Using Innovation as a Catalyst for Integrating Business and Engineering Education

David W. Keck
Jeffrey S. Raikes School of Computer Science and Management
University of Nebraska – Lincoln
Lincoln, Nebraska, US

Ian J. Cottingham
Jeffrey S. Raikes School of Computer Science and Management
University of Nebraska – Lincoln
Lincoln, Nebraska, US

Abstract -- **This paper describes a theoretical foundation and a successfully implemented curriculum that satisfies traditional disciplinary requirements, as well as interdisciplinary and innovation focused learning experiences via a thematic approach. Our work contributes an example of successful integration of business and engineering curriculum using foundational themes transcending disciplinary boundaries. The themes that connect the topics are model thinking augmented by data science and design thinking augmented by agile development and lean business and product development processes. Our approach leverages these themes to develop innovators using the disciplines of computer science, software engineering, and management. We offer as an example a successful implementation of this approach, the Jeffrey S. Raikes School, at the University of Nebraska – Lincoln.**

Keywords—innovation; interdisciplinarity; model thinking; design thinking

I. Introduction

Universities play a leadership role in economic growth through contributions to fundamental and applied research, as well as undergraduate education. However, an important opportunity that remains somewhat elusive is the effective integration of undergraduate engineering and business education in pursuit of developing innovators and entrepreneurs, both of whom are essential to a region's economic growth. The challenge partially arises from the lack of clarity and the connotations of *innovation* and *entrepreneurship,* both of which have evolved over several centuries. This lack of clarity, while acceptable in everyday usage, inhibits the understanding for both teaching and collaboration among the academic disciplines. The challenge also arises from the constraints of reduced credit hours for graduation and of disciplinary accreditation requirements.

This paper contributes a concept that combines traditional core courses in engineering, specifically computer science and software engineering, with business. Our concept integrates disciplinary education using themes that address the underlying challenges for collaborative innovation and entrepreneurship in an undergraduate program. The concept has been successfully implemented over the last decade and continues to evolve at the Jeffrey S. Raikes School of Computer Science and Management at the University of Nebraska – Lincoln.

II. Historical Context

The joint understanding of the foundations of innovation and entrepreneurship, as well as roles for colleges, faculties, and students must begin with a historical perspective as the concepts have evolved over the centuries.

A. Early Concepts of innovation and Entrepreneurship

The first modern use of *entrepreneur* is attributed to the Irish-French banker, Richard Cantillon in the late agrarian age – the mid 18th century [1]. Cantillon explained that other than the princes and landowners there were two dependent economic agents – *laborers* who earned a fixed wage and *entrepreneurs* (translated from French as *undertakers*) that faced a "hasard" relative to cost, price, and demand for a product, as well as faced competition. The *entrepreneur* drove the production, flow, and trade of goods and commodities and lived with "incertitude." Cantillon also addressed the concept of the *intrinsic value* of a product as being dependent on the quantity and quality of the input factors of land and labor.

In the late 18th century, economist Thomas Malthus wrote that arithmetically increasing available land would become a constraint on agricultural production and thus on a geometrically increasing population. This view reflects the classic economic concept of long-run diminishing returns of the value of the scarce economic resources of land and labor and thus earned economics the label of the *dismal science.*

In the early 19th century textile manufacturer and political economist, Jean-Baptiste Say added to the description of the *entrepreneur* [2]. Say described a knife grinder as requiring capital, but not land, and was "at the same time entrepreneur (translated from French as *adventurer,*) capitalist, and laborer." Say's entrepreneur "takes upon himself the immediate responsibility, risk, and conduct of a concern of industry whether upon his own or borrowed capital." In addition, Say's entrepreneur "launches and manages an enterprise by combining the means of production, labor, land, capital, natural agents [science] and knowledge," thus making important additions to Cantillon's agrarian age productive means of land and labor. Say also states the entrepreneur "requires a combination of moral qualities that are not often found together … judgment, perseverance, and a knowledge of the world, as well as of business." Thus Say's entrepreneur was also a leader and strategist.

