

The Future of Knowledge Work

An outlook on the changing nature of the work environment

Introduction

The world is changing dramatically in ways that will have a significant impact on everyday life.

By 2025 the explosion in world population, automobile ownership, and urbanization trends will make physical travel more complex and time consuming. In contrast, technology will continue to shrink, disappearing into the fabric of our life, eventually becoming so small that it will be embedded in our clothes and environment. Yet, even while technology increasingly disappears, the influence it has on each of us will increase dramatically fostered by cloud computing and massively expanded use of personal data.

The intent of this paper is to identify trends likely to shape The Future of Work, and seed the reader with information and ideas to imagine the future that is rushing towards us.

Tim Hansen, Intel Corporation

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White Paper

Intel Labs

Executive Summary

The foundation for this paper grew out of a May 2012 Workplace of the Future Summit held at Intel in Haifa Israel. Related research within Intel Labs in addition to significant external research has provided the source material for conclusions drawn. The content of this paper is focused on changes likely to impact global companies with a large number of knowledge workers, though many observations will apply more broadly.

While this paper provides an introduction to a wide number of topics, there are five key ideas that the cursory reader can take away.

1. The definition of an employee is on the cusp of a transformation. Employee attitudes and expectations for flexibility will influence where, when, and how people work.
2. Dynamic and agile team structures will become the norm, and the default mode of employment will look more like a gun for hire (contractor) than employment structures of the past.
3. The location of work will vary widely. Offices will serve as temporary anchor points for human interaction rather than daily travel destinations. Office as a Service (OaaS) will become a strategic tool to land employees in the right place, at the right time.
4. Smart systems will emerge and collaborate with humans, changing the nature of work, and driving a re-imagination of work content and work process.
5. A second wave of consumerization via services, "Servicification", will usher in changes to corporate IT organizations in a way more impactful than the first. The magnitude and speed of disruption will be propelled by short software development cycles and simplicity in wide deployment of services and apps quickly. Hardware changes driven by the iPhone and iPad in the first wave of consumerization will seem long-lived in comparison.

The way people work will change, and so will the attributes of employment.

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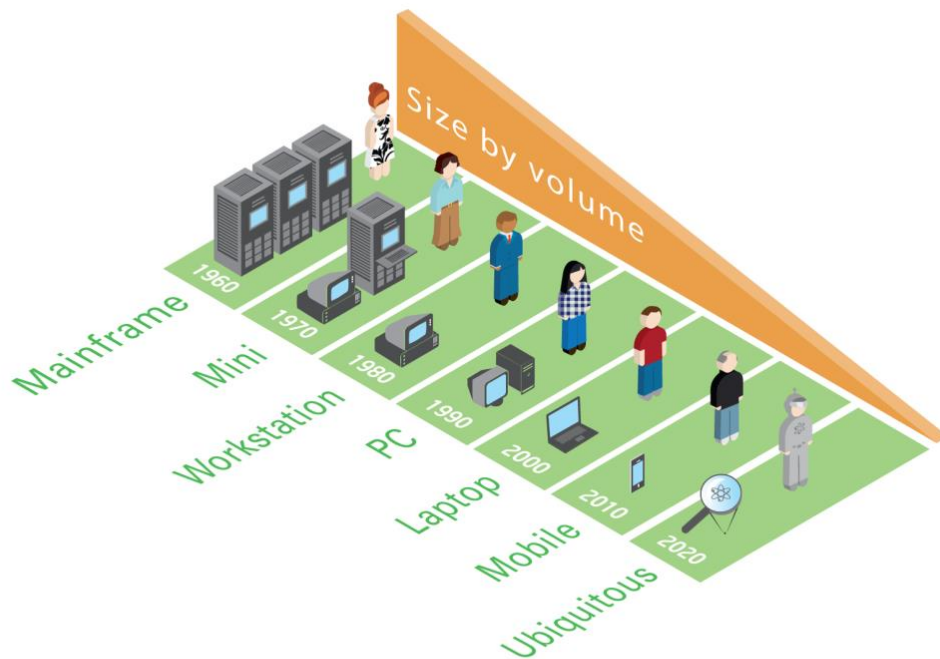
Special acknowledgement to Nirit Cohen (Intel HR), Liad Bareket (Intel HR), Shlomit Izhaky (Intel HR) and the Intel Israel HR team who hosted the Workplace of the Future Summit in Haifa Israel. The seed for many of the ideas in this paper were facilitated by their innovative efforts.

Preface

The world is changing dramatically, both expanding and contracting in ways that will have a significant impact on everyday life. Old models of work already in flux will seemingly dissolve as new models rise in their place. People working in 2025 may view today's work life as differently as we perceive the office life of the 1800's. Technology will be a major force of change, but the agents of change will be the innovative knowledge workers who envision, articulate, and implement the technology.

Those companies that possess a clear vision for the unfolding trends have an unprecedented opportunity to excel in a dramatically different landscape. As we move toward the year 2025 there are forces at work which will have dramatic impact to the work landscape.

