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How Startups Explore and Exploit Dynamic Instant Innovation (DII) for New Product Introductions from Experiment to Implementing

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INTRODUCTION

Innovation can be conceptualized as encompassing two different activities: the development of novel, useful ideas, followed by implementation [1]. Creativity can be viewed as the first stage of the innovation process. Innovators undertake exploratory research in an attempt to discover something new "...by creating new ways of doing things and new things to do" [2]. Startups then need to create marketable products as rapidly as possible in the hyper competitive business environment. Startups, therefore, need to first create "ideas" and then implement them in order to convert them into actual innovations for the marketplace. Ideas are useless unless they lead to the development and implementation of Instant Innovation [3]. Dynamic Instant Innovation (DII) is a new model of innovation seeking to integrate a dynamic capabilities perspective into other complementary fields. Extant papers on this topic, however, are relatively rare. This paper contributes to this research stream by focusing on how startups need to conceptualize the main element of DII: speed.

Research Question: Why did Innovation Take so Long in the Past, and How Dynamic Instant Innovation Increases the Speed of this Process?

A startup's success depends upon the discovery and development of opportunities in a rapid pace, which involves the effective combination of internally generated and externally generated inventions [4]. The traditional elements of business success: maintaining incentive alignment, owning tangible assets, controlling costs, maintaining quality, optimizing inventories, just-in-time management by Toyota, etc. are unlikely to be sufficient for sustained superior startup performance. Dynamic Instant Innovation (DII) is transforming innovation, because it can proceed in parallel among many open integrated parties and industries with the diffusion of more knowledge, to more participants in the industry by using today's multi-platform communication means. This can be accomplished albeit through weak-tie social networking on an ad-hoc basis instead of coordinated efforts. As a result, more parallel experiments are occurring leading to more variety and more choices, which foster more *rapid* innovation. Considering many applications of agile ideas by users, the DII model describes the innovation path from prototype development to launch as shown in Fig. 1. D'Aveni argues that "If a machine runs at a faster rate, the quality will usually go down. If service is delivered more quickly, it will be more standardized and less courteous" [5]. DMU (digital mock-up) is a concept that depicts a product, usually in 3D, through the entire life cycle. DMU is enriched by key engineering activities (design, manufacturing, and support) that contribute to create any physical prototype. This reduces time to market by identifying potential issues early in the design process, which decreases product development costs by minimizing the number of physical prototypes that need to be built. DMU also increases product quality by allowing a greater number of design alternatives to be investigated before a final one is chosen. Virtual product development (VPD) is design and development through software making use of CAD, FEA, CFD, and PDM which are disruptive innovations. This enables the ability to concurrently take into account more considerations sooner for product and process designs early in the process. Hence, VPD aims to reliably develop a mature product as fast

and as less costly as possible [6]. As such, the concept can be understood as rapid parallel research by individuals across the global spectrum that are loosely integrated by the Internet, thereby leading to Dynamic Instantaneous Innovation [7]. Schutz argues multidisciplinary innovation requires heterogeneous knowledge that needs to traverse through social and cognitive boundaries as it is transformed from information to innovation [8].

