A CONCEPTUAL FRAMEWORK FOR THE ASSESSMENT OF

WORKPLACE IMPACT ON PRODUCTIVITY

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Laurie L. Swift

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A CONCEPTUAL FRAMEWORK FOR THE ASSESSMENT OF

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Approved by:

Professor Kathy Roper, Advisor
School of Building Construction
Georgia Institute of Technology

Dr. Daniel Castro
School of Building Construction
Georgia Institute of Technology

Professor Baabak Ashuri
School of Building Construction
Georgia Institute of Technology

Date Approved: November 3, 2011

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LIST OF SYMBOLS AND ABBREVIATIONS

A/V	Audio/Visual
ADA	Americans with Disabilities Act
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
AWS	Alternative Work Strategies
BOSTI	Buffalo Organization for Social and Technological Innovation
CIO	Chief Information Officer
CoreNet	Corporate Real Estate Network
CRE	Corporate Real Estate Executive
DEGW	Duffy Ely, Giffone, and Worthington (Architectural Design firm)
EBITDA	Earnings Before Interest Depreciation and Amortization
FM	Facilities Management
HR	Human Resources
HVAC	Heating, Ventilation, and Air Conditioning
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
IT	Information Technology
NIST	National Institute of Standards and Technology
PCI	Payment Card Industry
POE	Post Occupancy Evaluation
SAS	Statistical Analysis Software
SF	Square Feet
USGBC	United States Green Building Council

SUMMARY

According to Frank Duffy, "the shocking fact is that almost 100 years of scientific enquiry into the relationship between office design and business performance has produced few replicable results with of any practical value" (Duffy 2007). In his essay "Justifying Place in a Virtual World", he goes on to describe why this area of study has been so difficult: the complex business environment of an organization, the economic context at a specific point in time, the poor feedback mechanisms for the office supply chain, the rate of change for both technology and organizations, and fundamental office politics. Despite the harsh reality of what Dr. Duffy asserts, the decision a corporate real estate executive (CRE) must make and present to his executive management team, has to address the costs and benefits of selecting and outfitting office space for the enterprise. If the entire decision could be based on mere real estate costs, then it would be a simple matter of choosing a least-cost solution for office space, but one must address the human factor and the various impacts to the occupants of the building. This research is an attempt to provide a practical tool for the CRE to use as a framework in making office space decisions including what other companies are doing and what is working as well as to provide a conceptual framework for the influences that should be considered.

This effort focused on a literature review of three major areas: office space design and the productivity impacts, sustainable buildings and the rating system elements which could impact productivity, and the concept of productivity measurement in a knowledge worker economy. In reviewing the literature on office space design and how researchers have assessed the value of various design considerations, it became apparent

that academics, furniture designers, architects, and others have developed compelling arguments about what works that has led to a set of contradictions for the CRE. For example, open office plans promote collaboration and creativity and are therefore superior yet knowledge workers need acoustical privacy in order to concentrate and deliver results. Another contradiction is that younger generations prefer to work outside the office and therefore do not need a dedicated space yet they also need a sense of belonging and identity with the brand when working for a company. In addition to the type of space to provide, the CRE must also assess the types of buildings that are appropriate for the company to occupy.

A common theme in research surrounding green building rating systems is that green-certified buildings can have a positive effect on productivity through improved air quality, occupant comfort, day lighting and views, and the sense of corporate responsibility they promote. Some research has indicated productivity improvements between 2% (Singh, Syal et al. 2010) and 5% (Miller 2009) for LEED certified buildings over standard office buildings, yet the literature review on knowledge worker productivity reveals it is difficult to measure productivity and that subjective job satisfaction measures are the most common solution.

Given the conflicting opinions surrounding what works and the lack of objective measurement systems for productivity, this research focused on the Explanatory Case Study method. Three companies of a similar size in different knowledge worker industries were selected for an in-depth analysis of their office space design, the LEED or other green building characteristics of the structure, and the business context in which they operate. Representatives from CRE, Human Resources (HR), and Information

Technology (IT) were interviewed via a structured questionnaire to gain insights and opinions as to how not only the workplace, but other influences combine to impact productivity.

Research findings reveal that all participants asserted the importance of workplace design, the need for collaborative space, and the desirability of a green building. These were subjective opinions because the companies do not systematically track productivity data in a standard method.   Knowledge workers are most productive when they are satisfied and while workplace has a significant influence there are other factors which interact to impact job satisfaction. With the use of a conceptual framework, the CRE can better understand the other influences which are present in their circumstances when making decisions about changes to the workplace.

CHAPTER 1

INTRODUCTION AND BACKGROUND

Buildings exist to fulfill a purpose. For office buildings it is "to support a commercial strategy, to accommodate innovative work processes, and to broadcast a particular set of business values" (CABE 2005). As companies and the type of work performed have evolved from the industrial age to the information age, so have the office buildings. Industrial age office interiors supported a hierarchical control structure characterized by large offices for management and bullpens for staff, while knowledge age office space is focused on the needs of the knowledge worker. This evolution has led to the concept of the office as a tool to perform work, rather than a status symbol of achievement for the worker (Brill 2001). As different tools are utilized to perform different types of work, so must the office be different based on the work performed by the occupying company. There has been a significant amount of research done by architectural firms, furniture designers, and others to assess the appropriate office configuration for the different types of work, and there are a large number of solutions that could be the right fit for any one enterprise.

What remains constant between the Knowledge Age and the Industrial Age is that offices continue to be used for branding and identity purposes so employees and the general public get a sense of who the company is that occupies the space. The messages may be different in the Information Age but the office space is still a form of showcasing

the products or services the company offers through its workplace fits and finishes. A newer concept in today's messaging is that space conveys the company's sense of corporate responsibility through the use of sustainable materials and energy efficiencies in addition to other factors such as site selection and promotion of alternative transportation. A choice for today's company is whether or not to require the office space it occupies to be a LEED certified space, which sends the message that corporate responsibility is a core value of the company.

There are a complex set of decisions a company must face when selecting the right office configuration. There must be sufficient space for the planning horizon, it must be organized in a manner that supports the work processes, it must send the right message about the company's value system, and the space must enable office occupant productivity.

1.1 Office Space Layout Impacts to Productivity

From the 1970's era until present day research on space design, the controversy of open plans versus private offices has been under review. Added to this are the increasing costs of real estate as companies more tightly manage their administrative and general expenses. Open plans are typically able to accommodate more workers per square foot than private offices. Current space standards are approximately 200 SF/person with the average enclosed office at 150 SF and the average workstation between 64-80 SF(GSA 2011). According to one productivity researcher "no one has ever expressed that they wished they had less space"(Stamer 2011). Despite whatever personal preferences or belief systems surrounding status around office space, the corporation is charged with finding cost effective tools and resources to enable employees to be productive and the

current trends, technologies, and furniture systems are enablers which can facilitate or impede worker productivity.

The Buffalo Organization for Social and Technological Innovation (BOSTI) is an organization with 30 years of workplace research, planning, and design. In a six year study between 1994-2000 involving 13,000 people across 40 business units, BOSTI identified 10 major workplace factors which have the greatest impact on productivity: The ability to do distraction-free individual work; Support for impromptu interactions, Support for meetings and focused group work; Comfortable workspace; Workspace that can accommodate drop-in visitors; Workspace adjacent to co-workers; Sufficient space for breaks; Access to needed technology; Access to daylight; and Air quality with some degree of temperature control (Brill 2001). How to provide all these elements in a cost effective delivery system has been studied in great depth by architectural firms such as DEGW and Gensler, Furniture systems providers such as Haworth, Kimball, and Steelcase, and consulting firms such as Accenture. With differing language, the concepts of working together versus working alone as seen in Figure 1, have led to general space design concepts which acknowledge that a variety or spaces must be provided in order for various departments within the organization to properly function.

Where DEGW utilizes the term "Den" for group processes, both Gensler (Andreo 2008) and Haworth (Cameron 2009) have called the same concept "Collaborate". They have similar meaning which is: knowledge workers working together on a solution. The DEGW "Club" term is called "Create" by Haworth, and means: a higher level of collaboration and thought processes to create ground breaking products or concepts.
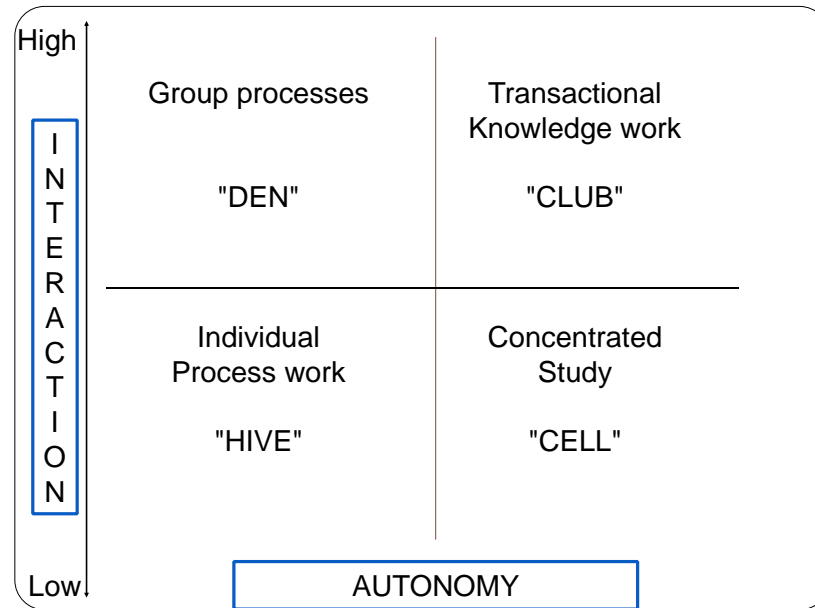
Figure 1: Work Styles
Source: DEGW (CABE 2005)

Where DEGW uses the term "Cell" to mean a place for concentrated study, Gensler utilizes the term "Focus". The term "Hive" indicates transactional work and Haworth calls this "Control" which means to do things right.(Cameron 2009). An additional space concept that Gensler uses is called "Learn", a self explanatory term indicating places to conduct training and development for the workforce. Another Gensler term is "Socialize" which indicates space designed to encourage informal interactions. DEGW has used a concept of "Neighborhoods" with a "Main Street" to develop a similar concept (CABE 2005).

These layouts all have successful applications to work styles and in many cases it is easy to predetermine what layout a department or work group needs without their input. It is still important to involve the impacted work groups to some extent so they have a sense of ownership about the spaces they occupy (Hodges 2008).

1.2   Furniture systems and Ergonomics

Ergonomics is widely recognized and studied in the manufacturing environment, yet understanding in the office environment has lagged. Research indicates that something as simple as a well designed office chair can increase job satisfaction by 27% and that ergonomically designed office furniture can have a positive 15.4% impact on productivity (Davies 2005). The assumption behind these productivity claims is that the typical office worker knows how to adapt this well-designed office chair to fit their particular physique. Office furniture providers have done a good job in assessing human characteristics and finding effective ways to produce furniture and peripherals to fit many different shapes and sizes, yet there are knowledge gaps for the people who actually purchase, deliver, and use this furniture. OSHA provides extensive information about the appropriate posture and chair adjustments needed to prevent muscle strain (OSHA 2011), but few employers provide an emphasis in making sure employees are aware of this information. Some companies are realizing this void and have organized office safety committees to address the day-to-day issues that can arise in a typical office environment and safety professionals suggest that employees receive basic training on ergonomics and how to adjust the office furniture provided to them as they would receive training on any other tool (Braganza 1994).

1.3 Technology Implementation Impacts to Productivity

There are a number of technology impacts to productivity and the ones which impact entire organizations and their interaction with other organizations could arguably be considered a part of the workplace. These include the IT infrastructure within the

physical office in addition to technology enablers for alternative workplace accommodations and telecommuting options. Examples would include voice and data systems, desktop support hardware and software, mobile computing devices, audio/visual tools, document management tools, and collaboration environments. There are additional technologies to support an individual organizations' productivity such as knowledge management databases, business process automation software that this researcher considers part of the firm's intellectual capital and not part of the workplace per se.

An effective partnership between the CRE and CIO is necessary to make the workplace function for the benefit of the occupants (Davenport 2005). IT standards and security concerns must be considered before the workplace infrastructure can be modified, and sometimes the security requirements restrict what can be deployed. Depending on organizational alignment of resources, decisions made by the CRE can increase workloads for some IT staff and impact IT budgets, so these decisions must be made collaboratively with the productivity of the occupants as a primary concern.

In a 2006 study by Dieringer Research, approximately 10% of U.S. workers regularly work at home while 25% have the capability to do so. (Fuhr 2011) Due to the improvements in technology from both a price and a performance perspective, it is likely that these percentages have increased significantly by 2011 and research firm IDC has predicted 35% of the workforce will be mobile by 2013 (Barber 2011). This makes the need for the corporate workplace to easily and reliably provide a seamless interface for the remote worker a high priority. Major employers such as Cisco, Siemens, and American Express have reported increases to worker productivity of 10%-50% from their employees' ability to work remotely (Fuhr 2011). Researchers from Pennsylvania State

University, the Georgia Institute of Technology, and the Batton Institute have independently found similar productivity increases from mobile work and cite reduction in employee absences, lost time in traffic delays, reduced stress, reduced turnover, and improved job satisfaction as reasons for these improvements (Barber 2011). Ernst & Young has developed processes to institutionalize a mobile work force. They have implemented technologies which allow employees to reserve offices irrespective from which city they are working. The reservation system seamlessly moves their office phone number to the destination work location and updates their location so co-workers can find them at any given time. Feedback has been positive, and many of their younger workers feel this dynamic work space allocation promotes better work/life balance. (Barber 2011).