Compute So Small it is Everywhere

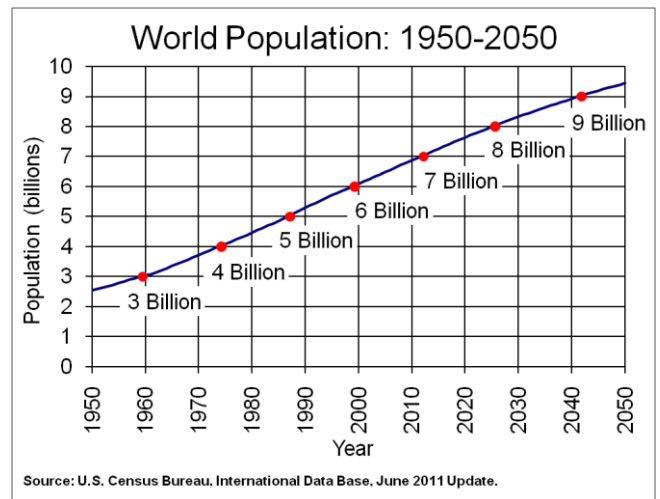


Computing power will evolve with Moore's law, becoming so small that it will easily be stitched into the fabric of our lives (and our clothes) in a pervasive and engrained way. This will result in an explosion of devices that will mesh together. By 2020 it is estimated that there will be over 50 billion devices connected to the internet.¹ In essence, we will be living inside a computing planet. Each person will access a myriad of devices on a daily basis, and cloud computing will enable these devices to intelligently communicate and collaborate. Imagine an automated message from home adding milk to the shopping list because the refrigerator recognized that the carton was almost empty.

More Congestion, Less Physical Mobility

In contrast to the shrinking of computing, there is an expected explosion in human population, urbanization and automobile ownership. The human population of 7 billion today is forecast to grow to 9.5 billion by 2050², with 75% of the world's population expected to live in cities, and 50 of those cities having more than 10 million people. About one billion cars on the road worldwide today may grow to 4 billion by mid-century.³

The amount of physical space we have will become ever more congested, and our ability to move physically from one location to another will become increasingly complex and time consuming.



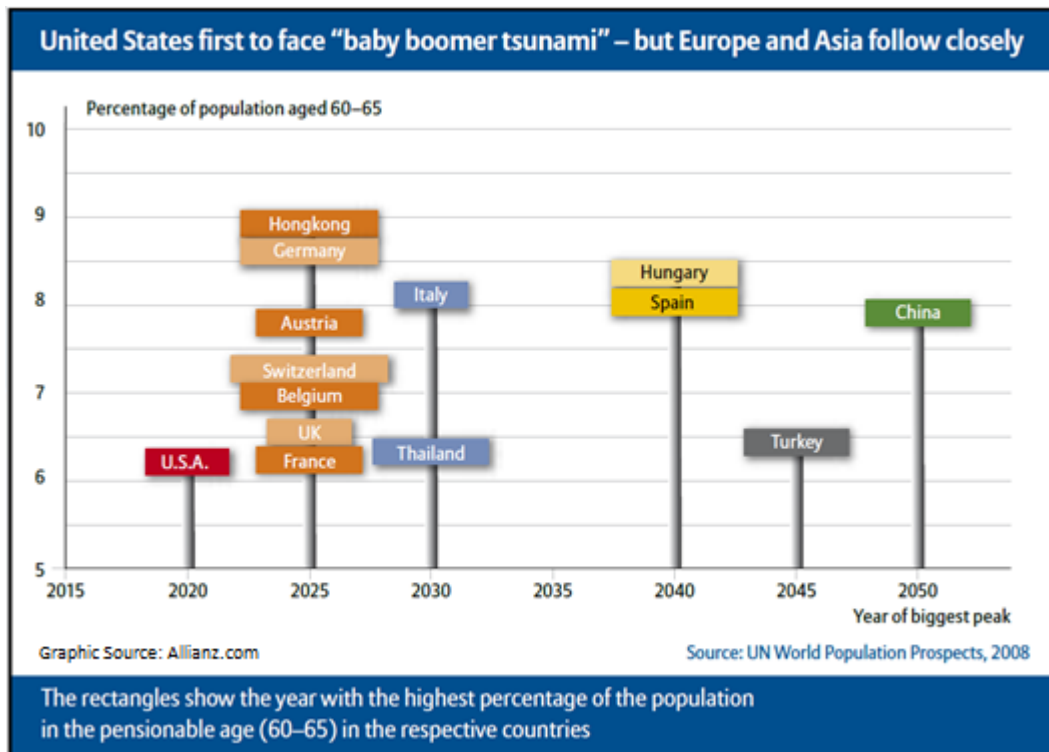
Without thoughtful intervention, commute times which are already significant in many cities around the world will rise. Strategies will be needed to address the negative health outcomes and overall decrease in life satisfaction that results from longer commute times.^{5,6}

There is a real opportunity for technology to ease the human burden in this regard. Solutions such as smart transportation systems, autonomous cars, and richer telecommuting options could all contribute to meaningful changes.

Emerging Geographies and Aging Populations Change the Workforce

Economic wealth is expected to shift over time from the west to the east with the growth of the world population. Educated knowledge workers from the east, especially China and India will form an ever larger percentage of the available work force.

