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## Editorial: The symbiotic relationship of entrepreneurship and information technology

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Robert Doktor\* and Tung Bui

Shidler College of Business,  
University of Hawaii Manoa,  
2404 Maile Way, Honolulu,  
96822, Hawaii, USA  
Email: doktor@hawaii.edu  
Email: bobdoktor@gmail.com  
Email: tung.bui@hawaii.edu  
\*Corresponding author

**Biographical notes:** Robert Doktor is a Professor of Management at the Shidler College of Business, University of Hawaii. He received his PhD at the Graduate School of Business, Stanford University. Prior to coming to Hawaii, he was a Professor at the Wharton School. He has been a Visiting Professor at the INSEAD in France, Aoyama in Japan, Copenhagen in Denmark and Canterbury and Auckland in New Zealand. He has published over 50 books and articles in journals such as *Management Science*, *Academy of Management Review*, *JIBS*, *Management International Review*, *ACTA Sociologica*, *General Systems*, *Policy Sciences*, *Psycho-Physiology*, and *the J. of Creative Behaviour*. He teaches course on international management, entrepreneurship, strategy and HRM.

Tung Bui is the Matson Navigation Company Chair of Global Business and Professor of Information Technology at the Shidler College of Business, University of Hawaii. He received his PhD in Managerial Economics from the University of Fribourg, Switzerland and his PhD in MIS/Economics from the NYU Stern. Before joining Shidler, he was on a faculty at NYU, the US Naval Postgraduate School, the Universities of Fribourg and Lausanne, and the Hong Kong University of Science and Technology. He has published 12 books and over 170 papers and is the chair of the Hawaii International Conference on System Sciences (HICSS). In its 51st year, HICSS is the longest and widely recognised as the most respected research conference in its disciplines.

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### 1 Introduction

Entrepreneurship is a many splendid thing! In one way or another we are all entrepreneurs. From cake sales to developing a new internet-powered business, almost every person has, at one time or another, set out upon a new business venture. Entrepreneurship is ubiquitous both in developed and developing societies and across many diverse cultural groupings. This ubiquitous presence of entrepreneurship is at once a great virtue for all societies and yet, concomitantly, a dilemma for researchers of

entrepreneurship. The problem for researchers of entrepreneurship is the problem of finding the consensus as to what entrepreneurship is what its critical dimensions are, and how to measure those dimensions. To illustrate this point we use a classical definition of entrepreneurship given to us by Morris et al. (1994) which defined entrepreneurship as: “a process activity. It generally involves the following input; an opportunity, one or more proactive individuals, and organisational context, risks, innovations and resources. It can produce the following outcomes; a new venture for enterprise, value, new products or processes, profit or personal benefit and growth”. While a valiant effort, this definition is an attempt to be all-inclusive of every view of entrepreneurship. As such the definition does, concomitantly, render as somewhat difficult the clarification and operationalisation of the dimensions of entrepreneurship for study by researchers of the field. Rather than creating a big-tent which might include all actions deemed to be entrepreneurial, researchers are given aid by the clarification growing out of the GEM project (Acs, 2006; McMullen et al., 2007). These researchers identify two basic and different types of entrepreneurship: necessity entrepreneurship an opportunity entrepreneurship. Necessity entrepreneurship is an undertaking by individuals to start a small business because it is their best option for securing a comfortable life. Opportunity entrepreneurship is an active choice to start a new enterprise based upon the perception that an unexploited or under-exploited business opportunity exists. Focusing upon the latter, opportunity entrepreneurship, we draw upon the insights of Schumpeter (1934). While neither always virtuous nor correct in many of his attitudes and beliefs, Schumpeter was precocious in his understanding of the fundamental dynamic of opportunity entrepreneurship. He theorised that the key concepts of what we now term opportunity entrepreneurship lie in the discovery of new combinations, unrecognised by others, which become the heartbeat of the innovations that are the engine of successful opportunity entrepreneurship. It is the discovery of new opportunities, through the perception of new, yet un-recognised combinations; and turning these newly associated combinations into discoveries, which lead to the innovations that become the driving engine of market economies. Baumol (2002) has long championed the role of the contributions and the innovations of the opportunity entrepreneur as a primary engine of economic growth. In a book, which Baumol co-edited with Sheshinski et al. (2007), it is argued that ‘opportunity’ entrepreneurs are the primary source of innovative breakthroughs in the marketplace. It is further argued that the strong economic growth of free-market economies is primarily attributable to these entrepreneurial innovations partnered with the resources of high-tech corporation whose large R&D budgets steadily improve upon, and bring to the wider market, the Innovative products and processes contributed by the ‘opportunity’ entrepreneur. All six articles of this special issue, to one extent or another, discuss the issue of opportunity entrepreneurship. The *International Journal of Entrepreneurship and Small Business* welcomes and encourages research and all kinds of entrepreneurship, both necessity and opportunity entrepreneurship. This special issue finds opportunity entrepreneurship as a primary topic of the articles herein. It is also true that necessity entrepreneurship is discussed to a lesser degree in that change and adaptation are inevitable.