The word *innovation* entered the European languages before or during the 16th century, but through the mid 19th century it was an effectively an antonym of *tradition* and thus had a negative connotation relative to pre-enlightenment institutions and social mores. *Innovation* as a productive factor was subtly introduced in the mid 19th century, when John Stuart Mill said that the diminishing returns of land and labor could "be suspended … by whatever adds to the general power of mankind over nature, and especially by any extension of their knowledge, and their subsequent command of the properties and power of natural agents [3]."

In the late 19th century French sociologist Gabriel Tarde introduced the idea that social change was due to "invention and imitation" – with *imitation* being the process of social change. During this time – a century into the industrial age – *innovation* developed a positive connation when technological progress became associated with economic and social progress [4].

In the early 20th century Austrian-American economist Joseph Schumpeter observed "the strategic stimulus of economic development is innovation, defined as the commercial application of something new [5]." Similar to Tarde, *innovation* requires *adoption* – not just *invention*. The innovation is a "new combination" of the means of production that appears discontinuously. "The carrying out of new combinations, we call *enterprise*, the individuals whose function is to carry them out, we call *entrepreneurs*" (translated from the German *unternehmer*.) Schumpeter's "new combinations" included new goods, methods, markets, supply sources, and organizations.

Schumpeter's definition of entrepreneur is based on his perspective that "new combinations as a rule are embodied in new firms which generally do not rise out of the old ones, but start producing beside them." This observation links the entrepreneur to innovation. Schumpeter also described the entrepreneur as a leader. "The leader type appears only when [innovation] possibilities present themselves … the entrepreneur's function in society was to challenge the established way of doing things." Thus Schumpeter was the first to connect economic development, the entrepreneur, innovation, the leader, and a general concept of the production function.

Subsequently, economist Frank Knight made a distinction between risk and uncertainty that remains the standard in economics and finance, but not in other disciplines [6]. He said that risk was quantified with probabilities and could be insured, managed, or hedged, whereas uncertainty could not and was thus the source for profits for successful entrepreneurs. Thus probability provides an appropriate method for some uncertainties, but not for others.

In the mid 20th century, sociologist Everett Rogers defined *innovation* as "an idea, practice, or object that is perceived as new by an individual or unit of adoption" and that the innovation was adopted by a diffusion process through a social system [7]. According to Rogers, "innovators" were the first to adopt, even before "early adopters*.*" Rogers' work became a cornerstone of *marketing* with its customer adoption rates and S–curves for market adoption via the diffusion process.

Within the decade, marketing pioneer, Frank Bass, connected concepts from Tarde and Rogers when he stated "some individuals decide to adopt an innovation independently of the decisions of other individuals in the social system." These adopters were *innovators* while the other adopters were *imitators* and thus not so much about timing as about decision process [8].

These early concepts provide the foundational understanding that the essential difference between invention and innovation is that innovation requires commercialization and adoption. Invention itself is insufficient to produce an innovation. For an invention to be an innovation it must also be rooted strongly in business, economics and sociology. This understanding provides a foundation to viewing, in a disciplinary sense, innovation as an output of engineering and science as well as business and sociology.

B. Economic Growth

Say's and Mills' introduction of the factors knowledge and harnessed natural agents laid the groundwork for the inclusion of increasing returns to capital and labor in the production function. Such returns are necessary for long-term economic growth, our ultimate goal. In the 1950s Nobel economist Robert Solow developed a production function that formally included *technical change* as a multiplicative factor, but was exogenous to the economic system. Nonetheless Solow created an explicit link between economic growth and technology [9] another critical component of innovation.