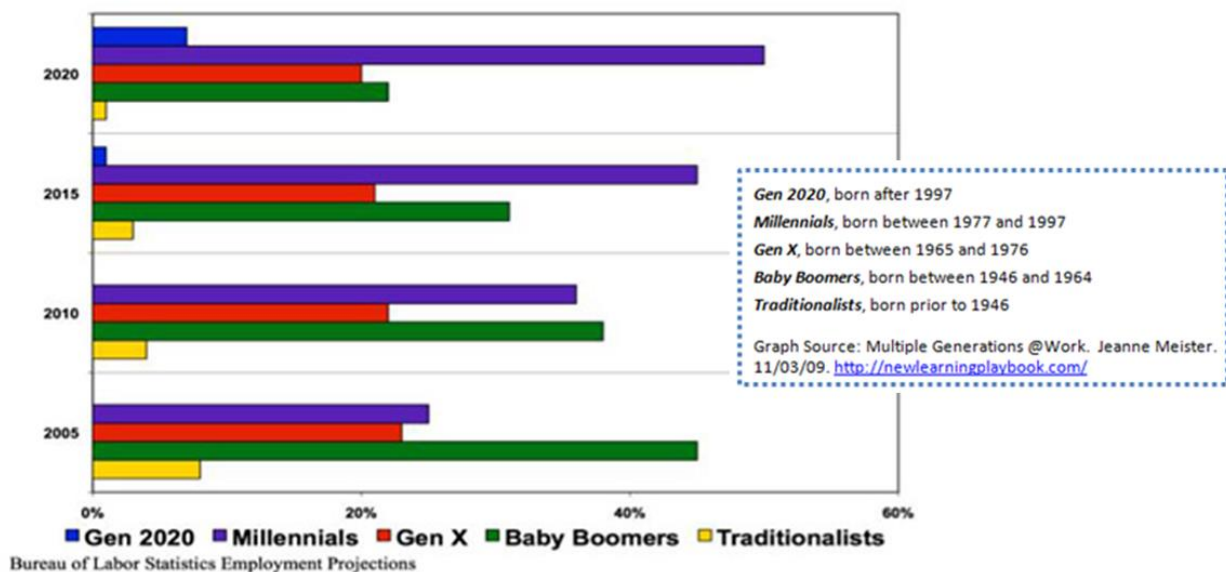
Projections for the U.S. labor force indicate there could be 14.6 million new nonfarm payroll jobs created between 2008 and 2018, and assuming no major immigration changes, there will only be about 9.1 million workers to fill the positions. The basic issue in the U.S. is that there are fewer young people to replace the aging Baby Boomer generation. This will leave a gap of ~5.5 million workers.⁷ Europe is facing similar challenges.



Europe and the US will need to tap new and underutilized resources to fill knowledge worker jobs. These may include a greater percentage of mature workers, women, students, transient workers, and immigrants. Globally, businesses are likely to leverage a larger percentage of workers from varied sources including contract pools, academic collaborations, open innovation challenges and crowd-sourcing.

Workers on both ends of the age spectrum will increasingly be involved in the work force. According to the World Health Organization, mature workers will be physically capable of working into their mid to late 70's⁹. It is also likely that organizations will tap the energy, enthusiasm, and insight from bright high school and college-aged students. In the US this will translate into a social phenomenon not yet witnessed, five generations working side by side.⁹

Five Generations in the Workplace



Knowledge Jobs Shape Work Opportunities

The shift in workforce demographics will also be influenced by a larger issue: the changing skill and knowledge levels needed to find and keep a job in an increasingly competitive global economy. Though there is still debate on the specific definition, knowledge work is generally seen as work that most leverages human intellect, creativity, and analytic skills. Trends are already indicating **that a growing number of jobs will require a significantly more complex set of interdisciplinary skills such as problem solving, judgment, listening, data analysis, relationship building, collaborating and communicating with multinational co-workers.**

Knowledge jobs are growing two and a half times faster than transactional jobs which involve fewer conceptual duties, and knowledge workers represent the fastest growing talent pool in most organizations. Approximately 48 million of the 137+ million U.S. workers are knowledge workers.¹¹ **As a result of the expected impact of technological innovation, knowledge workers will have an unprecedented opportunity to shape the future and influence societal change.**

Emerging Smart Systems Collaborate with People

While a growing percentage of the population shifts towards knowledge jobs, the rise of smart machines and systems will also make an impact. Society is “on the cusp of a major transformation in our relationship with our tools. In the next decade **smart machines will enter offices, factories, and home in numbers we have never seen before.** They will become integral to production, teaching, combat, medicine, security, and virtually every domain of our lives. As these machines replace humans in some tasks, and augment us in others, their largest impact may be less obvious: their very presence among us will **force us to confront important questions. What are humans uniquely good at?** What is our comparative advantage? And what is our place alongside these machines? We will have to rethink the content of our work and our work processes in response.”¹²

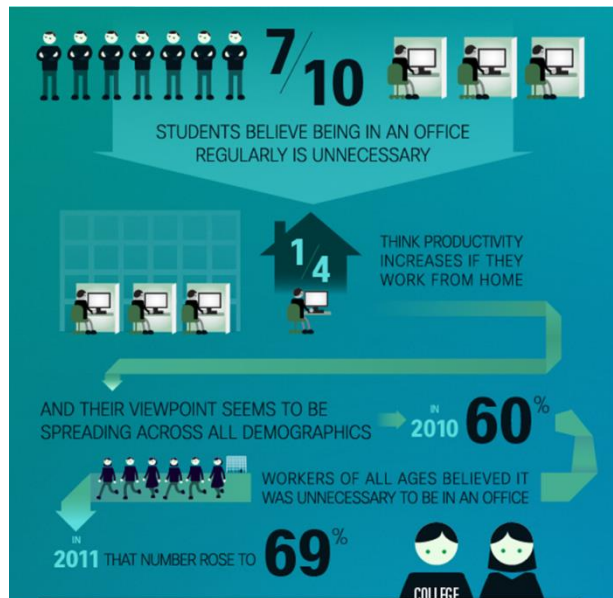
There are already leading indicators of how these new smart systems will work. IBM’s Watson is one such example. In an ongoing collaboration with the Memorial Sloan-Kettering Cancer Center in New York, IBM is working with a team of Oncologists to teach Watson how to diagnose tumors and suggest treatments. “Watson can ingest more data in a day than any human could in a lifetime. It can read all of the world’s medical journals in less time than it takes a physician to drink a cup of coffee. All at once, it can peruse patient histories; keep an eye on the latest drug trials; stay apprised of the potency of new therapies; and hew closely to state-of-the-art guidelines that help doctors choose the best treatments.”¹³ Watson is then able to suggest a range of potential treatments by confidence level which provides doctors with an effective tool to more efficiently help patients. Because systems like Watson can continually ingest an enormous amount of recent and relevant data, the system itself will outstrip a human’s ability to keep current with all relevant information.¹³

It’s a small step to imagine other domains that could benefit from similar systems. A legal based smart system could be implemented to expedite the processing of patent applications which have increased by more than 50 percent over the last decade, and which are significantly backlogged. More valuable still, this same system could improve the quality of application review, provide actionable recommendations to junior staffers, and reduce the process gaming that occurs. Investment bank fraud systems, corporate expense tracking and personal finances are but a few other examples.

