DesignIntelligence®
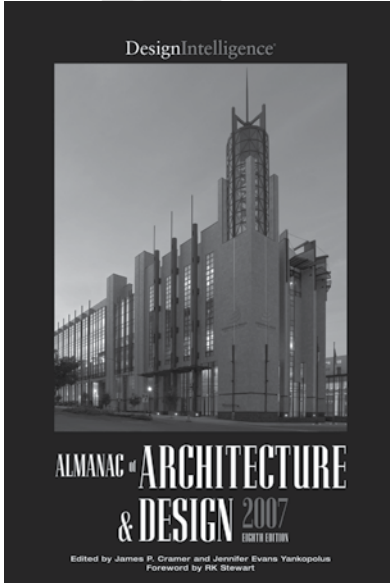
Tomorrow is Now!

Managing and Imagining Information
in the AEC Industry

Who's Afraid of Technology?

Building Technological Ubiquity

Technology
Survey 2007

CONTENTS

DESIGN INTELLIGENCE
www.di.net
PRIVATE REPORT
Number 209
DESIGN FUTURES COUNCIL

Awaken Your Inner Architect

—James P. Cramer

Successful practice management in the architecture, design, and construction marketplace is not dependent on firm size alone. It is not a Goliath versus David contest. Instead, it is about leveraging talent and resources to give clients what they really want. In a word, it's about strategy – about defining what you are going to do differently to be better. A firm of 55 can successfully compete against a firm of 550, or even 5,550. This continues to be possible today – often for new and different reasons than in the past. Moreover, new technology is providing talented small and medium size firms opportunities to compete for and win premier projects.

From the release of the recent AIA *Business of Architecture* survey, it is painfully obvious that far too many firms are woefully behind the curve in implementing new tools for practice management success. Some firms are not only failing to keep pace with today's best practices but are falling significantly behind the pack of average firms. Nearly 40 percent of firms in the AIA survey do not have a web site. Imagine that! Less than 30 percent of firms have experience doing a green or sustainable project. The average billings per full time staff equivalent are less than $85,000. And the amount spent for technology? Just $2,700 per employee. These numbers and others in the study present an urgent warning sign. If not addressed by the profession this survey represents a preliminary pathology report for thousands of firms.

Technology is not a money-burner. It is a huge tool to leverage talent and to do faster work. Designers need to get over their anxiety about technology and focus on opportunities and results that foster relevant value. New technology enables firms to create and analyze more solutions faster, to discard paradigms not worth keeping, and to do more productive work in the same amount of time. Speed keeps costs down, not only for the client but for the designer, providing more consistent financial success. When we do things quickly and with confidence, we create positive momentum for the entire project team. Since speed and the technology that creates it is inevitable anyway, we might as well embrace it – the issue is not going away.

Architects, engineers, designers, product manufacturers, and contractors who

1. Your primary focus should be on what benefits the client, not internal politics

2. Think long term vs. getting hung up on short term barriers

3. Move away from the bureaucratic and imagine being both fast and flexible

4. Be increasingly dissatisfied with status quo and challenge existing benchmarks and pesky average metrics.

utilize the new technologies will find that they can and will awaken their imagination for what's possible. Four characteristics will flow from utilizing imagination along with new technologies. Each characteristic can bring new levels of strategic success to your firm or organization:

1. Your primary focus should be on what benefits the client, not internal politics
2. Think long term versus getting hung up on short term barriers
3. Move away from the bureaucratic and imagine being both fast and flexible
4. Be increasingly dissatisfied with status quo and challenge existing benchmarks and pesky average metrics.

Creating change is what design is all about. Orchestrating a constant process to profit from change is necessary if your organization is to stay on the leading edge of competitiveness. Utilizing the latest technology means spending more than double and perhaps triple the amounts reported in the survey cited above. Complacency as a professional characteristic should not be praised, it should be challenged. When firms adapt quickly to the latest shifts in technology they will outperform their competitors and awaken their inner architect to what's possible in this profession of new meaning and opportunity.

James P. Cramer is editor of *DesignIntelligence*, co-chair of the Design Futures Council, and chairman of the Greenway Group. His latest book, *The Next Architect: A New Twist on the Future of Design* is now available through the *DesignIntelligence* bookstore, *www.di.net*.

2007 Technology Survey

In March and early April of 2007, *DesignIntelligence* surveyed a range of firm leaders and practitioners in the AEC industry to assess their usage and understanding of technology in the profession today. The *DesignIntelligence* technology survey yielded some telling, though not necessarily startling results. The primary purpose of the survey was to gain some insight into comfort levels, time spent employing, and basic operational understanding of established and proven technologies within and beyond the design profession.

Survey respondents are categorized, by default, as competent users of internet communication tools, as the survey was distributed via email and surveys were conducted using online survey technology.

The 2007 survey serves to track the emerging trends and reports how respondents are embracing new technology, staying informed, and maximizing available tools to stay abreast of the profession, improve project efficiency, and provide the best possible services to their clients and the profession.

Connectivity, communication, and the emergence of technological ubiquity in the profession were all considerations sought in the survey.

"The Leader"

...the majority of survey respondents are, as categorized, functional users of technology. More than a quarter of the respondents, however, could not set up an email account without the use of tech support.

The Survey

All respondents were asked for their age and contact information in the survey; a few respondents answered "old enough." The median age of respondents to this particular survey was 54 years old, and reflects a demographic cluster in line with practice-manager and firm partner demographics. The largest cluster of respondents was in the 55-64 year old range while the youngest respondent in the pool was 24 years old.

Of the remaining questions in the survey, not all respondents answered all questions. The survey results represent one of a series of assessments of technological saturation in the profession and can serve as a benchmark for further research into the technological development currently under way.

The questions were designed to gain a basic understanding of use and comfort level for well-established and emerging tools and technologies. The focus was on an efficient use of time in regards to practice management tools and means

Do you use a laptop?

8%

NO

YES
92%
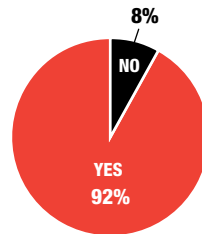
Do you use a desktop computer?

YES
80.5%

NO
19.5%
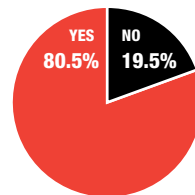
Do you use both a desktop and a laptop computer?

YES
73.5%

NO
26.5%
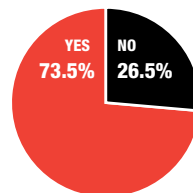
How technologically savvy would you say you are?

