

The Innovation Infrastructure

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ABSTRACT

In a world of progressively more difficult business conditions, the capacity to innovate remains one of the most important attributes of all organizations. It's not, however, particularly easy to do. The quest for innovation is supported through a focus on learning, and particularly when learning is applied to increasing the productivity of knowledge tasks. To support this process, there are elements of infrastructure that are particularly important to develop, which include adoption of effective innovation methodology, as well as robust collaboration, attention to eliminating obstacles and enhancing the enablers of innovation, and providing effective work environments.

Keywords: Innovation, infrastructure, innovation infrastructure, collaboration, learning, methodology, work place design.

BACKGROUND

One of the key lessons from the meltdown of the financial sector in the fall of 2008 is the vulnerability of well established organizations and institutions to change. Even the great ones are not assured to survive periods of heightened tumult, such as today.

The organizations that do endure are described in terms that we all love to use – flexibility, adaptability, foresight, courage, and yes, innovation. Innovation is indeed a critical competence in these days of rapid change, and while it's an easy word to say, attaining innovation with any measure of consistency is far from easy to achieve. In fact, innovation is one of the most difficult of all outputs to achieve. While society has tremendous admiration for genuine innovators, perhaps all the more so because innovative individuals and companies are relatively rare, they are tremendously valuable.

I should add an important nuance, which is that my definition of innovation is based not on the intangible or aesthetic value that comes through creating something new, but more significantly on the tangible economic value of innovation as expressed by the willingness of customers to buy innovative products and services. In other words, if customers don't buy it, it's not innovation...

For leaders that recognize the importance of innovation and are still not attaining their innovation targets, the question then becomes, How?

This paper focuses on a critical aspect of the robust innovation practice, the infrastructure which supports individuals, teams, and projects in the quest for innovation. It examines four key elements of this infrastructure: methodology, collaboration, enablers and obstacles, and the work place.¹

THE MEANS TO INNOVATION: LEARNING AND PRODUCTIVITY

In a world of proliferating problems and challenges, superior ability to deal with whatever the world brings may provide a key competitive advantage. This ability involves skills related to effectively understanding, diagnosing, analyzing, modeling, creating, inventing, solving, communicating, and implementing.

These are all attributes that we might consider facets of "learning," and naturally enough any organization that thrives in a rapidly changing environment necessarily has developed the capability to learn and to apply that learning to keep up with the changes. Hence we get Arie de Geus' insight that the company wins that learns fastest, and is then able to translate that learning into products, processes, and structures.²

The advantage gains significance in that the faster a company can learn, the faster it can apply that learning to create the next product. We also call this innovation, and clearly the link between learning and innovation is a strong one.

¹This paper draws from two prior works, my 2006 book *Permanent Innovation* (www.permanentinnovation.com), and a white paper entitled "High Performance Organizations and the Wicked Problem World," 2004.

²De Geus, Arie. *The Living Company*. Harvard, 1997.

By creating a positive self-reinforcing feedback loop of accelerated learning>innovation, companies attain shorter product life cycles, which leads to quicker learning, yet shorter product life cycles, etc. To a point this is a very positive process, although there's of course a danger with this tightening spiral, which is that a product has to endure long enough in the market to return a profit. But the competitive dynamics of the market are compressing rapidly in spite of what may be good for any one company, and so like an arms race, there's no choice but to keep up.³

In spite of the dangers, then, the capacity to systemically reduce cycle time is a powerful attribute. Toyota perfected cycle time reduction in its many-decades drive to reduce the days required to change production models on its assembly lines to hours, and then minutes, and the analogous process is now necessary for the thinking challenges related to problem-solving and dealing with complexity.

At root what we're talking about, then, could also be called "the productivity of the innovation process."

Productivity is the ratio of investment required to results obtained. In the auto industry this might be measured as person-hours-per-car-manufactured; in a bank, it might be cost per transaction; in a software company it could be person-years required to produce a new program.