Companies today are assessing the impact of cloud computing defined by the National Institute of Standards and Technology (NIST) as a "model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. network, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Han 2010). What The Cloud enables for the workplace is the ability to have applications and data available to the organizations employees irrespective of their physical location and largely independent of the physical access device they use whether it is a laptop, tablet, or a smart phone. The challenge for the IT organization is to effectively secure the organizations' data and define what performance risks are acceptable. Once that challenge is overcome then scarce IT resources can be redeployed to activities beyond supporting the infrastructure. Some companies are migrating from

company owned end user devices such as laptops and providing allowances to employees to provide their own technology. This is accomplished by moving basic functions such as e-mail to The Cloud. According to one executive from Shell Oil, this not only provides flexibility and enhanced productivity for the employee, but also is also effective at managing costs (Probyn 2011).

Gartner Group has gone so far as to predict that by 2014, companies will see social networking services replace e-mail as the primary means of interpersonal communications for 20% of business users (Collins 2010). Social media is already heavily used by the HR function for recruiting which has enhanced their productivity in the hiring cycle. Productivity increases are attributed to finding candidates who come into the hiring cycle somewhat pre-qualified as they are connected to other qualified and respected co-workers through tools such as LinkedIn (Adler 2011). Another technology which is transforming the way people work is the latest generation of video conferencing which utilizes high definition display. Cisco's product is known as "Tele-presence" where the HP offering is called "Halo". This type of video conferencing is truly as effective as an in person meeting as long as sufficient bandwidth is dedicated to each video conference event. Personal expressions are visible and other than the lack of a handshake, it feels like a traditional face-to-face meeting. Another reason this technology has become so effective is that the use is as easy as making a traditional phone call.

There are drawbacks to the newer technologies as they challenge the way companies have worked. Social Media tools require revised corporate policies and guidelines for appropriate usage. Companies have been somewhat reluctant to invest heavily in high definition video conferencing because of the up-front investment and due

to prior generations of video conference technologies that were largely ignored due to their low quality visuals and complex operating instructions. The Cloud requires a thorough scrutiny of data security practices before companies are comfortable in rolling out their corporate intelligence to unseen storage devices. Despite these challenges, technology changes are being implemented because of the productivity benefits they enable and the total life cycle cost advantages (Harrison 2009).

1.4   Green Buildings and the Impact to Building Occupant Productivity

The USGBC introduced a standard system to define and measure "green buildings" in 1998. While other green building rating systems exist, LEED is most widely recognized and was used as the reference system for this research endeavor. The system was developed by a cross functional team of architects, real estate agents, building owners, environmentalists, lawyers, and other industry representatives to ensure a fair, unbiased, rigorous rating system which could be applied across a diverse set of buildings. This rating system was called LEED which stands for Leadership in Energy and Environmental Design, and labeled as version 1.0, knowing that the system would evolve after practical application to buildings and with the intent to increasingly raise the bar to qualify buildings for certification and improve credentialing for industry professionals. The current version of LEED is referred to as LEED 2009, and the next version, LEED 2012, is under development.

Many of the elements measured by the LEED rating system are focused on creating healthy buildings as Americans spend an average of 90% of their time indoors (USGBC 2010). According to the USGBC, the annual economic impact from reduced respiratory disease ranges from $6 to $14 billion, with reduced allergies and asthma

contributing an additional $1 to $4 billion. Reduced sick building syndrome symptoms are believed to have a positive economic impact between $10 to $30 billion, and the overall annual economic impact from non-health related productivity improvements could be as high as $160 billion.(USGBC 2010)

1.4.1 Environmental Quality Systems and Impacts to Productivity

The LEED rating system elements which most closely impact productivity address: improved ventilation, reduced air contaminants, elimination of harmful materials in interior finishes and cleaning practices, better access to daylight and views, and allowing occupants some level of personal control over lighting and temperature. This overall LEED category has been called Indoor Environmental Quality (IEQ). According to the Center for the Built Environment, occupants of LEED-certified buildings are more satisfied with their thermal comfort, air quality, and cleaning and maintenance than occupants of conventional office space (Abbaszadeh 2006). LEED credits are awarded to buildings through the certification process and the IEQ category alone represents a potential 15 credits out of the minimum 40 to be a LEED NC or EB certified building. While IEQ has been defined to also include noise (Dorgan 2006) and LEED recognizes it as part of IEQ, there are no specific credits for acoustical performance for any type of building other than schools.

1.4.2   Air Quality and Health Impacts

Workers spend 90% of their time indoors (Callan 2006) and the average individual spends up to 95% of their time inside (Dorgan 2006) so it is important to examine the quality of indoor air and what impacts there are to quality of life and

productivity. Indoor Air Quality (IAQ) has been defined as a subset of IEQ that includes temperature, humidity, room air motions, and contaminant concentrations.

Many researchers have concluded that if IAQ is not satisfactory, then work quality may degrade along with the satisfaction level of both employees and customers (Dorgan 2006). Researchers also agree that it is difficult to study IAQ separately from other impacts to productivity as the IAQ is one variable in a complex work environment that include physical and psychological factors.

Some of the variables in commercial buildings which can impact IAQ studies include (Clements-Croome 2006):

- Comfort, which includes the perception of personal control over one's environment.

- Responsiveness to need or the perception that complaints and concerns are being addressed and solved with a sense of urgency.

- Ventilation type, which addresses the depth of the building and access to natural air ventilation and light.

- Workgroups, specifically the size of the group and the commonality of purpose.

- Design intent which encompasses the various building features that were designed and how well they were communicated to the occupants both before and after implementation.

While many of these variables have technical aspects they also have a subjective aspect based on the individual's personal filters and how they perceive their environment. If employees are happy with other circumstances associated with their work such as

management styles and overall engagement with the enterprise, it will also impact the variables that are associated with IAQ.

A study conducted by Charles and Chad Dorgan (Dorgan 2006) examined all USA commercial building stock and synthesized information from other research. They examined health costs and productivity benefits, specific IAQ-related illnesses and their cost impacts, and issues unique to the hospitality industry. Dorgan's approach was to develop the business case for companies to pay attention to IAQ. The stated objectives of the research were to:

- Classify and recognize IAQ degradation. This was done by classifying buildings as healthy, generally healthy, unhealthy

- Quantify health cost benefits. This was accomplished by applying medical researchers cost data to buildings classified as less than healthy and through interviews with operations personnel

- Quantify productivity benefits. Benefits were determined by applying researchers experience to the aggregated data which was stratified by building healthiness and then applying the data to the worker population and associate compensation.

- Identify costs to remediate IAQ issues. The total costs to remediate older buildings to ASHRAE standard 62-1999.

Dorgan concluded that U.S. companies could experience substantial savings by investing in IAQ improvements and thereby improve factors which impact worker productivity. As summarized below, the U.S. economy could enjoy economic benefits year over year with a net present value of over a trillion dollars.

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Table 1: Health related productivity benefits related to IAQ improvements (Dorgan 2006)

Inventory	
Number of commercial buildings in the U. S.	5,061,780
Total Space	$69.7 billion SF
Number of workers	83.7 million
Productivity and health benefits	
Annual total productivity benefits	$79.8/billion/yr
Annual reduced health cost	$11.9 billion/yr
Annual total productivity and health benefits	$91.7 billion/yr
Annual employee-related benefits, total	$1096/worker/yr
	$1.31/SF-yr
Cost to implement	
Implement all identified IAQ improvements	$123 billion
Average cost per area	$1.76/SF
Average cost per worker	$1,470
Initial average economic simple payback	1.3 years
Annual cost to sustain all improvements	$5.6 billion/yr
Net 20-year present value of benefits less cost (i=3%)	
For all improvements	$1132 billion
Per area for all improvements	$16/SF
Per worker for all improvements	$13,500/worker

There are five IAQ-related LEED credits available to buildings. The credits relate to proof of an IAQ management program and the ability to meet ventilation criteria with points given for exceeding the ASHRAE 62.1-2007 standard. Outdoor air monitoring and air quality management during facility alterations and additions can yield points, in

addition to exceeding the ASHRAE 52.2 standard related to particulate air filtering and distribution.

1.4.3   Lighting and Acoustics Impacts

The strategies for achieving a LEED credit for daylight and views acknowledge the need to balance potential issues such as heat gain, glare, visual quality, and variations in daylight with technical solutions such as shading devices, atriums, courtyards, and window glazing (USGBC 2010). The benefits of providing access to daylight have been described as an increased sense of well being for occupants and improved academic performance in schools. There are case studies reporting increases sales in Wal-Mart stores where natural light was available, and observed productivity increases by management at Lockheed (Callan 2006).

There are negative productivity consequences when lighting issues are ignored. A study sponsored by the American Headache Society examined environmental impacts on migraine headaches. Workers who experience migraines are either absent or have reduced productivity which can contribute up to $13 Billion in lost productivity (Friedman 2009). While the weather plays a large role in triggering migraines, the IEQ attributes which influence migraine episode are noted as noise and lighting. Some of the suggested remediation included: limiting exposure to video display terminals, changing the lighting, utilizing ergonomic chairs, and providing glare filters for non-VDT computer screens.

There are no LEED credits awarded for acoustical improvements outside of the school category. Acoustical distractions are a concern and in some green buildings,

credits for other LEED categories have caused acoustical issues. One example from early

an early LEED facility was the adverse impact to acoustical privacy through the

implementation of an under floor air systems (Malin 2003). The system aided thermal

comfort and energy efficiency, but caused unforeseen problems with acoustical privacy.

1.4.4   Impacts from Temperature

In a Finnish study which included five different office buildings, researchers

examined temperature impacts to productivity. The researchers utilized internet-based

questionnaires to examine both objective and subjective factors in perceived productivity.

The questionnaires were completed over a 1-month period during each of the four

seasons. While the researchers set out to assess temperature impacts to satisfactory air

quality, they found human-related factors such as temporary mental well-being had a

much stronger impact than temperature setting. Aside from that factor, 80% of occupants

were most comfortable and found air quality most satisfactory at 22.5 C or 72.5 F

(Kostiainen 2008).

1.4.5   Green Cleaning systems

A total of six LEED credits are awarded to buildings with Green cleaning policies

and programs. The credits are focused on encouraging businesses to use environmentally

friendly products and to change behavior through purchasing practices. The productivity

impacts from Green cleaning practices are indirect, as they impact overall air quality.

Other benefits from Green cleaning are observed in the upstream and downstream supply

chain.

CHAPTER 2

KNOWLEDGE WORKER PRODUCTIVITY

Knowledge worker is a term first introduced by Peter Drucker in the 1950's to distinguish a worker who develops concepts, thoughts, and ideas into company assets as distinguished from the manual worker in the manufacturing environment. Others have described knowledge workers as those with high levels of experience, education, or expertise whose primary purpose in their job is to apply or disseminate knowledge (Davenport 2005) or those who explore and generate ideas or concepts rather than focus on a single process or operation (Brand 2009). Drucker was concerned with the concept of knowledge worker productivity as the largest management challenge of the 21st century economy and was developing the concept against the backdrop of a significant rise in manufacturing productivity in post World War II America. More recent research has focused on knowledge management as a key to a company's competitive advantage (Mitchell 2009).

2.1   Corporate Influences and impacts to Productivity

While the workplace has impacts to employee productivity, there are a number of other elements which interact to influence an employee's ability to perform well. Organizational psychologists contend that individuals require some element of personal control over their environment, need the ability to utilize their specific skills, and have the organizational support to deliver results with those skills while also be compensated fairly (Clements-Croome 2006). BOSTI conducted research of over 13,000 individuals across many industries to assess design factors and asserted the effects from technology;

reward systems, direct supervision, and work/life balance had a 76% impact to job satisfaction but that the workplace still had a significant 24% impact. For the workplace design BOSTI concluded that support for distraction-free individual work in addition to support for impromptu interactions were the two most important factors for not only job satisfaction, but also for individual performance, and team performance (Olson 2002). The model depicted in Figure 2 describes the business context in which productivity must be considered, and was developed based on the literature review and supplemented with the researcher's experience.
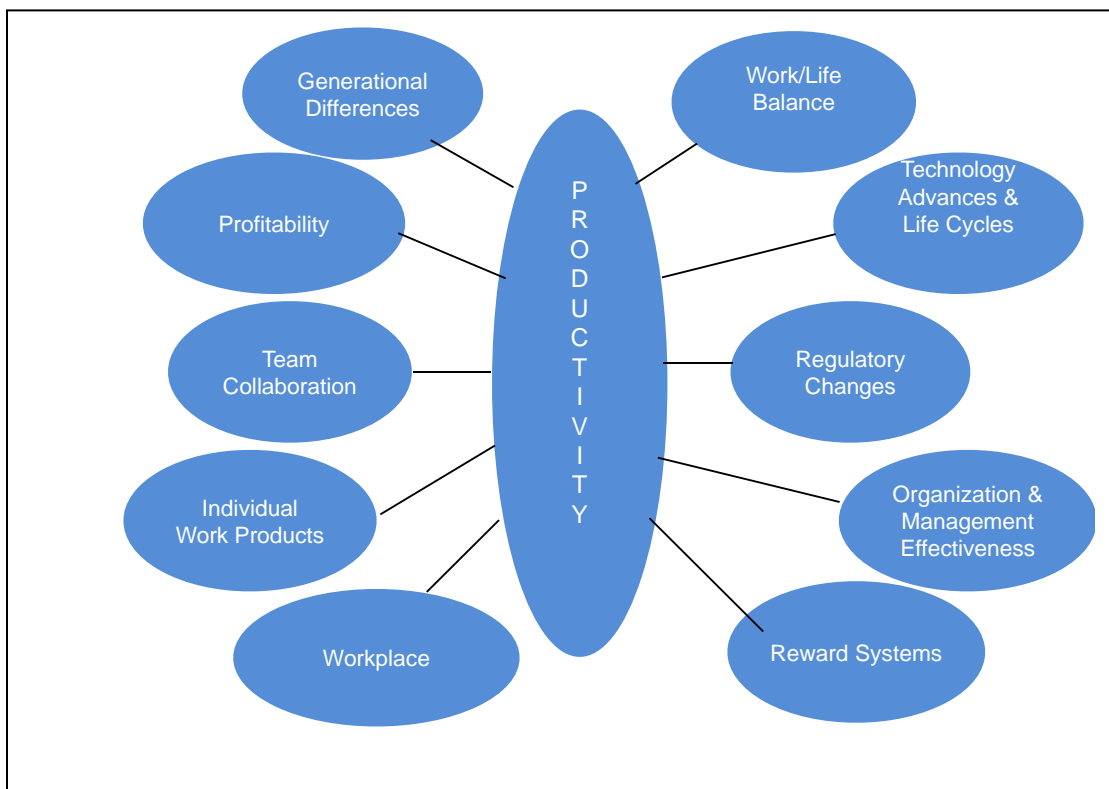
Figure 2: Corporate Influences to Productivity

While the workplace is the primary element of this research, the other elements influence productivity and were assessed in the primary research efforts. During the course of the research, the model was amended to better reflect how these elements interrelate. The meanings of the elements are defined as follows:

- Work/Life Balance is the company philosophy related to time spent with family, hobbies, and wellness programs relative to time spent focused on work deliverables. It includes the company's position on flexible work arrangements and any physical provisions such as onsite daycare centers (Harrison 2006).