The new partnership between humans and machines will open opportunities for people to focus on uniquely human strengths. Higher level "sense-making" skills will be increasingly valued as humans leverage data to create unique insights critical to decision making. This trend will also necessitate workforce training and transition plans for those workers impacted by the automation shift.¹²

Employee Attitudes Shift Towards Expectations for High Flexibility

As the composition of the workforce shifts, so too are the attitudes, desires, and expectations of the employee. **There are indications that both young and mature workers desire significantly increased flexibility in work times, work schedules, and work locations in order to pursue other valued life activities.** Social responsibility is becoming a significant differentiator as employees expect their company to provide opportunities to contribute in a meaningful way to societal good.¹⁴



Increasingly, job flexibility and remote access are valued more highly than salary considerations.¹⁴ 69% of employees polled in a Cisco survey indicated they believe it is unnecessary to be in the office in order to be productive, and 60% of students polled believed they should have the right to work remotely with a flexible schedule.¹⁴

The definition of an employee may also change significantly as knowledge workers desire to bounce part time between traditional corporate roles, cultivation of entrepreneurial opportunities, pursuit of societal contributions and leisure activities. Employees may request, and in some cases expect, all manner of flexible

schedules to accommodate their lifestyles. These may include partial work weeks, time shifted hours, time on - time off scheduling, etc. While it is still uncertain if knowledge workers will have the leverage to require this flexibility from their employers, if supply imbalance projections hold true, market conditions would likely provide workers with that opportunity. Contract-like work models could become a more prevalent and dynamic way to assemble successful teams. "In-sourcing" models may be used to create a priority retainer on valuable talent, giving those employees flexibility to take on outside endeavors in exchange for their availability at critical junctures. **Progressive employers looking to recruit and maintain top talent are likely to be the first implementers of a highly flexible work environment.**

Studies show that while employees desire ever greater flexibility and opportunity, they will also want a direct engagement with their company, and that interaction should reflect a more personalized understanding of them.¹⁵ As technology evolves, employees will come to expect tailored corporate services that will recognize them individually and proactively offer suggestions in a manner similar to a friend. Imagine a corporate coach service able to

recommend a specific job training curriculum, an increase to retirement savings, or potential tax consequences of a planned stock exercise.

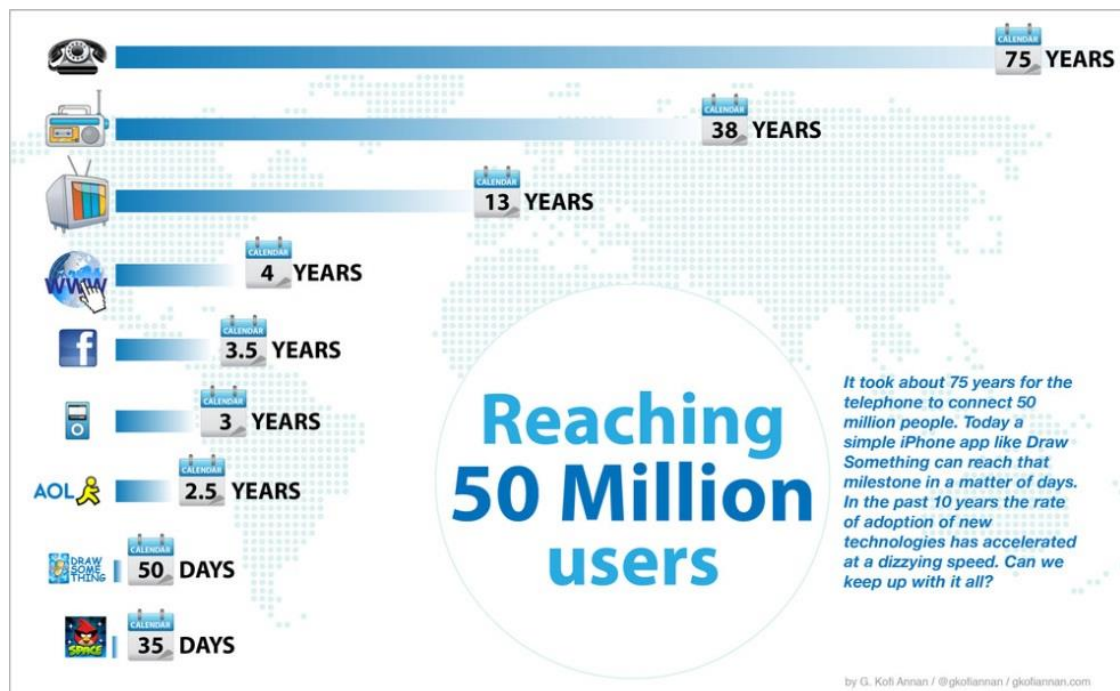
The expectations of the future workforce will also be shaped by the differing attitudes of the generational workers. This will present unique challenges in the way people relate, interact and collaborate with each other. **Productivity will be highest by those employers who find innovative techniques to unify the multi-generational, multi-national workforce in pursuit of organizational objectives.**

Cloud Computing Speeds the Pace of Innovation

Cloud computing will shape the future of work in at least three significant ways. It will change the way companies plan physical office space, it provides an ability for unprecedented agility and speed in the deployment of new concepts regardless of company size, and it will usher in changes to corporate IT organizations in a way more impactful than consumerization.

