The Typology of Human Capability: A new guide to rethinking the potential for digital experience offerings

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The Typology of Human Capability:
a new guide to rethinking the potential
for digital experience offerings

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To create significant advances in customer value in today's increasingly turbulent world requires constant focus on innovation. The two-phase management process involves discovering new ways of creating such value through creative exploration, and then exploiting those discoveries in the crucible of the marketplace. In the digital era, the exploration of value creation has benefited from many ingenious new ideas – customer experiences, mass customization, co-creation of unique value, design thinking, open innovation and others. Nowadays the reach of digital technology exceeds our grasp, opening new vistas of human experience, and commercial opportunity.

To further the exploration of the fusion of human experience and digital technology, we offer another innovation framework that can be used to identify new customer value and develop potential new business models. This framework, the Typology of Human Capability, illuminates the potential uses for technology across four dimensions of human experience. Viewing value creation possibilities with this typology can help companies tap the infinite possibility inherent in today's digital technology. Understanding this linkage between technology, human capability, and value creation can also boost a firm's creative capabilities.

Technology and value creation

Technology is ''a means to fulfill a human purpose,'' as Brian Arthur, now on the faculty of the Santa Fe Institute, observed in his pioneering book, *The Nature of Technology.*[1] Inspired by this insight, we examined the fundamental ways people employ digital technology. People – as individuals and in groups – apply digital technology to fulfill two primary purposes: connecting and doing; that is, linking to the world or to others in a way that increases knowledge and capabilities, or carrying out actions that affect the world around them. Individuals and groups connect by sensing and linking. They manipulate their environment by performing and organizing. By using this framework (see Exhibit 1, ''Typology of Human Capability'') experience designers can discover a richer set of possibilities for creating new customer value, especially when employing digital technology.

Sensing. When a person connects with the world, technology can expand the capability for sensing – seeing, hearing, touching, smelling, tasting and even feeling. As for seeing, we have long had the familiar technologies of eyeglasses, binoculars, and telescopes, not to mention lights, windows, and shades. Now, digital technology enables the extension of our capabilities in new ways. Augmented Reality, for example, lets us essentially look through walls and peer around corners, so that we see the physical world in a new light, or simply notice things we would not otherwise have. Haptic technologies, which provide physical sensations that enable electronics to give their users feedback, similarly extend our sense of touch. Virtual worlds let us sense environments that do not even exist, while mirror worlds –

Exhibit 1 Typology of Human Capability
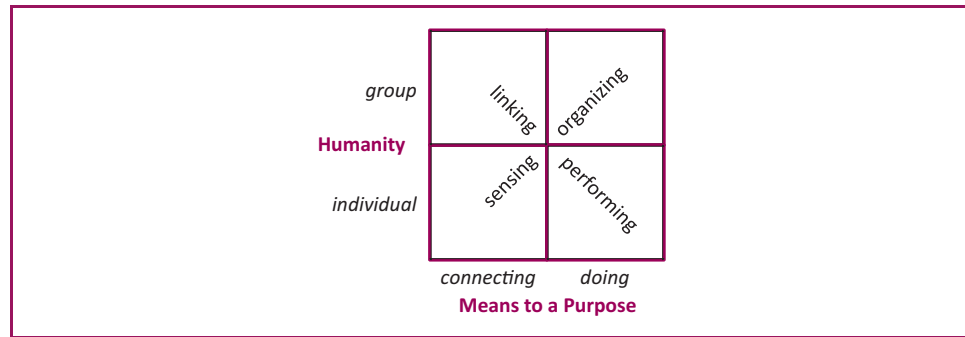
virtual worlds that simulate the physical one in real time – provide platforms that give us new ways of understanding the real world through what David Gelernter, professor of computer science at Yale, calls ''topsight.''[2]

Performing. Technology also expands a person's means of performing – learning, knowing, acting, thinking, building, moving, accomplishing, imagining, fantasizing, experimenting with alternatives, learning control and mastering self-improvement. Digital technology enhances any individual's capability to perform. One way it does this is by dramatically shortening the cycle of researching, learning, and application – for example, a video game devoted to responding to medical emergencies offers training for the actual experience. Digital technology enables people who aren't engineers to direct the design, manufacture, and sale of a product, enabling an individual to perform like a firm of professionals. Digital tools empower people to guide their life changes, from financial to physical. The capabilities of digital technology to increase an individual's abilities to perform seem limited only by our imagination.