- Technology Implementation is the infrastructure provided by the company to enhance collaboration, support individual work, provide connectivity anywhere to other company employees, the company network, applications and data. (Clements-Croome 2006)

- Regulatory Influence includes governments or other regulatory bodies' mandated changes that may require interpretations by the company. Examples include: financial regulations, ADA, and security/safety requirements.

- Organization Effectiveness addresses the employees' perception of the company and their level of engagement. It includes leadership, performance management, branding, social responsibility, and overall confidence in the organization (Jolton 2009).

- Reward systems include the company's philosophy regarding compensation and benefits and any other forms of employee recognition. This is often considered part of organization effectiveness.

- Generational Differences include the company demographics and how the organization chooses to respond to any differences that may exist.

- Profitability includes the financial well being of the company and potential growth opportunities for the employee.

- Team Collaboration addresses the type of work performed at the company and how collaborative processes are supported. This was later combined into type of work performed.

- Individual Work Products. This was combined into a single element with team collaboration and labeled "Type of work performed". Individual work examples would include software programs, legal briefs, written documentation, analysis reports.

- Workplace addresses the physical delivery of the office work space and any amenities which are provided on the property (Brill 2001).

2.2 Workplace Impacts to Productivity

According to the 2008 Gensler Workplace Survey, the average American worker is 42, has been with the company for 6.3 years and works in an office with 210 workers in a company of 3,711 employees. Other characteristics of the average American worker are a feeling of less time to think in the office due to increasing pressures while over 14% of social time is spent with work activities and colleagues (Andreo 2008).

In a 2002 study, Thomas Davenport, and his colleagues interviewed 41 companies which were in the process of redesigning space for knowledge workers (Davenport 2005). This research provided insight into what knowledge workers need to be effective in a workplace:

- There is a preference for an enclosed office, but knowledge workers communicate more effectively in open space.

- Knowledge workers prefer geographic locations where there are others with similar expertise.

- Knowledge workers are mobile, spending up to half their time outside the office while still working productively. This is balanced with time spent in the home office where they connect with each other and fulfill a need to be part of the larger enterprise.

- Knowledge workers both collaborate and concentrate. There is a need for the physical work space to provide solutions for both types of work.

- Knowledge workers communicate to those close by.

Other research confirms Davenport's findings. Tom Allen outlines the concept that technical (or knowledge) workers do not communicate with co-workers whose space is 30 meters or more apart (Wineman, Kabo, and Davis, 2009). While technology allows communication around the world, this 25 year old concept really represents having co-workers with whom you have respected professional relationships readily available for sharing concepts and brainstorming in real time.

In 1995 Shalley studied the effects of the physical workspace on both productivity and creativity and learned the type of task and goals associated with the

task impact whether the worker performed better alone or in the presence of others. The study revealed high production expectations were fulfilled better by those working alone, whereas a goal for a creative solution was fulfilled better in the presence of others (Shalley 1995). This confirms a need for knowledge workers to have both collaborative space and space to focus.

Furniture designer and manufacturer, Haworth, discovered that knowledge workers value dedicated team rooms because they allow the collaboration and cognitive processes required to do their jobs while also providing control over their environment. Some of the features most valued were the whiteboards which they called "displayed thinking", and the portable furniture which enabled flexible working arrangements. Another finding is that the presence of the team rooms conveyed a sense of status to the project team and communicated to others the value of the team's contributions (Augustin 2009).

An interesting concept called equity theory addresses the notion that employees have an inner sense of what value their inputs are to the organization and how those balance with their outputs, or rewards. Many employees view office space as a form of recognition or status. In a 1988 study at an insurance company employees were temporarily assigned to different types of office space on a random basis. If the employee was assigned to "better" space there was a tendency to perform at a higher level, where if assigned to "lesser" space there was a tendency to perform at a decreased level. This was called the equity theory (Voss 2009). For today's knowledge worker the underlying lesson is that if workspace changes are

made that may be viewed as a step backward, a method of restoring status needs to be addressed or productivity levels may be adversely impacted.

2.2 Productivity Measures

Measuring knowledge worker productivity is difficult. It is hard to quantify the quality, result, or impact of an idea, solution, or other intangible work product. As an example, the software development discipline has implemented measures such as "lines of code" and then abandoned those measures when it became apparent it had nothing to do with the quality or effectiveness of the resulting software programs. Other processes to measure productivity in the software development life cycle have been attempted, but none can claim success. In the world of attorneys, a common metric has been "billable hours", but that is not representative of how effective a law firm is at resolving a matter and therefore has lost favor as a true productivity measure.

Some of the measures presented in the literature review are:

- Reduced absenteeism, fewer breaks, fewer early departures (Hameed 2009)
- Reduced sick time from unhealthy buildings (Dorgan 2006)
- Increased accuracy, longer work periods without tiring, learning more effectively, being more creative, handling stress, getting along with teammates, coping with difficult situations, accepting more responsibility (Clements-Croome 2006)
- Speed of typing (Wyon 2006)

- Overall job performance including employee satisfaction, less absenteeism and turnover, creativity, collaboration, working more hours and accessing more documents (Morgan 2008)

- Subjective self-assessments of productivity (Martin 2006)

Most of these measures were utilized because they could be counted, not because they represented a unit of knowledge being created or improved. Morgan's subjective measures of job satisfaction and Martin's productivity self assessment have become the more recognized method to assess knowledge worker productivity.

CHAPTER 3

RESEARCH METHODOLOGY

Due to the impacts of technology, reward systems, career growth, meaningful work assignments, work/life balance and other factors which BOSTI found to impact 76% of an employee's job satisfaction (Olson 2002), a structured interview and explanatory Case Study approach was selected. This enabled the researcher to document the overall business context of an organization and its' impact on the work produced within that organization.

Much of the prior research on workplace productivity impacts utilized formal questionnaires with focus on a narrow aspect of the workplace such as air quality ((Kostiainen 2008), (Huizenga 2006),(Abbaszadeh 2006)), acoustical distractions (Juneja 2010), or on a specific characteristic association with productivity such as reduced absenteeism or fewer sick days (Seppanen 2005). One study provided a broader view of the workplace characteristics via a questionnaire to 31 branch banks in Pakistan but the results were limited to a specific type of office and a single culture (Hameed 2009). Another research category involved organizations such as BOSTI, architectural firms such as Gensler or DEGW, or furniture providers such as Haworth, Steelcase or Kimball. These service providers have databases of past projects that cover multiple years and industries which makes the data more robust, but with the perspective of a service provider. Research done by the occupiers of space is limited and takes the form of post occupancy evaluations with the results generally kept private.

When deciding which research method to apply here, the use of an explanatory case study with a structured interview data gathering mechanism seemed to be the best fit. This research is intended to be a practical tool for the CRE, who is faced with making a 10 year office decision in a world of uncertainty and with planning cycles that are approximately 3 years in length. Morgan suggests that the structured interview is the most useful due to the subjective nature of productivity measurement, where "user satisfaction has become the established proxy for productivity measurement" (Morgan 2008). The structured interview allows the researcher to collect the same information across a number of different implementations while also allowing follow up questions to put the answers in context. Structured interviews with assessment tools are utilized frequently by companies in the hiring process so that interviewers are able to assess one candidate against the others and develop a more complete and objective view of the candidate's capabilities than by random questioning or by performing a narrow test of a specific skill that does not represent the entire dimension of the job to be performed.

The companies were selected based on their involvement with the Corporate Real Estate Network (CoreNet), and their willingness to share information which may be considered sensitive. Three companies agreed to participate with all occupying different types of space. One of the companies was preparing to close a merger that would dramatically impact the Atlanta office, so the research reflects a fourth company which is the entity post-merger. A fifth company was approached and initially agreed to participate but declined due to the sensitivity of the information requests. An introductory memo was sent to the CRE outlining the purpose and scope of the research along with the information requests and the desired interview subjects.

An assessment tool was developed after conducting the literature review, from the model in Figure 3. This model represents the various corporate influences that can impact productivity and was derived after reviewing the research by BOSTI and Brill, Olson, Clements-Croome, Harrison, Jolton, and the researcher's prior management experience. This model then became the basis for the structured interview assessment tool found in Appendix B.   As Morgan suggested, use of an assessment tool was useful in making comparisons across the different companies.
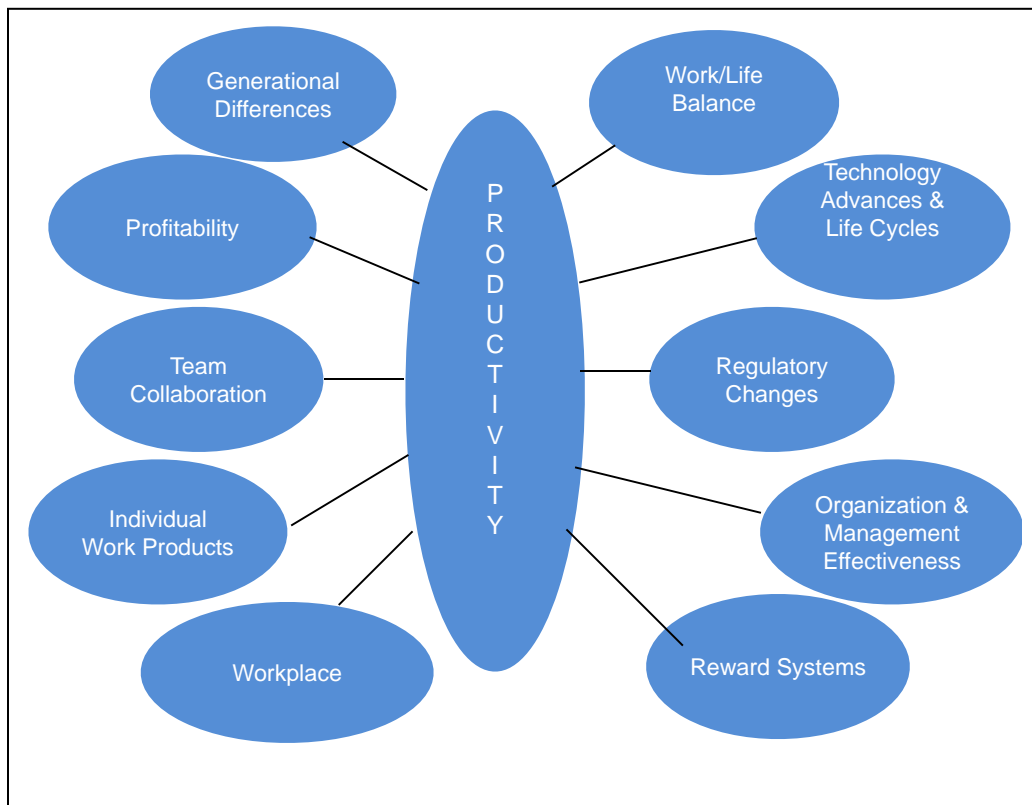
Figure 3:   **Corporate Influences to Productivity Model**

The assessment tool was reviewed with the CRE, an HR Director, an IT representative at the Director level, and others as needed. HR was critical to the research

as they have insight into how the organization functions and hear complaints from the employee base which may not be solicited by the workplace providers. HR is also the owner of the employee engagement/satisfaction survey process and can provide the results of those efforts. IT was needed as much of the workplace is dependent on technology enablement, particularly with a mobile workforce. Facilities and Corporate Real Estate were important as the other providers of the workplace.