While these examples explain productivity in "production" environments, we are even more interested in attaining improved outcomes in environments of unknowns, where the central task is to create *new knowledge* to solve *new problems* and *create new opportunities*, which is the classic domain of innovation.

This is not to say that building cars or managing banks are not complex activities, but the distinction is a critical one because there is a substantial difference between progressive refinements attained in a mature or proven domain, and the breakthrough kinds of insights that lead to competitive advantage, or better, sustainable competitive advantages.

INFRASTRUCTURE FOR INNOVATION

To support the accelerated learning and innovation process that we striving to evoke, create, and optimize, there are powerful tools at our disposal, which together we might call the innovation infrastructure. The four elements of this infrastructure that I will discuss here are innovation methodology, collaboration, enablers and obstacles in the organizational culture, and work place design.

Innovation Methodology

It's common to think of the innovation process as a funnel that contains a series of steps, or stages, through which ideas pass along the way from the moment of first insight through development, maturation, and eventually their introduction into the world as a new product, service, or process. The term 'stage gate process' reflects this sort of thinking.

Various authors may define the steps or stages differently, but the metaphor of the funnel endures because it's clear from experience that many ideas are needed in the front end to make a few good innovations at the other.

The varieties of the model are probably less important than the necessity to have a model, and even more importantly, to be engaged in improving it through time. Many organizations, for example, find themselves with an excess of incremental innovation ideas and not enough possible breakthroughs; hence, they have to adjust how the funnel works to give more effort to understanding the fundamental structure of the market, and seeking to change it.

This could mean adopting different approaches to research and thereby seeking the sorts of insights that might lead to breakthroughs, or opening up the innovation process to greater outside influences, or running specific ideation or brainstorming processes to identify opportunities outside of traditional frameworks, or working with outside consultants to help refresh the thinking process.

Collaboration

After years of work in the field of 'innovation,' I have yet to meet anyone who does not recognize the importance of collaboration as a vital element in the innovation infrastructure. Everyone I've ever talked to agrees that the way people interact is critical, because everyone also agrees that human interaction is central to the innovation process.

Developing new insights, testing new ideas, and developing them into innovations of value to the market are inevitably collaborative processes that may involve two, or tens or even hundreds of people. And as they work together, there are clearly things that can be done to enable or enhance the way they

³Von Braun, Christophe-Friedrich. *The Innovation War*. Prentice Hall, 1997.

work, just as there are factors that can inhibit them.

Most of the world's leading organizations which are admired for innovation are also noted for the quality of collaboration that they carefully and continuously promote. Toyota, for example, has developed a distinct environment where employees are not just welcome to put forth ideas, but fully expected to do so. Year after year, literally millions of ideas build on one another to add tremendous value to the company and its customers. In contrast, Toyota's largest global competitor, GM, is known not for the quality of collaboration that it evokes, but rather for the confrontational nature of its labor relations. Decades of conflict between labor and management have resulted in a culture of discord in which innovation seems to be pretty far down on the list of priorities. It is not an accident that Toyota passed GM as the world's largest automaker in 2008 (as measured by number of cars produced).

But what are the key qualities that support or inhibit innovation from occurring? These are enablers and obstacles.

Enablers and Obstacles in the Organizational Culture

So what's really different between GM and Toyota? At the top of the list I would put trust. Innovation just doesn't happen in environments where trust is absent, because the search for innovation is inherently risky that the lack of trust can stifle even the simplest attempt at innovation.

What kind of risk are we talking about? There are two kinds, really. First is the overt risk that the idea will not work out, which may involve some cost to the organization in terms of lost investment of time and money. For organizations that understand the innovation culture, this risk is a necessary one, for trial and error is the surest way to create things that are genuinely new.

Indeed, any review of major, minor, or intermediate innovations as documented in history and in our own memories makes it clear that you've got to try it to find out, and as often as not you won't get it right the first time. That might lead to a second try, and then a third, etc., until you do get it right, and an eventual payoff. But it's also quite likely that any given idea leads to no specific payoff at all, that it's a dead end.