Technophile	5.5%
Very Savvy	15%
Functional	68.5%
Basic Operator	11%
Inept	
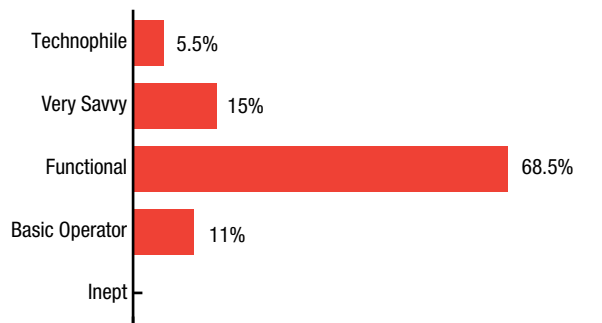
of effective communication and data management.

The average response time for the survey was just under six minutes for the 44, mostly drop-down or check-box type questions. The two fill-in type questions detailed operating systems and handheld device preferences and while most of the questions were answered, not all respondents answered all questions. The data was compiled using the online survey technology and reflects a mathematical analysis of calculated percentages.

Can you set up your own email account without the help of IT suppport

YES 71.2% NO 28.8%
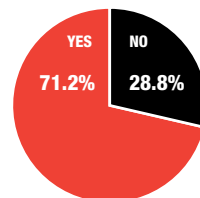
The Machines

An overwhelming number of users, nearly 92 percent, employed laptop computers. Eighty-one percent used desktop computers and nearly 74 percent of respondents used both a desktop and a laptop computer.

What operating system do you employ?
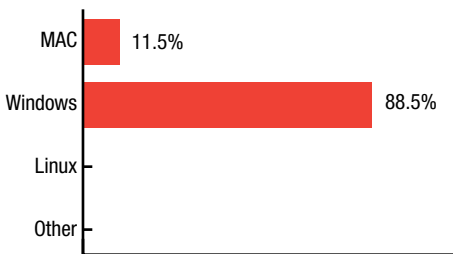
Well established and proven server technologies now allow users to access their desktop systems virtually using the range of remote access interface technology. Remote access permits a seamless connection between a user's office desktop and laptop computer, providing full access to network libraries and server data typically housed behind an office firewall. The efficiency of this technology is clearly becoming more appreciated and commonplace, as more than two-thirds of respondents "access their desktops remotely," the largest majority of those on a daily basis.

An overwhelming majority of users, 89 percent, employed Windows operating systems. There were a number of users who, based on firm structure and design demands, employed both the Mac and Windows operating systems and despite the availability of other open source and tested operating systems, none of the respondents reported using any OS other than Mac or Windows.

Bugs, SPAM, email, and file transfers

As the profession increasingly communicates via digital file transfers and emails, and as the prevalence of SPAM, junk, spy ware, ad ware, malicious software, and viruses proliferates, the time spent dealing with these issues also increases, usually behind the scenes, with an IT department.

The *DesignIntelligence* survey sought to determine the impact of communication on productivity with a range of questions dealing with antivirus software, SPAM filtering tools and email.

Nearly half of the survey respondents received less than 6 junk emails a day, suggesting that filtering software employed either at source servers, internally or otherwise, are working effectively, although nearly 13 percent did report receiving 50+ SPAM messages per day and the second largest grouping of respondents, 23 percent, dealt with between 11-25 unsolicited messages per day. The time spent dealing with these messages, however, is typically under 5 minutes, according to more than eighty percent of survey respondents.

Do you trust your antivirus software?

NO
20%

YES
80%

Forty two percent of those participating in the survey spend 1 to 2 hours exchanging emails daily; thirty-five percent spend 2-4 hours and 2 percent spend all day exchanging emails.

According to the survey, most users spend more time exchanging email than using the telephone. Nearly 37 percent of respondents spend under 1 hour on the telephone; half of the respondents spent 1-2 hours on the phone and no respondents spent more than six hours on the phone a day.

The exchange of digital data has become commonplace, proving more efficient and effective than courier and postal services. Sixty seven percent of respondents exchange data files online using a variety of tools, all equally represented. Thirty-three percent transferred files via email; twenty-five percent via file transfer protocol (FTP) sites; twenty-three percent via DVD or CD; eleven percent via zip drives; and approximately 7 percent reported using other means.

Client files are "rejected as suspect" rarely, in nearly 58 percent of cases, while almost thirty percent of respondents said they "never" reject client files.

How frequently do you not receive email someone has sent you?

Often	8.5%
Occasionally	22.5%
Rarely	45%
Never	24%
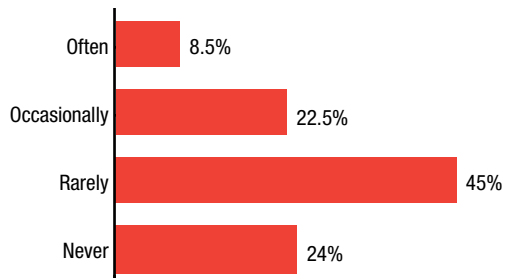
How many SPAM messages do you receive per day?

1-5	45%
6-10	13%
11-25	22.5%
26-50	7%
50+	12.5%
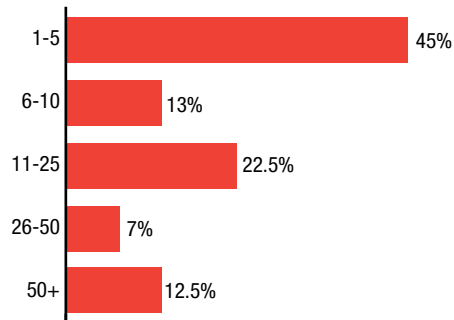
How much time do you spend dealing with SPAM on a daily basis?

Under 5 minutes	80%
5-10 Minutes	12.5%
11-15 Minutes	5.5%
16-25 Minutes	
25+ Minutes	1.5%
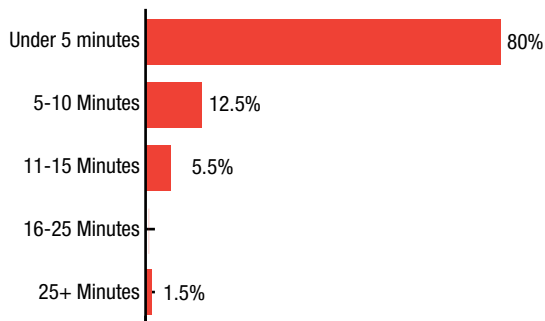
Connected at the hip or to the wall

Traditional, hard-wired, telephone lines still maintain a significant hold on the profession, although more than 90 percent of respondents maintain both a land line and a cellular phone line. Almost twenty percent of respondents have more than one cellular phone line.

Do you have a land line and cell line?