In a landmark 1990 paper, economist Paul Romer presented a production function that included *technological change* as a driver of economic growth [10]. Romer stated, "growth in this model is driven by endogenous technological change that arises from intentional investment decisions made by profit-maximizing agents." Romer makes three major points: technological change lies at the heart of economic growth, technological change arises primarily by intentional actions driven by economic incentives, and that technology is a non-rivalrous good meaning that it can be used by other firms. The knowledge that drives technological change can be embodied in technology and in human capital both of which are included in his production function and are the basis increasing returns to the relatively scarce physical capital and labor.

C. Innovation

At the end of the last century, the innovation process *design thinking* emerged from earlier work on design methods and from the engineering industrial design discipline [11]. The following composite illustration, Fig. 1, from the design thinking literature depicts innovation emerging at the intersection of three overlapping spaces represented by disciplines associated with technology, business, and human values, as well as by the innovation features of technological feasibility, business viability, and the utilities and human values of usability and desirability [12].

Fig. 1. suggests a useful definition of *innovation* – technological change that is feasible, viable, desirable, and useable – a definition that captures earlier ideas from economics and sociology, as well as engineering design. A definition of *technology* also requires consideration. Brian Arthur defined *technology* as "a means to a human purpose" that may be "a method, process, or device." Arthur also describes technologies as combinations of earlier technologies that evolve and drive the evolution of the economy [13].

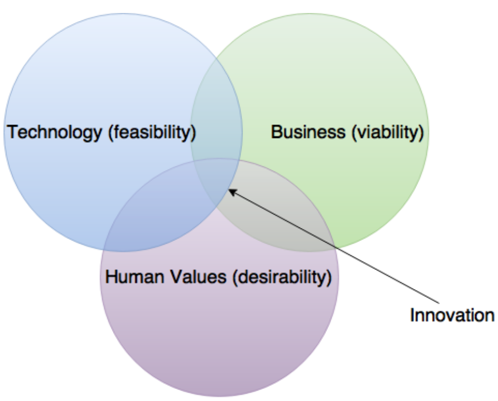

Fig. 1. The Interdependent Disciplines of Innovation

III. The Innovation Space

Rethinking undergraduate education in the interdependent cross-disciplinary 'space' from which innovation emerges begins by defining its key characteristics, which include economic, market, and human factors, as well as the current state of technology. This space is also characterized by "wicked" problems originally defined by both evolving and conflicting human requirements, as well as the interdependence between problem formulation and problem solution [14]. But there are at least three key characteristics that transcend the disciplines that require special attention – cross-disciplinarity, uncertainty, and exponentially growing data.

It is useful to think of disciplines as having *methods* including models and data, *knowledge* including theories, laws, principles, and designs, as well as *pursuits* and objectives. In our framework, inspired by Basarab Nicolescu, and shown in Fig. 2, *multidisciplinarity* uses the methods and knowledge of multiple disciplines towards a pursuit of joint interest; *interdisciplinarity* uses the methods and knowledge of one discipline towards the pursuits of another discipline; while *transdisciplinarity* represents a unification of methods and knowledge towards a transcendent pursuit [15]. Each of these approaches may be required in pursuit of innovation, with transdisciplinarity often being appropriate for innovation in the gaps between the disciplines. We refer to these three approaches collectively as *cross-disciplinarity*.

The space is certainly characterized by *uncertainty*, which is characterized by a lack of relevant information. The insight "information is the resolution of uncertainty" is widely attributed to Claude Shannon, the originator of information theory. Considered in its full historical context, one can view innovation as only arising from conditions of uncertainty – not from certainty! Uncertainty itself arises from the indeterminacies of randomness, complexity, and ignorance, while risk, a subset of uncertainty, implies the probability of a loss or failure. In the innovation space, where outcomes are unknown at the outset, management of uncertainty, as opposed to risk, is central to success.

An expanding opportunity for insight and prediction in the space increasingly comes from the exponentially growing data from communications, sensors, digitalization, online databases, and the internet of things. This data is the foundation for increasingly powerful methods and models. Models, that when properly utilized can provide insight that can help to reduce uncertainty and inform decision making processes in the innovation space.