The thing is, you can't know at the outset. Because if you know, then it's probably not really an innovation you're talking about. So, yes, there is risk of failure, and if your organization is one in which failure is punished, then people will quickly learn not to take risks, and an enormous obstacle to innovation will take root.

This does not mean that we wish to encourage failure, but we do wish to encourage the sort of behavior - namely trying new things - from which failure is a possible outcome. If we cannot fail we cannot try, and if we cannot try then we condemn ourselves to repeating what we do in the present until change overwhelms us.

The other sort of risk involved is the risk to the ego. If I fail, will I be shunned? If I am shunned, will I ever take another risk? Probably not.

Some organizations deal with both types of risk by recognizing that 'failure' can contribute value, and they even give awards to those who fail in ways that are particularly thoughtful, provocative, elegant, and from which new learning comes that may lead to ultimate success.

Another enabler is the organizational culture that believes that innovation takes time. This is why recognized leaders such as 3M and Google ask and expect key workers to take 10% to 20% of their time to work on their own ideas. Conversely, if everyone is up to their eyebrows just trying to keep up with the daily work, then innovation probably doesn't have a chance.

A third enabler is the work place itself, which I will discuss in the following section.

Work Place Design

The work place is the container for everything that doesn't happen in the virtual world. And actually in some sense it's even the container for that too, because in the end all virtual work involves a person at a computer clicking, reading, writing, and drawing, and that person is sitting in some room, somewhere.

One of the main reasons that the work place is so important is because of the difference between tacit and explicit knowledge. While explicit knowledge can be shared through verbal and written expression, tacit knowledge is that which we feel, believe, and experience, but which is beyond conscious awareness and we probably cannot articulate.⁴

Cognitive scientist George Lakoff puts it very simply: "One of the most fundamental results in cognitive science, one that comes from the study of commonsense reasoning, is that most of our

⁴Nonaka, Ikujiro and Hirotaka Takeuchi, *The Knowledge-Creating Company*. New York, Oxford University Press, 1995.

thought is unconscious – not unconscious in the Freudian sense of being repressed, but unconscious simply in that we are not aware of it. We think and talk at too fast a rate and at too deep a level to have conscious awareness and control over everything we think and say. We are even less conscious of the components of thoughts – concepts. When we think, we use an elaborate system of concepts, but we are not usually aware of just what those concepts are like and how they fit together into a system.”⁵

Why does so much of our experience lie beyond our conscious awareness? Studies of the human brain reveal that the sensory organs generate information at a prodigious rate, as the combined channel capacity of the nerves associated with the eyes, ears, skin, taste and smell systems is on the order of eleven million bits of data per second. Meanwhile, consciousness lags considerably behind at a paltry forty bits per second.⁶ This means that the brain is processing approximately 300,000 times more information than consciousness is aware of.

Since the gap between tacit and explicit processing is so great at both the sensory and conceptual levels, we begin to understand why face to face interaction is so dense and so important. Nuances of tone, inflection, timing, cadence, body language, attention, smell, and facial expression are all richly present in any encounter, while they are captured only partially – if at all – in interactions via telephones and computers. From our own experiences, we know that these factors contribute enormously to the completeness of exchange, to our ability to communicate effectively with one another. This is not to say that telephones and computers do not have their uses, but it does say clearly that there is something unique about encountering each other in the flesh.

And what of the common experience of interaction leading to new insight? Physiology and cognitive science tell us that the brain in general and the memory in particular work by association,⁷ and that interactions with one another stimulate new associations and new connections that can lead to breakthrough concepts. Face to face interactions also enable people to share experiences, which means sharing tacit knowledge and in the process creating new tacit and explicit knowledge. From this process we get the title of James Burke’s best-selling study of innovation called *Connections*,⁸ which we also call “creativity.”

To study unconscious behavior patterns in organizations as well as in communities and tribes, ethnographic methods⁹ are very useful because they expose the important tacit factors embedded in interactions and in entire cultures. These key factors also have to be taken into account in the design of work places for collaboration and creativity.