New technology will have a dramatic effect on how and where work is done. The accelerating adoption of mobility and the migration to cloud computing provide a transition point to 'empty' or 'thin' office space.¹⁶ Thin office space occurs as people and computing infrastructure can be decoupled from specific long term physical properties. The proliferation of data warehouses will enable corporations to centralize computing to large offsite facilities or to dynamically leverage external cloud services for needed compute capability. (E.g. Amazon Cloud) **The movement away from office buildings containing data centers and technology infrastructure will provide opportunities to create office location strategies that are agile, transient, and can be more focused on human centered usage.**

Cloud computing is also a significant disruptor behind the swift creation and implementation of new business opportunities. Almost overnight a small startup consisting of a few employees can develop a novel concept and deploy it globally. Social media platforms can be used to construct a web presence that appears established and allows a startup organization to compete against large corporations in an unprecedented way. The cloud enables organizations to crowd source, data aggregate, collaborate, and play at extreme scales from the micro to the massive.¹²



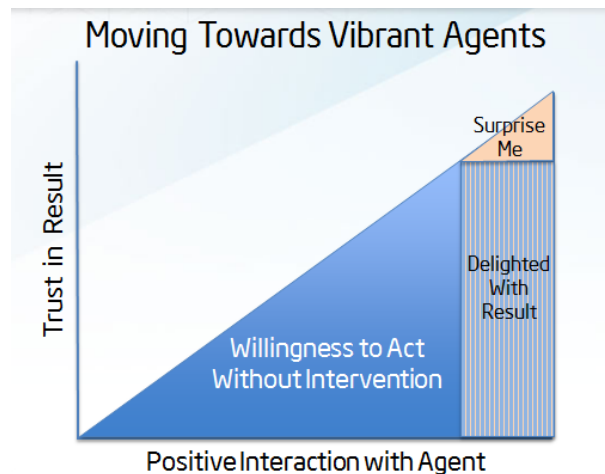
Penetration rates for new web sites and apps enabled by cloud computing are staggering.

The Draw Something app from OMGPOP had 15 million daily active users just eight weeks after deployment, and over two billion drawings were created in the first 6 weeks alone.¹⁸ If you put these numbers in context it is simply stunning; it took radio thirty-eight years, television thirteen years, the Internet four years, and Facebook three and a half years each to reach 50 million households.^{19,20}

Personal Data via the Cloud Changes Our Relationship with Technology

Meanwhile, the World Economic Forum has predicted the emergence of a new personal data economy which will provide high value in the use of personal data.²¹ People will have consistent access to their own personal knowledge repository. **The cloud will facilitate sharing and tying of this personal information across computing devices that will litter the landscape and personal data will be able to inhabit any available device which is authorized to assist the user.** Imagine every computing device working cooperatively with us because it can become temporarily possessed of our digital persona.

New digital agents and digital assistance services will likely use methods to analyze individual data, make recommendations, and often act on our behalf with little or no intervention. **Instead of asking questions to a Siri-like service and waiting for a result, we will find ourselves unexpectedly delighted by the actions that have been taken on our behalf.** As with any relationship, trust will need to be built through positive interactions over time. **Frequent incidents of delight will ultimately lead to moments of unexpected surprise.**



Our relationship with technology will shift from obsession with mobile gadgets to desired experiences that our personal data make possible, and this will enable unparalleled life flexibility, introspection, productivity, social interactions and convenience.

Digital agents working on our behalf could coordinate the myriad of daily activities for a busy family, help arrange common meeting time with friends and loved ones, seamlessly track shopping needs, and then have products delivered to our door at the right time. Like a life coach, these agents could provide an understanding for how time is spent, remember social interactions, recall frequent activities, and the help us understand the expenditure of finances. Digital agents may also help plan specific goals and respond reliably to questions like, “where did I leave my keys?” **What happens when a digital assistant is so helpful that you view it as a friend?**

The Second Wave of Consumerization in the Enterprise: “Servicification”

Changes in the consumer landscape will spill over into the workplace as employees strongly desire the flexibility to leverage and integrate the best of the life changing consumer services into the flow of their work life. Digital agents that facilitate unprecedented personal life convenience will initially be obstructed from becoming useful in the work environment due to corporate security barriers. Many employees, but most especially the Millennial generation who view work-life as intertwined and desire all-the-time access, will find this situation untenable. This will drive the second wave of consumerization. **“Servicification”, the need to integrate, adapt/adopt, or enable access to consumer based services in the enterprise will occur.** The trend will resemble the corporate consumerization transition that occurred with smartphones and tablets, but **the impact will be much more expedited and disruptive for IT organizations.**

The magnitude and speed of disruption will be propelled by short software development cycles and simplicity in wide deployment of services and apps quickly. (see previous OMGPOP example) Hardware changes driven by the iPhone and iPad in the first wave of consumerization will seem long-lived in comparison.

Nimble companies will define strategies to quickly harness the new consumer services and integrate them with work related services as a way to make employees more productive. Imagine a personal assistant that is aware of both home and work calendars, and can adjust an employee’s day based on that knowledge. Workplace based analytic engines will interact with employee provided data to seamlessly suggest (and change) benefit coverage for major life events such as the birth of a child.

Employment Models are Transforming; Big Changes on the Horizon

The knowledge worker supply imbalance is likely to be the cause for several organizational changes. **One of the most dramatic changes predicted is a shift towards dynamic employee staffing.** Projects and programs would be identified to meet specific business objectives, and teams will form dynamically in response. People will be drawn from varied resource pools based on skills, interests, and availability as needed for projects and programs. Instead of strict alignment to a corporate organizational structure, employees would be able to provide benefit across corporate business boundaries. Contributors could come from multiple geographies, and in some instances would be drawn from outside the company to fill gaps for specialized skills.