After the structured interviews were completed, the data was tabulated and compared for trends and observations. The model was revised to better reflect what was learned in the course of the case study and is found in figure 4. The original model indicated that all productivity elements had a direct impact to employee productivity.
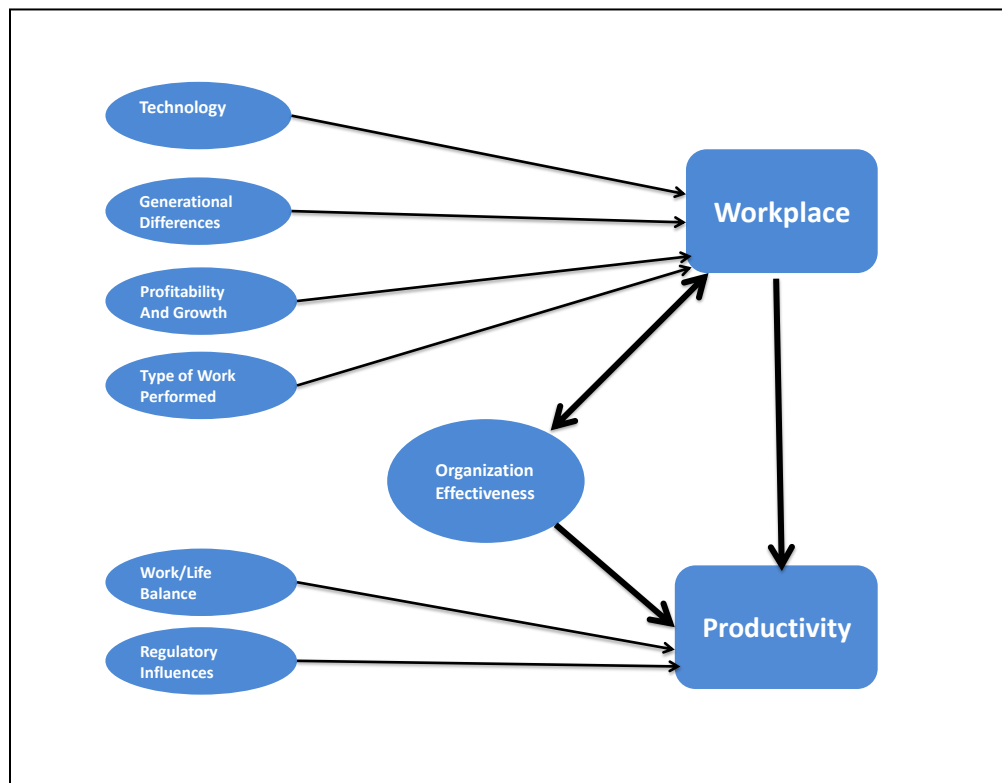
Figure 4: Revised Corporate Influences to Productivity Model

This research effort discovered that some elements: Technology, Generational Differences, Profitability and Growth, and the Type of Work Performed all influence the design and delivery of Workplace and therefore have an indirect relationship to the employee or occupant's productivity. The revised model fulfilled the research objective to provide a conceptual framework for the influences that should be considered regarding workplace decisions and the impact to employee productivity.

CHAPTER 4

RESEARCH FINDINGS

4.1 Company A: Payments Processing Company

Company A is a global payments processing company. The Atlanta location is a corporate headquarters facility and is housed in a popular office building complex with a number of amenities including: three cafeterias, a health club, an onsite child care facility, outdoor walkways, minor retail, and an ATM. Within the company space, a traditional coffee bar and vending are provided. Approximately 440 employees are housed at this location and the company is in growth mode with an approximate 10% increase in headcount over the prior year. Company A has been in the current building for 15 years, and has acquired pockets of space on an as-needed basis. The various company functions are spread out over five floors with only two floors being 100% occupied by Company A employees. Due to the reactive nature of fulfilling space needs, the space has been taken on a close to "as is" condition by only updating the finishes which were required. All the finishes are dated and the company has been actively seeking a longer term, integrated facility planning solution to its needs. A project has recently been approved to relocate to a nearby building on the same property taking 100,000 SF on contiguous floors so that the company can have its entire Atlanta headquarters in a branded, cohesive workspace. The space plan will change from a fairly closed space plan to a very open space plan over the next 6-9 months.

4.1.1 Company A Workplace Assessment Results

The structured questionnaire in Appendix B was reviewed with the Corporate

Real Estate (CRE) Executive and separately with the Human Resources (HR) Director.

These particular individuals were selected based on their areas of expertise and their roles

within the company. When answers to questions utilizing the Likert scale varied, the

results were averaged between the two responses. The interviews were conducted after a

tour of the facilities so that the researcher was able to ask follow up questions in the

context of the physical delivery of the company workplace.

4.1.1.1   Company A General Information

Company A is a corporate headquarters which houses approximately 440

employees. The types of employees are primarily professional with 70% designated

professional, 2% executive, and 28% clerical. The facility is over 20 years old and while

it is well maintained, it is not LEED certified. A visual inspection of the property

revealed dark interiors, high walled cubicles and maze-like corridors opening up into

different pockets of workspace. Within the specific workspace pods, the space layout

reflected the type of work being performed such as no-walled workstations for contact or

call center activities and high-walled workstations for transactional activities such as the

accounting group. There were some dedicated project areas for IT work which the CRE

described as "a temporary 18-month project that has been going on for over 3 years".

The company is initiating a project to acquire contiguous space in another portion of the

office park, and in the future layout there will be more open and collaborative areas

which reflect current design trends. This project is intended to be complete by mid-2012

and will encompass the entire corporate headquarters footprint.

4.1.1.2 Company A Generational Differences

The majority of Company A employees is classified as Generation X. Generation X comprises 62% of the employee population, with the Baby Boomer group following at 30%. There is less than 1% of the Legacy generation and 9% of the Generation Y. The presence of multiple generations has not presented any unique challenges to the company, nor have any specific accommodations been pursued. As the space planning approach has been reactive up to this point the CRE was forced to assign space based solely on what was available. The new 2012 headquarters space will be reflective of the management philosophy and based on current industry space standards which may introduce generational challenges that Company A has not yet experienced.

4.1.1.3 Company A Profitability and Growth

Company A is in a growing sector and has experienced a 5% revenue growth and a significant headcount growth of over 10%. The company tracks revenue/employee as a productivity measure, but does not find it truly representative of productivity, but rather an indicator of the cost of doing business between geographic regions.

4.1.1.4 Company A Types of Work Performed at this Location

The Atlanta location is primarily a marketing center with 48% of the work focused on business development. The IT function is significant at 22% and the accounting and finance function is similarly sized at 21%. Other corporate support functions such as HR, Legal, Operations, and Administration comprise a total of 8%. The type of work performed is primarily project work at 65%, with transactional work

representing 20% of the activity. Training and Marketing presentations represent

approximately 5% and Confidential work activities are an additional 10%.

4.1.1.2 Company A Workplace

Company A is located in a popular office park with a number of amenities. There

are three cafeterias on the property and a fitness facility with an extensive fitness

equipment and programs, and indoor and outdoor pool, racquetball facilities and spa

services. There are walking paths, minor retail facilities, and an on-campus daycare

center. Within the space occupied by Company A, the space allocation is primarily to

workstations with 40% of the space in low to no wall configurations, 40% in high walled

workstations, and 10% dedicated to enclosed offices. Conference room space covers

approximately 10% of the area footprint.   The use of workplace standards is generally in

place although due to the timing of acquisitions and associated build-outs along with the

philosophy of taking space "as is"; the feel of the furniture and finishes is very different

from one area or department to the next. The space is also organized in separate pods or

pockets as the availability of contiguous space was limited by the as-needed approach to

acquiring space. According to the CRE, the new space will be the first space they have

built out in 12 years. The Facilities Management function handles requests in a timely

manner, but finds it difficult to respond effectively to space requests due to their current

space constraints.

4.1.1.6 Company A Technology Implementation

Technology has been implemented within the framework of heightened security

surrounding Company A's business. This has resulted in a complete block of any

wireless connectivity within the company premises and provides some limitations to

where work may take place. While some collaboration tools such as video conferencing and virtual meeting software are in place, there are barriers to effective utilization. The video conference facilities exist in one conference room, but are not in place at all major sites limiting the ability to connect this global organization's various remote offices and foster a sense of community. Use of the tools requires technical assistance which further discourages more widespread use. A similar problem exists with virtual meeting software and the CRE noted the technology needed an internal champion to make usage more widespread. Other older collaboration tools such as A/V equipped conference rooms are also limited at Company A with only a 25% saturation level.

Employee mobility is supported by laptops, smart phones, and secure remote access through VPN. While the technologies are in place to support alternative work strategies, the implementation is categorized as "at department discretion". This is due to the perception of senior management that work can only be performed while a person is at the office, and due to the ever present concerns surrounding data security. There has been some innovative use of technology to support a mobile workforce has been the pilot introduction of tablet devices to within Company A's sales force.

4.1.1.7   Company A Regulatory Influences

Company A has significant regulatory influences which impact productivity due to the additional steps and audits that must be done to prove compliance. Concerns surrounding money laundering, funding of terrorist networks, and other malicious activities limit what alternative work strategies Company A is able to implement at this point in the various technology life cycles. Company A cites Sarbanes Oxley compliance, SAS 70 audits, and reports to the Federal Reserve Board, and the Office of

the Comptroller of Currency (OCC) as having the greatest impact on their overall productivity.

4.1.1.8 Company A Organization Effectiveness

Company A performs an annual employee engagement survey administered by Kenexa. Kenexa is a human resources consulting company focused on recruiting, research, and performance management along with other ancillary consulting services. Engagement surveys, also known as employee satisfaction surveys, indicate how well a company is engaged with its workforce and identifies areas that may be of potential concern. These surveys are not meant to be a report card, but a tool to help senior management have insight into the alignment of employee goals and expectations with company mission and goals. The surveys can be broken down to various organizational units to help better understand if one group has issues or concerns which are unique and may need attention.

Company A administered the survey in both 2010 and 2011 and the 2011 results were made available to the researcher. The results are compared to the Kenexa High Performing Norm which represents the top 25% of organizations in the Kenexa database. Areas where Company A scored higher than the High Performing Norm included questions regarding: senior management, direct supervisors, coworkers, advancement opportunities, accountability and performance management, and the physical work environment. Areas which scored below the norm included questions surrounding communications, customer service, and teamwork. These results were discussed with the HR Director who reinforced the research observations and further emphasized the company had some opportunities to improve the company position on work/life balance

and compensation. The low score on communications may link to the physical workplace due to the pocket of space tucked all over the building. Have fragmented space makes branding types of messages difficult to convey and provides very few opportunities for informal communications or serendipitous encounters with co-workers.

4.1.1.9 Company A Productivity and Metrics

Company A does not have any formal productivity metrics in place across the company. There are department level metrics surrounding project completions and the call center functions have specific metrics. As compared to industry norms, the HR Director said these departments perform at or above industry norm. The turnover metrics compare favorably which the HR Director admits could be a factor of the current economy. Absenteeism is not tracked company wide, but where it is tracked in the call center they do perform well.

4.1.2 Company A Summary Observations

Company A's corporate real estate leader expects the new workspace to have a noticeable impact on productivity. While the company's employees are proud to work here and satisfied with the current workspace, there were significant gaps when they measured internal communications criteria. The proposed open space plan will have all employees in a consolidated location and therefore provide opportunities to positively impact day to day communications. There are plans to conduct an occupant satisfaction survey prior to the move and then follow up with a post occupancy evaluation a year after the move is complete. Company A's survey data will be valuable to subsequent research efforts on the topic of workplace and productivity.

4.2 Company B: Application Software Company

Company B is an application software company which develops and supports applications for small to medium sized businesses. The Atlanta location is a regional office specializing in accounting software products. The suburban campus setting has two buildings with 100% of the space dedicated to Company B allowing excess space to be held in inventory for future needs. The structured questionnaire in Appendix _ was reviewed with the CRE, the onsite Facilities Manager, the IT Director of Business Performance and Analysis, and the HR Director to gain diverse perspectives on the impacts to employee productivity.

4.2.1 Company B Workplace Assessment Results

4.2.1.1 Company B General information

The company location is a regional office and has been occupied solely by Company B for over 5 years. The facility is a campus setting with applications development and support, call center support, marketing, accounting & finance, supply chain, and some additional staff functions in addition to a training center for the company's customers. The facility is approximately 6 years old and was a build-to-suit for this company. The floor plans are open with approximately 50% of the space having interior offices and no-wall workstations. The remaining 50 % is a mix of high-wall and low-wall workstations and interior offices. There are approximately 650 employees with 300 classified as professional knowledge workers and 350 as call center employees. In

addition to the dedicated employees, there are approximately 200 seasonal contract employees brought in for dedicated testing activities. While the building is not LEED certified primarily due to the energy management characteristics and a rooftop HVAC unit which causes some humidity issues, the facility would meet most of the criteria for Material and Resources (MR), and IEQ categories. The buildings are highly automated with lighting and energy control systems and indoor air quality management systems. The company has a solid waste management policy which it has fully implemented for ongoing consumables, and follows sustainable purchasing practices for equipment, facility alterations, and lighting. The IEQ elements include filtering systems which are 5 times the standard, Green cleaning practices, Green pest control services, outdoor air delivery monitoring, Daylight and Views. Based on the current facility characteristics, the buildings could achieve up to 25 LEED credits of the 41 required for certification.

4.2.1.2 Company B Generational Differences

The Company B demographics are 35% Baby Boomer generation and 35% Generation X. The Legacy generation represents approximately 10% of the workforce and the Generation Y is 20%. According to the Director of HR, the impacts of multiple generations in the workplace are significant, and she feels the company does not yet effectively manage these differences. Her assessment is that they "have taken Millennials, which is what we call them, and force fit them into a traditional baby boomer atmosphere". There are initiatives underway to better understand this and implement practices and policies which offer more flexibility, but nothing has been implemented to this point. In her role in HR, she sees a workforce that is relatively stagnant and risk-

aversive with everyone working for their best friends. She is finding the ability to attract and retain younger talent as a challenge for Company B.

4.2.1.3 Company B Profitability and Growth

Company B could best be characterized as stable. Revenues are flat although the second half of their fiscal year revealed 3% in organic growth, offsetting 2% contraction in the earlier part of the year. Profit is stable and cash flows remain strong. The headcount for Company B remains constant.   While they do track revenue/employee as a metric, the HR Director did not feel is was a useful productivity measure as much of their revenue is from software maintenance renewals.

4.2.1.4 Company B Types of Work Performed at this Location

The Atlanta location is composed primarily of IT applications and development at 30% and a call center which represents approximately 40% of the workforce. Remaining business functions include Marketing (5%), Accounting and Finance (10%), Supply Chain (13%), Legal (1%), and HR (1%). The work is evenly divided between project work, transactional work, confidential projects, and training or marketing presentations. The campus setting has flexibility to reallocate space depending on these needs.

