

How companies can transform from Product to Platform Ecosystem

By

Gaurav Khanna

B.Tech. Computer Science & Technology
Punjab Technical University, 2001

SUBMITTED TO THE SYSTEM DESIGN AND MANAGEMENT PROGRAM
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN ENGINEERING AND MANAGEMENT
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JANUARY 2016 [February 2016]

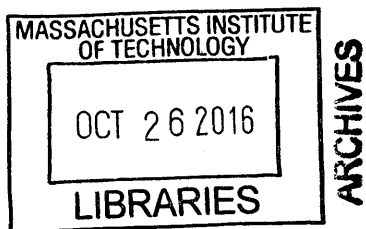
© 2016 Gaurav Khanna. All rights reserved.

The author hereby grants to MIT permission to reproduce
and to distribute publicly paper and electronic copies of
this thesis document in whole or in part in any medium
now known or hereafter created.

Signature of Author _____ **Signature redacted** _____
Gaurav Khanna
System Design and Management Program
January 22, 2016

Certified by _____ **Signature redacted** _____
Michael A. Cusumano
Sloan Management Review Distinguished Professor of Management
Thesis Supervisor

Accepted by _____ **Signature redacted** _____
Patrick Hale
Director
System Design and Management Program



ABSTRACT

The industrial revolution led to great innovations in machinery, methods and techniques for producing goods at a large scale. In order to compete and maximize their profits, companies primarily deployed a twofold strategy: generate high demand for the product being sold by spending heavily on marketing and optimize the production of goods to improve efficiency and reduce costs. This approach is often referred to as the *linear product development business model*. A big limitation with this linear business model is that over time, market for the product gets saturated and further optimization of already efficient processes gives diminishing returns.

With the advent of internet in the early 21st century, companies with new business models evolved that leveraged the power of connectivity and ease of distribution to look beyond the traditional linear product development model. These new internet based companies were able to target multi-sided market, where instead of being producers of a product, they provided infrastructure for the producers and consumers to interact with each other and do transactions using their infrastructure. Such businesses are often referred as being *platform business models*. A big advantage with the platform based business model is that they are able to grow exponentially. The more producers and consumers they attract, the greater is their appeal to other potential customers and producers.

Most present-day product companies, especially in the physical hardware space, are still following the traditional linear product development business model and are not fully taking the advantage of the widespread availability of internet. The primary goal of this thesis is to demonstrate how traditional product companies can leverage the power of digital economy and platform business models to transform themselves into a hybrid solution of *product platforms or ecosystems*.

ACKNOWLEDGEMENTS

I would like to dedicate this thesis to my late father in law Dr. Satish Bahl, who was a true inspiration and a role model for me.

I am highly indebted to my advisor Prof. Cusumano, not only for his guidance, advice and support for this thesis, but also for giving me the opportunity to learn about platforms and networked economics. I am really thankful to him for being extremely flexible and providing valuable comments and feedback to shape the thesis into its current form.

I am also thankful to Pat Hale, the Director of System Design & Management program for giving me an opportunity to be a part of the program and encouraging me always to challenge my existing boundaries of knowledge.

I would like to thank my parents for their constant encouragement and support. Finally and most importantly, a special thanks to my wife Samira Bahl. I owe her all those weekends and evenings that I spent writing this thesis, instead of spending them with her.

TABLE OF CONTENTS

ABSTRACT	2
ACKNOWLEDGEMENTS	3
TABLE OF CONTENTS	4
LIST OF FIGURES.....	5
LIST OF TABLES.....	5
1. Introduction.....	6
2. Limitations of Linear Product Development & Emergence Of New Business Models.....	7
2.1 What is Linear Product Development Business Model?.....	7
2.2 Limitations with Linear Product Development Business Model.....	8
2.3 Growth of the Internet and Emergence of new Platform Business Models.....	9
2.4 Digital economy Challenges and Opportunities for Product Companies	16
3. How is a Platform business model different from Linear Product business model	19
3.1 What is a Platform?.....	19
3.2 Types of Platforms in an Organization Context.....	20
3.3 Advantages of an External Platform over Linear Product Business Model	24
4. Hybrid approach – External Product Platforms.....	27
4.1 Challenges with an External Platform Business Model	28
4.2 Moving from Products to External Product Platforms	35
4.3 Case study I – Transforming a New Product into External Product Platform.....	37
4.4 Case study II – Transforming an Existing Product to External Product Platform.....	49
5. Conclusion	61
5.1 Guidelines for Transforming from a Product to External Product Platform	62
LITERATURE.....	65

