



Game Change

For Built Environment Professionals

Part II: Becoming a Professional Entrepreneur

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Entrepreneurs are “people who have the talent to spot business opportunities and the courage to risk their resources in developing those opportunities.”

Muhammad Yunus

In 2010, leaders at the civil engineering firm PSOMAS noticed an emerging opportunity in Southern California. A confluence of state mandates requiring the use of renewables in the generation of electricity, tax incentives offered by the state, and falling prices for photovoltaic technologies were spurring solar energy development.

But public institutions in the region (school districts and community colleges, etc.) had been largely left out. Even though they had plenty of sun and property for development (roofs and parking lots), the tax incentives that made solar development feasible were not available to them, and PSOMAS realized that this disconnect presented an entrepreneurial opportunity.

The firm sought out a finance partner and formed a new joint venture, PSOMASFMG, to secure contracts to design, build, operate, and finance solar power systems for public institutions, particularly for past clients of the firm with whom there was a high-trust relationship.

Photovoltaic arrays placed on roofs and parking lots provide electrical power at lower and predictable rates with no capital costs to these public institutions. In turn, PSOMASFMG benefits from the state tax credits available to private developers of solar projects. This value proposition has, in the last two years, helped make PSOMASFMG one of the fastest growing solar developers in Southern California -- completing systems on over 50 sites -- which, besides benefiting the firm financially makes a genuine contribution to the broader societal imperative for more sustainable energy solutions.

The opportunity for Larson Design Group (LDG) surfaced during the early days of the Marcellus Shale natural gas boom in Pennsylvania. Leaders at the engineering, architecture, and surveying firm, located in the heart of the Marcellus Shale region, realized that the treatment of waste water produced by fracking operations was going to be a key problem that would have to be addressed to enable drilling activity in the region. But, LDG didn't just wait for drillers to hire them to design treatment facilities -- they got out in front.

LDG developed an innovative water treatment solution involving the design of a small, centralized water treatment unit that could service a local "neighborhood" of drillers to address the fracking wastewater problem. Leaders realized that, if they kept the water treatment unit small, the firm could manage the risks associated with taking full responsibility for financing, building, and operating the unit as well as designing it. They established LDG's TerraQua Resource Management (TARM) division to take on this challenge and proceeded with the design and construction of a prototype unit.

LDG's first completed water treatment installation quickly passed its profitability breakeven point. Based on that experience, the firm moved on to plan and design additional units, capable of being moved to accommodate drilling patterns and water networks as they spread through leaseholds in a given area. TARM was so successful that the firm attracted a major Canadian-based oil and gas services company as a partner in the development of additional water treatment facilities in the Marcellus, as well as, in the future, other shale gas regions across the country.

The entrepreneurial “aha moment” for a small group of consulting engineers in Houston, Texas came in 2006, as they confronted the progressive failure of critical infrastructure systems in America’s fourth largest city. The deteriorating storm water, street and drainage systems of this subtropical Gulf Coast city, exposed residents to ongoing floods -- disrupting traffic and commerce, damaging property, causing injuries and sometimes resulting in loss of life.

Roughly two-thirds of the city’s storm sewer and street drainage systems were beyond their useful life and the problem was getting worse. Funding of \$500 million per year was required to fix the problem. Unfortunately, Houston was spending only a fraction of that amount -- approximately \$100 million per year -- on those critical infrastructure systems.

Rather than continuing to play the victim to chronically inadequate state and federal infrastructure funding levels, the consulting engineers decided to turn the challenge around and frame it as a leadership opportunity -- they would help the local community understand, own, and solve its problem.

To accomplish this, the engineers decided to mount a major political initiative, something none of them had ever done before. They formed a non-profit organization, ReNew Houston 501C-4, to educate the public about the storm water, street and drainage problem. They also set up a separate “Specific Purpose Political Committee” (also called ReNew Houston) to lead the campaign to pass a city charter amendment mandating locally generated fees and dedicated funding to fix it.