4.2.1.5 Company B Workplace

The campus is comprised of two buildings. All offices are in the interior to maximize the daylight accessible to employees. There is a mix of high and low wall workstations at 14% and 19% respectively of total space. Enclosed offices represent 29% of total space, call center seating comprises 24% of the space and 15% of the space is dedicated to conference/meeting space. The amenities provided at the Company B

campus include a health club, an unstaffed first aid center, outdoor areas, vending and some of the new Aventi style retail kiosks. There is a dedicated team of 3 in facilities management with a high service level. The best measure of FM success is that the VP of Corporate Real Estate hasn't gotten a phone call over FM issues in 8 years.

4.2.1.6 Company B Technology Implementation

Company B is in the process of doing a number of technology upgrades to foster collaboration. While they have one tele-presence video conference unit in place, they are installing 18 additional units to connect 12 locations. The older video conference equipment was relatively complex and seldom used, so they have focused this implementation on being easy to use in addition to providing the inherent benefits of the high definition images. Other collaboration tools provided include online reservation systems for conferencing, A/V equipped conference rooms for 70% of the available rooms, and the use of Connect Pro virtual meeting software. They have one electronic whiteboard, but noted that it was not used.

Mobility tools include laptops and smart phones, but they are also upgrading the business phone system to the "one phone" technology. This technology allows an individual to have their office phone ring at all locations: office, mobile, home and can be adjusted through employee controlled settings so that work related calls can be diverted after hours as necessary. According to the Director of IT Business Performance and Analysis, the one phone technology is approximately 75% implemented across Company B's North America footprint. Other mobility technologies in place include 100% wireless coverage, secure remote access, and cloud computing for some applications.

The HR Director noted a deficiency in the overall mobility strategy due to lack of management support for alternative work strategies. While the company does have an AWS policy, the top management is skeptical. According to the HR Director, this is due to an entrenched baby boomer management style where some find it difficult to believe employees can be productive outside of the office.

4.2.1.7   Company B Regulatory Influences

While regulatory influences have a significant impact to Company B, it is not disruptive. The primary influence noted was the PCI credit card processing compliance requirements which are associated with the software sales and support functions housed at Company B.

4.2.1.8 Company B Organizational Effectiveness

A number of performance metrics associated with organizational effectiveness are captured by Company B. The HR Director warned that while the metrics are captured and compare favorably to industry trends, they can also be misleading if a company has not gone through the process of defining who they are. The company does an annual employee satisfaction survey with consistently high scores, but the HR director is concerned that this may reflect a complacent workforce as opposed to an effective workforce. As an example, the attrition rate is 8% which is favorable for a software development company, but does not measure whether you are hiring and keeping the right people. They have implemented a new metric tracking retention within the first year of employment and learned it was trending downward in the first year but it is now at a more favorable level.

Another concern was the perception of senior management by the employee population. This is due to a high turnover rate in the CEO suite with two CEO's over the past two years. Most employees are taking a "wait and see" approach which may impede overall productivity. Other management concerns noted was a culture of the immediate supervisor being the "best friend" so that while everyone got along, performance expectations may not be at the right level.

The HR Director summarized overall organization effectiveness as good, but needing improvement. The workforce itself has an eight-to-five mentality, while the leaders work very hard and long hours to promote new concepts and programs. The company provides good benefits and has a wellness strategy to promote work/life balance, but lacks some of the environmental factors attractive to new employees. The HR Director hears the daily issues of the younger workforce who want meaningful work and the ability to work outside or off campus in a more casual setting which she does not feel is offered today for Company B. The CRE is championing some changes in this area, but is faced with educating senior management about the impacts of ignoring more flexible work environments.

4.2.1.9   Company B Productivity and Metrics

A number of metrics are tracked with revenue per product line and dates around software releases being the most observed metric. HR tracks turnover rates and on-boarding costs for new employees and trends favorably as compared to industry norms. Absenteeism is captured through the wellness programs to see if they are effective, but not enough data has been captured to observe a trend.

Metrics around the workplace focus on expense reduction and control with a CFO focus rather than an end-user satisfaction focus.

4.2.2   Company B Summary Observations

Company B is a strong and stable company that recognizes it needs to update some of it policies and practices. Some of the workspace and the organizational policies need to be updated and the CRE is championing these efforts. There has been turnover at the CEO level, with three different CEO's in less than a year which has caused a natural tendency to refocus the enterprise. Many of the employees have taken a "wait and see" approach and the overall workforce were described as "complacent". The Atlanta workspace reflects the tone of the organization as it appears to be in a state of transition. Some of the space is no longer used and has gone into a lights-off mode and other portions are ready to be repurposed. There is significant investment in technology surrounding video conference tools and the one-phone deployment, and it will be interesting to see how these tools have been utilized and what benefits they have provided in the next 12-18 months.

4.3   Company C: Energy Trading and Power Production Company

Company C is an electric power generating company with an energy trading function which provides risk and hedging opportunities in addition to power marketing. The Atlanta location serves as the company headquarters and houses approximately 450 employees. The Office Tower is a LEED gold certified property and was built in 2000. The trading center includes a 420 seat column-free area used for the trading and marketing functions and a 15,000 SF data center. The entire trade center has backup power supply with unique characteristics such as dual power feeds from two different utility substations to ensure complete reliability. The Company C case study is based on data as of 2010 prior to a merger which dramatically impacted this location. The transformed entity post-merger is described later and is identified as Company C-1. The assessment tool was reviewed with the IT Director, the HR Director and insights from the researcher who was also the CRE at the time.

4.3.1 Company C Workplace Assessment Results

<u>4.3.1.1 Company C General Information</u>

The Company C Atlanta office is a corporate headquarters which the company has occupied for over 10 years. The workforce has 450 employees with 83% being professional workers and the remaining 17 % either clerical or executive. The office tower is LEED gold certified and reached the certification level in 2008 under the LEED 2.2 existing building program. The trade center is not LEED certified. Many of the criteria which enabled certification were a result of the design specifications that

Company C required when the facility was constructed in 1999-2000. These criteria include the energy savings from building automation systems, the air handling and monitoring systems for the trade center and the office tower, the alternative transportation program, shower facilities in the health club, and the solid waste stream policies and programs. Some of the additional features installed by property management in 2008 included low-flow faucets, recycled rainwater irrigation systems, dedicated bicycle parking, and an extension of Company C's recycling philosophy to other building occupants.

4.3.1.2 Company C Generational Differences

Company C has a 35% Baby Boomer generation and 40% Generation X to make up the bulk of the workforce in the Atlanta office. Legacy generation is approximately 5% and Generation Y is approximately 10%. The impact of multiple generations is not significant in the workspace design and trends more to a functional orientation. One aspect unique to Company C is the 420 seat trade floor, where multiple generations are working in a very open environment, and as business functions were moved out to the trade floor space to conserve costs, the Baby Boomer population had a more difficult adjustment to the lack of acoustical privacy and the constant visual distractions. These moves were made at a time when the company was under financial duress, so employees were motivated to adapt in order to preserve their jobs.

4.3.1.3 Company C Profitability and Growth

Company C is a profitable company with a stable workforce and a decreasing revenue stream due to industry pressures. The company revenues are closely tied to the price of natural gas, and in a time when natural gas prices contract, so does the company

revenue and the company stock. As a result of this, revenue/employee is not a useful productivity measure.

4.3.1.4 Company C Types of Work Performed at this Location

Primary functions at this location include IT applications development and support (27%), Accounting and Finance (27%), and Energy Trading (20%). Other functions include Legal (9%), HR (6%), Operations (11%), and other at 4%. The types of work are primarily transactional at 50% due to the Energy Trading function. Other work types are project work at 30%, confidential work at 15% and marketing/presentation work at 5%.

4.3.1.5 Company C Workplace

Office space allocation is dedicated to enclosed offices at 35% and open workstations with seated privacy at 40%. Collaborative space to support projects is approximately 15% and conference and meeting rooms comprise 10%. Building amenities include a fitness center, an unstaffed first aid center, ATM, vending, a credit union, and direct access to the public transit system which is subsidized 100% by Company C. Workplace standards are heavily enforced with support from top management. The Office Tower facilities reflect a corporate headquarters of a utility company with rich finishes, exterior offices and interior workstations. Attempts have been made to maximize day lighting through lower wall workstations and transom windows for interior project rooms.

The Trade Center is a completely open environment with frit-patterned glass windows and a standard 4 x 6 trading desk. The trade center is free from any columns as the ability to have direct line of sight communication was critical to the trading business

function. Special acoustical ceiling finishes were installed to minimize noise distractions despite the number of people the space was designed to accommodate.

4.3.1.6 Company C Technology Implementation

Company C has one video conference facility at the Atlanta location, which is connected to both the California and Washington D.C. locations. The facility is primarily used by executive management and rarely used by the average employee. WebEx software is heavily used for project work and all Company C locations make use of the virtual meeting software. Ninety percent of the conference rooms are equipped with A/V to promote collaboration.

Mobility for the workforce is enabled through 100% laptop usage with VPN access enabled on an as-needed basis. Smart phones are heavily used and wireless access covers 90% of the facility. No formal policies exist for alternative work strategies and it is done at the discretion of each department. The expectation exists that all management employees are available as needed irrespective of their location.

4.3.1.7   Company C Regulatory Influences

Regulatory influences have a significant impact to productivity. The company experienced accounting irregularities in its past and therefore puts a high emphasis on Sarbanes Oxley compliance which results in a high degree of internal and external audits. Other recent regulations which have impacted productivity include cyber security related to critical assets associated with the nation's electrical infrastructure.

4.3.1.8 Company C Organizational Effectiveness

Company C does not capture any traditional performance metrics other than financial metrics, but has chose to take a performance goal approach to measuring success. Employee satisfaction surveys have not been done in the past five years due to the overhead required to define and administer them. Turnover metrics are captured as part of the HR function, and compare favorably with other companies in the utility industry. Reward systems are measured against the utility industry, which is known for having a rich reward system and would therefore be considered above market for most companies.

4.3.1.9 Company C Productivity and Metrics

As company revenue is tied to the price of natural gas, and therefore increasing revenue goals are not a meaningful measure of success, the company utilizes a goal driven system to measure success and fund annual bonus pools. Targets include an EBITDA goal to measure success in forecasting and meeting the revenue and expense targets, but also include safety targets, environmental compliance, and successful project completion thresholds. The company has either met or exceeded their targets over the past 4 years.

4.3.2 Company C Summary Observations

Company C has a relatively new workplace due to a renovation in 2008. The finishes are current and the furniture is either new or in good condition. The employees are satisfied with the office space and it reflects a very traditional company in the office tower and a more contemporary feel in the trade center. The company has been through an eight year period of downsizing, financial restructuring, and divestitures and the

employee base has developed a sense of loyalty to each other as they have survived each

phase of the company's evolution.

4.4   Company C-1: Energy Trading and Power Production Company

Company C-1 is a new entity that resulted from the merger between Company C described earlier and another Houston-based Energy Trading Company. In the merger, Company C-1 has headquarters in Houston, and the Atlanta location has been transformed into a Regional Trading office. While there is a larger trading function in the Houston location, this group specializes in proprietary trading. In this transformation, the Atlanta location has downsized from 450 employees to approximately 70 employees. The personnel have moved from the purpose built Trading Floor into redesigned space in the LEED gold Office Tower. The assessment tool was reviewed with the HR Director and a Senior Trader.

4.4.1 Company C-1 Workplace Assessment Results

4.4.1.1 Company C-1 General Information

The Company C Atlanta office is a regional trading office which the company moved to in August 2011. The workforce has approximately 70 employees with 98% professional workers 2 % clerical. The facility is LEED gold certified and reached the certification level in 2008 under the LEED 2.2 existing building program. Many of the criteria which enabled certification were a result of the design specifications that Company C-1's predecessor required when the facility was constructed in 1999-2000. These criteria include the energy savings from building automation systems, the air handling and monitoring systems, the alternative transportation program, shower facilities in the health club, and the solid waste stream policies and programs. Some of the additional features installed by property management in 2008 included low-flow

faucets, recycled rainwater irrigation systems, dedicated bicycle parking, and single stream recycling.

4.4.1.2 Company C-1 Generational Differences

Company C-1 has a 10% Baby Boomer generation, with 75% Generation X and 15% Generation Y. The impact of multiple generations was not considered in the workspace design as the primary business function at this location is trading.

4.4.1.3 Company C Profitability and Growth

Company C-1 is a profitable company with a decreasing workforce resulting from redundancies after the merger. The revenue stream has decreased from the prior year and is expected to decrease slightly in 2012 due to industry pressures. The company revenues are closely tied to the price of natural gas, and in a time when natural gas prices contract, so does the company revenue and the company stock. As a result of this, revenue/employee is not a useful productivity measure.

4.4.1.4 Company C-1 Types of Work Performed at this Location

The primary function at this location is Energy Trading (80%). IT support for the trading function represents approximately 10% and the remaining support functions are Legal (2%), HR (5%), and Operations (3%). The types of work are primarily transactional at 85% due to the Energy Trading function. Other work types are project work at 10%, confidential work at 5%.

4.4.1.5 Company C-1 Workplace

The Company C-1 Workplace has 2 dimensions. The primary space is devoted to Energy Trading and is comprised of 30% enclosed offices and 55% trading workstations

Collaborative space is approximately 5% and conference and meeting rooms comprise 10%. The secondary space is reserved to support Business Continuity requirements should the Houston office have any disruptions from hurricanes or other causes. This secondary space is comprised of 35% enclosed offices and 45% seated privacy workstations. The remaining space is dedicated to a server room with backup UPS and switchgear, storage space for business continuity supplies, and a dedicated security monitoring function. Building amenities include a fitness center, an unstaffed first aid center, ATM, vending, a credit union, and direct access to the public transit system which is subsidized 100% by Company C-1.

