SocketSite, **Forest City’s 5M Project: Big Plans For 4 Acres At Fifth And Mission**, SocketSite (February 6, 2013) available at http://www.socketsite.com/archives/2013/02/forest_citys_plans_for_4_acres_at_fifth_and_mission_the.html (last accessed October 19, 2013).

Bohlen, Marc and Frei, Hans, **Micro Public Place**, in **SITUATED TECHNOLOGIES, PAMPHLET NUMBER 6** (Architectural League of New York, Spring 2010).

De Sola Pool, Ithiel, **Forecasting the Telephone: A Retrospective Technology Assessment of the Telephone** (Ablex Publishing Corp, 1982).


Varnelis, Kazys and Freidberg, Anne, **Networked Publics** (Cambridge, MIT Press, 2008).

Waber, Ben, **PEOPLE ANALYTICS** (Financial Times Press, 2013).

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CREDITS
CURE. Adjunct Associate Researchers: Eivind P. Karlsten and Sam Allison-Mayne
Graphic Design: Eivind P. Karlsten
ANDREW LAING, Ph.D.

Andrew Laing, Ph.D., is a Senior Fellow of CURE and global practice leader of Strategy+ at AECOM. Laing joined the design consulting firm DEGW (which is now the Strategy+ consulting practice within AECOM) in 1989 and took a lead role in developing the firm’s consulting services worldwide. He relocated from London to New York to found the DEGW practice in North America in 1998, with offices in New York and San Francisco. He is interested in the changing worlds of work, technology and the design of places at multiple scales from the workplace to the urban. He has worked with many clients on re-thinking how their workplaces support their changing business needs, including Accenture, Capital One, CBC, Google, GlaxoSmithKline, General Services Administration, Microsoft, Nike, and the United Nations.

He co-authored the books: The Responsible Workplace (1994) and New Environments for Working (1998) with Frank Duffy and has published many articles. His workplace research was featured in Harvard Business Review (September 2011). Since 2007, he has been a Lecturer at Princeton University’s School of Architecture teaching a seminar on theories of urbanism. Since 2012 he has also taught at the Graduate School of Architecture, Planning and Preservation in the real estate development department at Columbia University. He was educated at the Bartlett School of Architecture in London and received a doctorate in urban studies and planning from MIT.