“Talent Marketplaces” that provide a way to match skilled employees to programs, projects, and tasks are one such approach. Projects **could be listed in an exchange that would match organizational needs to employee skills and interests.** A Talent Marketplace could provide more opportunity for employees to stay engaged and challenged, while best leveraging resources across a company. Project durations may vary significantly and the employee could find new opportunities once existing projects complete. In a marketplace approach, employees would rotate from project to project instead of from organization to organization. The role of a manager in this type of environment would shift towards coach, counselor, and facilitator.

Intel Israel HR has imagined this workplace with a concept video: <http://youtu.be/OX4zeUjvJrc>

Creative work models like Open Innovation and Crowdsourcing are likely to become more prevalent. “The traditional model for innovation--which has been largely internally focused, closed off from outside ideas and technologies--is becoming obsolete. Emerging in its place is a new paradigm, ‘open innovation,’ which strategically leverages internal and external sources of ideas and takes them to market through multiple paths”²² Crowd sourced models use a distributed problem solving approach to tap into large pools of people with unique skills, each of whom can contribute to a final solution.

Employees will have a greater set of opportunities and flexibility, and the definition of an employee is likely to shift. Individuals may choose to invigorate their careers by being part time employees for some companies, held on retainers for specific skills by others, becoming entrepreneurs for a period of time, or by participating in open innovation challenges that utilize their unique skills. The Millennial generation in particular is likely to desire frequent shifts between differing work modalities.

Employers will consider expanding their use of talented part-time resource pools to more quickly add specialized skills, fill needs for constrained skillsets, or to “pile on” large and diverse sets of people to more quickly innovate.

In a world where employees frequently transition to new job opportunities with a myriad of companies, and employers source people from widely distributed and external sources, more flexible intellectual property models will be needed. Rewarding invention without stifling innovation will be an increasingly significant issue to resolve in the coming years.

Compensation systems will need to change to accommodate the new work models. **Employee compensation is likely to be more closely tied to results produced rather than hours worked.** HR departments will need to consider new methods for identifying, assigning, and tracking the completion of deliverables while incentivizing organizational teamwork. In some cases employees may choose to distribute a portion of their compensation to leverage other employees as sub-contractors. Employees will exercise more control over work selection, work load, and salary.

Training, education, and employee development nurtured by employers could be a strategic differentiator to foster employee allegiance and grow employee value through educational opportunities. Mentors and training systems could proactively identify courses and projects to build worker skills. In an environment of worker scarcity, creating a path to grow worker knowledge will help address future needs and help connect employees to their company.

Changes in how people collaborate and communicate are also starting to take shape. **An evolution from directed 1:1 conversation (email, phone) to multi-point communication (enterprise social networks) is projected to yield significant productivity gains.** The global distribution of employees and corresponding time zone differences require efficient methods to work asynchronously. A McKinsey Global Institute report notes that while 72 percent of companies use social technologies, very few are close to achieving the potential benefit from them. McKinsey predicts that a shift that moves single threaded communication to social medium can reduce the time employees spend on searching for information by as much as 35 percent.²³ Once the corporate consciousness is captured and searchable, more people can be working from the same set of assumptions and information.

Work Environments Are Optimized For the New Location: Everywhere

While it is likely that workers will increasingly be spread geographically and across time zones, **co-location will still be required to fulfill the human need to establish connection with co-workers, build relationships and trust, and provide opportunities to grow as a team through social interaction.** Co-location is also important because it is known to spur knowledge spillover, serendipitous interactions and innovation.²⁴

The competing forces of worker fragmentation and human co-location suggest a coming paradigm change. In some cases this will mean new methods for establishing and building rapport via travel to a common location (temporarily) at project inception, and at periodic intervals. In other cases technology would help fill the gap virtually. Regardless of the location, businesses will want to proactively optimize the work environment where people meet to best facilitate productivity.

Three strategies likely to emerge aligned with work location include: Optimized Office Location Planning, Hybrid Office Configurations, and Virtually Being There.

Optimized Office Location Planning: Office as a Service (OaaS)

“Real estate costs today represent for most organizations the second biggest overhead after salaries, and this is now under scrutiny as companies’ state that they will grow in headcount without taking on more square feet.”²⁵ The location of the office will be much more dynamic in the future, and require more consistent planning. Population and urbanization trends will more negatively skew commute times, influence the use of satellite offices, and be a determinant in the location for permanent locations. Proximity to air travel hubs will be an important consideration to cope with an increasing geo-fragmentation of the employee base, and to minimize travel time when workers come together. **The occurrence of dynamically created project teams co-locating to temporary sites is likely to rise as a way to drive team cohesion, especially in the early stages of new projects.**

Leased, rented, and multi-company shared office (temporary) formats are expected to be more prevalent as a way to address capital and operational expenses, provide flexibility for team co-location, and facilitate broader cross company collaboration. **Offices will serve as temporary anchor points for human interaction rather than daily travel destinations.** Temporary locations may be used on a daily, weekly or monthly basis. Where permanent locations are utilized, they will increasingly be structured for ease in reconfiguration and use. **Office as a Service (OaaS) will become a strategic tool to land employees in the right place, at the right time.** OaaS will leverage both internal and external sites, consider travel requirements, and address a robust set of logistics and collaboration needs over varying time frames. Imagine a work location that could be unique for each project. After formation of a project team one of the first tasks would be to schedule an office location.

Hybrid Office Configurations are Shape Shifting Spaces

Once workers arrive at the office, employers will desire optimum worker productivity. **Physical space will be configured in consideration of the type of task, the role of the job, and even reflective of the personality of the worker.** In some cases this will mean open environments designed for group collaboration and opportunistic encounters, in other cases it will be private areas that allow for quiet thinking or heads down engineering.

Sometimes the physical configuration will be based on job types requiring specific space and equipment (HW engineering or HW testing), other times the configuration may be based on an understanding of the differing personality and psychology of people (i.e. introverts vs. extroverts). “Fluid” locations such as those on short term lease, cross company hoteling models, and virtual commuting will also influence new configuration methods. Many companies are already configuring Activity Based Work environments, and the sophistication of these solutions is expected to rise.