We can summarize the tacit aspect of this discussion by quoting a comment from Glaxo Wellcome chemist Dan Sternbach, who noted that, “Nothing replaces two people standing at the board and drawing things, which is the way we communicate a lot. It’s an interactive situation where when somebody’s drawing something up the other guy says, ‘Well that reminds me of this thing.’ As soon as you try to do that by email it takes more time. You can do some of it that way but the same conversation would probably happen in a day versus 20 minutes because of the give and take that goes on.”

An example of tacit factors in product design is the car key. Today it’s accepted that a single key both opens and starts the car, and since the key is symmetrical it works facing either direction assuring 100% success with the key in the lock or the ignition 100% of the time. But for decades, American car makers provided a key for the door and the ignition, and a different one for the trunk. These keys were non-symmetrical, so up and down were different, and the key only worked one way. So for decades American car owners were consigned to fumbling at random on a dark and rainy night with only a 25% chance of getting the right key in the lock correctly. Eventually the Japanese innovation also became standard, but very late.

The point of all this discussion is that tacit factors are critical to successful collaboration and creativity, and we’re particularly interested in creating work places for great face to face collaboration. So what kind of room is it going to be? What are its critical attributes? What matters?

Collaboration Settings

The essentials for effective innovation are thinking, creating, problem-solving, and collaborating, and

⁵Lakoff, George, *Moral Politics: What Conservatives Know that Liberals Don't*. Chicago, The University of Chicago Press, 1996.

⁶Zimmermann, Manfred, “Neurophysiology of Sensory Systems.” *Fundamentals of Sensory Physiology*, Robert F. Schmidt, ed. Berlin, Springer-Verlag, 1986. p. 115.

⁷Calvin, William H., *The River that Flows Uphill: A Journey from the Big Bang to Big Brain*. New York, MacMillan, 1986.

⁸Burke, James, *Connections*. Boston, Little, Brown and Company, 1978.

⁹Jordan, Dr. Brigitte, “Ethnographic Workplace Studies and Computer Supported Cooperative Work.” Institute for Research on Learning, Report No. IRL94-0026, 1994.

we know that the work place that best supports them is not a traditional conference room, which is in fact a proven creativity killer. It's deadly dull, inflexible, and made really just to support information exchange in a hierarchical setting. Avoid it at all costs!

But effective work place collaboration isn't just one thing. There are many different collaboration settings, among which we take these seven examples from everyday life:

- The kitchen table, where the family gathers to share conversation and meals, and where it meets to do its paperwork and discuss its "business."
- The art studio, where artists work, and where they gather to present their work to their peers for feedback and criticism.
- The stage, where actors, musicians, or dancers develop their performances, and then deliver them.
- The coffee house or pub, where people gather for spontaneous discussion.
- The marketplace, where sellers and buyers meet to collaborate in trade.
- The beehive, a collective (rather than collaborative) setting where the work gets allocated and accomplished almost spontaneously.
- The sand box, where children gather to invent and re-invent the world and their adventures in it.

Collaboration happens in all of these, and while a different kind of collaboration may occur in each, attributes of all of them are useful in solving wicked problems - at the kitchen table there is the laughter and joy of sharing, the pleasure of the family; in the art studio there is encouragement to explore and take ideas further, and perhaps also inspiration in the explorations of others; on stage there is interaction that drives the ensemble to new discoveries about each one and the whole; in the coffee house there's the anticipation of unexpected discovery because you never know who will walk in; in the marketplace there are always new ideas to discover, examples of the creativity of others; in the beehive there is constant focus and commitment; and in the sand box the imagination soars in new worlds to build and play in, and a medium so flexible that the castle at 2:15 is a city by 2:30 and a spacecraft on Mars at 2:40.

Our concept of the ideal setting for facilitated collaboration is the Innovation Center,¹⁰ the place where people and ideas come together to understand complex systems and create solutions to wicked problems that afflict them.