Of the roughly \$1,750,000 spent on the campaign effort, almost 70% was provided by the engineering community in Houston -- not counting the considerable sweat equity invested by engineers in learning the ropes of running a major political campaign, collecting signatures during petition drives, forming coalitions with groups representing other civic interests, attending

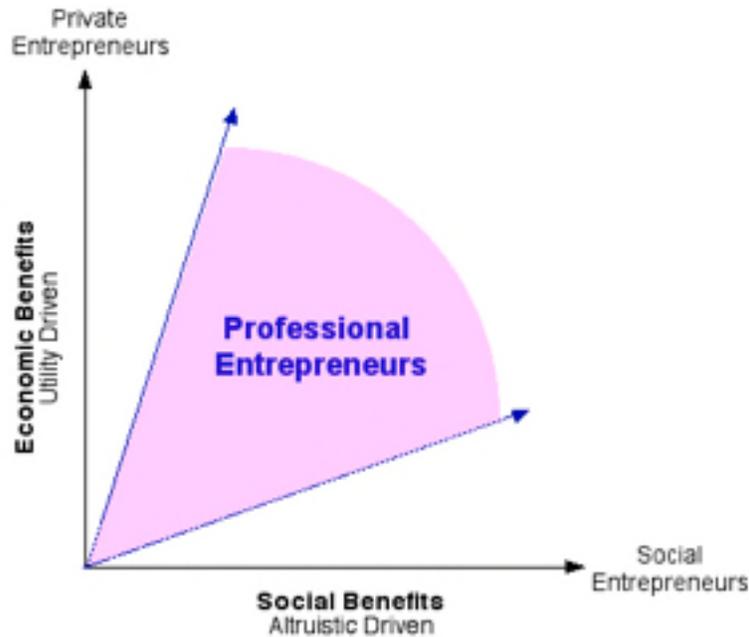
and speaking at community meetings, giving press conferences, and the countless other activities that the group engaged in to help pass the amendment.

Houston voters approved the charter amendment in the fall of 2010, providing financing to meet the full \$500 million a year (\$10 billion over 20 years) need. As a result of ReNew Houston's vision, initiative, and adaptive leadership, Houston is on its way to creating a twenty-first-century storm water, street and drainage system. This "good work" by the city's engineering community will continue to pay significant social dividends to local residents and businesses for decades.

Three Types of Entrepreneurs

Entrepreneurs play a key role in economic growth and development through their willingness to put new ideas and technical inventions to use, according to economist Joseph Schumpeter. This role has traditionally been ascribed to *private entrepreneurs* -- classically, figures such as Andrew Carnegie, John D. Rockefeller, and J. P. Morgan -- who reshape the world through commercial enterprise. For private entrepreneurs, primacy is placed on generating a substantial return to investors.

In the last two decades, *social entrepreneurs*, such as Nobel Peace Prize winner Muhammad Yunus -- who pioneered the concept of microcredit financing (small loans to poor people, mainly women, to help them start businesses and lift their families out of poverty), have entered the global stage. Mission-oriented, social entrepreneurs (often with funding provided by philanthropic and government institutions) target initiatives on behalf of underserved, neglected, or disadvantaged populations. They endeavor to create social benefits (public good) for particular groups and/or for society at large. Social entrepreneurship is a vital, new force shaping societal progress by addressing critical unmet needs.



PSOMAS, Larson Design Group, and the ReNew Houston engineers represent an emerging third entrepreneurial type, the *professional entrepreneur*. Professional entrepreneurs operate in the gap between private entrepreneurs and social entrepreneurs -- combining purpose with profit to serve unmet needs within, or adjacent to, their professional domains.

Professional entrepreneurs are transformative agents seeking to create new public goods while generating fair returns for their initiative and risk-taking. PSOMASFMG’s entrepreneurial efforts are advancing the use of solar energy -- helping to meet a social need to increase the use of renewables for electric power generation in order to reduce the state’s carbon footprint. At the same time, these projects provide an attractive financial return on their engineering and entrepreneurial efforts.

Professional entrepreneurs are forward thinking and innovative. Almost before any drillers had moved into the Marcellus Shale region, Larson Design Group anticipated the potential wastewater problem associated with shale gas drilling and fracking operations, and put together

an innovative solution, underpinned by a sound business case, that could be deployed quickly to address that issue at a local level.