NO
10%

YES
90%
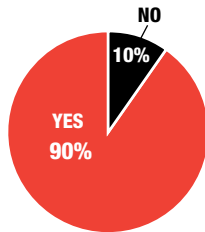
Blackberries and other handheld messaging devices are taking an increasingly important role in the communicability of the firm professional. More than half – 56 percent – of respondents report using a Black-berry or other messaging device. Black-berry systems are the device

Do you have more than one cell phone?

YES
18%

NO
82%

of choice for most respondents, with the Palm Treo series and Samsung handheld devices coming in second and third, respectively. Other devices mentioned were the IPAQ, widows-based Motorola devices, and offerings by Cingular.

Half of the handheld device users surveyed used their systems for sending email, while only a third used their devices for text messaging, granting that the difference on a system like a Blackberry or Treo is negligible.

How much time do you spend
- on the phone?
- exchanging email?

Time	on the phone?	exchanging email?
Under 1 hour	36.5%	11%
1-2 hours	49.5%	42%
2-4 hours	11%	35%
4-6 hours	3%	7%
6-8 hours		3%
8+ hours *all day*		1.5%
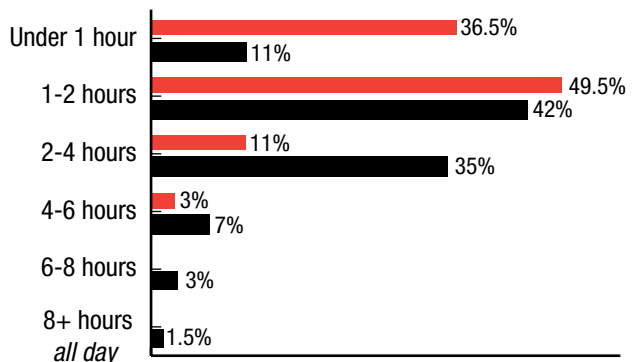
What percentage of your firm's projects employ BIM software?

Under 10 percent	57.5%
11-25 percent	21%
26-50 percent	7.5%
51-75 percent	6%
76-99 percent	6%
100 percent	1.5%
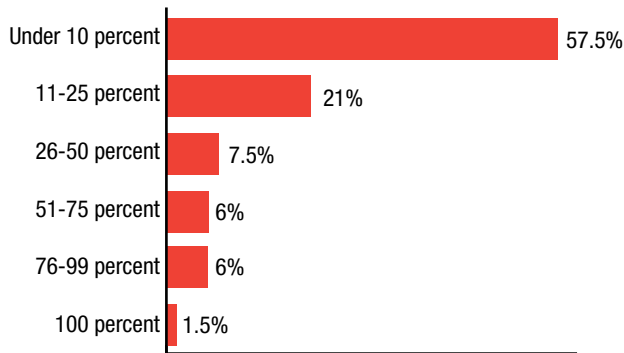
Managing BIM

The BIM (Building Information Modeling) revolution is not quite at hand, at least at the practice management level. An overwhelming number of individuals responding to the survey, approximately 58 percent, state that "under 10 percent of their firm's projects employ BIM software." Twenty one percent claim to use BIM software in "11 to 25 percent" of projects, but only 2 percent of respondents use BIM for 100 percent of their firm's work. The overwhelming majority of those responding, 88.6 percent claim no proficiency in BIM software and 60 percent report an "under 10 percent" saturation of technical staff with BIM proficiency.

Are you (personally) proficient in the use of BIM tools?

NO
88.5%

YES
11.5%

Location, Location, Location

GPS systems lead the charge to tech ubiquity. New tools and systems which will increasingly allow the design

Do you use GPS tools in your work?

NO
69.5%

YES
30.5%
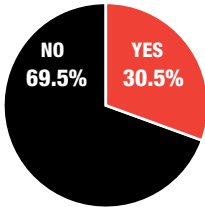
profession to leverage location data are in place or are coming on line every day. This charge, while not fully embraced, is making some headway

Do you use GPS:

In your car? On your phone?

NO

NO
58%

YES
42%

NO

YES
88% 12%
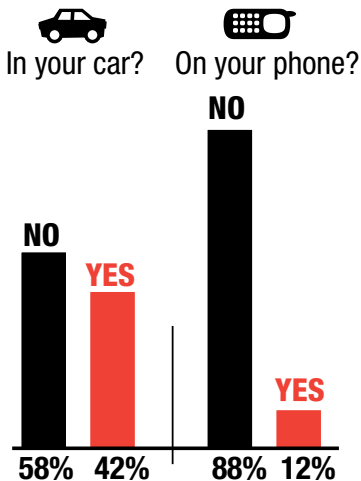
in the profession. Just slightly less than a third of survey respondents utilize GPS tools in their work while nearly 41 percent use GPS information or geospatial imaging, such as topographical data, in their projects.

Forty-two percent have a GPS system in their cars but only twelve percent employ the GPS devices on their telephones.

How frequently do you employ social networking tools?

Often	9.7%
Occasionally	12.5%
Rarely	21%
Never	57%
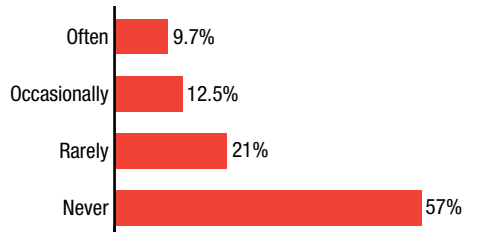
Do you Network network?

Social networks have changed. And while networking tools still include mixers and meet-and-greets, increasingly, young professionals rely on digital networks and online networking tools such as *linkedin.com*, *collectivex.com*, and *myspace.com* to make necessary and meaningful professional connections.

The majority of survey respondents, the bulk of those representing the 55-64 age bracket, did not employ social networking tools (74 percent). Nine percent of those that did employ social

networking tools did so "often," and 16 percent of those that employ these networking tools claimed that the tools improved their business or professional prospects. Anecdotal evidence suggests, and perhaps a survey demographic representing a younger range of professionals might report, that these social networking tools are an efficient and effective way to make the necessary connections to land projects and cultivate prospects, although this has yet to be borne out.

Staying Informed

With the profusion of news resources and the daily barrage of media messages, professionals are confronted with the task (and privilege for some) of staying informed without being overwhelmed. A variety of tools have been developed over the past several years to assist with the management of this seeming data overload. Firm professionals in this survey, however, are not taking full advantage, or don't feel the need to leverage these tools. Only 22 percent

Do you utilize social networking tools? (i.e.: *linkedin.com; collectivex.com; myspace.com*)

NO 74.5% YES 25.5%
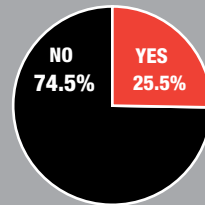
Have these social networking tools improved business or professional prospects?