The business setting where these desirable characteristics may be most in evidence is the R&D lab, where grown-ups work together to create the products and services that will define the future of their companies. R&D is the microcosm of the creation of the future organization and its products and services, so it's worth studying to examine the interplay of all the critical factors.

The R&D Lab

The best labs produce incredible ideas that become great products and services - imagine what it was like in the coolest lab where the coolest stuff was invented - Thomas Edison's Menlo Park lab where the light bulb was perfected, or Ford's workshop where the Model T came from, Douglas Aircraft when the first DC-3 was built, or Xerox PARC when the PC was invented. Lots of brilliant, creative people solving difficult problems with astonishing levels of insight and inventiveness.

If you're going to be successful in our challenging world, this is the kind of environment you need to create

So how do you do it?

Not long ago we studied some of the best biotech, high tech, and pharmaceutical R&D facilities around the US, and we found that there are few work environments more complex than the research laboratory, and none that better exemplify the complex issues surrounding knowledge work.¹¹ In a typical lab the knowledge workers are generally scientists, engineers, and technicians who design and conduct experiments in order to create useful new knowledge that is expected to be valuable to a company or organization. It may be knowledge of the uncharted physical world of chemistry or biology, or knowledge about the behavior of man-made products, or knowledge about how people interact with each other and with physical artifacts.

From the perspective of the architect, it turns out that the design of a research lab is quite a difficult problem. Numerous factors must be taken into account, some of which require resolving conflicting or contradictory requirements.

¹⁰Morris, Langdon. *Managing the Evolving Corporation*. Van Nostrand Reinhold, 1995.

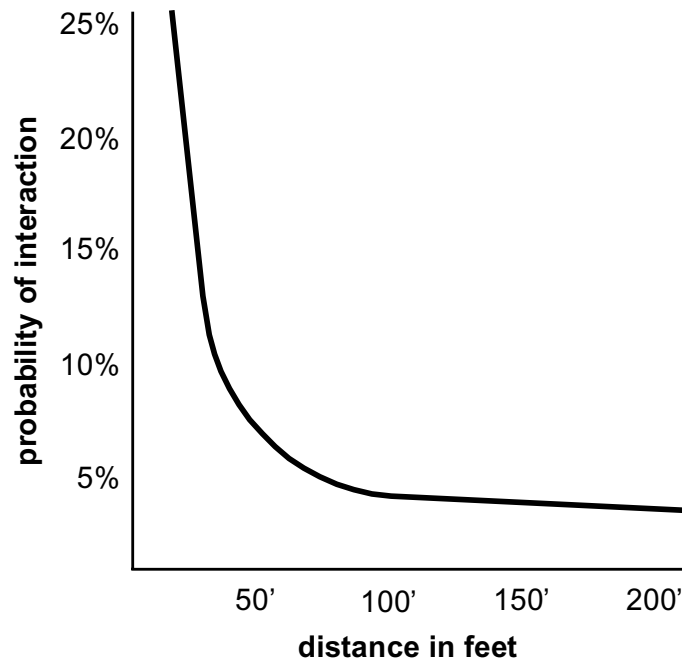
¹¹Morris, Langdon. "Social Design: The Link Between Facility Design, Organization Design, and Corporate Strategy." *InnovationLabs*, 2001.

The most immediate issue is that in a typical lab facility each researcher normally has two different work settings, the lab itself and an office. Ideally, these two work locations should not be too far from one another, but they also should not be isolated from other offices and labs so that researchers can easily interact. Then again, cost considerations suggest that separating lab and office functions reduces construction expense.

But all of it must be done to maximize interaction, because every researcher believes, as we do, that optimizing interaction between researchers is critical to R&D success. At the same time, though, all researchers are convinced that they have to have a lot of private space to think, write, and research in peace and quiet. (It's important to note, by the way, that the actual innovation process is as important to effective R&D as the work environment, because even a great environment can't necessarily overcome a broken way of working. A detailed examination of R&D process is found in Miller and Morris' book *4th Generation R&D: Managing Knowledge, Technology, and Innovation*¹².)