Linking. Technologies as diverse as pencil and paper, writing, language, and the telephone enable people to interact with one another. This function of connecting now also involves the linking of multiple individuals to one another through e-mailing, texting, Skyping, TelePresencing, and Tweeting, along with myriad other means of socially connecting. Digital technology can dramatically boost communication immediacy and effectiveness. For example, a mother serving in the armed forces overseas can lovingly read her daughter at home a bedtime story via Skype video. Recent technology improvements and significant cost reductions greatly expand people's capability to connect together.

Organizing. Purposeful groups of people, whether families, communities, political campaigns, nonprofits, customers, or employees, require organizing. Organizing capabilities include such activities as guiding, managing, coaching, recruiting, evolving, reforming, reorganizing, perpetuating, specializing, segmenting (into multiple groups), and merging (multiple groups into one. Enabled by Internet technologies we now routinely conduct meetings, collaborate on projects, play Fantasy Football, attack kingdoms, and so on, regardless of where in the world the participants happen to be. Groups also spontaneously self-organize via social media based on individual interests, with digital technology drastically decreasing the costs of banding together, as media expert and New York University professor Clay Shirky makes clear in his book *Here Comes Everybody: The Power of Organizing without Organizations*.[3]

What's unique about digital technology?

In 1984, pioneering computer scientist Alan Kay recognized the unique power of the computer's digital technology to embody what he identified as ''the first metamedium, and as such it has degrees of freedom for representation and expression never before encountered and as yet barely investigated.''[4] Around that same time computer scientist

and composer Jaron Lanier coined the term ''virtual reality,'' envisioning the creation of a ''virtual world with infinite abundance.''[5] And less than a decade later, Brenda Laurel, a visionary writer, researcher, designer and entrepreneur in the fields of human-computer interaction wrote in *Computers as Theatre* that, ''computers are representation machines'' and that designing the ''human-computer experience'' could be ''about creating imaginary worlds that have a special relationship to reality – worlds in which we can extend, amplify, and enrich our own capacities to think, feel, and act.''[6] What these visionaries foresaw two and three decades ago today offers a new dimension of value for customers.

Digital technology differs from all other kinds of manmade technology because of the distinctive characteristics of its component bits:

- The essence of bits is immaterial; they weigh nothing, cost little or nothing to store, cost essentially nothing to replicate, and do not age with time. They require no ongoing maintenance, are always as good as they were the first day they were produced, and do not wear out with use.[7] For example, music recordings replicated on vinyl albums may get dirty, scratched, and wear a little each time a needle slides down the groove bouncing off the molded pattern of matter holding the analog information about the music. Even CDs, an intermediate technology somewhere between the analog vinyl record and the digital music file on a computer or iPod, is subject to damage, misplacement, and general deterioration over time. But much to the chagrin of the music industry, music in a lossless digital format can be replicated without limit and stored indefinitely while every copy remains as good as the original recording. Bits are easily integrated, at little or no cost. Increasingly, digital devices can talk to other digital devices in a wave of ongoing digital convergence. Your PC or web-enabled mobile phone can now be used to control your home's lighting, pools, heating, air conditioning, and DVR from wherever you are in the world. And if you want to go out to eat while on the road, there's an app for that, as your iPhone takes your verbal request to locate a restaurant, gives you the latest reviews, shows it on a map, emails the result, and gets you a reservation. Apps even allow you to ask open-ended questions about what is available to do in your area today, tonight, or this weekend. Such capabilities come about from the mashup of a wide variety of once distinctly separate analog technologies, including telephone directories, road maps, newspaper and magazine reviews, and so forth, to provide a seamless, simpler, and more complete experience.