NO 83.5% YES 16.5%

Do you subscribe to RSS feeds?

NO 77% YES 23%

of those responding to the *DesignIntelligence* technology survey subscribe to RSS feeds. A majority of respondents,

20 percent, did receive more than 10 email newsletters per week, with the next largest percentage of respondents, 18 percent, receiving only 3 email newsletters per week. Most respondents report using e-services primarily to stay abreast of "the profession", a testament to the drive of AEC professionals, although a smattering did report, aside from world news updates, using e-services for sports and entertainment updates.

respondents profess. The aural history portion of the survey, if you will, determined that nearly 40 percent of the respondents knew what an LP (Long Play vinyl record) was and had owned one; 18 percent had never owned one and 43 percent said "What is that?" to the LP question.
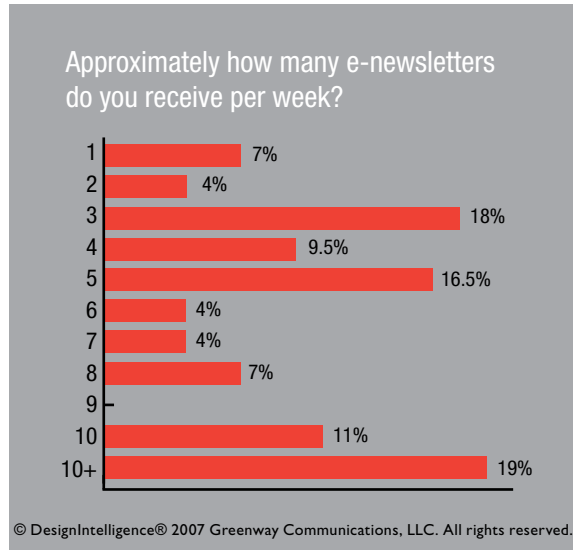
More than half of the survey respondents, 56 percent, listened and/or viewed webcasts but an overwhelming majority, 82 percent, did not subscribe to podcasts. Those that did listen to podcasts did, largely, on a bi-weekly basis.

Staying Tuned

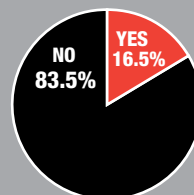Many, if not most, people use music to enhance their focus, relax, or promote creativity, all elements of productivity and efficiency in the workplace and beyond. Music, heard over office speaker systems, desktop speakers, earphones or otherwise, can be found in just about every office setting. DesignIntelligence wanted to understand just how frequently users employed digital music and other aural media, and just what sort of historical musical background many of these

Approximately how many e-newsletters do you receive per week?

Number	Percent
1	7%
2	4%
3	18%
4	9.5%
5	16.5%
6	4%
7	4%
8	7%
9	
10	11%
10+	19%

Do you listen to webcasts?

NO 44.5% YES 55.5%

Design Futures Council
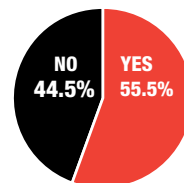
Do you subscribe to podcasts?

NO
83%

YES
17%
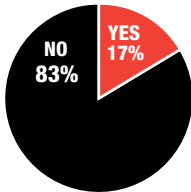
How frequently do you receive podcasts?
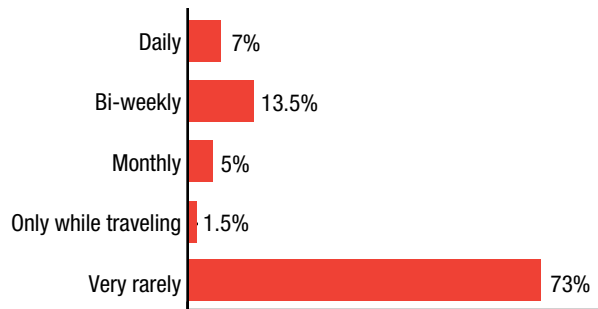
Daily	7%
Bi-weekly	13.5%
Monthly	5%
Only while traveling	1.5%
Very rarely	73%

Have you ever owned an LP?

39%

18%

43%

Yes

No

What is that?

Connectivity and Communication

The increasing ubiquity of global communications technology will have a significant impact on the way the profession works and the ways in which emerging communities and corporations leverage these technologies for populations. Regardless of whether we consider connectivity the panacea for global ailments, it behooves the design profession to consider developments in communications technology from a global perspective and to remain mindful of this increasing degree of global interconnectedness. Sooner than later, this connectivity between cultures, peoples and ideals will bear fruit through technological ubiquity. It is up to us to design preferable scenarios and decide whether this fruit is palatable.

Australia
Population* 20,434,176
Telephone and cellular subscribers**
29,880,000
Internet users ** 14,664,000
Personal computers*** 13,720,000

Bahrain
Pop.: 708,573 (includes 235,108 non-nationals)
Tel./Cel.: 945,200
Internet: 152,721
PC Users: 121,000

Brazil
Pop.: 190,010,647
Tel./Cel.: 128,592,000
Internet: 25,900,000
PC Users: 19,350,000

Canada
Pop.: 33,390,141
Tel./Cel.: 34,876,000
Internet: 21,900,000
PC Users: 22,390,000

China
Pop.: 1,321,851,888
Tel./Cel.: 787,913,000
Internet: 123,000,000
PC Users: 52,990,000

Hong Kong SAR
Pop.: 6,980,412
Tel./Cel.: 12,488,000
Internet: 4,879,000
PC Users: 4,186,606

Colombia
Pop.: 44,379,598
Tel./Cel.: 29,528,800
Internet: 4,739,000
PC Users: 2,506,081

Costa Rica
Pop.: 4,133,884
Tel./Cel.: 2,489,000
Internet: 1,000,000
PC Users: 930,000

Croatia
Pop.: 4,493,312
Tel./Cel.: 4,874,000
Internet: 1,451,000
PC Users: 842,000

Cuba
Pop.: 11,394,043
Tel./Cel.: 984,400
Internet: 190,000
PC Users: 300,000

Ecuador
Pop.: 13,755,680
Tel./Cel.: 7,947,000
Internet: 616,000
PC Users: 724,000

Egypt
Pop.: 80,335,036
Tel./Cel.: 24,441,000
Internet: 5,000,000
PC Users: 2,300,000

El Salvador
Pop.: 6,948,073
Tel./Cel.: 3,383,500
Internet: 637,100
PC Users: 300,000

Finland
Pop.: 5,238,460
Tel./Cel.: 7,351,000
Internet: 3,286,000
PC Users: 2,515,000

France
Pop.: 63,713,926
Tel./Cel.: 68,803,000
Internet: 29,945,000
PC Users: 29,410,000