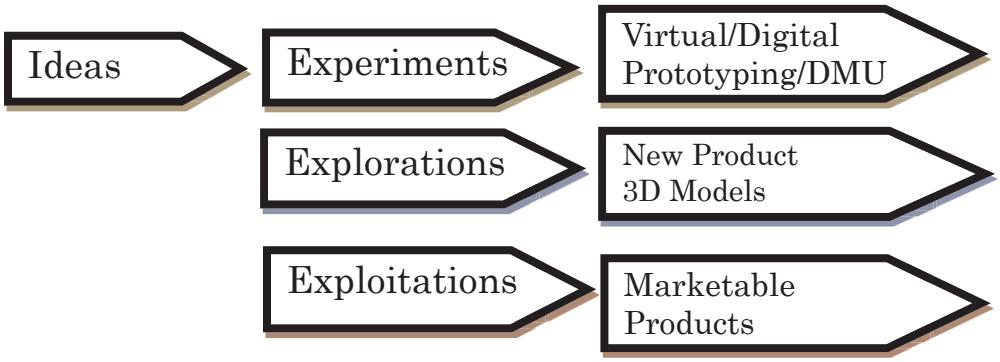


Fig.1. Conversion of Innovation Path by DII
Under DII, this diagram shows how speedy operations can be accomplished without lowering quality because of disruptive innovation (Virtual /Digital prototyping, 3D printer, CAD, CFD, PDM, etc.)

In fast moving business environments under hypercompetition, a startup's success requires instantaneous innovation. In the past, innovation took very long to become commercially available. For example, although words of the invention of the internal combustion engine first spread in 1870, it took another 40 years for this product to be manufactured with Henry Ford's mass production of the Model T. Another example is in the drug industry. In the past, new drug discovery and development process took 15-20 years and could cost as much as $500 million for a single drug [9]. Therefore, startups need to create new and disruptive products (simpler, cheaper and more convenient) as rapidly as possible in addition to locating strategic alliances to better the odds for success. Understanding more fully the role of startups allying along the entire new product development process is illustrated in Fig. 2.

In order to capture today's innovation process, the authors of this paper propose an integrated product development path where a technology startup's exploration alliances predict its products in development (the development of novel, useful ideas, search variation, risk taking, experimentation flexibility, discovery, or innovation). Furthermore, a startup's products in development predict its exploitation alliances (refinement, choice, production, efficiency, selection, implementation and execution), and these elements in turn lead to products on the market. With appropriate marketing, Christensen assures startups are likely to beat the incumbents in disruptive circumstances (i.e. NCR, Kodak, Xerox, and Bethlehem Steel). However, for a sustaining-technology strategy, if startups sell a better product into an established market to capture established competitors' best customers, the competitors will be motivated to fight rather than flee [10]. Startups will not be likely able to win against large incumbents in direct competition per Table 1, below. For certain startup strategies, these upstarts will make serious efforts in developing a new product that may compromise existing core products. In this case, leading companies with a wealth of experience and information associated with those core products are in a highly advantageous position, so chances for inexperienced newcomers to succeed are rarer. [11]

