

“Dynamic innovation sandbox”: an approach for strategic innovation¹

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Abstract

In this study we analyze a process for strategic innovation called “Innovation sandbox” – introduced by C K Prahalad, designed primarily for businesses with customers at the bottom of the pyramid (BOP). We take key elements from the original “Innovation sandbox” approach; add a few new elements and show that the generalized approach is useful as a tool in strategic innovation process in any business. We call this approach “Dynamic innovation sandbox” as it focuses on changes to the sandbox over a period of time. Next, we analyze a successful strategic innovation (Apple) and a failure (Xerox) through the lens of “Dynamic innovation sandbox”. We also discuss the challenges in implementing this approach and point to future direction on this research.

1. Introduction

Strategic innovation² is differentiated from a non-Strategic innovation by the factor with which it departs from the existing business parameters such as who the target customer is (Cannon’s entry into copiers for small business), value proposition (IBM’s shift from selling hardware and software to selling solutions in 1990s) or re-design of end-to-end value-chain architectures (Dell’s direct selling model) [1, 2]. Three defining characteristics of a strategic innovation are: (1) High expense of a single experiment (2) long length of each experiment (3) high degree of ambiguity of results [1].

Approaches for strategic innovation have been studied by various researchers e.g. Govindarajan-Tremble [1], Hamel [3], Kim-Mauborgne [4], Lafley-Ram Charan [5] and Prahalad [6] to name a few. The objective of this paper is not to compare various approaches of strategic innovation. Our objective is to analyze one approach, that of Prahalad [6] and enhance it and show how it can be applied to various business contexts other than what Prahalad has presented in the paper.

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² In this paper, we treat following concepts synonymously: Strategic innovation, Radical innovation, Breakthrough innovation and Business model innovation.

Prahalad introduced an approach “Innovation Sandbox” [6] for strategic innovation for products at the bottom of the pyramid (BOP). The approach is based on the premise that strategic innovation for BOP must satisfy 4 criteria (1) World class quality (2) Significant price reduction (3) Scalability (4) Affordability for BOP. This approach differs from the linear stage-gate approach of innovation [2] in that, unlike in the stage-gate approach; it puts a set of stringent constraints including commercial constraints up-front in the innovation process. In the stage-gate approach, commercial considerations come in at a latter stage. We show that a modified “innovation sandbox” approach which we call “Dynamic innovation sandbox” can be used as a powerful lens in analyzing and designing strategic innovation in any organization.

Rest of the paper is organized as follows. In section 2, we analyze the “innovation sandbox” approach. In section 3, we present “Dynamic Innovation Sandbox” approach. In section 4, we show how the proposed approach can be used to analyze successes and failures in strategic innovations. Section 5 presents how “Dynamic innovation sandboxes” can be created and managed. In section 6, we show that not every strategic innovation can fit into Dynamic innovation sandbox approach. Section 7 presents a set of challenges in making dynamic innovation sandbox approach work. Section 7 concludes the study and points to future directions for this research.

2. “Innovation sandbox” approach

“Innovation sandbox” is a process of designing strategic innovations especially with businesses with customers at the bottom of the pyramid. It starts by identifying following four conditions [6]:

1. The innovation must result in a product or service of world-class quality.
2. The innovation must achieve a significant price reduction – at least 90 percent off the cost of a comparable product or service in the West.
3. The innovation must be scalable: It must be able to be produced, marketed, and used in many locales and circumstances.
4. The innovation must be affordable at the bottom of the economic pyramid, reaching people with the lowest levels of income in any given society.

This approach is called “Innovation sandbox” because it involves fairly complex, free-form exploration and even playful experimentation (the sand, with its flowing, shifting boundaries) within extremely fixed specified constraints (the walls, straight and rigid, that box in the sand). The 4 conditions specified above become the rigid walls of the sandbox [6].

Prahalad elaborates the approach with the example of an innovation sandbox for healthcare industry (see Figure below) [6]. The four sides represent the core constraints.



Prahalad mentions in [6] that, “Value of this approach is keenly felt at the BOP market, but any industry, in any locale, can generate similar breakthroughs by creating similar context for itself.” However, he cautions further, “There is no generic sandbox design, any more than there could be generic checklist of strategies that would apply to every business.” This is the point where we depart from Prahalad and show that the approach can be generalized meaningfully and be used as a lens and/or tool in strategic innovation in any business.

