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Innovation in Consumer Goods and Brand

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Re-Energizing Product Development: InnovationSpace at Arizona State University

by Paul Rothstein and Peter Wolf

The competitive reality is that design management demands collaboration.

At Arizona State University, InnovationSpace unites expertise in design, engineering, and business to create prototypes of products that satisfy consumers, benefit society, can be manufactured, and create value for investors and corporations. Here, Paul Rothstein and Peter Wolf profile the process and diversity-sensitive results of this approach.



As this new century unfolds, the transformative effects of globalization are becoming clear. Consider, for example, these trends and developments.

- According to a recent issue of *BusinessWeek*, the US graduated 400,000 scientists and engineers in 2003. During that same year, China and India graduated 650,000 scientists and engineers—and they did so while spending less than half of what the US spent as a percentage of their respective GDPs. As this continues in the years to come, China and India will likely see a substantial return on investment in science and technology, arguably the foundation of new product development.
- A recent study by Forrester Research Inc. reported that design-



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related jobs are being shipped offshore rapidly. According to the report, by the end of next year, US firms will send overseas as many as 54,000 jobs in the fields of architecture and design. More alarming, by 2015, the number is expected to skyrocket to 221,000.¹ Outside the US, highly effective educational programs have sprung up in product design, engineering, and design management. In Asia and elsewhere, the traditional core competencies in all these disciplines are being taught to ever-increasing numbers of highly competitive students—with excellent results. Keen to capitalize on new capabilities,

¹ I. J. Shinal, "Jobs flying faster from U.S.," *San Francisco Chronicle*, May 18, 2004.

ambitious countries are also forming strategic partnerships among education, government, and the private sector as a way to fuel economic development. With such extraordinary support, the partnerships are creating undergraduate and graduate programs that could marginalize US programs in a matter of years.

- Innovation itself has gone global. As Tom L. Friedman recently warned in the *New York Times*, “The Chinese and the Indians are not racing us to the bottom. They are racing us to the top. Young Indian and Chinese entrepreneurs are not content just to build our designs. They aspire to design the next wave of innovations and dominate those markets.”²

Opportunities in a Changing World

While these and other challenges may have made conventional product development just another global commodity, the competitive edge

still goes to those who can be truly innovative. The opportunity lies in developing new attitudes, capabilities, and approaches to maximize innovation. According to *BusinessWeek* editor Bruce Nussbaum, product designers have already responded to this opportunity: “The design profession shifted its core competencies from drawing to thinking, from styling to innovating, from shaping things to visualizing new business paradigms.”³

Designers have also abandoned the “lone genius”

approach and embraced teams as a way to super-charge innovation. In other words, collaboration is critical to engage the “innovation opportunity.” The good news is that US product development firms are, by and large, already sold on the value of cross-functional teamwork. As noted by Nussbaum in *Creating Breakthrough Products*, “Really good design operations integrate the engineering of functions and features, as well as the marketing goals of brand identity

and brand extension. Teaming product industrial designers with engineers and marketing people is often the key to quick success.”⁴

On university campuses, educators and researchers have also taken note. Many research initiatives now feature multiple disciplines and different modes of thinking as common elements to address complex problems. In part, this is simply a result of US granting agencies increasing their support for teamwork. “After years in which federal research funds focused largely on discipline-specific projects,” notes an article in the *Chronicle of Higher Education*, “government agencies are increasingly encouraging collaboration, and appear to be providing a growing amount of money for interdisciplinary research.” In fact, the numbers are substantial. According to the *Los Angeles Times*, “Federal funding for interdisciplinary research and development at US universities climbed to \$675 million in 2002, more than double the \$330 million in 1997.” Even more impressive, the National Institutes of Health has earmarked \$2.1 billion over five years for interdisciplinary initiatives.

InnovationSpace at ASU

In response to challenges from abroad and opportunities at home, several US educational institutions offer design programs or courses that focus on equipping students with the skills to collaborate and the ambition to innovate. These include offerings at some of the nation’s most recognized institutions, including a graduate course, Integrated Product Development, at Carnegie Mellon University; the Center for Innovation in Product Development at the Massachusetts Institute of Technology; the Institute of Design at the Illinois Institute of Technology; and Stanford University’s new Institute of Design.