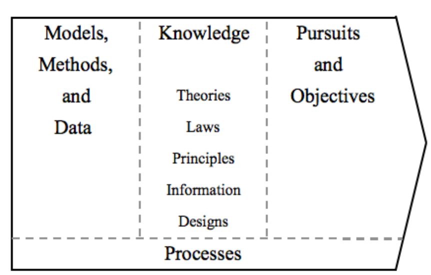

Fig.2 The Disciplinary Framework

IV. The Themes

The methods and processes of model and design thinking, attributed to Scott Page and David Kelley, are employed herein as *integrating themes* and provide the foundations for disciplinary and cross-disciplinary pursuits. In our deployment, they have been supplemented and adapted to our particular academic challenge hopefully without confusing the originators' intent.

These themes employ processes that are iterative and embrace both rational, as well as creative and intuitive, thought. Both themes address uncertainty and interconnectedness, through the iterative, evolutionary, and adaptive development of insight and solution. These themes are as fundamental and complementary as *analysis and design* and create the basis for collaboration, communication, and understanding amongst the disciplines in pursuit of innovation; especially novel innovation relative to wicked problems best addressed not by problem definition followed by solution, but by the interconnected, iterative processes of the themes themselves.

The successful utilization of these themes *does* require a collective leadership to align the methods, processes, and organization with the innovative pursuit. The collective leadership are the *innovators* and in the case that the pursuit includes an *innovation driven enterprise*, perhaps a startup, then the collective leadership embodies the entrepreneurial function.

A. Design Thinking

The design thinking theme evolved over the last several decades from the best practices of human centered, cross-disciplinary design teams. This iterative process focuses on the development of a strong understanding of both the problem and solution spaces. While many processes exist, common steps include: developing empathy, defining the problem in the context of empathy, ideating to explore the solution space, prototyping to understand the solution space, and testing to connect the solution with the problem. The processes tend to build on the concepts of inspiration, ideation, and implementation, embraces learning and adapting under uncertainty with a high tolerance for failure (risk) at each step. Our understanding of design thinking has been herein augmented with two compatible design subthemes, lean startup and agile development [16][17].

The lean startup process focuses on the development of the business startup and the innovation driven enterprise i.e., an organization that faces relatively greater uncertainty in pursuit of innovation. Unknown products and unknown markets define uncertainty in the lean startup method. The objective is the development and validation of a *business model*, not the development of an executable *business plan*, which requires the prior resolution of some uncertainty; the development of metrics plays a critical role in this process. This subtheme is our approach for including *entrepreneurship* in the pursuit of innovation, regardless of whether the business is large, small, new, or well established. The process provides a template for iterative exploration of a solution space in the context of delivery, applicable from the proverbial garage to the boardroom. The concept is captured less in the startup company and more in the mindset of the startup itself.

The agile development method for software engineering is also a compatible customer centric, collaborative, and iterative process. The agile process was introduced in response to the limitations of the traditional waterfall development process, which depends on prior resolution of at least some product uncertainty. The Agile Manifesto [17] states "the best architectures, requirements, and designs emerge from self-organizing teams"; "business people and developers must work together daily throughout the project"; and the "highest priority is to satisfy the customer." Informed strongly by empathy and embracing learning through prototyping and testing, agile concepts and associated methods fit well with design thinking and lean startup to address the cross-disciplinarity and uncertainty that characterize the "space".

B. Model Thinking

D*esign thinking* is perhaps the concept most associated with innovative product design, however the objective herein is *innovation*, which necessitates insight and prediction in a space where both analysis and design are essential and interconnected.

Models and methods are foundational to both business and engineering practice *and* education; perhaps foundational to all disciplines. Models, "tools for thinking" [18], are useful, simplifications of reality that support decision making, strategy development, design and discovery. This is quite important in the uncertainty resolution process since people have well known limitations and biases relative to rational estimation – especially when evaluating risk. The broadly defined concept of *model thinking* is therefore well suited [19].