3. Proposed “Dynamic innovation sandbox” approach

At the heart of the innovation sandbox approach is “constrained creativity” and includes:

1. A set of self-imposed constraints
2. An environment for systematic experimentation within these constraints

The constraints (“walls”) impose a discipline and the “sand” within the “walls” fosters creativity. In this section, we will first present Google’s AdSense story, then we propose a generalization of the innovation sandbox and explain it with the help of Google story.

3.1 Google’s Gmail and AdSense story

Google’s business model of monetizing search using AdSense technology is one of the most successful strategic innovations of this decade. Following story narrates how this business model

came about. The sequence of events is as follows (as narrated by Marissa Mayer who is currently VP Search Products and User Experience at Google in an interview [7]).

1. Paul Buchheit, tech lead of Gmail project and Marissa Mayer Product manager for Gmail shared an office and got into discussing how they will make money from Gmail. Marissa says, “We will give small mailboxes for free and upsell on the large mailboxes.” This was the prevalent business model that time. To which Paul says, “I am not so sure. Maybe we should put ads there.” Marissa immediately reacts saying, “Paul, Paul, Paul. Ads are not going to work. We won’t be able to find relevant ads and then there will be privacy concerns”.
2. 3am – Marissa is about to leave the office. She leans back from the door and says, “Paul, we agreed we are not exploring the ad thing, right?” Paul responds, “Yeah”.
3. 7am – Paul leaves his office after finishing a throwaway prototype implementation of adSense
4. 9am – Marissa is back to office and logs into gmail and sees ads everywhere on the screen. First reaction is “Oh my gosh! What has he done?” She feels like calling him immediately to take this off. However, she resists it because she feels Paul should sleep for at least a couple of more hours before she disturbs him.
5. Between 9am & 10am – Marissa gets 2 emails. One from a friend about going hiking. And an ad pops up for hiking shoes. Then another mail comes saying Al Gore is visiting Stanford. And an ad comes up showing Al Gore’s books.
6. 10am – Marissa is beginning to appreciate this ad thing.
7. 11am – Sergei comes in and he likes it too.

Eventually, AdSense was released before Gmail release and subsequently became part of one of the most successful strategic innovations of this decade.

3.2 From “Innovation sandbox” to “Dynamic innovation sandbox”

We tweak two assumptions underlying Prahalad’s innovation sandbox:

Original assumption-1: The constraints of the sandbox are fixed and rigid

New assumption-1: The constraints of the sandbox are fixed for a given set of experiments. Learnings from the experiments are likely to alter some of the constraints. In fact, in any exploration, especially with high ambiguity, it is more likely that the initial set of constraints and the final set of constraints by the time product or service is commercialized are different.

Assumption-2: We can't identify any generic design for the constraints any better than we can identify a list of approaches

New assumption-2: We can identify a minimal set of *types of constraints*, which guides the innovation process towards higher yield.

Apart from these modified assumptions, we add another assumption as follows:

Assumption-3: Ability to create environment for rapid prototyping or systematic experimentation under a given set of constraints” is one of the differentiating competency for strategic innovation.

With these set of assumptions, we define the dynamic innovation sandbox as follows:

Dynamic innovation sandbox approach has three elements:

1. **The walls:** A set of constraints each corresponding to a wall of the sandbox.
2. **The sand:** A lab for rapid prototyping and systematic experimentation
3. **The kids:** A set of heterogenous passionate people

We elaborate each of the three elements below:

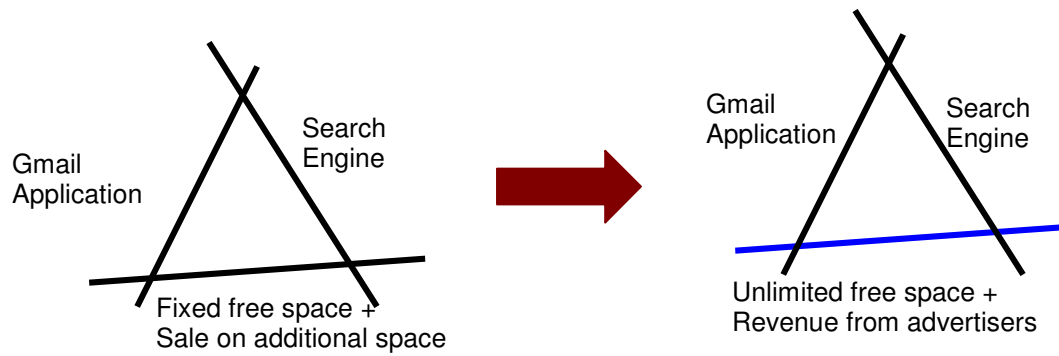
- **The walls:** We derive the walls of our sandbox based on the three perspectives of Revolutionary Strategy presented by Gary Hamel in an interview [8]. The three types of walls of the sandbox are:
 1. **Unmet customer need:** Understanding the discontinuities in the environment and answer the question – What is an unmet need? For example, in Google example, the unmet customer need was: Easily usable and manageable online mail application.
 2. **Core competency:** This answers the question – what do we have that is unique and differentiating and has a potential to create substantial customer value? In case of Google, the unique asset was “search engine”.

3. **Business model:** A way to capture the value created – a way of monetizing the innovation. In case of Google, the business model was giving a fixed size for the mailbox free and charging for additional space.

Note that the four constraints in Prahalad's innovation sandbox approach belong to two of the three types of constraints: (1) Unmet customer need – need for masses at BOP to get high quality products/services (such as healthcare, education etc.) (2) Business model – providing affordable products for BOP at a profit.

- **The Sand:** Role of rapid prototyping in innovation has been emphasized by both researchers [9] and practitioners [10, 11, 12]. "Fail early and fail often" is a well-accepted principle of innovation. However, very few organizations create laboratories for systematic experimentation [9]. Google story underscores the importance such experimentation. Google had an environment where technology components for experimentation were readily available to Paul and he could create a prototype overnight. Paul could also download an open source semantic analyzer and use it to analyze mail content while creating the prototype [7].
- **The kids:** A sandbox is useless unless it can attract kids who can immerse themselves in the sand for hours building castles. Similarly, innovation sandbox is useless unless it has a set of people experimenting passionately. Google story shows that you may not need too many of those. However, heterogeneity makes a difference in looking at various perspectives (walls) of the sandbox. It is important that an engineer such as Paul and a person with business understanding such as Marissa were into a meaningful dialogue of creating and capturing value from Gmail product.

In Google's case Paul's experiment created an alternate business model that is generating revenue through advertisements (sometimes called the Media model). Author does not know whether experiments with both the business models were pursued further or the old approach was abandoned immediately. However, it is quite possible that Gmail team continued with two different set of experiments: One with old business model as a constraint while the other with the new business model as the constraints. Such a decision would depend upon the cost of experimentation as well as available resources.



We summarize the how the constraints of the innovation sandbox underwent changes post Paul's prototype below.

Basic elements	Sub-elements	Gmail (before Paul's prototype)	Gmail (after Paul's prototype)
Walls	Unmet customer need	An online mail tool with ease of search	Same as before
	Core competency	Search engine	Same as before
	Business model	Prevalent business model at the time where you give some mailbox space for free and up-sale for additional space (same model used by hotmail).	Offer mail tool for free. Monetize based on the advertising revenue (Media model)
Lab	Rapid prototyping	An environment where Paul could create a prototype overnight	
Passionate People	Heterogeneity	Both Paul and Marisa were passionate about Gmail and its success. The fact that Paul spent a night implementing the prototype shows how passionate he was about his idea. Even a two member team of Marissa and Paul was able to discuss both technology and business. This demonstrates the heterogeneity in the team.	

4. Applying “Dynamic Innovation Sandbox” lens to two strategic innovations

In this section, we use dynamic innovation sandbox approach to analyze past strategic innovations, one successful one (Apple) and one unsuccessful one (Xerox).