The trading function moved in August 2011 from a purpose built trading floor with 30 foot ceilings to a conventional office floor configuration with 10 foot ceilings as a part of the merger. This has caused some adjustments and has had a slight perceived negative impact to productivity according to one of the senior traders. The seating configuration has made it more difficult to communicate with the other commodity traders than the previous space due to a change in proximity. The lower ceilings have caused acoustical distractions and the trading personnel have had to adjust their vocal levels due to the other functions around them. These changes have not adversely impacted their ability to meet earnings targets in the two months they have occupied the new space, but they are generally less satisfied with the space.

4.4.1.6 Company C-1 Technology Implementation

Company C-1 has one video conference facility at the Atlanta location, which is connected to the head office in Houston and the California and Washington D.C. locations. Video conferencing is primarily used for the daily trading meetings held each

morning before the market opens, and the room serves as a conventional conference room at other times. WebEx software is used for project work and all Company C-1 locations make use of the virtual meeting software. All conference rooms are equipped with A/V to promote collaboration.

Mobility for the workforce is enabled through 100% laptop usage with VPN access enabled on an as-needed basis. Smart phones are heavily used and wireless access covers 100% of the facility. While alternative work strategies are not used heavily at this location due to the nature of energy trading, this location does serve as an alternative work site for employees who did not permanently relocate to Houston as part of the merger.

Technology impacts from moving to the new space in August were generally positive. The trading workstations have 12 high definition monitors suspended overhead so that data and market positions are easily seen by the trading personnel. This was noted as a big improvement over the dated rear-projection monitors on the purpose built trade floor. A negative impact resulted from the consolidation of all the servers from Atlanta to Houston, so that traders were experiencing time delays in posting their positions. This delay has immediate negative risk management consequences, so additional servers are being added back to the Atlanta location to mediate this problem.

4.4.1.7   Company C-1 Regulatory Influences

Regulatory influences have a significant impact to productivity although less than prior to the merger. It is unclear as to whether these changes will be permanent or if this was due to less rigorous oversight by the internal audit officer. The audit officer was replaced in August 2011, so additional controls may be reintroduced. The cyber security

standards related to critical assets associated with the nation's electrical infrastructure are still in place, but the impacted assets and personnel have moved to Houston which has decreased the regulatory influence in Atlanta

4.4.1.8 Company C-1 Organizational Effectiveness

Company C-1 does not capture any traditional performance metrics other than financial metrics, but continues the performance goal approach that was in place prior to the merger. Employee satisfaction surveys are not administered. Turnover metrics are captured as part of the HR function, and have increased since the merger even when adjusted for involuntary severances. Reward systems are measured against the utility industry, which is known for having a rich reward system and would therefore be considered above market for most companies.

Due to the very recent merger and ongoing adjustments at the senior management level, the overall enthusiasm about the company has declined. Many of the Atlanta personnel receive long term incentives of stock and stock options, and they are less satisfied with their compensation

4.4.1.9 Company C-1 Productivity and Metrics

Company C-1's revenue is tied to the price of natural gas which is volatile like other commodity prices, and therefore annual performance goal are established to measure success and fund annual bonus pools. Targets include an EBITDA goal to measure success in forecasting and meeting the revenue and expense targets, but also include safety targets, environmental compliance, power plant availability, and successful project completion thresholds. The safety and environmental targets are at risk for 2011 and have caused changes in executive management responsible for those results.

4.4.2 Company C-1 Summary Observations

The majority of company C-1's employees have moved from non-LEED space into a LEED Gold facility in the past two months. The perceived productivity impacts have been primarily negative due to a smaller space and the need to make adjustments to work styles. There were some positive aspects to the new space such as some upgraded technology and the presence of a dedicated IT support person. The only method for tracking productivity is performance against budgeted earnings, and thus far those were on track.

4.5 Case Study Comparison and Analysis

After conducting the structured interviews with the three Case Study companies, results were tabulated and analyzed to see if there were any trends or conclusions.

General Information

Table 2: **General Facility Characteristics Comparison**

General Information	Company A	Company B	Company C	Company C-1
1 - Type Facility	Corporate Headquarters	Regional Office	Corporate Headquarters	Regional Office
2 - Time in Facility	15 years	5 years	10 years	< I year
3 - Number of employees	440	650	450	70
4 - Facility characteristics	well maintained 20 year old facility	Uncertified Green Building	LEED - Gold	LEED - Gold

Company A is in an older property, Company B is in a green building, and

Companies C and C-1 are in a LEED Gold certified facility. The differences between the

properties are most noticeable with the use of daylight and views. Because Company A

acquired space on an as-needed basis, the office space is organized in pods and therefore

department space was allocated based on what could fit in a particular space pocket. This

has created long dark hallways due to the space partitioning available at the time.

Another issue is that adjacencies between like functions are compromised. Both

Company B and C were developed as part of a master plan which allowed consistent

space layouts with access to daylight for most individual workstations. Groups and

departments were co-located in a logical fashion. As an example, the IT and product

support functions were near each other in Company B, and the Accounting and Finance

functions were on the same floor in Company C.

Generational Differences

Table 3:   Generational Differences Comparison

Generational Differences	Company A	Company B	Company C	Company C-1
5 - Demographics				
Legacy	1%	10%	5%	0
Baby Boomer	30%	35%	35%	10
Generation X	62%	35%	40%	75
Generation Y	9%	20%	10%	15
6 - Generational Impact to Productivity	2	5	3.5	2
7 - Generational consideration in Workplace	4	2	3	2

Company A had the youngest profile of the three companies. The workplace does

not currently fit their demographic profile, but it is being planned into a project to be

completed in the next 6-9 months. Company B identified generational differences as an

issue in the workplace and has the largest number of the Generation Y population. They

cited concerns surrounding innovation tied to their baby boomer culture, and the high-walled workstations and lack of collaborative space were an opportunity to improve. Company C had the most open space plan of the three, primarily due to the nature of its trading function and did identify any particular issues related to the generational mix.

Profitability and Growth

Table 3:   Profitability and Growth Comparison

Profitability & Growth	Company A	Company B	Company C	Company C-1
8 - Profitability Increase	4	3	3	3
9 - Headcount Growth	5	3	1	5
10 - Revenue/Employee metric	4	2	2	2

The three companies had very different growth profiles. Company A was growing in both revenue and headcount, Company B was relatively flat, and Company C was in contraction mode. Company A's growth was global and tied to the growth in the electronic payments sector. Company B's growth has been stagnant in the past year and they are in a retrenchment phase after significant turnover in the executive ranks. Company C was experiencing contraction due to industry consolidation and went through a merger in 2010 which resulted in Company C-1. Even after the merger, Company C-1 expects lower earnings in 2011 due to compressed natural gas prices and the resulting impact on power production.

Work Performed at the Location

Table 5: Comparison of work types

Work Performed at this location	Company A	Company B	Company C	Company C-1
11- Business Functions				
Marketing	48%	5%	1%	
IT	22%	30%	25%	10%
Legal	1%	1%	8%	2%
Accounting & Finance	21%	10%	30%	
Human Resources	1%	1%	5%	5%
Supply Chain/Operations		13%	6%	3%
Other - Call Center	6%	40%		
Other - Energy Trading			25%	80%
12 - Type of work				
Project	65%	25%	30%	10%
Transactional	20%	25%	50%	85%
Confidential	10%	25%	15%	5%
Training/Marketing	5%	25%	15%	

All three companies have a diverse set of business functions operating at the Atlanta location. Each company has one business function making it unique from the others: Company A has a large marketing presence, Company B has a significant call center, and Company C had s large energy trading function. Company C-1 has a much smaller energy trading function. The other functions were traditional staff functions and varied in size between the three companies. Company A has the highest percentage of project work, which may account for the reason the employee satisfaction scores for the physical workspace were favorable despite the dated office space. Each project group is able to be co-located so the projects do not suffer. Company B has an even division of work types which is reflected in their space layout. Transactional work in the form of energy trades was the primary output for Companies C and C-1. This particular type of transactional work is highly collaborative as the information flow regarding real-time markets is critical in making profitable trades.

Workplace

Table 6: **Workplace Comparisons**

Workplace	Company A	Company B	Company C	Company C-1
13 - Space Allocation				
Individual enclosed Offices	10%	28%	25%	25%
Collaborative or Team space	0%	0%	9%	5%
Open Workstations - low/no walls	40%	24%	29%	45%
Open Workstations -Seated Privacy	0%	19%	29%	20%
Open Workstations - High Walls	40%	14%	2%	
Conference/Meeting Rooms	10%	15%	7%	5%
Other				
14 - Amenities				
Cafeteria	Y	N	N	N
Health Club	Y	Y	Y	Y
First aid center - unstaffed	Y	Y	Y	Y
First aid center - staffed	N	N	N	N
ATM	Y	N	Y	Y
Concierge	N	N	N	N
Child Care	Y	N	N	N
Outdoor Areas	Y	Y	N	N
Vending	Y	Y	Y	Y
Retail	Y	Y - Aventi system	N	N
Other	N	N	Y - Credit Union	Y - Credit Union
15 - Use of workplace standards	Consistent at department level	Consistent in U.S.	Consistent at location	Consistent in U.S.
16 - Timeliness of Facility space requests	4	5	4	4
17 - Responsiveness of Facility maint. Requests	4	5	4	4

The workspace allocation analysis was based on square footage, and company B

had the highest percentage of space dedicated to enclosed offices. Company B has the

oldest generational profile and also has a dedicated campus setting with excess space,

which may allow a higher degree of private enclosed space. With Company A being

younger than the other two companies and also space constrained, it is not surprising to

see that only 10% of the space is enclosed. Company C has a trading floor with very

dense seating which offsets the square footage devoted to enclosed offices. The

amenities were comparable between the properties although only 3 were common

amongst all: a health club, unstaffed first aid centers, and vending. Workplace standards were consistent at the department level for Company A and at the location level for Company C. Companies B and C-1 had national workplace standards in place. The facility management function was rated highly at all locations, with Company B having the highest rating. Employee feedback on space was positive at companies A and C. Company B measured satisfaction by lack of complaints. Company C-1 employees were less positive about their space than when they were employed by Company C although they had only been in the space for 2 months.

Technology Implementation

Table 7:   Technology Implementation Comparison

Technology Advances and Life Cycles	Company A	Company B	Company C	Company C-1
18 - Technologies to support				
Video Conferencing	Y	Y	y	Y
High Def	1 (not used)	1 growing to 18	1 - used only by execs	1
Laptop/Desktop capable	N		N	N
Reservation Systems	Y	Y - Outllook/VC	N	N
AV equipped conference rooms	Y - 25%	Y - 70%	Y - 90%	Y - 100%
Electronic whiteboards	N	Y - Only 1 / not used	N	N
Social media	N	Y - Customer focus	N	N
Virtual meeting software	Y - Microsoft Lync	Y - Connect Pro	Y - WebEx	Y
19 - Technologies supported				
Tablets	Y - Sales force	Y - sales and development	N	N
Laptop Computers	Y - 50%	Y	Y	Y
Smart phones	Y	Y	Y	Y
"One Phone" technology	N	Y - 75% impl	N	N
Wireless access coverage	N - Block for Security	Y - 100%	Y - 90%	Y
VPN/Secure remote access	Y	Y - SSL	Y	Y
Cloud computing	N	Y	N	N
20 - Alternative Work Strategy	Dept level - Not supported by upper mgmt	Dept level - CEO does not support	Dept Level - CEO does not support	N

Company B had the most sophisticated use of technology, based on the growth in the high definition video conferencing capability and the "one phone" project. These technologies are enablers for alternative work strategies (AWS), but Company B

currently has the same informal AWS policy as the other companies, which are not well supported by senior management. All the companies had some level of remote access irrespective of the AWS policy support. Company A had more issues surrounding remote work due to the controls around their particular industry. Company C had made it a practice to encourage AWS at the supervisor-to-employee level, but to make it fully transparent to senior management. Tablet computers had a narrow use for the Sales functions at companies A and B. The use of Social Media tools were in place for the Sales functions at companies A and B and utilized heavily by HR at all three companies. None of the companies were utilizing social media for any sort of employee communications/engagement programs.

Regulatory influences

Table 8:   Regulatory Influences Comparison

Regulatory Changes	Company A	Company B	Company C	Company C-1
21 - Regulatory factors impact to productivity	5	4	5	4
22 - Regulatory influences				
Sarbanes Oxley	Y		Y	Y
Cyber Security standards	Y		Y	Y
OSHA				
FMLA				
Other	SAS-70, FR Board, OCC	security	FERC	

All three companies noted some level of impact to productivity due to regulatory influences. At Company A, there is scrutiny associated with the financial transactions they process. Company B was less vocal regarding the specific impact, but acknowledged increasing regulation as a barrier to productivity, and Company C was highly vocal about the additional non-value-added tasks required by additional Sarbanes-Oxley controls.

Organization Effectiveness Indicators

Table 9: **Comparison of Organizational Effectiveness Indicators**

Organization Effectiveness	Company A	Company B	Company C	Company C-1
23 - Performance Metrics Captured		HR noted concern about metrics captured. Don't track effectiveness	Safety - a primary metric	Safety
Employee Satisfaction/Engagement	Y	Y	N	N
Employee Attraction	Y	Y	N	N
Employee Retention	Y	Y	N	N
Internal Customer Satisfaction	Y	Y	N	N
Only Financial metrics			Y	Y
24 - Employees positive about Sr. Management	4.5	3	4	3
25 - Employees positive about direct supervisor	4	5	5	3
26 - Employees proud to work for Company	4	3.5	4	3
27 - Company promotes work/life balance	3.5	4	4	4
28 - Employees clear about expectations	4	4	4	4
29 - Employees find workplace suitable	4	4	4	4
30 - Employees feel fairly compensated	3.5	4	4	4

Two of the companies performed annual employee engagement surveys. Company A felt they were doing well as they had changed their method of comparison to a higher performing company index than in years past. In reviewing their summary scores, they ranked very low on communications issues as compared to the high performing companies which may be influenced by the way the space is organized into separate pod. Company B had a satisfaction survey as well, but was concerned it reflected a complacent workforce rather than a company who was remaining current with the competition. Company B chose not share any specific results from their survey but did not feel it was an accurate reflection of their current organizational status.