InnovationSpace, at Arizona State University (ASU), is also a member of this forward-thinking group, but one with several distinct fea-

2. T.L. Friedman, “Oops. I Told the Truth,” *The New York Times*, October 17, 2004.

3. B. Nussbaum, “Redesigning American Business,” *BusinessWeek*, November 29, 2004.

4. J. Cagan and C.M. Vogel, *Creating Breakthrough Products: Innovation from Product Planning to Program Approval* (Upper Saddle River, NJ: Prentice Hall PTR, 2002).

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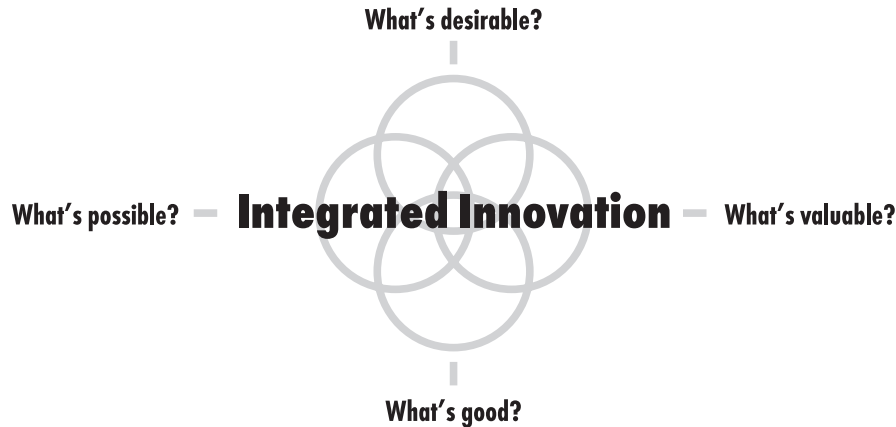


Figure 1: Integrated Innovation, the InnovationSpace model of progressive product development.

tures—and, we think, competitive advantages. Equally supported by business, engineering, and design, InnovationSpace is a university research and development lab that seeks to commercialize product design concepts that are progressive, possible, and profitable. It is based on three parts: 1) Integrated Innovation, a new model for sustainable product development; 2) the institutionalization of transdisciplinary collaboration; and 3) a real-world focus on the transfer of university-generated design concepts to the private sector.

Integrated Innovation

Successful organizations are often fueled by compelling and ambitious ideas. At InnovationSpace, our idea is sustainable product development. It is communicated in a conceptual model called Integrated Innovation (see figure 1), which is used to develop product design concepts that improve society and the environment, and succeed in the marketplace. It is admittedly a significant challenge, but one that progressive product developers in the twenty-first century clearly need to address as large parts of the globe adopt western-style consumerism.

Integrated Innovation aims to create new products that fulfill four requirements: 1) to satisfy consumer demand; 2) to benefit society; 3) to be manufacturable; and 4) to create measurable value for a business. It is important to address these requirements in sequence. Understanding what consumers want and what society needs should be done first. Once under-

stood and articulated, the wants and needs of consumers and society can be satisfied through appropriate technology (What's possible?) and successful business planning (What's valuable?). Linking consumer and social elements as inseparable is, of course, somewhat radical, since social and environmental benefits are typically viewed as marketing options. Integrated Innovation erases this as an option and, as such, rejects the technology- and marketing-driven approaches that many companies still practice.

In today's market, there is a variety of well-recognized products that embody Integrated Innovation and demonstrate its effectiveness. Toyota's Prius is an excellent example. Environmentally progressive and technologically advanced, the Prius is a hotly sought after product that is providing measurable benefits to Toyota's bottom line and global brand equity.