Greece
Pop.: 10,706,290
Tel./Cel.: 16,346,000
Internet: 3,800,000
PC Users: 986,000

Hungary
Pop.: 9,956,108
Tel./Cel.: 12,676,000
Internet: 3,050,000
PC Users: 1,476,000

Iceland
Pop.: 301,931
Tel./Cel.: 479,900
Internet: 258,000
PC Users: 138,000

India
Pop.: 1,129,866,154
Tel./Cel.: 118,943,000
Internet: 60,000,000
PC Users: 13,030,000

Indonesia
Pop.: 234,693,997
Tel./Cel.: 59,682,000
Internet: 16,000,000
PC Users: 3,022,000

Israel
Pop.: 6,426,679
Tel./Cel.: 10,693,000
Internet: 3,700,000
PC Users: 5,037,000

Italy
Pop.: 58,147,733
Tel./Cel.: 97,249,000
Internet: 28,870,000
PC Users: 18,150,000

Japan
Pop.: 127,433,494
Tel./Cel.: 153,525,000
Internet: 86,300,000
PC Users: 69,200,000

Jordan
Pop.: 6,053,193
Tel./Cel.: 3,641,200
Internet: 629,500
PC Users: 300,000

Korea Rep.
Pop.: 49,044,790
Tel./Cel.: 62,087,000
Internet: 33,900,000
PC Users: 26,201,000

Mexico
Pop.: 108,700,891
Tel./Cel.: 66,974,000
Internet: 18,622,000
PC Users: 11,210,000

Peru
Pop.: 28,674,757
Tel./Cel.: 7,833,000
Internet: 4,600,000
PC Users: 2,689,000

Romania
Pop.: 22,276,056
Tel./Cel.: 17,745,000
Internet: 4,940,000
PC Users: 2,450,000

Russia
Pop.: 141,377,752
Tel./Cel.: 160,100,000
Internet: 23,700,00
PC Users: 19,010,000

Saudi Arabia
Pop.: 27,601,038 (incl. 5.6 mil. non-nationals)
Tel./Cel.: 17,800,000
Internet: 3,200,000
PC Users: 8,476,000

SOURCES: CIA World Fact Book, 2007; UN Statistics Division:
Millennium Development Goals Database, 2006
NOTES: *2007 estimates; **2005 figures; ***2004

Community-based Tech-ubiquity in the Built Environment

— Leigh Lally, D. Scott McCrickard, and Jason Chong Lee

Many individuals already have on-the-go access to unprecedented amounts of real-time information through a variety of hand-held, satellite-linked devices such as cell phones, global-positioning systems and tablet personal computers. The prevalence of these technologies and the emergence of tech-ubiquity have the potential to drastically improve the richness and accessibility of our built environment. Synergy between our actions and electronically mediated interactions will inevitably influence human interaction and use of public spaces. Information Communication Technology (ICT) will be both mobile and built into the environment, essentially ubiquitous. But will people be able to effectively use it?

The economics and sociology of pervasive computing in urban environments are intimately intertwined. The mal-distribution of opportunities resulting from the implementation of information communication technology has made it a focus at the World Summit on the Information Society (WSIS). This has brought attention to the need for an "effective use" approach, which ensures that the economic and social opportunities of technology benefit the entire community, through actively involving community leaders, architects, and planners in the rapid development of these technological initiatives.

Located in Blacksburg, Virginia, a rural university town in the mountains of Southwestern Virginia, Virginia Polytechnic Institute and State University (Virginia Tech) is setting the stage for ubiquitous computing in the built environment. How does a community of 41,000 people set the stage for pervasive computing in urban areas? Metropolitan areas can be looked at as a cluster of individual communities very much like Blacksburg. As home to Virginia Tech, Blacksburg attracts a multitude of visitors for tours, conferences, and athletic events, similar to what would be found in a typical urban area. It is necessary to look at the city both holistically as well as by its constituent community attributes. Planning for urban areas requires consideration of the social, economic, and environmental requirements of the

city through representative stakeholders from commerce and government in addition to understanding the goals and needs of each distinct community.

At Virginia Tech the Center for Human Computer Interaction focuses on the community in terms of the social benefits and costs related to new technologies. As an inter-disciplinary team that includes faculty and students from computer science, engineering and architecture and urban planning disciplines, our research depends on multi-disciplinary collaboration in the development of overall vision and design methodologies. As we pursue research of pervasive computing in urban spaces, we see the need for an "effective use" approach. In particular, we seek to draw upon the experience and techniques of other disciplines actively working with the urban environment.

Community-based Design for Tech-ubiquity
The fields of human-computer interaction and architecture and planning share similar design methodologies, including "effective use" and user-centered interaction design. The architecture and planning profession can effect a rapid transformation to

William Mitchell

In his collection of books, including *e-topia*, William Mitchell, professor and former dean of the School of Architecture and Planning at MIT, provides a comprehensive look at the way in which technology is forever changing and shaping the urban form. His background in architecture and information technology and his understanding of the importance of community in terms of public spaces provides a grounded and action-oriented perspective on the potential for cities to evolve in concert with new technological systems. Mitchell challenges urban planners and architects, to redefine their roles and reinvent design and development in concert with pervasive computing initiatives. In turn, computer scientists and developers must also reinvent their discipline in concert with the needs of an urban community. With a certain amount of hope, he imagines that the inevitable progress of the global village can improve humanities condition.

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Community-based Tech-ubiquity

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tech-ubiquity in the built environment through truly collaborative, innovative design practices. Both fields are rooted by social and physical context-based objectives, thus providing a common ground for the collaboration required to investigate ways of embedding Information Communication Technology into our communities in a globally enhanced sustainable manner.

Community-based design for tech-ubiquity integrates community design methodologies and collaborative processes such as integrated design and innovative design techniques including interaction design:

Community Design is a methodology that encompasses community participation and planning along with community and social architecture initiatives. The participative and collaborative nature of this methodology offers tools and methods applicable to other professions. The charrette, as an agent for new urbanism, is a cross-disciplinary platform which allows stakeholders to effectively shape their own futures as architects and planners create holistic community designs that incorporate all aspects of urban life.

Integrated design is a collaborative design methodology emphasizing knowledge integration in the development of holistic designs. The practice inherently maximizes the benefits of multi-disciplinary collaboration throughout the design process. The underpinnings for integrated design practices are in the "whole building design" approach. By viewing a building system interdependently as opposed to its separate elements (site, structure, systems and use), the approach facilitates sustainable design practices. Integrated design processes require multi-disciplinary collaboration, including key stakeholders and design professionals, from concept to completion. Decision-making protocols and complimentary design principals must be established early in the process in order to satisfy the goals of multiple stakeholders while achieving the overall project objectives. The understanding of integrated design has evolved in conjunction with the rise of multi-disciplinary design firms and is now being used as a term to describe a collaborative design process.