Companies C and C-1 do not conduct annual engagement surveys. They feel certain the constant industry pressures, reorganizations, and mergers/divestitures would show low scores, and have chosen to focus their efforts toward annual corporate-wide goals instead.

Attitudes regarding senior management were highest at Company A and Company C. Company B has experienced 3 CEO changes in 2 years and there is some degree of skepticism at this point. Company C-1 has recently merged and the stock price is not performing well which leads employees to wonder what is next. These trends also influence the responses regarding question 26, which is the overall attitude toward the company. Responses regarding direct supervision were highest at Companies B and C, although Company B felt it reflected an unhealthily level of comfort rather than excellent management. Work/Life balance ranked the same at companies B, C, and C-1 with a slightly lower assessment at Company A. AWS and general flexibility in work styles were noted as barriers here. All of the companies ranked the clarity of work expectations high as well as the workspace provided. Company A ranked satisfaction with total compensation lower than the other companies and commented this was always an issue.

Organizational Productivity/Performance Metrics

Table 10:   Comparison of Organizational Productivity/Performance Metrics

Productivity/Performance Metrics	Company A	Company B	Company C	Company C-1
31 - Corporate Workplace significant to productivity	4	5	4	5
32 - Workplace impacts to organization				
Expense reduction and control	Y	Y (HR)	Y	Y
Increase employee satisfaction	Y	N	N	N
Improve flexibility	Y	Y - (FM)	Y	N
Improve service delivery	N	N	N	N
33 - Operation metrics captured				
Real estate cost/employee	Y	Y	N	N
SF/Employee	Y	Y	N	N
Revenue/Employee	Y	Y	N	N
Speed to market			N	N
Customer service - internal		Y	N	N
Customer service - external		Y	N	N
HR Cost/person	Y	Y	Y	N
Technology cost/person		Y	Y	N
34 - Employee productivity measures				
Individual level	Y	N	N	N
Department level	Y (At industry norm)	Y	Y	N
Corporate level		Y	N	N
Not captured				
35 - HR metrics captured at this location				
Onboarding costs	Y	Y	Y	Y
Training costs	N	Y	N	N
Recruiting Costs	Y	Y	N	N
Turnover rates	Y	Y	Y	Y
Absenteeism	Y - Department Level	Y - through wellness program	N	N

All of the companies felt the corporate workplace was significant to productivity and that some changes were needed. Company A has a new relocation project scheduled, Company B has plans to create some new collaboration space and Company C-1 is not yet happy with the new space they occupy. All the companies indicated that the workspace was an expense to manage and only Company A also assessed employee satisfaction as a workplace consideration. Flexibility was important to all companies except C-1. Company C-1 has a lease expiring in 2 years, so that may explain why flexibility was not an important characteristic at this time. None of the companies felt that service delivery was important for their workplace.

Almost all the operational metrics related to workplace and staff functions were captured by Company B, although they were more indicators of cost control than quality. Company A captured 4 of the 8 metrics listed but again used them to explain costs. Company C only captured HR and Technology costs per person and used it to defend overhead costs. Company C-1 has not implemented any metrics except for the power generating facilities which drive overall corporate goals.

Employee productivity goals were captured at Company A at the individual level and department level and used in performance management. This was not done in all functions, but only where sales or calls were involved. Company B had some metrics in the call center and looked at company level sales metrics for different product lines. Companies C and C-1 did not track any sort of productivity metrics. No knowledge worker metrics were in place for any of the companies. The only metric associated with employees that companies C and C-1 tracked were safety metrics.

HR tracked performance metrics at all the companies. On boarding costs are easy to capture out of the new web-based recruiting tools which most companies now use. Only Company B captured training costs. Recruiting costs were tracked by Companies A and B and were again a natural result of the web-based tools they utilized. Turnover rates were tracked by all the companies. Absenteeism was not systematically tracked by any of the companies. Company B did track absenteeism through participants in their wellness programs, in order to measure the effectiveness of the wellness program.

CHAPTER 5

CONCLUSION AND CONSIDERATIONS FOR FUTURE RESEARCH

The original model used to develop the assessment tool was modified after the structured interviews occurred, resulting in the conceptual framework to assess workplace and the impact to productivity as seen in Figure 5. Some corporate influences had a direct link to productivity while others were indirect.

Workplace, Organization Effectiveness, Work/Life Balance, and Regulatory Influences were found to have the most direct impact on Productivity based on the data gathered via the questionnaire and the content of the structured interviews. Workplace impacted how responsive the company could be to changing business needs and desires (Table 9, #29, Table 6, #16, #17) thereby providing a tool to support a productive work environment. Organization Effectiveness impacted how employees felt about the company and how satisfied they were in their overall work circumstances (Table 9).

Technology, Generational Differences, Profitability and Growth, and the Type of Work performed had a direct influence on the element of Workplace. Technology provided flexibility for where employees could work and how they connected to corporate data and applications (Table 7, #19) in addition to providing the ability to collaborate irrespective of work location (Table 7, #18). The way a company reacts to generational differences impacts the workplace, through either providing some collaborative and relaxed work areas or by maintaining a more traditional interior workspace and expecting people to conform. This is supported by participant opinions

(Table 3, #6, #7) and how the workplace had factored the needs into the space design and allocation (Table 6, #13).   Growth drives the need for workplace expansion as supported by Table 3, #9 and profitability enables a company to invest in the workplace as a more effective tool. The type of work performed directly influences the workplace through the way space is allocated to the functions. This is supported by comparing the business functions described in Table 5, #11 and the nature of the work described in Table 6, #12 with the space allocation in Table 6, #13.
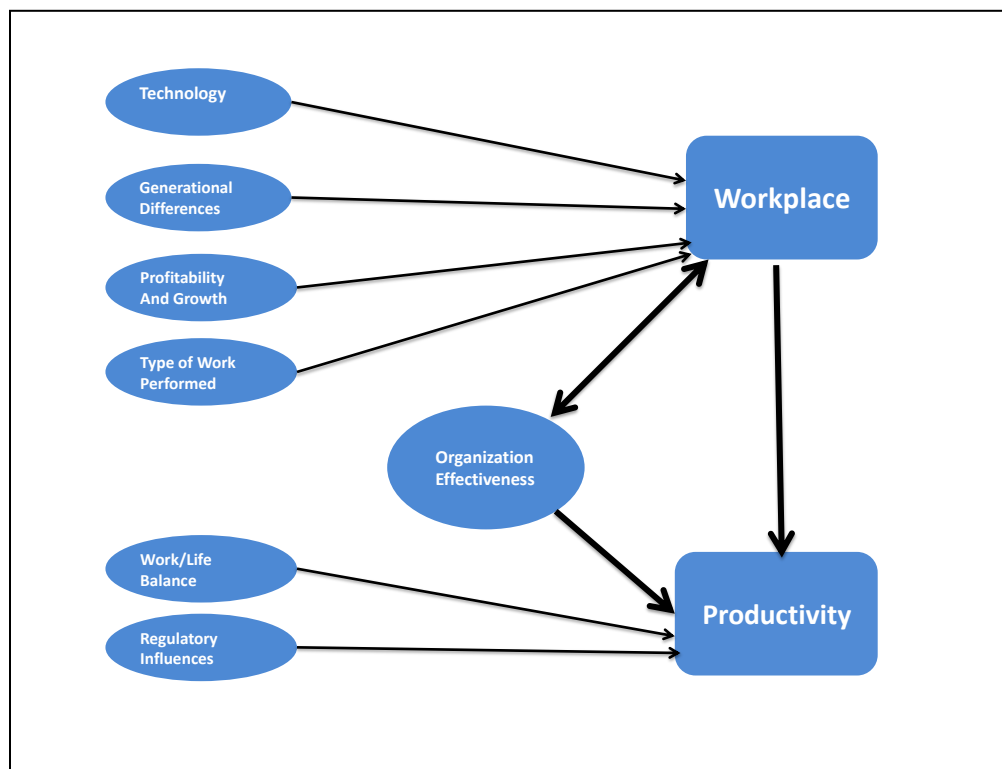

Figure 5:   Conceptual Framework to Assess Workplace and Productivity

The element of work/life balance has a direct impact to productivity as the companies described political obstacles to alternative work strategies (Table 7, #20). While technology enabled AWS, the company policies limited how well AWS was

66

implemented. Regulatory influences also had a direct impact as employees were required

to focus on non-value-add tasks due to reporting requirements outlined by regulation

(Table 8, #21, #22). In some cases, Security regulations impacted access to certain

physical areas which caused additional procedures and time delays. In one company's

case, access to the wireless network was blocked due to their interpretation of an industry

regulation.

Based on the interview process the Workplace and Organization Effectiveness

influences have an interactive relationship. The Workplace influences Organization

Effectiveness through its impact on employee satisfaction and the ability to recruit. The

Organizational Effectiveness attributes of senior management effectiveness and

Corporate Responsibility influence the Workplace by how much is invested in the space,

what standards are supported and whether or not a Green building will be required.

This conceptual framework is a contribution to advance the understanding of

influences to Productivity. As Technology evolves and becomes more integrated into the

Workplace, the lines between Technology and Workplace are blurring. Additional

research is needed to better understand the relationship between Technology and

Workplace, or if boundaries continue to exist as Alternative Work Strategies mature.

How well companies integrate Technology and Workplace decisions may have

significance to productivity that distinguishes them from their competitors. Additional

research to better understand the dynamic between Organizational Effectiveness and

Workplace may also be helpful in increasing productivity. Of particular interest would

be the relationship between the Organizational Effectiveness element of corporate social

responsibility and the occupant performance of green buildings. With research

conclusions that document productivity enhancements from 2% (Singh, Syal et al. 2010) to as high as 5% (Miller 2009) additional data to support these claims would be useful.

This Research was limited by subjective responses to a narrow group of structured interviews.. Future Research would enhance the framework through additional case studies and data gathering. As the LEED certification process already requires data reporting for energy consumption in order to remain certified, it may be useful for future researchers to define occupant data that could relate building characteristics to productivity attributes so conclusions could be drawn from a larger data population. Occupant attributes such as absences, sick days, and subjective productivity assessments are examples of data which could be gathered to and analyzed. Some green building experts suggest the use of a standard post-occupancy evaluation (POE) to gather performance feedback and facilitate continuous learning on green building design issues (Malin 2003), and this researcher would suggest it could be a way to facilitate knowledge worker productivity measurements.

APPENDIX A

CASE STUDY INFORMATION REQUEST

The Corporate Workplace and its Impact on Productivity

Case Study Information Request

The purpose of this research study is to ascertain the impacts that the workplace has on

employee productivity. As the workplace is only one of many variables which can have

an impact, the intent is to gather the company's experience for all dimensions and better

understand how they relate. Depending on the data available, this research will attempt

to draw some distinct conclusions regarding the distinct impact of the workplace variable.

Another specific research goal is to identify whether occupants in LEED certified

buildings experience any productivity boost over non-LEED space.

If your company has gathered any productivity metrics or conducted employee

engagement surveys, the data from these efforts will be particularly helpful for this

research. Also, your company may have participated in the July 2011 CoreNet Global

research effort focused on productivity metrics, and any data you have from that effort

will be useful. The aggregate data from the CoreNet study is under analysis and the

results will be utilized as it is made available for the purposes of comparing aggregate

information against elements revealed through the case study approach.

The research method will involve interviews covering the company's experience in their

current workplace. The researcher is a graduate student from the Georgia Institute of

Technology, and the preferred approach is to conduct separate 20-30 minute interviews

with appropriate representatives from Corporate Real Estate, Human Resources, and IT

to gather background information surrounding the various factors as depicted in be Figure

1. All data will be confidential and the companies will only be identified based on the

type of institution. A second assessment will analyze the LEED categories that most

closely impact employee productivity and how those are implemented in the company

workplace. The conclusions from these assessments will either support or refute the

hypothesis that LEED spaces have a positive impact to productivity.