By understanding the desire for environmentally friendly products, and by overcoming the technological obstacles that crippled previous electric cars, Toyota has captured consumer attention and respect while positioning itself as a global leader and innovator. In this regard, Toyota has successfully optimized the "environmental imperative" that Curtis Moore and Alan Miller discuss in *Green Gold*:

"Call these imperatives environmental protection, energy conservation, consumer demand, or something else entirely, they are very real—and more importantly, they are changing the way business is being done throughout the world, yielding a profusion of new products that are better at what

*they do precisely because they are, for lack of a better term, cleaner.*²⁵

Transdisciplinary Collaboration

Collaborative teams are required to tackle the challenge posed by Integrated Innovation. Discipline-specific or interdisciplinary teams may be adequate for many design and business problems, but they simply do not provide enough expertise or variation in thinking to handle the economic, social, and environmental dimensions of sustainable product development. That requires transdisciplinary teams in which boundaries between knowledge and perspectives are integrated.

On campus, InnovationSpace has established transdisciplinary alliances with a variety of groups that are involved in commercializing progressive new design concepts. As equal partners, the W.P. Carey School of Business, Ira A. Fulton School of Engineering, and ASU's College of Design bring a vast array of scientific and nonscientific capabilities to InnovationSpace. With a common interest in capitalizing on university-generated intellectual property, all three provide financial support along with faculty and students. This year, for example, 24 senior-level undergraduate students drawn from business, engineering, graphic design, and product design are working with InnovationSpace faculty on year-long product development projects.

Partnerships have also been developed with on-campus research labs, ASU's business consulting service (managed through the MBA program), and the legal group that handles the university's intellectual property. Each plays a critical role. The research labs, for example, generate new technologies, materials, and inventions that the InnovationSpace teams work to develop into market-ready products. The business consulting service explores and defines market rationales and strategies. And when the concepts developed in InnovationSpace are ready for the marketplace, the intellectual property management group jumps in to provide legal assistance and direction.

Off campus, other key partnerships have also been established. These include strategic project

partners that collaborate in the development of new design opportunities. Global corporations, for example, partner with InnovationSpace to explore product concepts for underserved consumer groups or new offerings that address broad social trends, such as aging and environmentalism. Intellectual property consultants, venture capitalist groups, and economic advocacy organizations have also become highly valuable off-campus partners. Entrepreneurial and product-focused, these groups bring real-world projects and experience to the table to complement the academic expertise.

Intellectual Property

As an action-oriented program, InnovationSpace seeks to improve the future by getting the work of its faculty, students, and partners into the marketplace. It is intentionally serious and entrepreneurial, and its success is ultimately measured by market performance. In a research university, this translates into intellectual property. While most undergraduate and graduate educational programs shy away from the legal complexities of intellectual property, InnovationSpace openly embraces it as a spark to motivate ambitious, entrepreneurial young students. Students from all the disciplines are assigned co-inventor rights on all projects and actively participate in lifting ideas off the drawing board and crafting the business plans and marketing/communications strategies to support the transfer of these concepts to the private sector. For corporations and private sector groups, the concepts created by InnovationSpace can be licensed or purchased according to option agreements signed in advance with ASU. With successful commercialization, all parties—students, faculty, ASU, InnovationSpace, and external partners—share in the profits.

Structure, Process, and Output

As illustrated in figure 2, InnovationSpace conducts applied projects with university researchers, corporations, and other private sector groups. The topic and scope of projects are

5. C. Moore and A.S. Miller, *Green Gold: Japan, Germany, the United States, and the Race for Environmental Technology* (Boston: Beacon Press, 1994).