Interaction design is the means to embody the software of places, according to Malcolm McCullough in his book, *Digital Ground*. An architect equally familiar with technology, McCullough

expounds a theory which suggests that interaction design has evolved to a state serving both pervasive computing and architecture as they unite in the physical environment. McCullough is a proponent of enabling ubiquitous computing in concert with architecture and planning through interdisciplinary context-based design initiatives. He warns that if architects and pervasive technology developers don't take the leap and join forces, the new discipline will be left

to technocrats and remain void of usability and design consideration. As the appropriateness of the technology moves to the fore, design must become more intentional. His focus on the elements of interaction design, as a tool for successful integration of technology into the social and physical environment, offers a shared point of departure for the future of ubiquitous computing.
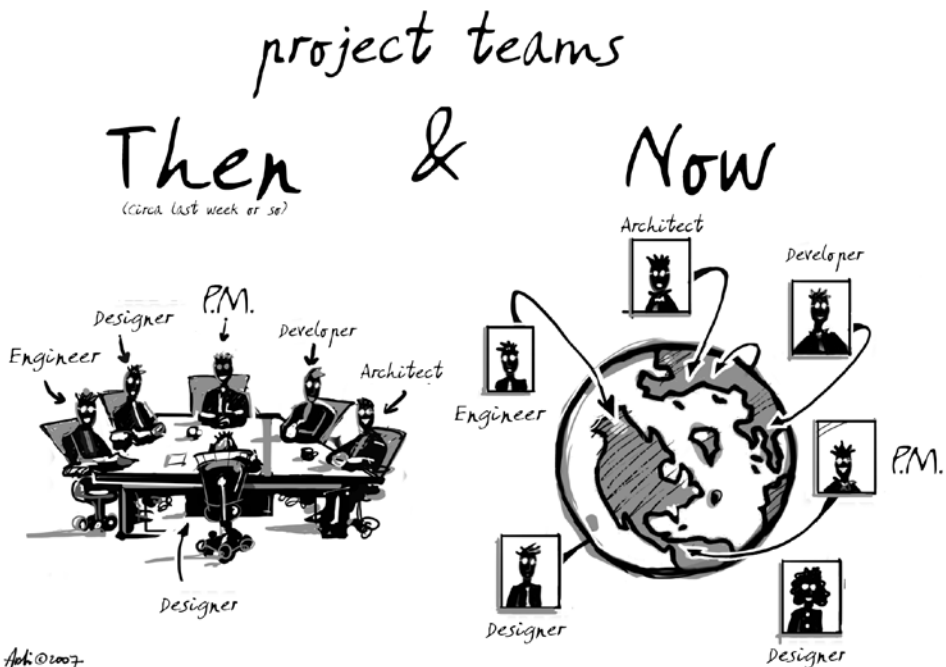
IDEO has established itself as leaders of the practice of interaction design, a concept developed by IDEO co-founder, Bill Moggridge. An evolution of interface design, interaction design is now used by multiple disciplines interested in the usability and experience of an object or a system. Interaction design follows a process of iterations in which design solutions can be generated quickly and tested with the users. Similar to community design for "effective use", interaction design requires design research and concept development, storyboarding and schematics as well as concept testing with the stakeholders prior to implementation. With the advent of computers, technology has become the only truly interactive product.

... if architects and pervasive technology developers don't take the leap and join forces, the new discipline will be left to technocrats and remain void of usability and design consideration.

The field of human computer interaction focuses on usability and employs social computing techniques such as interaction design, usability engineering, and interface design methodologies. These techniques follow analogous design paths including the identification of project goals, stakeholders, and specific project requirements. There are numerous similarities in the built environment and technology design processes which facilitate user-centered approaches for "effective use" of technology. Through multi-disciplinary collaboration, these methodologies can be adapted for use in designing and planning for community-based pervasive computing in the built environment and urban spaces.

Setting the Stage
Virginia Tech has a history of technology foresight as demonstrated by the deployment of one of the most successful community computing initiatives in the country, the Blacksburg Electronic Village (BEV). The BEV – established in 1993 – was the first community in the world with Internet access. It has consistently maintained one of the highest rates of Internet penetration in the world, achieving a saturation rate of nearly 90 percent by 2002. BEV was designed and developed using a community computing approach, akin to "effective use" and based on participatory design principals.

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The Virginia Tech university campus setting is an excellent test bed for our research, not only because of mobile computer ownership requirements, but also because the university is currently committed to significant investments in leading edge infrastructure and an array of applications serving the extended VT campus and community. These investments extend into the thirty million dollar range over the next several years and encompass much of the pervasive computing capability of an interactive city.

The Center for Human Computer Interaction (CHCI), *http://www.hci.vt.edu/*, integrates the construction of innovative software and applications with the development of social and behavioral methods and analyses. CHCI has been constructing innovative software and investigating the use and social impact of computing through multiple interdisciplinary projects, including: the LINK-UP usability engineering environment; the SeeVT location awareness notification system; information re-finding; cultural issues in usability engineering; technology support for education; digital government; and the Blacksburg Electronic Village.

Top 10 Foresight Reading List:

Spring 2007

1. *Powerful Times: Rising to the Challenge of Our Uncertain World.* By Eamonn Kelley (Wharton School/Pearson Prentice Hall)

2. *The Next Architect: A New Twist on the Future of Design* by DFC Senior Fellows Scott Simpson and James P. Cramer (Ostberg/Greenway)

3. *The World is Flat: A Brief History of the Twenty-First Century* by Thomas L. Friedman (Farrar, Straus and Giroux)

4. *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals* by Jeffrey D. Sachs (Earthscan)

5. *Plan B 2.0: Rescuing a Planet Under Stress and a Civilization in Trouble* by Lestor Brown (W.W. Norton)

6. *Why Globalization Works* by Martin Wolf (Yale University Press)

7. *Winning the Oil Endgame: Innovation for Profits, Jobs, and Security* by Amory B. Lovins of Rocky Mountain Institute (FS)

8. *A whole New Mind: Why Right-Brainers Will Rule the Future* by Daniel H. Pink (Riverhead/Penguin)

9. *Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant* by Kim and Mauborgne (Harvard)

10. *Inevitable Surprises: Thinking Ahead in a Time of Turbulence* by Design Futures Council Senior Fellow Peter Schwartz (Gotham/Penguin)

Sweden
Pop.: 9,031,088
Tel./Cel.: 14,883,000
Internet: 6,800,000
PC Users: 6,861,000

Thailand
Pop.: 65,068,149
Tel./Cel.: 34,414,000
Internet: 8,420,000
PC Users: 3,716,000