Although Ries does refer specifically to measurement and analysis, the design thinking literature does commonly refer to analytics, synthesis, models, and prototypes as necessary tools. The range of models, however, is necessary in the innovation space is beyond the reach of many designers and non-specialists. Thus we distinguish the models of this theme from low-resolution prototypes and drawings and from business and financial *models*.

Models are the logical, analytic, or computational basis for methods and knowledge. A model, however, is independent of a discipline so can be shared and serve as a basis for common understanding and collaboration between the disciplines. For example, a phenomenon described by Brownian motion or by a Markov process that may itself be highly disciplinary can be shared across disciplines more easily by virtue of its description using the common (Brownian motion or Markov process) model. In this sense, models can provide a basis for understanding, communicating, and pursuing ideas between disciplines.

The models for this theme include those from physical and life sciences, as well as the human oriented sciences describing people, organizations, markets, industries, and economies. The models can be analytic or virtual and can be based on theories calibrated with data or based entirely on data. The structure of models can be cells, elements, nodes, or agents and connected by grids, trees, lattices, or networks. Insights that may not be obvious from observing local behavior, from random sampling, or from focus group interviews can emerge when the appropriate model is applied to collected data!

Our model thinking sub-theme of *data science* including analytics and learning, addresses the characteristic of exponentially growing volumes of data via methods from statistical inference and computer science.

Model thinking is not only based on process, but includes human-centered models, creating a strong integration point with the theme of Design Thinking. For example, for individuals there is decision theory, for competitors there are strategic games. There are models for 'crowds' that could be "mad" or "wise". Models can demonstrate coordination, competition, culture, adaptation, self-organization, tipping points, and even the emergence and growth of a market economy from the local interactions of learning and adapting economic agents. Models can provide critical insight into human behavior, strongly informing the design process.

Modeling, like design, is based on learning and searching with the objective to select and develop a useful and hopefully validated model including its scope, features, and associated data that must be identified, collected, cleaned, merged, and explored. The model selected can produce quite different insights and predictions. For instance, is a dispersion-like phenomena best modeled as a percolation, diffusion, or contagion? Does the phenomenon have a tipping point or exhibit order emerging from disorder? Is the phenomena static or dynamic? equilibrium or non-equilibrium? linear or non-linear? The answer to each of these questions informs the use of different kinds of models for gaining different kinds of insights. The ability to apply many models increases both the breadth and depth of knowledge, a valuable asset when faced with conditions of uncertainty.

Models can represent phenomena that range from the certain to the uncertain and from the orderly to the disorderly. At some scale all non-quantum phenomena can be modeled with complete order and certainty while at other scales the phenomena might be modeled with uncertainty or with complete disorder. At the scales characterized by certainty, e.g., models of Navier-Stokes and Maxwell, models still contain unknowns to be determined and include constants or parameters determined from other analyses at smaller scale or by measurement. Model thinking is not limited to rational analysis, like design thinking it stretches the notion of *thinking* beyond the rational and objective to intuition and creativity. Intuition comes from experience and expertise in modeling while creativity is the stimulus for novel insights, as well as designs.

An inspiration stemming from *model thinking* is Scott Page's concept of the many model thinker, who can apply multiple models to a single phenomenon or apply a single model to multiple phenomena in pursuit of innovation [19]. Such modeling skills are powerful in cross-disciplinary pursuits. Examples include Page's Diversity Theorem [20] that proves that numerous independent, diverse, properly aggregated predictions are as powerful as the predictions of a few experts; from machine learning that an ensemble of independent, weakly accurate classifiers outperform experts; or the aggregation of individuals in financial or prediction markets.