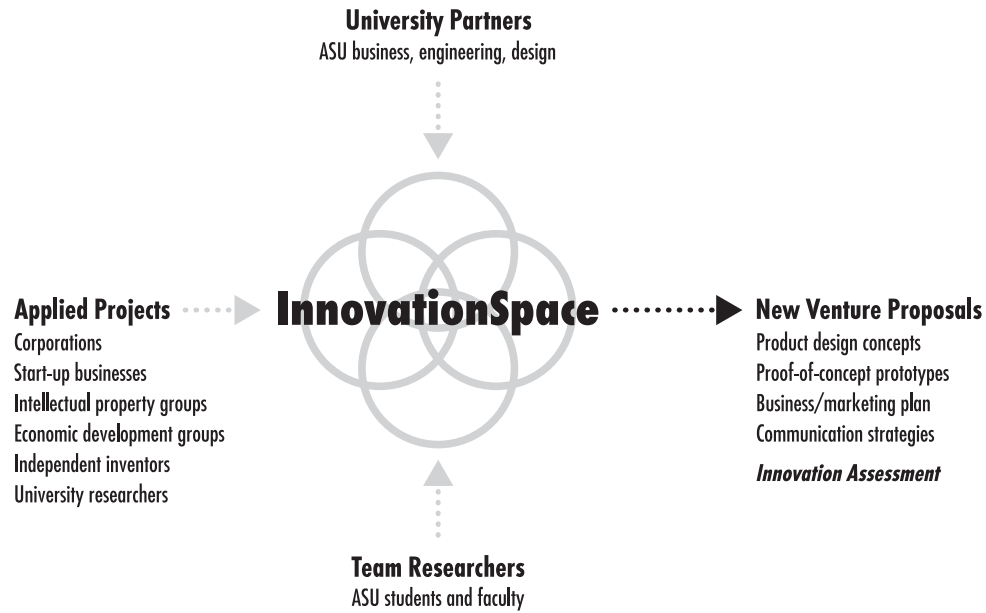


Figure 2: InnovationSpace structure, process, and output.

negotiated in advance and often based either on an existing invention (for instance, an engineering prototype) or an open-ended interest in exploring new opportunities. While the focus of projects may vary widely, all projects are shaped by Integrated Innovation and thus aim to improve the future.

Once a project is defined and fees negotiated, students are recruited from the business, engineering, product design, and graphic design programs. Typically, students sign up for a year-long, two-semester course sequence that is cross-listed and satisfies program requirements in all the disciplines. As an alternative option, students may also be hired by InnovationSpace as research assistants to work on shorter-term and more-targeted projects. In either case, faculty members from each of the four disciplines collaborate to provide instruction and support.

InnovationSpace projects are normally conducted in six phases (see figure 3). During each phase, Integrated Innovation is used to develop and present concepts and plans. As an educational and development tool, the model has proven to be very useful and effective in helping teams of students target and explore specific areas of interest. They use it during the fall semester to organize research and to generate

and evaluate emerging design concepts and business plans. In the spring, with concepts and plans more clearly understood and articulated, they use it as a guide to develop “new venture proposals,” which fully describe the proposed design concept (including engineering specifications) and an integrated business, marketing, and communication design plan.

As a final step, the teams are required to present their new venture proposals in a trade-show exhibition and in front of a public audience that typically includes a diverse group of ASU faculty, university intellectual property managers, students, venture capital groups, investors, and corporate partners. During these events, each team discusses its proposal and assesses its value (that is, the quality of its innovation) by measuring it against Integrated Innovation. By design, this last step forces the teams to make a compelling argument for how their proposal satisfies consumer demand in a unique way, improves society and the environment, and creates measurable value in the marketplace. While it is a tall order for teams of undergraduate students, each succeeds by collaborating and by leveraging the team’s collective creativity, knowledge, and entrepreneurial spirit.

Figure 3: InnovationSpace Development Process

Phase 1 – Collecting Information

Using Integrated Innovation as a guide, teams conduct comprehensive research into consumer needs and wants; social and environmental conditions and trends; market conditions and trends; and technology, materials, and processes.

Phase 2 – Making Discoveries

Involves applying analysis tools from business, engineering, and social science to articulate key findings, conclusions, and criteria.

Phase 3 – Visualizing Opportunities

Entails identifying market opportunity gaps, exploring product design concepts, communication design concepts, and business options.

Phase 4 – Developing a Concept and Plan

Preliminary development of a *New Venture Proposal*. Parts include a business/marketing plan, a product design concept, an engineering/manufacturing assessment, and a communication strategy.

Phase 5 – Finalizing a Concept and Plan

Final development of each team's *New Venture Proposal*. Includes an Integrated Innovation Assessment in order to articulate how the proposal satisfies consumer demand, promotes social/environmental progress, is manufacturable, and creates measurable value in the marketplace.

Phase 6 – Exhibiting and Presenting

Tradeshow-like exhibit of each final *New Venture Proposal* and public presentation in front of intellectual property consultants, venture capitalists, and other private sector groups.