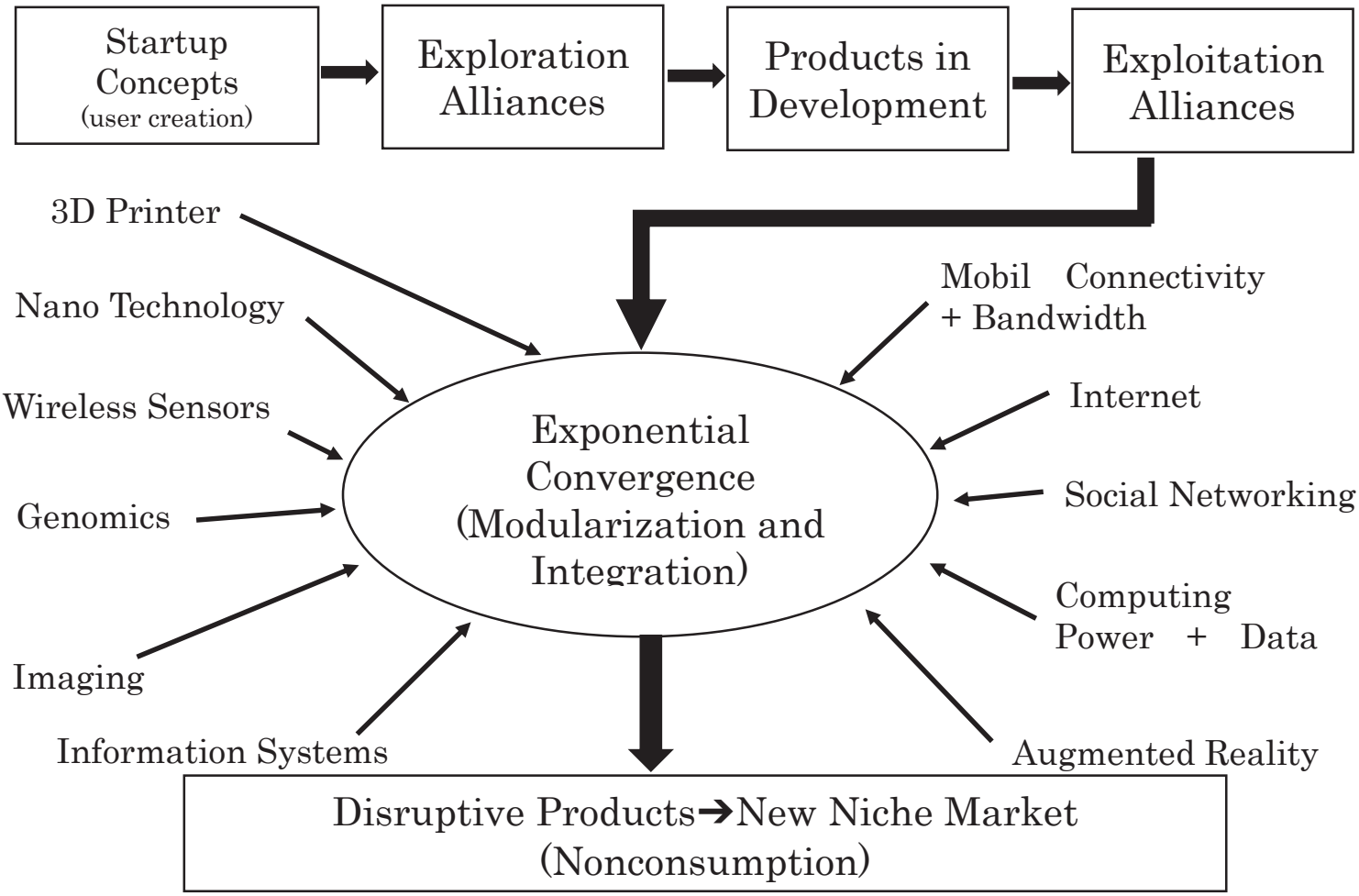
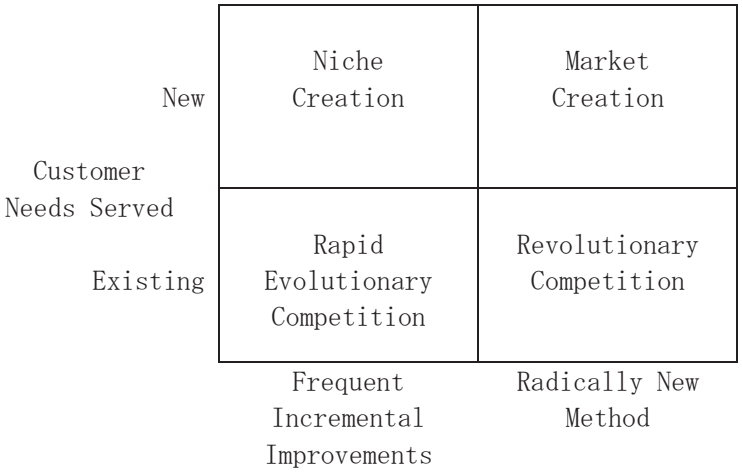


Figure 2. Startup Allying and New Product Development with DII concept (F.T. Rothaermel and D.L. Deeds - Amended by M. Fukushima)

	Direct Competition	Indirect Competition
Established	Win	Loss
Startups	Loss	Win

Table 1. Win/Loss Matrix

D'Aveni offers a useful way of analyzing the types of disruption that can be pursued by a hypercompetitive firm. It is based on selecting new or existing markets to serve and new or existing methods for serving them as shown in Table 2. By identifying which of the four squares to compete in, the company defines its next move or series of moves [5].