V. Application

The Jeffrey S. Raikes School of Computer Science and Management, established in 2001, is an honors academic unit at the University of Nebraska – Lincoln. The School connects the faculty, students and curriculum of the College of Business Administration and the Department of Computer Science and Engineering with the goal of using the disciplines of management, computer science, and software engineering to provide a baseline for understanding technology, business, and human values – to produce students deeply immersed in processes for innovation.

The School's four-year curriculum consists of the core courses in both computer science and business with one course from each discipline being taught each semester. Each course meets requirements for minors, or majors, or university requirements, allowing us to leverage existing academic programs and models in the pursuit of our innovation curriculum. The School utilizes a cohort system wherein all students take the School's courses together regardless of their major. The School is housed in an academic residential center, which supports frequent interactions between students and faculty, as well as supports for team projects. Students receive scholarship funding to support the residential requirement.

Business courses, while satisfying major and minor requirements, tilt topics to addressing the innovation-driven enterprise including startups and to information-driven decisions and business models, which includes business analytics. These concentrations span business pursuits characterized by the availability of little data *and* of big data. The computer science courses tilt topics towards software engineering, as well as modeling and simulation. Such topics include data modeling, time series, optimization, Monte Carlo and agent-based simulations, and machine learning. During most semesters, faculty assign joint projects that include both business and computer science requirements. The curriculum also includes two year-long capstone software project courses wherein the student teams design and deliver sophisticated solution to a complex problem, typically involving software, for industry sponsor organizations like Microsoft, IBM, or Mutual of Omaha.

In 2011 the School's strategic mission was extended to not only deliver a value added undergraduate program embracing both on both computer science and business, but to include the transcendent goal of developing innovators, as well as innovation driven entrepreneurs. The challenge was that additional courses could not be added, thus involved building within the core. The implementation of the transcendent objective led to the background study summarized earlier that established useful connections between innovation, technology and the disciplines, as well as the key characteristics that define the space from which innovation emerges. The study resulted in the focus on methods, models, and processes that create the necessary foundation. Understanding the nature of disciplinarity led to the insight that methods, models, and processes could be shared and leveraged to create cross-disciplinary insights and designs.

Implementing the mission required adjustments to the curriculum and to the academic organization. The key to curricular adjustments was the integrating themes of model thinking with data science and of design thinking with agile development and lean startup. A freshman course introducing innovation processes was added, while core modeling and analytics courses were added in the sophomore year. These additional courses satisfied various college and university requirements. This hybrid academic curriculum allows students to satisfy the essential disciplinary requirements while allowing students to pursue the transcendent objective through the themes. The academic organization is built on a core interdisciplinary teaching faculty with academic and industry credentials that coordinate the themes, courses, topics, and projects, as well as coordinate with faculty from the colleges that teach many of the School's courses and other courses taught in the colleges.

Results have been very positive as measured by student ACT test scores (34 mean), high level of capstone project sponsorship ($50,000 per project), full employment of graduates at both local and global innovation driven enterprises, professional internships even for freshmen, success in academic and entrepreneurship competitions, students starting businesses (Hudl) or joining startups in the region, as well as the adoption of the pedagogy and topics elsewhere in our colleges.

VI. Summary

Economic growth is an essential driver for increased standards of living broadly defined. The university, the innovator, and the innovation driven entrepreneur are essential drivers of economic growth. But what are their respective contributions and interconnections? How are innovators 'developed' as university students, allowing the modern university to contribute significantly to societal drivers for growth?

Knowledge embodied in technology and people is the basis for innovation and for increasing returns to the scarce economic resources of capital and labor required for economic growth. Innovators and innovation driven entrepreneurs must address the uncertainty, interdisciplinarity, and voluminous data that character the space from which innovation emerges. The development of this talent is an emerging role for universities in addition to their critical role in fundamental research and disciplinary education.