Turkey
Pop.: 71,158,647
Tel./Cel.: 62,587,000
Internet: 16,000,000
PC Users: 3,703,000

United Kingdom
Pop.: 60,776,238
Tel./Cel.: 94,034,000
Internet: 37,600,000
PC Users: 35,890,000

United States of America
Pop.: 301,139,647
Tel./Cel.: 487,400,000
Internet: 205,327,000
PC Users: 223,810,000

Venezuela
Pop.: 26,023,528
Tel./Cel.: 16,101,000
Internet: 3,040,000
PC Users: 2,145,000

Vietnam
Pop.: 85,262,356
Tel./Cel.: 25,438,000
Internet: 13,100,000
PC Users: 1,044,000

With the confluence of wireless internet clouds covering wide areas, and more capable and powerful handheld devices, there is now an opportunity to enrich our every day experiences on-the-go by providing location-aware information that benefits not only individuals but entire communities. This opportunity allows us to break the traditional experience model where users enter cyberspace via some specific portal (e.g., desktop, or even semi-mobile laptops and tablets) and provides a new experience model where internet-based information comes to users and groups in timely and location-relevant ways. Modern location sensing techniques such as GPS, and our own homegrown SeeVT system, which uses Wireless LAN to determine location, allow us to determine the relative location of our users. Accurate location information is the corner stone of such location-aware communities.

The model for the design process draws from multiple disciplines with a focus on architecture and urban planning techniques for pervasive computing applications in urban areas. From our experiences, we have found that user interface and user interaction design and evaluation needs to be highly iterative and creative early on in the process, especially for systems which do not have

standards or "best practices" to reference for design guidance. Through a participatory design process, we focus on the needs of our users, seeking to understand how location-based technologies can help them realize social and personal benefits. The design and implementation of our technologies are conducted using a customized usability engineering methodology, an extension of a scenario-based development methodology and interaction design techniques. Claims-centric, scenario-based design methodology focus design through the use of design claims, leveraging an agile usability approach and claims map design representations to help to guide system development. This process captures the design in prototypes and interfaces that can be used in long-term user studies.

We plan to identify user needs and interests from the outset, and to enlist user collaboration in the development of specific scenarios of use. Following the high-level interaction design stage, we will hold charrette events with the stakeholders and interested community members. This will provide an open forum to engage the community in visualizing the designs and allows them the opportunity to provide input in determining the final design(s). We

will extend this participative process with advanced infrastructure and applications, including augmenting collaboration through blogs and wikis.

> ... there is now an opportunity to enrich our every day experiences on-the-go by providing location-aware information that benefits not only individuals but entire communities.

As designs mature and become more integrated with backend functionality we will then apply evaluations which employ representative users from each of our user groups engaged in increasingly realistic/real tasks with the system.

This approach supports interactive citizenry in location-aware communities and employs location-aware, mobile augmented reality and personal information management technologies to provide personal and community benefits to people with disabilities, students, and community leaders, targeting user groups representative of a diverse community. Community leaders help define and drive changes, and with the adoption and use of new

technologies by these leaders, it is expected that others will follow. We have a long-term collaborative relationship with interactive citizenry initiative

... through the cultivation of synergy between the increasingly related design methodologies a common ontology can be formulated to facilitate interdisciplinary collaboration.

stakeholders, dating back to the origins of the BEV in 1993. As with prior efforts of Virginia Tech, we expect our community to act as an exemplar to others across the nation and world in the use of location-based mobile technologies.

Common Ground

We assert that it is necessary to find common ground to build on in order to facilitate active community participation and ensure "effective use" of the technology and benefit society as a whole. The nature of pervasive, ubiquitous computing requires that it be inscribed into the social and physical fabric of our daily lives. If we ignore this fact, ICT integration could potentially be exploited by those uninterested

in responsibly developing a community-based pervasive computing environment, leaving certain constituents behind in the process. By first acknowledging this issue we can then begin to draw on the strengths of the multiple disciplines engaged in the efforts and through the cultivation of synergy between the increasingly related design methodologies a common ontology can be formulated to facilitate interdisciplinary collaboration. With a shared goal of creating successful social and physical context-based designs we can create common ground between the stakeholders and meet this design challenge head on. The combined experience and shared foresight can provide guidelines for responsibly planning the integration of technology into our everyday urban environments and lifestyles.

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File Tracking Nightmare # 367

With speed the "critical value for clients," (*The Next Architect*, p. 67 Östberg 2006), AEC project managers must maintain timely, efficient access to myriad project related data required in the execution of key process decisions.

Not only must this data be readily accessible, accountability requires that the trail of information, changes, notifications, etc. be maintained across project teams.

New technologies are continually being developed to address this increasingly diverse and challenging information management dilemma. With BIM adoption on the rise, the need to track and access pertinent information for all members of a project team is vital. Emerging and established information management technologies provide a range of a centralized, searchable server-based options for access to documents, messages, and materials.

Email, design documents, and other project related information can now be housed in centralized, web accessible servers across platforms, providing requisite access to the tools for timely decision making. A holistic "process oriented" approach to information management is eliminating much of the time wasted searching for critical files, improving time to market, increasing productivity and equating to enhanced client and project satisfaction.

Who's Worried About Technology?

—Evelyn Lee

I watch, mildly awestruck, as my brother, seven years my junior, plays one of his favorite computer games. In this particular game his internationally diverse team, half of whom he has never met, is making its way through a virtual battlefield, strategically seeking players from the opposing team, to gun them down one-by-one. None of my brother's team is in the same state; two players are on the other side of the world. One member of the team is on the east coast, one on the west, and one is somewhere in the Midwest. Jon and I are in New Mexico. All of the team's communications are performed in real-time over headsets like those worn by mission control personnel coordinating space shuttle launches. The whole exchange leaves me wondering what the future holds for this emerging generation, with college degrees finally in hand.

Physical boundaries have never been a hurdle when it comes to team collaboration, so what if this same team, now playing computer games, grows up to be architects, engineers, and construction managers? Imagine these same players coordinating a single computer model and putting together a bid for the latest sustainable, zero-carbon high-rise on the newest manmade island off the coast of Dubai.

Bridging the gap between generations X and Y, the newly licensed, emerging professionals, and new graduates all have something in common: thinking, designing, and building in three dimensions has never been a new idea.

Computers have always been a viable and effective communication tool. The latest 3D software (all varieties of Building Informational Modeling included) will never be considered a change in technology or practice, but a common tool integrated into their own versions of traditional and non-traditional practice. As a graduate student in 2002, I learned, with an odd sort of ease known to those growing up with video games, how to build a computer model in five very different programs; because inevitably, one program never does everything one needs it to do. This new class of potential architects has adapted quickly to the shortfalls of the latest technology while pushing the limits and waiting for programmers and software developers to

catch-up with their ideas. There is a very short learning curve, if any at all, and for this new generation of architects, the computer, much like the refrigerator or microwave, has always been considered a common household item.

