Innovation Management and Computing

ECOSYSTEMS and Technology

Idea Generation and Content Model Processing

Cyrus F. Nourani
Editor

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LIST OF ABBREVIATIONS

AHA	active and healthy ageing
AI	artificial intelligence
AII	abstract intelligent implementation
AIIMS	All India Institute of Medical Sciences
AU	action units
BI	business intelligence
BIOME	Bio Innovations and Opportunities in Medicine and Engineering
CRDM	cardiac rhythm disease management
EBM	evidence-based medicine
EDB	Economic Development Board
ERP	Enterprise Resource Planning
FACS	Facial Action Coding System
IIC	Industrial Internet Consortium
IPMP	innovation process management process
ITESM	Monterrey Institute of Technology and Higher Education
IUSSTF	Indo-US Science and Technology Forum
JFMDA	Japan Federation of Medical Devices Associations
JMSUICE	JurInfoR-MSU Institute for Contemporary Education
KM	knowledge management
KPI	Key Performance Indicators
LBM	logic-based medicine
MVP	minimum viable product
NEET	not in employment, education or training
OISPG	Open Innovation Strategy and Policy Group
OM	organizational memory
PLM	product lifecycle management
RDF	Resource Description Framework
RMNCH	Reproductive, Maternal, Newborn, and Child Health
SDC	System Development Corporation
SIB	Stanford India Biodesign
SMS	Short Message Service
SSB	Singapore-Stanford Biodesign

ABOUT THE EDITOR

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Dr. Cyrus F. Nourani has a national and international reputation in computer science, artificial intelligence, mathematics, virtual haptic computation, information technology, and management. He has many years of experience in the design and implementation of computing systems. Dr. Nourani's academic experience includes faculty positions at the University of Michigan-Ann Arbor, the University of Pennsylvania, the University of Southern California, UCLA, MIT, and the University of California, Santa Barbara. He was also a Research Professor at Simon Frasier University in Burnaby, British Columbia, Canada. He was a Visiting Professor at Edith Cowan University, Perth, Australia, and a Lecturer of Management Science and IT at the University of Auckland, New Zealand.

Dr. Nourani commenced his university degrees at MIT where he became interested in algebraic semantics. That was pursued with a category theorist at the University of California. Dr. Nourani's dissertation on computing models and categories proved to have intuitionist-forcing developments that were published from his postdoctoral times on at ASL. He has taught AI to the Los Angeles aerospace industry and has worked in many R&D and commercial ventures. He has written and coauthored several books. He has over 350 publications in mathematics and computer science and has written on additional topics, such as pure mathematics, AI, EC, and IT management science, decision trees, predictive economics game modeling. In 1987, he founded Ventures for computing R&D. He began independent consulting with clients such as System Development Corporation (SDC), the US Air Force Space Division, and GE Aerospace. Dr. Nourani has designed and developed AI robot planning and reasoning systems at Northrop Research and Technology Center, Palos Verdes, California. He also has comparable AI, software, and computing foundations and R&D experience at GTE Research Labs.

PREFACE

Innovation is the generation and application of new ideas and skills to produce new products, processes, and services that improve economic and social prosperity. This includes management and design policy decisions and encompasses innovation research, analysis, and best practice in enterprise, public, and private sector service organizations, government, regional societie,s and economies. This volume presents important new innovations in the area of management and computing, particularly venture planning for innovations and competitive business modeling.

Ecosystems and context-driven innovation modeling systems assist in the generation of better ideas faster; in measuring relevant data on ECO systems; in creating idea streams, innovation platforms, and virtual interfaces; in enhancing business intelligence and content processing; and in analyzing haptic expression and emotion recognition innovations, with applications to neurocognitive medical sciences.

This volume starts with a glimpse on technology selection for startups. Startups face tremendous challenges across many fronts, from fundraising to attracting talent to getting their first customers. In the early days of a technology startup, the focus is on creating a minimum viable product (MVP). Chapter 1 explores the early technology choices made by startups and how they can impact future success with real-world examples. Facing today's challenges and competition involves continuous innovation, which is considered as ecosystems generating impact. Balancing these ecosystems for sustainable success requires connecting and combining multidisciplinary knowledge, know-how, and intelligence. Focusing on an ecosystem model of innovation, a condition for balance, and the role of technology in making it effective are explored in chapter 2. Agile methods are explored in a following chapter. Intensified competition putspressure on organizations to outperform their competitors by addressing customer needs in a timely, cost-effective, and superior manner. Newer trends with decentralized structures, abandoning hierarchical organizational forms in

favor of flattened hierarchies and a massive use of self-managing teams, are explored.

Agile software development paradigm is conceived of being about feedback and change. However, there is a lack of clear or detailed recommendations about how to successfully drive autonomous teams towards high innovation performances. Additional areas treated are Swedish Medical Apps Management.