This paper has described a comprehensive approach to undergraduate education that addresses the challenges and opportunities has had initial success at the University of Nebraska – Lincoln. The contributions include

- A summary of the connections between economic growth, innovation, technology, the innovator, and the innovation driven entrepreneur;
- A definition of innovation that is useful as a basis for collaboration among the disciplines;
- The most challenging characteristics defining the space from which innovation emerges;
- The identification of two themes with three subthemes that support the development of innovators and that are 'teachable;'
- A useful definition of 'disciplinarity' that supports cross-disciplinary sharing of methods and knowledge, as well as joint pursuits;
- Clarification of the key concepts of uncertainty and risk across the disciplines;
- Presents a description of an academic plan that combines both essential disciplinary, as well as cross-disciplinary pursuits of innovation; and
- A specific description of the application of this plan to the joint computer science and management program at the University of Nebraska.

The Jeffrey S. Raikes School not only contributes strong evidence that universities can continue successfully play a role in the broader growth of society in the 21st century, but offers a model that can be replicated. The key insight in the success of the School, that the themes of design and model thinking can be used as the basis for innovation curriculum, is rooted in the idea that cross-disciplinary study and interaction are essential for the emergence of innovation as an outcome to any process. It is in that idea where the university, which can leverage strong scholastic tradition, has the most significant role to play.

References

[1] R. Cantillon and H. Higgs, *Essai sur la nature du commerce en général. Edited with an English translation and other material by Henry Higgs*. New York, A.M. Kelley, Bookseller, 1964.

[2] J. Say, C. Princep and C. Biddle, *A treatise on political economy*. New York: A.M. Kelley, bookseller, 1964.

[3] J. Mill, *The Principles of political economy*. Kitchener, Ont.: Batoche, 2001.

[4] G. Tarde and J. Antoine, *Les lois de l'imitation*. Paris: Les Empêcheurs de penser en rond, 2001.

[5] J. Schumpeter and R. Opie, *The theory of economic development*. Cambridge, Mass.: Harvard University Press, 1934.

[6] F. Knight, *Risk, uncertainty and profit*. Boston: Houghton Mifflin Company, 1921.

[7] E. Rogers, *Diffusion of innovations*. New York: Free Press, 1962.

[8] F. Bass, "A New Product Growth Model For Consumer Durables", *Management Science*, vol. 15, no. 5, pp. 215-227, 1969.

[9] R. Solow, "Technical Change and the Aggregate Production Function", *The Review of Economics and Statistics*, vol. 39, no. 3, pp. 312-320, 1957.

[10] P. Romer, "Endogenous Technological Change", *Journal of Political Economy*, vol. 98, no. 5, pp. s71-110, 1990.

[11] J. Jones, *Design methods*. London: Wiley-Interscience, 1970.

[12] "Our point of view", *d.school*, 2016. [Online]. Available: http://dschool.stanford.edu/our-point-of-view/. [Accessed: 12- Apr- 2016].

[13] W. Arthur, *The nature of technology*. New York: Free Press, 2009.

[14] H. Rittel and M. Webber, "Dilemmas in a general theory of planning", *Policy Sci*, vol. 4, no. 2, pp. 155-169, 1973.

[15] B. Nicolescu, *Manifesto of transdisciplinarity*. Albany: State University of New York Press, 2002.

[16] E. Reis, *The Lean Startup*, 2011.

[17] "Principles behind the Agile Manifesto", *Agilemanifesto.org*, 2016. [Online]. Available: http://agilemanifesto.org/principles.html. [Accessed: 13- Apr-2016].

[18] M. Pidd, *Tools for thinking*. Chichester [England]: Wiley, 1996.

[19] “Model Thinking", *Coursera*, 2016. [Online]. Available: https://www.coursera.org/instructor/~268. [Accessed: 12- Apr- 2016].

[20] S. Page, *The difference*. Princeton: Princeton University Press, 2007.
Press, 2007.

[21] S. Blank and B. Dorf, *The startup owner's manual*, 2012.