- Bits are also cheap when it comes to imagining, experimentation, and prototyping. With purely digital offerings you can play around with them to your heart's content and market's readiness without every incurring the cost of physical production. Developers can repeatedly design/prototype/test until the cows and forecasts come home before spending one dime on expensive machine tooling and full-scale physical production. Budding entrepreneurs can design and develop products for sale without ever setting foot in a design department or factory.

- Bits enable the development of offerings otherwise impossible. In 1972 the first digital fly-by-wire system, for example, replaced conventional mechanical flight controls with electronic flight controls coupled to a computer.[8] This new digital technology domain opened the door for the development of a new generation of inherently unstable military aircraft, unflyable by conventional controls but incredibly maneuverable when guided by digital fly-by-wire controls. As an analogy, think bicycle vs. tricycle: a bike is more

"**To further the exploration of the fusion of human experience and digital technology, we offer another innovation framework that can be used to identify new customer value and develop potential new business models.**"

unstable than a trike, but greatly more maneuverable.[9] Bits are easily modified, combined, improved, and customized. Who among us have not come to expect a never-ending stream of updates and upgrades to the software tools we use, often at no or minimal incremental cost? Google has taken ample advantage of this characteristic. Google e-mail has been a constant stream of delightful surprises that make it more and more feature-rich as time goes on without us ever having to lift a finger to perform an upgrade. The same holds true for the Google Chrome browser and thousands of other offerings hundreds of other companies. Goodbye out-of-date software – and goodbye being treated exactly the same as everyone else, as technology increasingly customizes itself to our every desire. Smartphones are perhaps the most customizable piece of technology ever invented, with address books, ringtones, skins, screens, music, calendars, apps, and more all eminently and easily modified by and adapted to each person.

Together, these characteristics make digital technology the technology of experiences. It enables new-to-the-world possibilities for the delivery of emotion-evoking experiences by an ever-broadening array of methods that engage our human senses through endless sights, sounds, and other sensations.

As a case in point, consider MyFord Touch, based on the Ford Motor Company's SYNC connectivity system as a digital technology for sensing, organizing, linking and performing. Its touch screen enables you to control your entire environment, including customizing your dashboard, while voice recognition as you drive enables on-the-fly control, not only of the car but your mobile phone and digital music player as well. You can browse your phone book and make calls with the sound of your voice, get turn-by-turn directions, direct 911 emergency contact in the event of an accident, access a vehicle health report letting you know if your car needs servicing with the option to schedule that service immediately, do business searches or get traffic, sports, and weather reports – all at your verbal command.

All domains of technology, whether computing, communication, entertainment, manufacturing, transportation, genetic, and on and on, converge as their foundations each become digitized. Even matter itself is increasingly programmable, enabled by 3D printers and fabrication studios such as Menlo Park-based TechShop, the place for do-it-yourself enthusiasts. For those goods that resist digitization, companies digitize information about them so they can – often in collaboration with customers – be virtually designed and then, after production, be tracked, monitored, and mirrored online.

Plain and simple, ones and zeroes talk to ones and zeroes. This provides a common means, a common language, for the exchange of information and thus the integration between any form of technology expressible in digital form. The ongoing digitization of broad swaths of technology, with no limit in sight, looks to be the natural extension of the information revolution that began with the computer. This digitization revolution is like a genie uncorked from his or her bottle who is growing more powerful every day.

How managers can use the Typology of Human Capability to innovate

The four capabilities – sensing, performing, linking, and organizing – come into play independently and collectively in all of our experiences. When exploring the frontiers of discovery and innovation, the Typology of Human Capability can be a useful guide to innovation opportunities.