Professional entrepreneurs are impatient with the status quo. The ReNew Houston engineers were unwilling to sit on the sidelines and watch critical infrastructure systems in their community continue to deteriorate. They seized the entrepreneurial initiative to help solve Houston's storm water problem.

Finally, professional entrepreneurs must be willing to bear and manage the risks associated with their ventures as a necessary condition for achieving the rewards -- whether for private gain or public good -- that they seek.

Professional Entrepreneurship: Start With Innovation

In his book *Design Thinking*, Roger Martin describes how innovators and entrepreneurs move along a predictable path – what he calls the “knowledge funnel.” Innovators start at the top of the funnel, exploring “mysteries -- things in our environment that excite our curiosity but elude our understanding.” Moving downward, Martin describes how explorations often lead to new insights or “heuristics -- rules of thumb that guide us toward a solution (*or invention*).” In the hands of entrepreneurs, these roughly formed inventions can be fashioned into viable commercial products and services. These products and services are, in turn, further refined and elaborated at the base of the funnel -- creating algorithms or “explicit, step-by-step procedure(s)”¹ that can be exploited for operational efficiency and maximum profit.

The type of curiosity and initiative exhibited by entrepreneurs and innovators at the top of Martin's knowledge funnel were hallmarks of nineteenth century engineers and architects. Benjamin Wright and William Geddes, primary engineers for the Erie Canal, explored the mystery of transportation in a wild country. James B. Francis, Chief Engineer for the Lowell

¹ *The Design of Business: Why Design Thinking Is The Next Competitive Advantage*, Roger Martin, Harvard Business School Press, Boston, Mass., 2009.

Locks & Canal Company outside Boston, plumbed the depths of waterpower and industrial production, and the Chicago School architects, such as Daniel Burnham and John Root, delved into the architectural puzzle of tall buildings. For each of these innovators, the “mystery” provided a container for inquiry, reflection, inspiration, and ultimately invention.

Unfortunately, during the last half of the twentieth century, most engineers and architects shifted their focus toward the bottom of the knowledge funnel, becoming masters of the algorithms of professional practice. For most contemporary design firms, devoting time and resources to “exploring mysteries” just doesn’t fit with the service mentality that currently dominates professional practice.

Design professionals can begin to reassert their legacy of innovation and entrepreneurship by moving back toward the top of the knowledge funnel -- becoming curious about and exploring the driving forces, trends, and challenges (or mysteries) that are shaping the world and reshaping professional domains.

The top of the funnel teems with possibilities. “Mysteries” might be found within emerging markets (shale oil and gas development, the smart grid for powering electric vehicles, the industrial renaissance in North America), the evolution and convergence of technologies (IT, nanotechnology, biotechnology, neuroscience), in environmental issues (global climate change, water depletion, the food cycle), or in other adaptive challenges confronting society (education, poverty traps, criminal justice, healthcare and wellness, urbanization).

Invest in Research & Development

Explorations may take the form of formal research and development efforts. Some design professionals already engage in this type of activity and give R&D a legitimate (funded) role in their firms.

For example, the innovative global engineering firm, ARUP, emphasizes research as a fundamental element of technical excellence, exploring both large-scale drivers of societal change and focused technological developments in such areas as 3D design, simulations, buildings physics, and fluid dynamics. Gensler has long used a major commitment to workplace-focused research, particularly pre- and post-occupancy workplace management, to differentiate themselves from competitors in the commercial office design market.

The architectural firm Kiernan & Timberlake has a dedicated team of researchers (many with PhDs) and devotes 3% of gross revenues to ongoing research.² Their exploration of the “mystery” of prefabricated, mass-customized manufacturing methods for building envelopes,³ established the firm as one of the most innovative architectural design firms in the country, prized by clients and other industry stakeholders (particularly manufacturers) for their ability to lead collaborative R&D efforts and consistently produce innovative new building systems and design approaches.