Regardless of the physical configuration, an adaptive compute workspace will increasingly understand and tailor the environment (compute, displays, etc.) to the people and situation of the moment. Imagine a local environment that is activated by a personal digital assistant on behalf of each participant. Collaboration material would appear for group work sessions (video, audio, documents) without the need to search. Individual workers would be able to use the compute environment at each location in concert with their mobile digital assistant to complete their job. Meeting transcription, identification of key points and decisions would automatically be documented and summarized so all people would be free to concentrate on the topic rather than the process of articulating what occurred.

The end goal would be a configurable physical environment interwoven with technology that enables productive work based on the needs of the individual and the successful collaboration of groups of people.

Virtually Being There

Companies will leverage a myriad of hiring practices, travel, and co-location strategies to enable teamwork, trust building and serendipitous innovation. But the key to addressing workforce fragmentation over the long term is most likely to be solved by a technological innovation.

“Virtual co-location” is expected to include a combination of technologies that will enable people to virtually “be there” when they can’t be physically present. **Successful virtual solutions would allow people to feel and interact as if they were sitting in the same room, provide ambient sociability, and enable better understanding and trust building.** Capabilities such as virtually sketching ideas or sharing 3D physical models across a distance would provide rich interaction. These solutions would ultimately encourage the unanticipated moments that occur when people are able to bump into, hang out, and connect personally with others. This would not be the simplistic two dimensional video conference systems in place today, but a set of technologies that would provide a rich interpersonal experience.

Given the likelihood that team members may need to travel more frequently to co-locate physically (at least during project inception), the same type of rich interpersonal virtual solution could also be a significant factor for **“homing from work”**. **An interactive experience that provides ambient sociability with family members while away on travel** would ease some of the angst employees experience while away.

An increase in the geographic dispersion of co-workers, and a shift toward management by results are two trends that could spur increased travel in order to facilitate the human-human connection. However, this trend is likely to diminish over time in direct correlation to the fidelity of virtual solutions that become available. **As the virtual medium enables robust interpersonal interactions, the need to be physically present will lessen.**

Summary

Over the coming years there will be significant changes to the way we socialize, interact, play and work. This paper has highlighted some of the significant trends that appear on the horizon, and offers a view of potential changes. Some of these changes will come as a result of global environmental factors such as world population growth while many others will be driven through technological innovation.

New challenges on the horizon present questions to resolve. What type of work model should be used to manage knowledge workers? When workers are increasingly distributed in far flung global locations and multiple physical locations, how do effective interpersonal relationships form and grow? How will technology and people considerations impact the locations where people come together? How can the office environment be configured for the best productivity of the worker? How will organizations source the best workers, and cope with differing attitudes across a five generation workforce?

Against a backdrop of world-wide social change and as technology facilitates broad global socialization, the need for human connection and understanding of differing viewpoints will become more pressing than ever. Travel and temporary co-location, especially at project inception, may provide an anchor for human relationships until the fidelity of the virtual experience approximates being there in person.

Employee identification, cultivation, and retention will be a strategic focal point. Development of "person centric" HR systems could help keep employees engaged and engendered to their company, and be a competitive advantage in the retention of employees. Those systems would integrate, adapt, and leverage the coming wave of personalized consumer services.

HR processes and guidelines will need consideration to maximize the use of the knowledge worker, and to provide employee flexibility and choice. New models for performance evaluation, compensation, and time off could be created to foster collaboration and innovation. Employee satisfaction will become an important barometric guide.

The location for work will increasingly be varied as workers are spread over a larger geographic landscape. Telecommuting and working on the go are likely to become the norm with the spread of mobile technologies, and the increasing expectation by workers to work remotely. Office location planning and configuration optimization will be another important consideration.

A technological change tsunami is rolling towards us and will wash away many previous perceptions of the world. The way we work will be swept into this new reality, and the knowledge worker is positioned to be the primary agent of change. Astute organizations will see and embrace these trends and aggressively plan for the new landscape.