Innovations in education systems are considered in chapter 4. Young people, who are the fundamental asset of our economies and societies across the world, face real and increasing difficulties in finding decent jobs more and more often. The aim of this study is to find the optimal ratio of e-learning and conventional learning for first-year students to increase motivation. Research methods on "Entrepreneurship (Distance Learning e-Course)" are reviewed. The students were tested by (i) a survey about the course on "Entrepreneurship (Distance Learning e-Course)" assessment; (ii) psychologist M. Lusher's color test, which is based on the method of projection individual's emotional state of the diagnosis; (iii) the degree of risk appetite according to Schubert's method of success; (iv) motivation after T. Elersamethods, failure avoidance motivation in correlation with T. Elersa method; and (v) a survey about optimal proportion between traditional and e-learning studies.

The healthcare domain area examples are presented in several chapters (chapters 5 and 8) that provide an overview of the various methods used today for identifying unmet needs and developing products. The healthcare domain is chosen as the medium for the description. The biodesign process as developed at Stanford University is described, along with multiple alternate adaptations of the process. Chapter 5 analyzes other processes examining the critical factors that lead to the success of these programs. It also analyzes through examples of medical devices and medical technology developments, where a lack of a structured process has led to 'failures,' the key learning from these case studies.

Building a successful innovation platform for affordable medical technology is important to address. This chapter 5 emphasizes the need for an innovation platform for successful accomplishments. It takes the example of healthcare innovations and explores the different facets that need to be brought together to create an innovation platform in the medical technol-

ogy space and its use today to enable affordable medical technology in low-resource settings. The authors use various case studies of innovation platforms accessible to healthcare innovators and highlight the thought process behind developing such platforms (Stanford Biodesign, John's Hopkins' innovation platform, CAMtech'd innovation platform, InnAccel's acceleration program, government-run incubation programs, etc.). The chapter details a stage-wise process that begins with the identification of gaps in the ecosystem through feasibility studies to setting up a physical medical technology innovation platform. Further, the authors highlight the need for the incorporation of structured processes for needs identification and product development embedded within innovation platforms. An overview of how this is being used today in different settings is described.

In chapter 9, logic-based medicine versus evidence-based medicine for modeling qualified self-health kits is examined. In this chapter formal logic is applied to bridge the gap between information management in qualified self apps and information classification and structures residing within health and healthcare ontology. Mathematical innovative techniques are briefly described to enable a well-founded logical and ontology representation. Modeling uses these theoretical notions in order to extend the logical structure of classifications of health. The author focuses on active and healthy aging, including aspects of assessment and classification so that individuals and patients can manage their own data, in particular for self-monitoring purposes. There is the need to shift from society owning all individual health data to individuals themselves owning their data. Another aspect is that the quantified-self movement is still rooted mostly in wellness and even fitness, and as having various apps at their disposal.

Chapter 6 begins by describing the art of innovation as an analogy that shows the exponential level of complexity when scaling innovation management processes from personal innovation to visionary and led innovation, and finally to enterprise/ecosystem innovation. Soft factors to the innovation process are explained at each level, with the emphasis being on enterprise and level factors with suggestions for overcoming them. We have the perception that process models, idea generation platforms,and cognitive products are all necessary to improve an organizational innovation management process. However, many soft factors provide the real key

to innovation success. There is an inhibitive factor when the role has been designed to be 95% reactive. This chapter describes some of the factors inherent in people and organizations that can inhibit innovation.

The new IoT areas are considered in a chapter that presents the impact of the IoT concept on the manufacturing systems and the challenges that R&D actors face in order to anticipate future evolution. The author first presents the general concepts related to IoT and M.E.S. Then the announced benefits from this exposition are presented. These benefits present new challenges.

The newer realistic challenges are previewed in chapter 10 on virtual mobile or cloud interfaces, business intelligence, and analytics content processing. Intelligent business interfaces are designed with intelligent multi-tiers and interfaces applying agents and intelligent business objects with applications to intelligent WWW. Basic content management with multi-tier designs for interfaces are presented. The field of automated learning and discovery has obvious financial and organizational memory applications. A computing model based on a novel competitive learning with database warehousing, model discovery, and customizing interface design is discussed. Intelligent visual computing paradigms are applied to define the multimedia computing paradigm and active databases. The intelligent multimedia paradigms can be applied to databases and query processing applications to stock trading. A view-model-controller design prototype for mobile business platforms with content processing specifics is presented. Web content is an important interface to preview.

The volume concludes with innovations on haptic and neurocognitive computing for visual facial expression emotion recognition. The chapter presents novel modeling techniques for facial and visual expression computation and recognition. Based on the functions on the haptic computing logic, we can state expression-spanning schemas—hereon called Eigen Schemas—that on tuples are morphed to characterize facial expressions. The Eigen schemas allow us to express or detect human emotions expressed on facials. The haptic logic encompasses a predictive Bayesian confidence on the characterizations.

CHAPTER 1

TECHNOLOGY SELECTION FOR SOFTWARE STARTUPS

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CONTENTS

ABSTRACT

Many, perhaps most, software startups start with just an "idea."

- It should be easier to get a ride to go where I need to go now;
- I want to sell my beanie babies online;
- It should be easier to find information.

If the inventor is a software engineer they might just start writing software-using tools that they already know. Some might think a little harder