So what then is the big idea that has grown out this volume? What is the contribution here made to the academy of researchers of entrepreneurship?

In a 2001 article entitled ‘the global reach of symbiotic networks’, Dana et al. (2001, 2008) identified a dynamic in entrepreneurship which foreshadowed the primary insight offered by the collection of articles in this special issue.

## **2 The entrepreneurship-information sciences symbiosis**

Symbiosis is a concept originally coined in biology and later used in ecology. The concept originally applied to a situation in which two unlike organisms form a mutually beneficial bond. As a classic example, a clownfish feeds on small invertebrates that can harm the sea anemone. The sea anemone is drawn to the clownfish as the fecal matters of the clownfish are the nutrients for the anemone. In turn, the clownfish is protected from predators by the anemone's stinging cells; and concomitantly the high-pitched sounds emitted by the clownfish protect the sea anemone from being eaten by butterfly fish. The concept of symbiosis is, today, used in both the natural and the social sciences.

The contributions of this special issue point to the symbiotic relationship between two unlike silos of thought and action: information science and entrepreneurship. A common theme in all six contributions is an exposition of the benefits and possible difficulties in creating a symbiosis between information sciences and entrepreneurship. Entrepreneurs have demonstrated that business models that creatively use technology-enabled platforms are able to disrupt existing market structures. Uber and AirBnB are examples of the symbiotic relationship in action in the sharing and on-demand economy. The benefits are the mutual assistance which these two silos of thought and action can bring to each other. Be it the refinement and advancement of social media in the crowd-funding effort. Or the creation novel software in the development of an IS creativity support tool to spur opportunity discovery. Or the connectivity of IS technology used in business incubators. Each knowledge and action silo learns, matures and becomes more innovative from the interaction with the other.

The difficulties are initially exposed in the 'adoption problem' article. Here we begin to understand that these two silos are truly un-alike. They have different characteristics and draw upon fundamentally different problem-solving models. Entrepreneurship is the product of discovering unique combinations, and therefore draws heavily upon the ability of divergent thinking to conjure remote associations which lead to opportunity discovery and ideally innovation. Information sciences relies more upon analytic reasoning to create and build new software and hardware.

Surely this is not an all or nothing situation. There clearly exists the need for both knowledge silos: (IS and entrepreneurship) to employ analysis (breaking the whole into parts and specifying the rules which differentiate the parts) and synthesis (identifying the commonalities of parts that allow the integration of new whole).

## **3 The cyber-physical eco-system**

The industrial revolution 4.0. is understood by many as the inevitable shift from isolated uses of technologies to a full digitalisation that redefines business models in a more mature technological convergence. In order for the physical, biological and digital worlds to create beneficial symbiosis, business executives need to relentlessly become cognisant of the revolution and continuously renovate.

Even in the digital age, integration is nonetheless the primary cognitive problem solving skill of *entrepreneurship* while differentiation is the primary cognitive problem solving skill of the *information sciences*. And herein lies the great challenge the exposition of which is the major contribution of the collective findings here reported. It is

very difficult to create a team composed of interdisciplinary thinkers and problem solvers (entrepreneurs and IS professionals and entrepreneurs) who can truly understand and work harmoniously with each other to take advantage of cross-technology synergies. The common marching order would be to move forward in full force with a strategy that fosters awareness of the challenges toward a dehumanised economy driven by intelligent machines and the opportunities to shape a people-centric society enhanced by hyper-scale advanced technologies. What would then be the responsibilities, roles and functions, and effectiveness of government-subsidised incubation centres and accelerators? Would the new forms of co-creation powered by crowd-funding through digital platforms including social media be adequate enough to deal with the rapid pace of change and profound impacts? Under what conditions the various building blocks of the fourth industrial revolution would work well together to foster innovation?

This then is the call for on-going research: We know what is needed, but how do we find and organise the right people we do find to work together, fully understanding each other, and concomitantly and harmoniously creating the symbiosis necessary to achieve the maximum actualised collaboration between the Information Sciences and Entrepreneurship? This special issue calls for an all-hands effort to immediately and swiftly revisit current modus operandi and explore new strategies to adapt to the new fast-changing environment accelerated within the cyber-physical systems. The six selected papers that passed a second round of review provide an eclectic view of the context in which today's entrepreneurs are dealing with –a sharing economy that enables, in the words of Chris Anderson (2012), makers to use the tools of the 21st technologies to put forward their ideas, dreams and passions. And better yet, projects – if shared – will become bigger projects, the landmarks of symbiosis.

Kevin Kelly (2017) offers an optimistic view of the fourth industrial revolution that is indeed in motion. Technology is to Kelly humanity's accelerant. Yet, in a world that the safest prediction is that future will outstrip our imagination, the question for the next generation of researchers of the symbiosis between these two silos of knowledge and action (entrepreneurship and information sciences) is of paramount importance. The ultimate objective would be to propel humanity into a cyber-physical world with a new collective consciousness and a renewed shared sense of destiny.

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