Because LEED is relatively new and due to the recognized difficulty in measuring

productivity outside of a manufacturing environment, the goal is to have 3-4 companies

in the Atlanta area participate in the case studies. By examining the current experience of

3 companies against the productivity elements and then the LEED characteristics of the
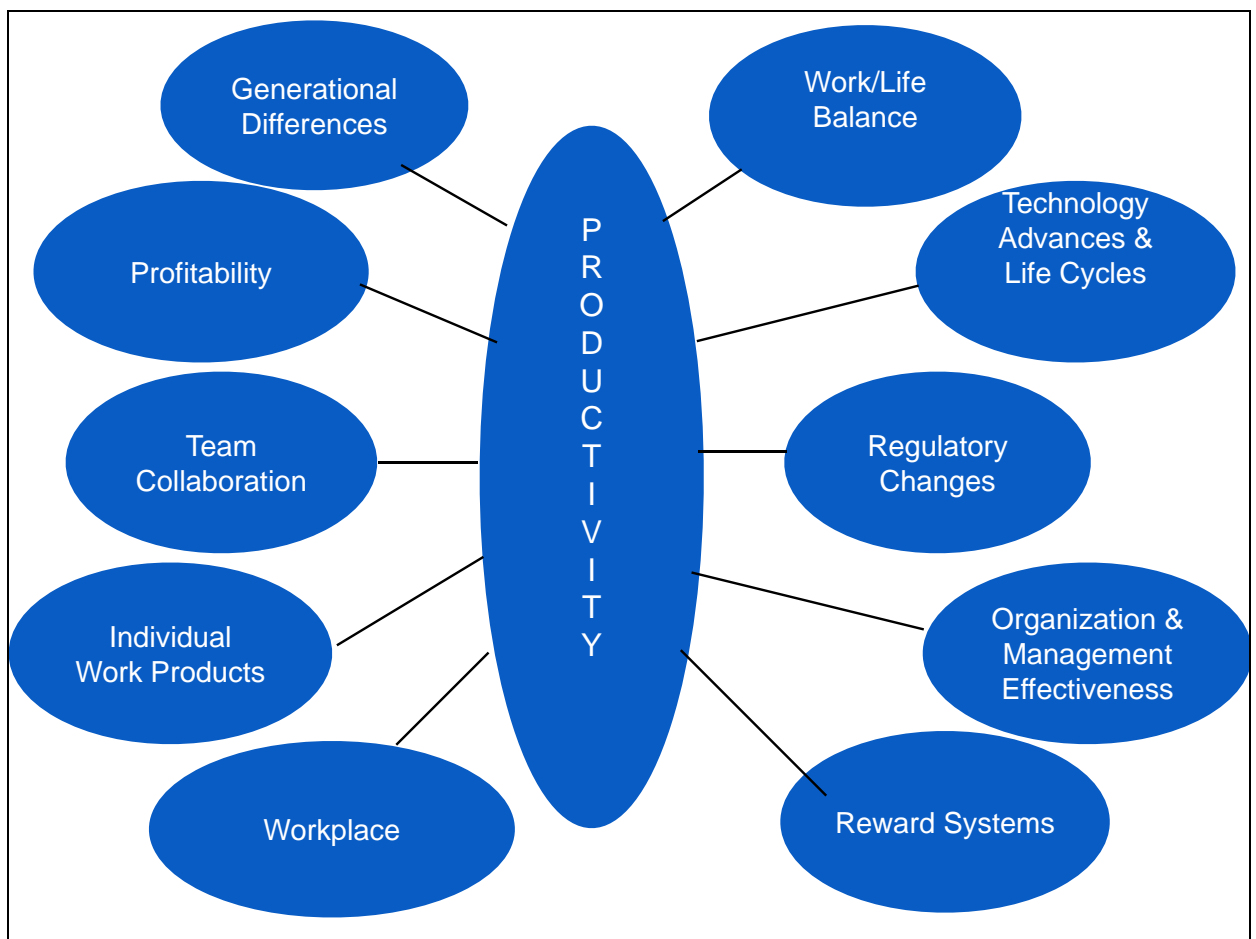
workplace, the hypothesis can be tested.

Figure 1. The Productivity Elements

Definition of the Productivity Elements

- Work/Life Balance – the company philosophy related to time spent with family, hobbies, and wellness programs relative to time spent focused on work deliverables. Are enablers such as onsite daycare centers available?

- Technology Advances and Lifecycles – Technology provided by the market over which a company has no control but which must be factored into the existing infrastructure. Examples would include the ubiquitous Microsoft upgrades and revolutionary advances such as cloud computing or tablet computers.

- Regulatory Changes – Government mandated changes that may require interpretations by the company.   Examples include: government required postings, lactation rooms, and security/safety requirements.

- Organization Effectiveness - How the company is viewed by its employees. Are there high turnover rates? How is leadership perceived by external audiences such as lenders or Wall Street? Are employee engagement surveys done and if so, how are the results utilized?

- Reward Systems – What is the company's philosophy regarding compensation and benefits? Is compensation at, below or above market? What percent of pay is at risk for the majority of the workforce? How is employee recognition addressed?

- Generational Differences – What are the company demographics?

- Profitability – How stable is the company from a financial standpoint? Are revenues increasing or relatively stable? If public, how is the stock performing relative to the

market. Does this element give employees a sense of pride and confidence in the company?

- Team Collaboration – Does the work require collaborative processes? This may vary by function and has this been reflected within the workspace?

- Individual Work Products – What percentage of work is task oriented? What kind of individual deliverables are created? Examples include: software programs, legal briefs, written documentation, analysis reports.

- Workplace – how are offices, workstations, conference rooms arranged? How are they used? What amenities are provided such as: exercise facilities, cafes, concierge services, and alternative transportation solutions? How was the space occupants involved in the design process?

These elements all have impacts to productivity and may even conflict with one another. It is beyond the scope of this research to analyze the interrelationship of these elements but rather to document current practices and philosophies.

Research Methodology

As described in the attached research checklist, information is to be gathered via a series of structured interviews. Where information is unavailable or there are confidentiality concerns, a general description of the company's position or experience will suffice. If the company is in a LEED certified building, access to the LEED checklist is requested. If the building is not LEED-certified, the researcher will perform a high-level assessment in order to capture building performance data on those elements most likely to impact productivity (indoor environmental quality).

After the information is gathered, the researcher will summarize the information for review and approval by the corporate real estate contact to ensure it is an accurate representation of the company.

Research Checklist

- Conduct kick-off meeting with corporate real estate leader.
- Interview representative(s) from Corporate Real Estate/Facilities
    - Overview of company and its mission. Gather public information regarding company success measures.
    - General description of the company culture
    - Conduct tour of workspaces and gather background of when and how they were created
    - Address LEED certification or "green" characteristics of the workspace
    - Describe how building services are administered for the company
    - Describe the various departments and the types of space and service requests that are made
    - Describe the organizations and their "work temperament". Are they project-oriented, road warriors, and heads-down workers?
    - What alternative workplace strategies are in place?
    - Did the company participate in the recent CoreNet survey on Productivity Metrics? If yes – gather available data.
- Interview representative(s) from Human Resources
    - Gather any available productivity metrics:
        - Workers Comp or OSHA data surrounding lost work days
        - Absence reports surrounding sick time off
        - Employee Satisfaction or Engagement survey data
    - Gather information on company reward systems
    - Gather organization and management effectiveness data
        - Organization charts to a level of detail that is meaningful to understand how the company operates
        - Results from Employee Engagement/Satisfaction surveys
        - Employee turnover/retention rates as compared to industry
        - Employee demographics by age, education, and ethnicity
    - Gather information on company use of health and wellness programs
- Interview representative(s) from IT
    - What types of Audio Visual tools are available?
    - How is video conferencing used?
    - What kind of individual devices are supported and who owns them?
        - Laptops
        - Desktop computers
        - Tablet computers
        - Smart phones
    - How is device security administered?
    - How are software upgrades administered?
    - What is the estimated percentage of installed applications compared to "cloud based" applications?
    - How is remote access supported?
- Interview Property Management (if needed for LEED information)

APPENDIX B

WORKPLACE PRODUCTIVITY ASSESSMENT TOOL

Workplace and Productivity Assessment Tool

General Information

1. Type of Facility:

   ☐ Corporate Headquarters
   ☐ Regional Office
   ☐ Independent Subsidiary
   ☐ Other_____

2. Length of time in this facility: _____ years

3. Number of employees at this facility:

   ☐ Professional   _____
   ☐ Clerical   _____
   ☐ Executive   _____
   ☐ Other   _____

4. Type of Facility:

   ☐ LEED certified
   ☐ Meets Major LEED credit criteria for:
      o Sustainable sites
      o Water efficiency
      o Energy and Atmosphere
      o Materials and Resources
      o Indoor Environmental Quality
   ☐ Facility over 5 years old
   ☐ Facility over 10 years old
   ☐ Facility over 20 years old

Generational Differences

5. Please estimate the age demographics for your organization:

    - Legacy   (Born before 1946)   _____%
    - Baby Boomer   (Born 1946-1964)   _____%
    - Generation X   (Born 1965-1976)   _____%
    - Generation Y   (Born 1977-1998)   _____%

6. Having multiple generations in the same workspace has an impact to productivity:

    - ☐ Strongly agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly disagree

7. Generational considerations are factored into the workspace design at my company:

    - ☐ Strongly agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly disagree

Profitability & Growth

8. Company Revenue for fiscal year 2010 was:

    - ☐ Up by 10% or greater over the prior year
    - ☐ Up by 5% or greater over the prior year
    - ☐ Up by 0%-3% over the prior year
    - ☐ Down by 3% over the prior year
    - ☐ Down by over 5% over the prior year

9. Employee headcount as compared to fiscal year 2010 was:

- ☐ Up by 10% or greater over the prior year
- ☐ Up by 5% or greater over the prior year
- ☐ Up by 0%-3% over the prior year
- ☐ Down by 3% over the prior year
- ☐ Down by over 5% over the prior year

10. Revenue/employee is a useful productivity measure for my company:

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

Team Collaboration/Individual Work Products

11. Please describe the business functions housed at this location:

- ☐ Marketing   _____%
- ☐ IT applications development and support   _____%
- ☐ Legal   _____%
- ☐ Accounting & Finance   _____%
- ☐ Human Resources   _____%
- ☐ Supply Chain   _____%
- ☐ Other _____   _____%

12. Please describe the type of work performed at this location:

- ☐ Project work   _____%
- ☐ Transactional work   _____%
- ☐ Confidential Work   _____%
- ☐ Training/Marketing Presentations   _____%

<u>Workplace</u>

13. The current office space allocation could best be categorized as:

    ☐ Individual enclosed offices   _____%
    ☐ Collaborative or team space   _____%
    ☐ Open workstations – low/no walls   _____%
    ☐ Open workstations – seated privacy   _____%
    ☐ Open workstations – high walls   _____%
    ☐ Conference/Meeting rooms   _____%
    ☐ Other: _____   _____%

14. The following amenities are provided at this work location:
    ☐ Cafeteria
    ☐ Health Club
    ☐ First aid center – unstaffed
    ☐ First aid center – staffed
    ☐ ATM
    ☐ Concierge
    ☐ Child Care
    ☐ Outdoor areas
    ☐ Vending (describe) _____
    ☐ Retail (describe)_____
    ☐ Other (describe)_____

15. The use of workplace standards are best characterized as:

    ☐ Consistent at this location
    ☐ Consistent across all locations within the U.S.
    ☐ Consistent within a department or organization
    ☐ Not in use

16. Facilities space requests are handled in a timely and predictable manner:

    ☐ Strongly agree
    ☐ Agree

☐ Neutral
☐ Disagree
☐ Strongly disagree

17. Facilities maintenance requests are handled in a timely and predictable manner

☐ Strongly agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly disagree

Technology Advances and Life Cycles

18. Indicate which of the following technologies are in use to support collaboration:

☐ Video Conferencing. Please estimate # locations
  o High Definition   ____
  o Laptop/Desktop capable   ____
  o Other   ____
☐ Reservation systems
☐ A/V equipped conference rooms. Please indicate percentage: _____%
☐ Electronic whiteboards
☐ Social media
☐ Virtual meeting software (ex: WebEx)

19. Indicate which of the following technologies are supported at this location to support employee mobility:
☐ Tablets
☐ Laptop computers
☐ Smart phones
☐ "One phone" technology
☐ Wireless access coverage. Please indicate percentage: _____%
☐ VPN/Secure remote access
☐ Cloud computing

20. Alternative Work Strategies can best be described as:

☐ At department discretion
☐ Widely used with infrastructure to support "work anywhere"

☐ Not utilized

Regulatory Changes

21. Regulatory factors have a significant impact to productivity:

☐ Strongly agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly disagree

22. The following regulatory influences have impacted productivity at this location

☐ Sarbanes Oxley
☐ Cyber Security standards compliance
☐ OSHA
☐ FMLA
☐ Other _____

Organization Effectiveness

23. Please indicate the type of performance metrics captured at this location:

☐ Employee satisfaction/engagement
☐ Employee attraction
☐ Employee retention
☐ Internal customer satisfaction
☐ We do not measure any performance metrics other than financial

If your company participates in annual employee satisfaction/engagement surveys, the following topics are typically addressed. If that data is available please provide the best interpretation of those results. If not, please indicate the most representative response for your location:

24. Employees are generally positive about their interactions with senior management:

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

25. Employees are generally positive about their interactions with their direct supervision:

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

26. Employees are generally proud to work for the organization:

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

27. The company promotes work/life balance.

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

28. Employees are clear about what is expected from them:

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree

☐   Strongly disagree

29. Employees find their workspace suitable

    ☐   Strongly agree
    ☐   Agree
    ☐   Neutral
    ☐   Disagree
    ☐   Strongly disagree

30. Employees feel fairly compensated

    ☐   Strongly agree
    ☐   Agree
    ☐   Neutral
    ☐   Disagree
    ☐   Strongly disagree

Productivity Metrics

31. The corporate workplace has a significant impact on employee productivity:

    ☐   Strongly agree
    ☐   Agree
    ☐   Neutral
    ☐   Disagree
    ☐   Strongly disagree

32. Please indicate the impacts the workplace has on your organization:

    ☐   Expense reduction and control
    ☐   Increase in employee satisfaction
    ☐   Improves flexibility
    ☐   Improve service delivery
    ☐   Other _____

33. Please indicate which of the following operational impacts are captured at your

    location:

    ☐   Real estate cost per employee
    ☐   Square footage per employee
    ☐   Revenue per employee
    ☐   Speed to market
    ☐   Customer service through-put (internal)
    ☐   Customer service through-put (external)
    ☐   HR cost per person
    ☐   Technology cost per person
34. Please indicate if employee productivity is measured at this location:

    ☐   Individual level
    ☐   Department level
    ☐   Corporate level
    ☐   Not captured
35. Please indicate which of the following HR metrics are captured at this location:

    ☐   Cost of on-boarding new employees
    ☐   Training costs for new employees
    ☐   Recruiting costs
    ☐   Turnover rates
    ☐   Absenteeism
    ☐   None
    ☐   Other _____

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