4.1 Homebrew Computer Club and Apple

The Homebrew Computer Club was an early computer hobbyist club in Silicon Valley, which met from March 1975 to roughly 1977 [13, 14]. From the ranks of this club came the founders of many microcomputer companies, including Bob Marsh, George Morrow, Adam Osborne, Lee Felsenstein, and Apple founders Steve Jobs and Steve Wozniak. Homebrew members were hobbyists, most of them had an electronic engineering or programming background. They came to the meetings to talk about the Altair 8800 and other technical topics and to exchange schematics and programming tips. According to Steve Wozniak, each session began with a "mapping period," when people would get up one by one and speak about some item of interest, a rumor, and have a discussion. Somebody would say, "I've got a new part," or somebody else would say he had some new data or ask if anybody had a certain kind of teletype. This would be followed by "Random Access Period" during which members would wander outside and find people trading devices or information and helping each other. Steve would bring Apple I and II to the club and demo the progress as the designs evolved. In fact, Apple's first major order came from a retail shopkeeper who was a member of the club.

Homebrew Computer Club created an innovation sandbox, with constraints revolving around (1) unmet customer need -- making a low cost computer (2) core capability – Steve Wozniak's ability to make complex circuits with fewer chips (3) business model exploration – Steve Jobs's obsession for selling a product to masses at profit and negotiating low-cost chipsets.

4.2 Xerox's spinoff: Adobe

Xerox PARC is a classic example of innovation sandboxes with one of the walls being weak, that of "Business model exploration" [15]. Let's see one such example, that of Adobe which was started by technologists from Xerox. The technology embodied in PostScript came from Interpress, a page description software developed at Xerox PARC. Interpress was an internal, proprietary protocol used to print fonts generated from Xerox workstations on Xerox printers. This was effective usage of technology because it linked tightly with Xerox's own business model, but its latent value was limited to that of an important component in a larger system. Interpress

advocates Warnock and Geschke tried to make Interpress into an open standard without success. Subsequently they left Xerox and started Adobe which eventually evolved its own business model substantially different from that of Xerox.

This example shows the importance of feeding the learning back into the constraints and changing them if required.

5. How to create and manage “dynamic innovation sandboxes”?

Dynamic innovation sandbox creation starts with recognizing one of the two types of constraints first: (1) Unmet target customer³ need (2) Core assets or competency.

5.1 Starting with core capabilities

When an IT services organization builds SOA (Service Oriented Architecture) Competency Center [16] or GE builds Nanotechnology expertise [17] or P&G builds design expertise [5], these organizations are starting by fixing the core capabilities “wall” of the sandbox.

5.2 Start with recognizing unmet customer need

When Tata Motors identified a market for ultra-low cost cars or Titan identified a need for branded jewelry or branded eye-ware or when Reliance identified opportunity in wireless telecommunications, sandboxes are getting created with “Unmet customer need” as the first wall.

5.3 Create labs for systematic experimentation

One of the differentiating factors for dynamic innovation sandbox is creating labs for systematic experimentation. In the context of services organizations like Bank of America these laboratories include carefully designed sites where customers experience new services [9]. At P&G, innovation centers are built where shoppers lend their wisdom and retailers and P&G learn from it [5]. The innovation center just outside Cincinnati includes a small, five-isle grocery store, complete with checkout counters and cameras and microphones for observation. Shoppers are asked to look for certain items, do their regular shopping, or buy a certain amount of goods from a couple of specific isles. The P&G and retailer teams watch the shopper go through her paces. Strategic innovations involve longer cost and duration of experiments. Hence, a good laboratory with well-equipped tools goes a long way in enhancing capacity for experimentation.

³ Note that the target customer may be a non-customer today

6. Limitation of the dynamic innovation sandbox approach

Not all strategic innovations fit into this sandbox approach. We bring out one such example that of Intel's exit from memories and entry into microprocessors [18].

When Intel decided to exit memory business, two things happened: (a) Andy Grove and Gordon Moore recognized that their primary business – memories – is struggling and they don't have any solution to make it competitive (b) they have a choice of a viable alternative – that of microprocessors – which they can make as their primary business and exit from memory business. By this time, Intel had been selling microprocessors for 5 years profitably and hence there wasn't any need for experimentation to realize its viability. Hence, this strategic innovation does not fit into dynamic innovation sandbox approach.

7. Challenges in making “innovation sandboxes” work

We see following challenges in creating and leveraging “innovation sandboxes”

7.1 Challenging the dominant logic of business

As we have seen Marissa's response to Paul's question and in Xerox PARC example, questioning the dominant logic of business (business model) is difficult. It is a typical challenge where innovation responsibility squarely rests on research departments which are far removed from business model understanding leave alone explorations. Govindarajan-Tremble refers to this as the “unlearning” challenge [1].