Signs of Success

At InnovationSpace, we apply a formula to calculate success that combines high-quality education for our students with real-world impact for society. While much still needs to be improved, early signs suggest we are heading in the right direction. Student demand for participating in InnovationSpace is high; our projects (described below) are realistic and progressive; external partners claim our work “exceeds expectations”; and *The Business Journal* called our mid-project presentations “sophisticated and impressive,” adding that “the business ideas and quality of presentations would have stood up well to the firms that presented at the Arizona Angel Investment Conference.”

The Future

The prospects for InnovationSpace are as bright as the Arizona sun. Current plans are on the board to expand the undergraduate program and to develop an ambitious graduate offering with an emphasis on global issues. An alliance of research labs at ASU is also being established with faculty in assistive technology, nanotechnology, architecture, robotics, and other areas. Off-campus, our relationships with inventors, intellectual property consultants, and corporations are deepening and growing as news about our mission and capabilities is publicized.

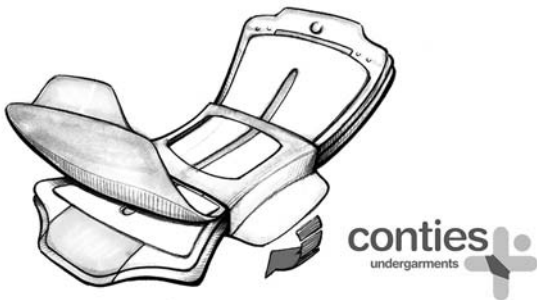
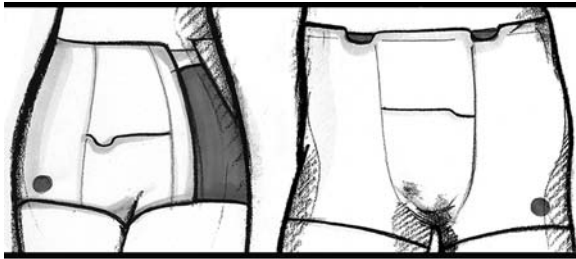
With these and other developments, InnovationSpace is cementing transdisciplinary collaboration and invention as essential to twenty-first century innovation. Equally important, it is equipping some of tomorrow's leaders with the entrepreneurial ambition, social vision, and imagination to create a better and more sustainable future. In this way, InnovationSpace is helping make the “race to the top” a much more competitive one.

Project One: Reinventing Daily Life by Design

As widely reported, baby boomers—all 78 million of them—will begin to retire in just a few years. With Arizona Business Accelerator (a Phoenix-based organization that supports innovators in the region), three InnovationSpace teams have developed new venture proposals targeted at making daily independent life more comfortable and safe for boomers as they experience the physical and psychological affects of aging.

Product Concept: Conties

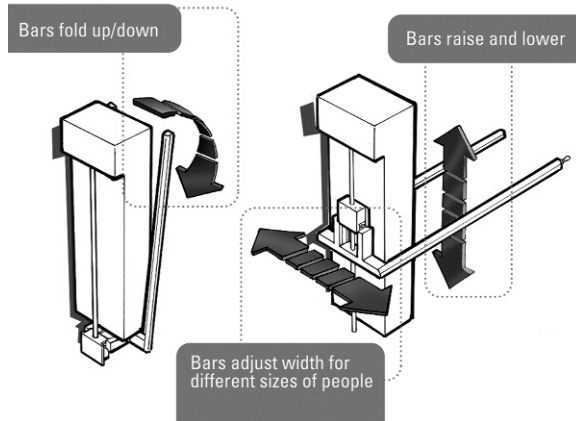
Conties is a product that is designed to remove the social stigma and psychological discomfort



attached to adult urinary incontinence, a problem that more than 17 million people currently experience. A reusable undergarment, Conties holds five disposable and ultra-absorbent pads, each of which can be easily removed and flushed without ever taking the fabric garment off. An innovative marketing and communication strategy will transform public perception of this health problem, similar to the way in which Viagra has changed negative attitudes about erectile dysfunction.