Designing the Ideal Lab

In 1977, Tom Allen, Professor of Organizational Psychology and Management at MIT's Sloan School of Management, wrote what is still the definitive book on interaction in the laboratory, *Managing the Flow of Technology*.¹³ The book presents Allen's research into the factors affecting human interaction in the R&D process, and one of his key discoveries is shown in a graph of the probability of interaction between two people as a function of the distance between their offices. He updated the book in 2006 with coauthor Gunter Henn in *The Organization and Architecture of Innovation: Managing the Flow of Technology*.



“The probability that two people will communicate as a function of the distance separating them”.

Adapted from: Tom Allen, *Managing the Flow of Technology*

Since face-to-face interaction is accepted as a critical design goal for an R&D lab, the obvious meaning of this research is that everyone should be no more than 100 feet away from everyone else. Which, of course, is quite impossible in organizations with more than about a hundred people. So the trick in designing labs is to apply strategies to optimize interactions, and Allen explores many of them in his book.

Our study of R&D labs led us to invent the term “social design” to describe these strategies, and the practices of designing labs and other collaborative spaces to optimize the quality and quantity of interactions. Implicit in this approach is the question:

¹²Miller, William L. and Langdon Morris. *4th Generation R&D: Managing Knowledge, Technology, and Innovation*. Wiley, 1999.

¹³Allen, Tom, *Managing the Flow of Technology*, Cambridge, MA, The MIT Press, 1977, 1995.

Can better buildings make for a better quality of interaction?

In our survey of 9 new R&D facilities around the US, we found that the answer was clearly yes. We identified about 70 different specific applications of social design, where the work place and the work process were both designed to optimize interaction and thinking and creative outputs.

Along the way we spoke with many people, and a story from Hewlett Packard is a particularly concise expression of the concept of social design. In our conversation, a former member of the R&D department at Hewlett Packard lamented what he felt was a marked decline in both the quality of HP's R&D output, and the lack of esprit de corps he noticed at the lab. He had thought about this a lot, and he attributed a lot of the decline to the departure of Bill Hewlett, who he had found to be great leader of R&D. He also felt that some of the decline was due to the invention of the small coffee maker and the change in corporate culture that it caused.

Back in the old days, it seems, coffee makers were big things, hot, noisy, and kept out of the way in the company kitchen. So down in the HP kitchen somewhere far from the R&D office they'd brew up a big pot and once in the morning and once in the afternoon someone would bring it around to R&D on a cart. If you were around you grabbed your cup and went and filled it up. There, you would of course find your colleagues doing the same thing, and you'd stand around for a few minutes and chat while taking a break and enjoying your coffee.

What you'd chat about, in addition to your favorite team or the news, was your work. More specifically, you'd talk about where you were stuck, and you'd brainstorm possible solutions to the wicked design and engineering problems anyone happened to be working on. If today's ideas didn't work out, tomorrow's morning's coffee break was another opportunity to get some creative input from someone who was by now aware of what you were doing and might even be thinking about it for you. A lot of problems got unstuck at the coffee cart.

But then coffee makers got small and cheap, and the kitchen staff didn't have to bring it around on a cart anymore because each part of R&D had its own pot that simmered all day. No more coffee break, no more spontaneous brainstorming, and as far as our friend was concerned, the beginning of the end for the great days of HP R&D.

Nearly everyone has had the experience of a chance conversation that opens new insights that later proved to be important, and at HP the shared coffee break was an organizational tool to promote that, and thus an example of social design.

Taking all of this into account, we recently worked a client to help them conceive of a new R&D lab. We started with a collaborative workshop involving 350 people, and we divided them in to 48 teams and asked them to think about attributes of their ideal lab. Then we asked them to design a lab and build a model of it using craft supplies that you'd find in a typical supply store. We then took their ideas and synthesized them into a single design, not in the expectation that it would be built, but as a model to think about as they continued to refine their visions of how and where they would work.