Methods / Technologies Used to Serve Customers
Table 2. Four Visions of How to Disrupt Markets
By D' Aveni

Why We can Create Innovation Instantaneously by the DII Concept.

DII is now possible because of the exponential convergence of new disruptive innovation. For example, nanotechnology, wireless sensor, Internet, imaging, mobile connectivity, social networking, computing power, data universe, etc. have all contributed to exponential convergence of disruptive innovation. von Hippel noted "Steady improvement in computer software and hardware are making it possible to develop increasingly capable and cheaper tools for innovation that require less and less skill and training to use" [12].

Integration of Dynamic Capabilities with Dynamic Instant Innovation

In the past 20 years, during Japan's economic slump, Japanese electronics makers have been surpassed by Samsung. Kawai surmised that this was due to mistakes by top management. The causes of these mistakes include 1) failure to sense, 2) satisfaction with the status quo, 3) failure to strategize, less resources, and inability to overcome sectionalism and rigidity, 4) lack of flexibility, and 5) lack of concept of "dynamic strategy"[13]. Christensen elaborated it as the lack of Disruptive Innovation created in Japan, stating that there was only one disruption, "Nintendo-WII", during past 20 years [14]. Drawing from the resource-based view of the firm from strategic management theory, sustained competitive advantage can be maintained by a firm through capabilities and resources that are heterogeneous and immobile, and these capabilities can include IT applications [15][16]. Mata (1995) surmised that managerial IT skills were the most critical component. Bhardwaj (2000) found that firms with strong IT capabilities outperformed other firms [17]. Teece, et al. argue that well-known companies like IBM, Texas instruments, Philips, and others appear to have followed a "resource-based strategy" of accumulating valuable technology assets, often guarded by an aggressive intellectual property stance. However, this strategy is often not enough to support significant competitive advantages. They further refer that Winners in the global marketplace have been firms that can demonstrate timely responsiveness and rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences. They refer this as the Dynamic Capabilities of the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments [18]. Fjeld illustrates Dynamic Capabilities as how tasks are accomplished in these dynamic environments. The "how" is the mechanism or processes at a deeper level than simply the statement of the input-output relations of resources to products as modeled in the neoclassical model of the firm. He further adds that material and

human resources are the inputs whereas capabilities are the "how" these resources are used to realize a product or service [19]. Helfat emphasized that competing in a changing environment through innovation and other mechanisms is of paramount importance for firms [20]. The author argues that another important mechanism is "Speed" of DII, which comes from ambidextrous organization per Fig.3.