Step 1: Learn how the Typology of Human Capability works in practice.

- First, using just your imagination, reverse engineer a successful digital innovation using the Typology of Human Capability. What senses does the product potentiate? What organizational efficiencies are achieved? How does it add customer value?

- Second, discern the way and the relative magnitude that sensing, linking, organizing, and performing have each been extended, amplified, or enriched by the innovation. What

does this reveal about the essence of the value created? Specifically, how does this innovation change how an individual or group connects with or affects the world around them? How does the value created in one dimension relate to another?

■ Third, ask yourself what happens when a technology succeeds by using one of the typology's capabilities. How would you use the typology to look for opportunities for innovation in adjacent areas? Could the same technology that creates new value in one dimension also create new value in any of the other dimensions? What technologies complement the current one and where might they join together to create additional value?

Step 2: Seek out new value creation opportunities for your existing digital technology, keeping in mind the Typology of Human Capability's four means of achieving a purpose. Almost all companies can benefit from experience-designed digital innovation, if not for their offerings then for their internal processes.

Step 3. Look for ways you can use the Typology of Human Capability to boost the effects of your technology to generate new and better offerings – for goods, services, and experiences.

■ Look for opportunities to solve customer problems, find alternatives for them to use their time and resources in ways that improve their lives, extend their current capabilities, or enable them to do things they otherwise would not be able to do.

■ Show your innovation teams how to consider each newly created idea from the perspective of the Typology. Clearly discern and articulate the primary means to a purpose that creates the most value within the proposed offering, and then the extent to which each of the others contribute to customer value.

Step 4. Use the Typology of Human Capability to generate new ideas.

■ First focus on the primary value-creating concept, whether sensing, performing, linking, or organizing. For example, Starbucks might use digital audio technology to create zones of privacy within its bustling, noisy coffee shops. The technology could enable a small group of people to eat and drink while they talked about books or records, undisturbed by the hubbub around them. The groups could attract a following of new customers by inviting authors or musicians to entertain. The group's organization could be spontaneous or formalized, limited to one location or linked with customers at other places.

■ Once you have explored one of the primary means of extending the human experience in depth, systematically focus on the other three, one at a time, generating ideas that initiate or extend their influence on the proposed offering. And as you do so, go one step further: also examine how the capabilities might interact with each other, integrating possibilities that may arise from the simultaneous consideration of multiple capabilities.

The possibilities for such innovations that take advantage of employing digital technology as the means to value-creating purposes across the Typology of Human Capability are endless, for they are limited only by human imagination.

Notes

1. W. Brian Arthur, *The Nature of Technology: What It Is and How It Evolves* (New York: Free Press, 2009), 28.

2. David Gelernter, *Mirror Worlds: or the Day Software Puts the Universe in a Shoebox. How It Will Happen and What It Will Mean* (New York: Oxford University Press, 1992), 52.

3. Clay Shirky, *Here Comes Everybody: The Power of Organizing without Organizations* (New York: Penguin Books, 2008).

4. Alan Kay, ''Computer software,'' *Scientific American*, Vol. 251 No 3, September 1984, 52-59, cited in Brenda Laurel, *Computers as Theatre* (Reading, Massachusetts: Addison-Wesley Publishing Company,1993), 32.

5. Jaron Lanier, *You Are Not a Gadget: A Manifesto* (New York: Alfred A. Knopf, 2010), 103.

6. Laurel, *Computers as Theatre*, 32-33.

7. While bits themselves are not subject to entropy, the underlying technology housing the bits of course follows the Second Law of Thermodynamics.

8. ''F-8 digital fly-by-wire aircraft,'' *NASA Dryden Fact Sheet*, www.nasa.gov/centers/dryden/news/FactSheets/FS-024-DFRC.html

9. *Op cit* Arthur, W.B., *The Nature of Technology*, 72-73.

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