Guerilla R&D

As an alternative to large scale research and development efforts, consider empowering staff to launch “guerilla R&D” efforts -- small scale, low-cost experiments and tests using unconventional means designed to surface new insights into technical problems and client issues. For example, the increasing ubiquity and decreasing cost of embedded sensors and control technologies provides a new way for design firms (particularly engineers) to stage and learn from their own real-time experiments.

Guerilla R&D efforts, with ‘barely enough’ budgets, can challenge teams to get creative. Recall the plentiful stories of high-tech start-ups that created their technology breakthroughs on shoestring budgets – using the inspired energy of deeply committed, curious (and mostly young) people. Generation Y staff (roughly below the age of thirty) who are technologically adept,

² *Kiernan & Timberlake Website.*

³ *Refabricating ARCHITECTURE, Stephan Kiernan and James Timberlake, McGraw-Hill, New York, 2004.*

thrive on the challenge of new learning and aren't prisoners of algorithmic mental models, can be critical additions to these teams.

The burgeoning "makers" movement is filled with examples of individuals and organizations engaged in this type of guerilla R&D. Within the design and construction industry, some small architectural firms are already collaborating with start-up digital-fabrication laboratories to launch relatively inexpensive explorations into material fabrication, form-making, and prototyping methodologies.⁴

Connect and Collaborate

Technical innovation and entrepreneurship seldom flow from individual actors. It's a team sport where success often hinges on effective collaboration between multiple parties. You don't have to do it all on their own, but you do have to find, connect, and collaborate with the right partners.

To take advantage of their solar energy development opportunity, PSOMAS connected to a compatible financial partner. ReNew Houston's engineer-leaders had to develop and manage a wide range of political alliances with community and other interest groups in order to pass their charter amendment.

Firms don't have to be constrained by traditional industry roles and boundaries. Consider research laboratories, universities, and non-profits as potential alliance partners. Join larger industry coalitions that are addressing major problems within your professional domains. For example, participation in the U.S. Green Building Council's largely "open source" development of LEED (Leadership in Energy and Environmental Design) standards provided a major stimulus for innovation and knowledge creation for countless design professionals during the last twenty years.

⁴ *In the Hothouse: The Next Industrial Revolution May Be Happening In Our Own Backyards*, Blaine Brownell, Architect: The AIA Magazine, July 2012, pp. 88.

Find a university that has added a “design thinking” program to their academic curriculum -- such as Stanford University’s *d.school* (the Hasso Platner Institute of Design). Volunteer to participate in, and support, the design program’s efforts. The creativity and social entrepreneurship demonstrated by young students from diverse academic backgrounds, designing products and services to solve problems of the world’s poor, is truly exceptional. Their efforts and spirit are infectious and likely to stimulate your own creative thinking. They may also deeply inspire your staff as they think about possibilities for your firm’s future.

Finally, don’t be limited in your search for potential collaborators by geography. Look for potential partners in creative hot spots--geographic areas, often urban districts, where creative, entrepreneurial people naturally gather, rub shoulders, and share knowledge about emerging trends and the latest new technologies. You might even consider moving staff to those locations.

Small Bets

As ideas and innovations crystalize, entrepreneurs move forward along two fundamentally different paths, according to Saras Sarasvathy, a professor at Darden Graduate School of Business.⁵ Along the first path, entrepreneurs attempt to fully develop a singular big idea, prepare a detailed business plan, and organize and implement a step-by-step roll out strategy. This is the “big bet” approach Boeing has used to launch successive generations of its jet aircraft. But, with big bets come big risks.

Along the second path, entrepreneurs make “small bets,” developing ideas and innovations “just enough” to launch an experiment -- an initial prototype or offering -- that allows the entrepreneur to test the waters to learn what works, and what doesn’t. Based on that learning, they continue to iterate the process, building up to a breakthrough. Or, they stop the initiative and move on before sunk costs become too high.

⁵ As discussed by Peter Sims in his book, *Little Bets: How Breakthrough Ideas Emerge from Small Discoveries*, Free Press, New York, 2011.