7.2 Getting a heterogeneous team to work together

Sandbox experimentation is inherently a cross-functional effort. It works best when experts with experience in different functionality corresponding to various constraints (or walls) are experimenting together, having a dialogue together. This is usually a big challenge especially in large corporations as functions such as research, marketing and engineering are silos speaking their own language [19].

7.3 Making “systematic experimentation” as a process

As Stefan Thomke mentions in an interview [20], many organizations confuse “failure of an experiment” with “failure of the experimentation process”. The former event can very well lead to

a learning as to “what does not work in what context” which is as critical as knowing “what works in what context”.

7.4 Discovering a deeper sense of self – core competency

When GE discovers that it has unique capabilities in “non-destructive testing and predictive failure” or in “remote monitoring of plants” it is discovering a deeper sense of self [17]. Gary Hamel says, “A lot of companies try to build the picture bottom-up, by looking at the capabilities of individuals, at the specific skills of those in the work force. They end up creating laundry list of technologies and functions.” The idea is to find capabilities that transcend the traditional boundaries in an organization [3].

8. Conclusion

In this paper we analyzed “innovation sandbox” approach proposed by Prahalad and proposed a modified approach called “dynamic innovation sandbox”. Using Gmail example, we showed how dynamic sandbox may alter some of the fixed constraints associated with the innovation sandbox. We also looked at how organizations may start constructing a dynamic innovation sandbox. We showed the limitation of the approach, as it does not model every strategic innovation. Finally, we looked at possible challenges in implementing the dynamic innovation sandbox.

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9. References

- [1] Govindarajan and Trimble, 10 rules for strategic innovators, Harvard Business School Press 2007
- [2] Davila, Epstein and Shelton, Making innovation work, Wharton School Publishing, 2008
- [3] Gary Hamel, Leading the revolution, Penguin Books, 2002
- [4] Kim and Mauborgne, Blue Ocean Strategy, Harvard Business School Press, 2005
- [5] A. G. Lafley and Ram Charan, The Game-changer, Penguin Books, 2008
- [6] C. K. Prahalad, The innovation sandbox, Strategy + Business, issue 44, Autumn 2006
- [7] Interview with Marissa Mayer, iinnovate.blogspot.com/2007/08/marissa-mayer-vp-of-search-products-and.html, Aug 31st 2007, accessed on March 1st, 2009

- [8] An interview with Gary Hamel, by Joel Kurtzman, Strategy and Business, issue 9, Oct-Dec 1997, pp 89-97
- [9] Thomke Stefan, Managing product and service development: text and cases, McGraw-Hill Irwin, 2007
- [10] Kelley and Littman, The art of innovation, Profile books, 2003
- [11] Kelley and Littman, The ten faces of innovation, Profile Books, 2007
- [12] Guy Kawasaki's interview, Why India should have at least four Steve Jobs, Economic Times, Sept 19th 2008
- [13] Homebrew Computer Club, en.wikipedia.org/wiki/Homebrew_Computer_Club, accessed on March 1st 2009
- [14] Wozniak and Smith, iWoz: Autobiography of the man who started the computer revolution, Headline review, 2007
- [15] Chesbrough and Rosenbloom, The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spinoff companies, Harvard Business School, Report #01-002, Version 6.2
- [16] "Who needs SOA Competency Center?"
www.infosysblogs.com/soa/2008/08/who_needs_the_soa_competency_c.html, accessed on March 1st, 2009
- [17] "GE finds its inner Edison", interview with Jeff Immelt, Technology Review, Published by MIT, October 2003 (www.technologyreview.com)
- [18] Interview with Andrew Grove, iinnovate.blogspot.com/2007/03/andy-grove-former-ceo-and-chairman-of.html, March 13th 2007, accessed on March 1st, 2009
- [19] Schein, Edgar, Three cultures of management: They key to organizational learning, Sloan Management Review, Fall 1996, pp 9-20
- [20] Interview with Stefan Thomke by Jim Blasingame,
www.smallbusinessadvocate.com/small-business-interviews/stefan-thomke-973, accessed no Mar 1st, 2009.