Product Concept: The Assist

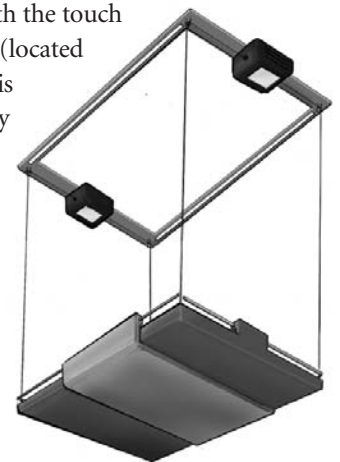
The Assist is a mechanical device disguised as a bathroom storage cabinet that helps to safely



lower and raise people from the toilet. After pressing a button to lower a set of adjustable rails, users tuck the rails under their arms and lower themselves onto the toilet. When finished, the Assist helps the user stand up and the rails store away inconspicuously. By eliminating ugly equipment from around a toilet, the Assist eases people's embarrassment about a private problem. It also potentially taps into a healthcare and medical equipment market that is generating approximately \$14 billion dollars per year.

Product Concept: Atlas

Atlas is a storage system that greatly reduces accidents in the garage when users store and access boxes and containers. With the touch of a button, a large storage unit (located in the space above parked cars) is lowered to where users can easily get to items without bending or standing on ladders. Designed as a product to be installed by homebuilders and garage door operators, Atlas is positioned to compete in a garage storage market that is growing at 8 percent per year and creating \$800 million in sales.

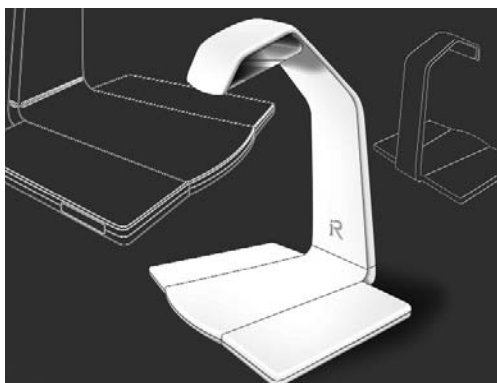


Project Two: The iReader—Looking Ahead to the Market

Another set of InnovationSpace teams are collaborating with the Ira A. Fulton School of Engineering's Center for Cognitive Ubiquitous Computing (CUbiC) to provide people who are blind or visually impaired with one of life's simple pleasures—reading books, magazines, and newspapers. CUbiC's unique invention incorporates advanced camera and software technologies for translating text into a synthesized voice. With CUbiC's fully functioning prototype as a starting point, the InnovationSpace teams are peering ahead into the future to envision how the iReader might be introduced as a family of innovative products.

Tabletop iReader

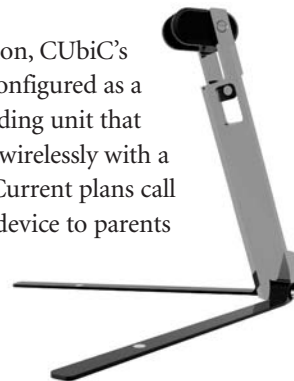
In many libraries, less than 5 percent of the collection is accessible for people who are blind or visually impaired. The Tabletop iReader will eliminate this discriminatory condition and provide instant access to information and knowl-



edge for millions of users in public institutions, workplaces, and homes. When users place a book or document on the iReader's viewing platform, the iReader's synthesized voice begins reading aloud to them at a user-adjustable rate.

Portable iReader

With miniaturization, CUbiC's invention can be configured as a small, portable reading unit that will communicate wirelessly with a laptop computer. Current plans call for marketing the device to parents of school-age children who are blind, visually impaired, or have reading disabilities.



When deployed, the device would enable these grade-schoolers to improve their reading capabilities and, thus, their likelihood of success in our knowledge economy.

Wearable iReader

As high-definition cameras become smaller and more cost-efficient, an even-handier version of the iReader becomes possible. Configured as



“smart” eyeglasses, this device features a set of miniature cameras and speakers that communicate wirelessly to a pocket-size hard-drive. Designed for broad consumption, the Wearable iReader could be designed to be as ubiquitous as reading glasses or as high-style as Calvin Klein fashion glasses. ■

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