SUMMARY

Our experience is that all of these infrastructure elements – proper methodology, effective collaboration, attention to enablers and obstacles, and properly designed work environments – work in synergy to accentuate the effectiveness of all innovation efforts.

In summary, I will briefly present two short case studies that illustrate how these elements can be combined for the best results.

The Boeing 777

Through the early years of its history, Boeing Corporation developed a company culture that was at times quite adversarial. Conflict characterized the relationships between the company and its suppliers, and the company and its unions.

With the development of its new 777 aircraft during the late 1980s and early 1990s, the company consciously strove to adopt a more collaborative approach to enhance innovation and achieve what was expected to be a better result, and a milestone in commercial aviation. By toning down the conflict and choosing a much more win-win style, Boeing's leaders achieved, and perhaps even exceeded their goals. The 777 design team produced this new airplane in record time.

The innovation infrastructure was evident throughout the process. One of the methods that supported their work was a work environment optimized for the team approach. In fact, the entire project was

divided into project teams, and each of the 250 teams had its own, dedicated work environment to help them work effectively as a team. They were supported by an electronic drafting system that enhanced collaboration among the thousands of people involved, and to help assure that everyone was sufficiently informed and aligned, there were regular meetings of all 5000 Boeing employees on the project. But since the largest meeting room available could only hold 2500 people, the meeting was held twice, for consecutive half hours, once a week.¹⁴

St. Petersburg College Collaborative Labs

St. Petersburg College operates a Collaborative Labs work space that provide a unique environment for teaching, workshops, and consultative projects with local businesses and the community. A staff of professional facilitators supports many of the project teams that use the 10,000 square foot facility, which is uniquely designed and equipped to foster dynamic interaction and spur creativity.

Our firm supported the creation of the Collaborative Labs, and I asked Andrea Henning, Executive Director of the Labs, to share some key learnings from their work, and this is how she replied¹⁵:

It's challenging to boil it down, but here are some key points our clients have shared with us about the innovation process that helped them achieve the best results:

– Getting the right stakeholders in the room to work together face to face is important. These may include internal as well as external people, representing all levels of the organization, as well as all functions, and all aspects of organizational expertise.

– Asking the right questions through the medium of a well-thought out design for the collaborative process is the key to a successful engagement that takes complex, multidimensional issues and organizes them into 'manageable information chunks,' helping design teams focus for the best results.

– Using collaborative tools and technologies to get the most robust, accelerated results from teams. We use collaborative brainstorming software that enables multiple teams to brainstorm hundreds of ideas and prioritize them into meaningful categories quickly.

– A unique facility design that contains advanced furniture products that enable groups to capitalize on team iterations to produce the best results.

– And our staff captures information in a detailed 'Real-Time Record' of every aspect of the collaborative engagement, which frees the participants from note-taking, while providing a complete roadmap of all the ideas discussed during the collaborative process. We deliver it the next business day, complete with digital images of teams at work, their whiteboards, transcriptions of their discussion, and synthesis of the work in progress, along with final strategy maps and other illustrations.

Together, all of these elements enable groups to achieve exceptional productivity and innovation.

It may be that your organization is ready for a complete review of its innovation infrastructure, or perhaps some modest changes to the things you're already doing well is the right next step. Either way, careful attention and proper tools can make a significant difference in the speed to results and the quality of the results, and can provide your organization with the means to more consistently achieve innovative results. In developing the capacity to develop innovation on a regular basis, organizations distinguish themselves in the marketplace, enhance the value they provide to their many types of stakeholders, and help assure their continued survival in an era of unprecedented turbulence.

¹⁴Sabbagh, Karl. *Twenty-First-Century Jet: The Making and Marketing of the Boeing 777*. New York, Scriber, 1996.

¹⁵Andrea Henning, Executive Director, Collaborative Labs, EpiCenter, St. Petersburg College, Florida 33760. <http://www.spcollege.edu/central/collaborative>.

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