Larson Design Group’s prototype water treatment is a great example of a small bet. The firm carefully considered what it was willing to lose on the venture before proceeding with its first unit. LDG purposely limited the size and cost of the prototype unit. They needed to test their value proposition to find out whether they could sell the water treatment service to a neighborhood of drillers and generate a profit. And, they needed to determine if that treatment operation could be run successfully within the context of a professional service firm. The first prototype answered those questions affirmatively and the firm is now scaling up and expanding their TARM initiative.

Small bets are particularly important for entrepreneurs with limited capital. In his analysis of “how entrepreneurs succeed”, Malcolm Gladwell notes that entrepreneurs aren’t necessarily more courageous or risk seeking than others. Rather, they are just “better at figuring out how to make a sure thing than the rest of us.”⁶ Small bets offer professional entrepreneurs an effective way of figuring out “sure things” and dealing with the major risks that come with new ventures, particularly the financial ones. Simply put: keep your bets small until you know you’ve got a winner.

Professionals as Bridge and Catalyst

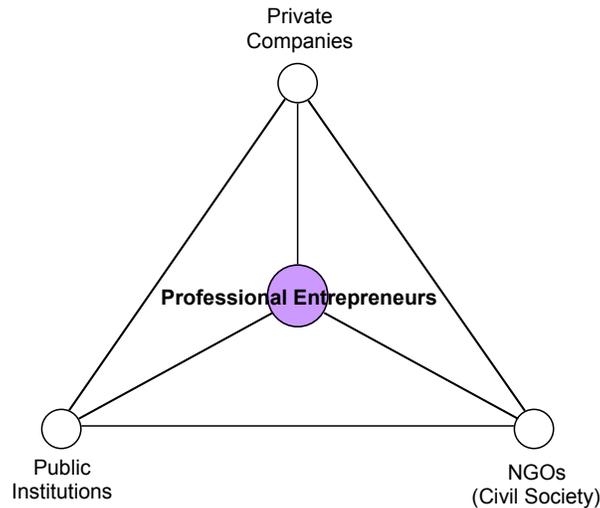
Beyond contributing to Paul Romer’s virtuous growth cycle⁷ of technical innovation, knowledge sharing, and economic growth and development, professional entrepreneurship represents a transformational opportunity for society.

In his book *Commonwealth*, Jeffrey D. Sachs argues that the public sector, the private sector, and the not-for-profit sector (NGOs or Non-Governmental Organizations) must come together in unprecedented ways to solve the daunting global challenges society will face in the next fifty years (ranging from environmental sustainability to population dynamics to poverty traps). But, he leaves out a significant fourth actor – the professional entrepreneur.

⁶ *The Sure Thing*, Malcolm Gladwell, New Yorker, January 18, 2000, pp. 24-29.

⁷ See the first essay in this series for a full explanation, *Game Change for Built Environment Professionals - Part I: Growth Through Innovation and Entrepreneurship*.

Professional engineers and architects have traditionally served as both bridge and catalyst to harness emerging scientific and technical knowledge (often generated by public sector university and research institutions) to solve societal problems.



Movement toward professional entrepreneurship places engineers and architects back into the role of catalytic leadership, facilitating collaboration with organizations from the other sectors to move toward sustainable solutions through enterprise and applied innovation. Design professionals, leveraging their technical expertise, creativity, and leadership capacities within the context of new entrepreneurial initiatives and enterprises are uniquely situated to help society successfully confront these challenges. If they are willing to take on this role and the challenges that come with it, they can help create a more prosperous future for society and for their own professional practices.

Coming Next: *Part III: Champions of Responsible Growth*

A Note On This Series

Game Change for Built Environment Professionals: Becoming a Professional Entrepreneur, is the second of a three-part series. The first essay explores how engineers, architects, scientists, and designers can change the game of professional practice through technical innovation, knowledge sharing, and entrepreneurship. The second essay examines specific strategies for technical innovation and becoming a professional entrepreneur -- including case studies of firms are already engaging in these types of entrepreneurial initiatives. The third essay raises the bar for built environment professionals regarding their mission to spur the growth and development of society, going beyond just economic growth to propose a broader definition of responsible growth, bringing more people up to decent standards of living while making our living systems healthier and more resilient.

I would appreciate thoughts and feedback about this essay. Please send your comments to:
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