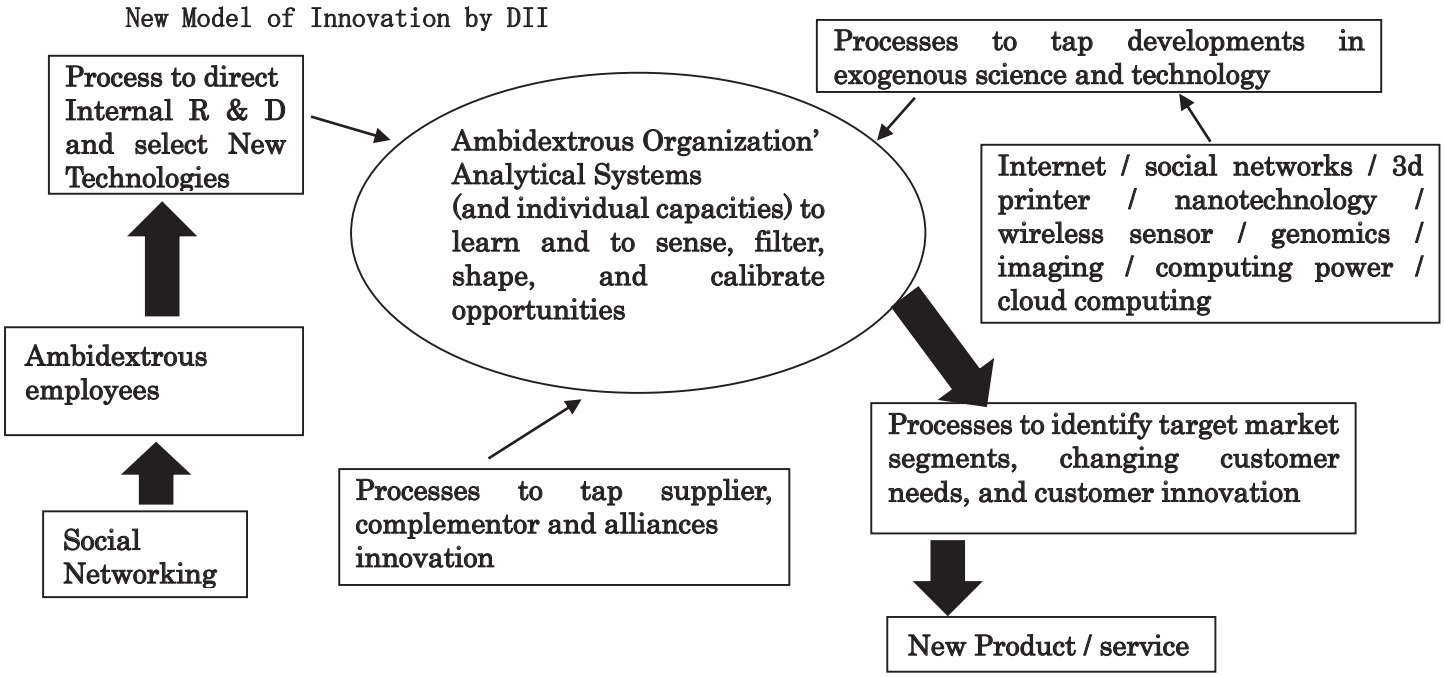


Fig.3. Elements of an ecosystem framework for 'sensing' market and technological opportunities by Teece and amended by M. Fukushima.

Conclusion

Teece, et al. proposed three organizational and managerial process-coordination/integration, learning, and reconfiguring as core elements of dynamic capabilities [21]. However, the author posits that along with the processes that support sensing, seizing, and managing threats, "speed" of DII is the single most important task of top management. Kawai analyzed the failure of Japanese companies, such as Panasonic, sharp, and Sony, caused by the new DC framework. Japan's economic stagnation can be partially attributed to the lack of disruptive innovations (Christensen mentions only one disruptive innovation found in Japan: Nintendo WII) such as the Walkman, transistor radios, mini-motor cycles by Honda, inexpensive cars sold by Toyota in 1970's. Incremental innovation (i.e. Prius) does not create more employment. In addition, efficiency innovation decreases employment. So in the 1990s, Japan has not created DII, instead, trying to exploit their technology deeper, making it better, but with higher cost. On the other hand, other competitors such as Samsung have made products faster and cheaper and, in turn, created greater overall economic conditions in Korea in terms of employment. Samsung's success is in changing not only corporate and competitive strategies over time in response to environmental change (i.e. mobilization of DSC) but also resource configuration in response to the strategies. Japanese electronics makers have failed because of their head-strong decision to stick to the failed strategy of vertical integration and their failure to restructure their business models [17]. The authors in this paper develop a model revealing that this failure is largely due to the inability to respond rapidly to the DII Concept. Many Japanese companies disrupted once in 1950s (i.e. Sony: portable radios, and Walkman, Nippon Kokkan, Kobe, and Kawasaki Steel: exported low quality steel to Western market, Honda: Supercub, Toyota: cheap subcompact cars) [21] that created huge employment. DII will

create jobs on the other hand, incremental and efficiency innovations do not create employment. Especially efficiency innovations will hire less people and create stagnation [14].

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