"If we can envision the future we want, then we can work to build it."²⁶

Sources

1. Cisco Connected World Technology Report 2011
<http://www.cisco.com/en/US/solutions/ns341/ns525/ns537/ns705/ns1120/CCWTR-Chapter1-Report.pdf>
2. Geo Hive Population Statistics. <http://www.geohive.com/>
3. Green Car Congress coverage of Bill Ford "Blueprint for Mobility"
<http://www.greencarcongress.com/2012/02/billford-20120228.html>
4. World Population Graphic 1950 – 2050. U.S. Census Bureau. June 2011 Update.
<http://www.census.gov/population/international/data/idb/worldpopgraph.php>
5. Stress that Doesn't Pay: The Commuting Paradox. The Scandinavian Journal of Economics, 2008. Alois Stutzer, Bruno S. Frey. <http://commonsenseatheism.com/wp-content/uploads/2011/01/Stutzer-Frey-Commuting-Doesnt-Pay.pdf>
6. Relationship between commuting and health outcomes in a cross-sectional population survey in southern Sweden. BMC Public Health, 2008. Erik Hansson, Kristoffer Mattisson, Jonas Bjork, Per-Olof Ostergren, and Kristinia Jakobsson.
<http://www.biomedcentral.com/1471-2458/11/834>
7. After the Recovery: Help Needed. The Coming Labor Shortage and How People in Encore Careers Can Help Solve it. Barry Bluestone and Mark Melnik, Northeastern University, 2010.
<http://www.encore.org/files/research/JobsBluestonePaper3-5-10.pdf>
8. United States face retirement tsunami. Graphic source courtesy of Allianz January 2011. Data source courtesy UN World Population Prospects, 2008.
https://www.allianz.com/media/responsibility/documents/demographic_pulse_retirement_tsunamis_all_over_the_world.pdf
9. Are You Ready to Manage Five Generations of Workers? Jeanne C Meister and Karie Willyerd, http://blogs.hbr.org/cs/2009/10/are_you_ready_to_manage_five_g.html
10. Multiple Generations @Work: What Should You Do Differently? Posted by Jeanne Meister, November 03, 2009. New Learning Playbook. <http://newlearningplaybook.com/>
11. The 2020 Workplace: How Innovative Companies Attract, Develop, and Keep Tomorrow's Employees Today. Jeanne C Meister and Karie Willyerd, May 2011
12. Future Work Skills 2020. Institute for the Future for the University of Phoenix Research Institute. <http://apolloresearchinstitute.com/research-studies/workforce-preparedness/future-work-skills-2020>
13. IBM's Watson is Learning Its Way to Saving Lives. Jon Gertner. October 15, 2012. Fast Company. http://www.fastcompany.com/3001739/ibms-watson-learning-its-way-saving-lives?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+fastcompany%2Fheadlines+%28Fast+Company%29
14. Cisco Connected World Technology Report 2010
<http://www.cisco.com/en/US/netsol/ns1120/index.html#~2010>
15. Voices from the Inside: Key Intelligence from 2011 IT UX Research with Employees. Intel IT/HR Research Report. Intel Internal Paper.
16. Agility at Work - Adopting the Corporate Six Pack - Phillip Ross
<http://www.regus.presscentre.com/imagelibrary/downloadMedia.ashx?MediaDetailsID=365>
17. Reaching 50 Million Users Graphic. G.Kofi Annan,
http://www.google.com/imgres?hl=en&sa=X&rlz=1C1CHFX_enUS383US383&biw=1296&bih=977&tbm=isch&prmd=imvns&tbnid=1JXFSHTfv9e71M:&imgrefurl=http://www.gkofiannan.com/&docid=gF07nbULdXx6tM&imgurl=http://getfile2.posterous.com/getfile/files.posterous.com/temp-2012-05-

- 01/dHpqtJuqhbDICguEpzGIJhwrtcxpGEvjqnabynuBFodAGwHBqzamIcpuyDb/reach50million_gkofiannan.jpg.scaled1000.jpg&w=1000&h=619&ei=iPlgUilJD43oiQLEiYCYBA&zoom=1&iact=hc&vpx=433&vpy=429&dur=2733&hovh=178&hovw=286&tx=107&ty=203&sig=101351832358428417249&page=1&tbnh=120&tbnw=193&start=0&ndsp=33&ved=1t:429,r:28,s:0,i:162
18. How Draw Something Drew 50 Million Users <http://www.getelastic.com/how-draw-something-drew-50-million-users-infographic/>
 19. Digital Stats. <http://digital-stats.blogspot.com/2011/04/it-took-radio-38-years-to-reach-50.html>
 20. United Nations Cyberschoolbus.
<http://www.un.org/cyberschoolbus/briefing/technology/tech.pdf>
 21. Personal Data: The Emergence of a New Asset Class. World Economic Forum Report. 2011.
<http://www.weforum.org/reports/personal-data-emergence-new-asset-class>
 22. Chesbrough, H.W. (2003). Open Innovation: The new imperative for creating and profiting from technology. Boston: Harvard Business School Press
 23. The social economy: Unlocking value and productivity through social technologies. McKinsey Global Institute Report.
http://www.mckinsey.com/insights/mgi/research/technology_and_innovation/the_social_economy
 24. The Importance of Proximity and Location. Maryann P. Feldman, Barak S. Aharonson and Joel A. C. Baum. *Rotman School of Management, University of Toronto*
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&sqi=2&ved=0CFQQFjAB&url=http%3A%2F%2Fadvancingknowledge.groups.si.umich.edu%2Fdrafts%2FFeldman-MF%2520importance%2520of%2520proximity%2520and%2520location-revised.doc&ei=6HTbT4G1G-ao0AGiqYW_Cg&usg=AFQjCNH1LoyQC-BKary9HdSMm13jsLFOIQ&sig2=bWBVdfsbrajOiB9yJONktw
 25. Agility@Work; The impact of six forces on the way we work. UNWIRED Research. Mark Dixon and Philip Ross. 2010
 26. Brian David Johnson (Intel Futurist), Intel Workplace of the Future Summit, May 2012
 27. Five Trends that Are Dramatically Changing Work and the Workplace. Joe Aki Ouye, Ph.D. Knoll Workplace Research. http://www.knoll.com/research/downloads/WP_FiveTrends.pdf
 28. 10 Pinterest Infographics: Visual Explanations for a Visual Social Network
<http://blog.hubspot.com/blog/tabid/6307/bid/33078/10-Pinterest-Infographics-Visual-Explanations-for-a-Visual-Social-Network.aspx>
 29. David Arkless (Manpower Group's President of Corporate & Government Affairs, external speaker), Intel Workplace of the Future Summit, May 2012
 30. Philip Ross (CEO of Cordless Group, external speaker), Intel Workplace of the Future Summit, May 2012
 31. Greg Lindsay (Author of "Aerostropolis: The Way We'll Live Next", external speaker), Intel Workplace of the Future Summit, May 2012
 32. Dr. Tony Salvador (Director of Experience Insight Research, Intel Labs), Intel Workplace of the Future Summit, May 2012
 33. Activity Based Working - The Hybrid Organisation: Buildings - Philip Ross
 34. Connected World Technology Report 2011, The New Workplace Currency Infographic.
http://www.cisco.com/assets/sol/ent/business_trend/borderless/ccwtr/tech_world_report2.html
 35. A peek to the workplace of the future, imagined by Intel. <http://youtu.be/OX4zeUjvJrc>