The impact on practice management

New graduates likely know much more than the majority of senior employees regarding the latest techniques in the BIM program releases. Most new graduates, however, as the prototypical stereotype holds, may not necessarily have the experience to put together a working set of detailed drawings, including, for example, the variety of means necessary for keeping moisture out of a building. The scenarios that new technologies create mean a requisite change in the hierarchical structures of firms, but doesn't necessarily mean new strategies altogether. This new paradigm could very well revive the idea of the apprenticeship in the practice of architecture, with more consistent, collaborative working relationships between the more senior staff and the new class of juniors.

The latest development in BIM technology may very well bring back the architect as the master builder, and the emerging architects relish the opportunity. The new class is learning virtual modeling. The laser and water jet cutter are becoming obsolete against CNC and vacuum form machines. Actively working with

sub-contractors and manufacturers while still in educational settings, this new class is dynamically learning to build with the latest in innovation.

Both Frank Gehry and Thom Mayne have openly embraced technological integration in their firms, taking full advantage of all the latest and greatest available to the built environment. Perhaps this is why their designs are arguably some of the most talked about and debated works in the profession.

A New Level of Competition

For the newly emerging or newly licensed architect, a tacit knowledge of the latest computer and communication technology gives them the ability, as small start-up firms, to immediately compete for major work on a global scale. With knowledge of the latest modeling technology, the once necessary role of the drafter becomes obsolete, as does the man power necessary to complete construction documents for large multi-phased, billion dollar projects. With the knowledge of the latest communication technology making the right global connections, even finding reliable consultants and engineers, is almost as simple, and as enjoyable, as finding an internationally diverse team of players for my brother's favorite computer game.

The next generation of architects also knows best how to interact with their peers and the new architecture client. Not only can they offer three dimensional models built with incredible precision and detail, they also possess the know-how to walk clients through buildings in virtual space. Technologies in several accredited schools have taken modeling yet another step, allowing users to walk, virtually, through buildings at a 1:1 ratio, putting the designer or the client inside the building. In a world where the new clients have grown-up with the same technology as the incoming generation of architects, it's important to be able to give each client the opportunity to interact with technology in ways that are familiar to them. Why simply look at a model when you can walk in the model?
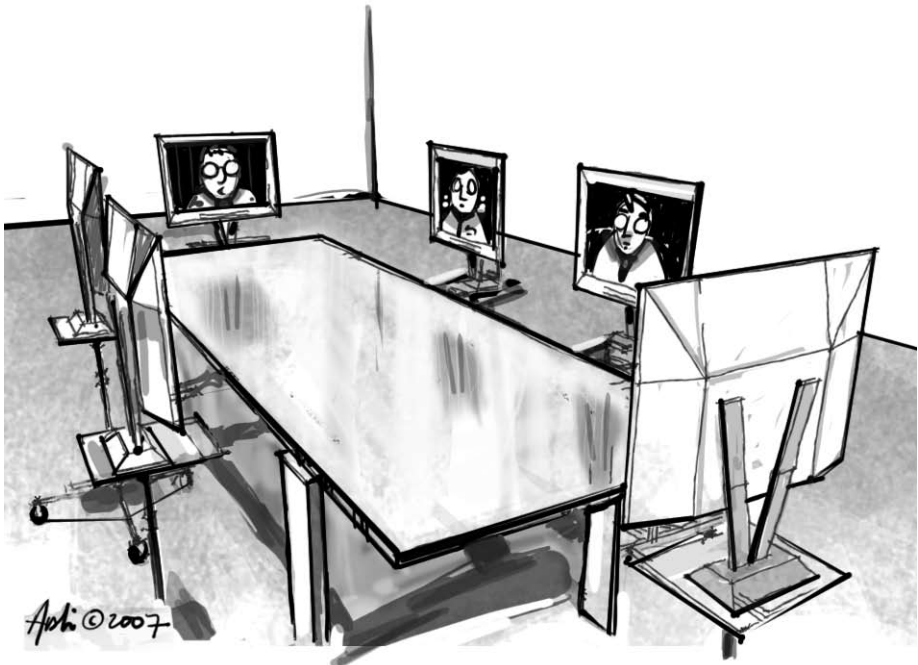
"Ok, now that I have you all here..."

Gone are the requisite social networks of professional conventions, cigar clubs and the putting green. More efficient and affordable networks are found online, available in the adult version of the working professional's *MySpace*, on burgeoning sites such as *LinkedIn*, *Collective X*, and *Ryze*. Online social networks not only provide a place to find the necessary support staff of engineers, design consultants, and manufacturer's representatives, but they've become a place to meet potential clients, developers, and CEOs. At the time it was published online (January 2007), an article entitled "MySpace for Professionals": A Social Networking Site Geared for Careerists," executive-level professionals from 499 of the *Fortune* 500 companies could be found on *LinkedIn*. Here the virtual playing field is cluttered with resumes, recommendations, and open solicitations for new jobs, request for proposals, and inquires from a variety of professionals.

So who's worried about technology?

The X and Y generations are up and running, obtaining licensure and graduating from accredited universities, excited to apply a newfound knowledge gained through school and internships. For the new practitioners, implementation of technology is matter-of-fact, having grown-up without knowledge of a world where the professional's toolbox was limited to vellum, pencils and face-to-face networking mixers. From their perspective, optimizing technology as a tool for production and communi-cation not only improves the bottom line, but also streamlines efficiency in practice. Professional, client, and social networks are not limited to county, city, or even state, but are ebullient and burgeoning organically, on the internet, a mere plane ride away from a face-to-face meeting. So who's worried about technology? Not the new class of practitioner. And if practice mangers are just now considering whether or not to wholeheartedly embrace these new technologies, it's really too late, because as technology often outpaces itself so again will the next generation of architect, perhaps only a few years our junior.

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Linked In: *http://time-blog.com/work_ in_progress/2007/01/myspace_for_ professionals_a_so.html*
Ryze: *http://www.ryze.com/*

Evelyn is a job captain at Dougherty + Dougherty Architects in Costa Mesa, California. She currently serves as the National Associate Director on the AIA National Board and the Vice President to the Academy for Emerging Professionals for AIA California Council. Evelyn is a graduate of the Southern California Institute of Architecture (SCIArc) Metropolitan Research and Design program and senior contributing editor for *inhabitat.com.*

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May 17–18, 2007
The New York Yacht Club
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Faculty: Scott Simpson,
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