LIST OF FIGURES

Figure 1 Different stages of a traditional product life cycle (Hauser and Dahan 2008).	7
Figure 2 Internet usage growth over the years (Number of Internet Users (2015) - Internet Live Stats n.d.).	9
Figure 3 Showing the growth of internet traffic across different phases of World Wide Web (Infographic: Evolution of Browsers and the Web n.d.).....	12
Figure 4 Showing the key business models that evolved along with internet growth.	17
Figure 5 Showing basic concept of platform.	20
Figure 6 Bass Product Platform Adoption Model for External Platforms (Sterman 2013)	26
Figure 7 Correlation between network effects and platform quality vs installed base (Lakhani, Karim, and Marco Iansiti. September 21, 2015.).....	29
Figure 8 Ecosystem of the Emerging Digital Platform Economy (Evans 2015)	36
Figure 9 Technology frontier curve for used vehicle pricing market	40
Figure 10 US used car sales from 2007 to 2015 (Edmunds.com 2014).....	41
Figure 11 Showing feature dependency matrix for HealthMeter platform.....	46
Figure 12 Possible multi-sided interactions for HealthMeter platform	48
Figure 13 Illustrates how building automation customer needs are changing over time (Moore 2014).....	50
Figure 14 Showing the different services offered by ESCO (Morgado 2014)	52
Figure 15 Showing major EMS players (Source: Verdantix Green Quadrant® Energy Management Software (Global) 2013).....	54
Figure 16 Range of estimated market penetration (2003-2012) and remaining ESCO market potential by market segment (Stuart et al. 2014).....	55
Figure 17 Possible multi-sided interactions for BEAM platform	59

LIST OF TABLES

Table 1 Comparison between Web 1.0 and Web 2.0 (<i>Aghaei 2012</i>).....	11
Table 2 Comparison of web 2.0 and web 3.0.....	13
Table 3 External Platform Challenges Comparison - Engagement vs Product Platforms	34
Table 4 Competitive analysis for used car market products	38
Table 5 Feature comparison for potential market competitors for HealthMeter.....	45

1. INTRODUCTION

The industrial revolution led to great innovations in machinery, methods and techniques for producing goods at a large scale. In order to compete and maximize their profits, companies primarily deployed a twofold strategy: generate high demand for the product being sold by spending heavily on marketing and optimize the production of goods to improve efficiency and reduce costs. This approach is often referred to as the *linear product development business model*. A big limitation with this linear business model is that over time, market for the product gets saturated and further optimization of already efficient processes gives diminishing returns.

With the advent of internet in the early 21st century, companies with new business models evolved that leveraged the power of connectivity and ease of distribution to look beyond the traditional linear product development model. These new internet based companies were able to target multi-sided market, where instead of being producers of a product, they provided infrastructure for the producers and consumers to interact with each other and do transactions using their infrastructure. Such businesses are often referred as being *platform business models*. A big advantage with the platform based business model is that they are able to grow exponentially. The more producers and consumers they attract, the greater is their appeal to other potential customers and producers.

Most present-day product companies, especially in the physical hardware space, are still following the traditional linear product development business model and are not fully taking the advantage of the widespread availability of internet. The primary goal of this thesis is to demonstrate how traditional product companies can leverage the power of digital economy and platform business models to transform themselves into a hybrid solution of *product platforms or ecosystems*.

The thesis is divided into four main sections (from 2 -5): Section 2 defines the existing linear product development lifecycle process and its key limitations. It then discusses the emergence of new alternate business models across different generations of the World Wide Web and the potential opportunities it creates for product companies. Section 3 formalizes the new internet driven business models as platform business models and then compares and contrasts the product vs platform approach. It further discusses different types

of platform business models that organizations can adapt. Section 4 discusses the challenges with the platform business model and how product companies can overcome these challenges by leveraging a hybrid *external product platform approach*. To demonstrate the implementation of hybrid platform product approach, Section 4 provides two real world case studies: one, an existing large multinational product based company and another, a small product based startup. The case studies discuss the limitations with linear product development only approach and how companies can enhance the value creation by transforming product into a product platform business model. The last section, Section 5, summarizes the product to product platform transformation process and highlights key points that product companies need to consider while going through this transformation.

2. LIMITATIONS OF LINEAR PRODUCT DEVELOPMENT & EMERGENCE OF NEW BUSINESS MODELS

2.1 What is Linear Product Development Business Model?

Linear product development business model, as shown in Figure 1 below, follows a four stage process: first, identify an unmet customer need; second, build a product to meet that need; third, sell the product in the market and finally, provide support, maintenance and enhancements and in the process extract value for the company. The success of the product is dependent on multiple factors such as how effectively the product captures the unmet customer need, how well the product is marketed and how widely the product is adopted by the end users. Due to economics of scale, once a company has launched a successful product, its goal is to sell large units of the same product to maximize profit.



Figure 1: Different stages of a traditional product life cycle (Hauser and Dahan 2008).

2.2 Limitations with Linear Product Development Business Model

In the linear product development business model, if the product becomes successful, new players start entering the market with similar cheaper offerings. This leads to more choices for the end consumers and some price sensitive consumers tend to shift towards substitute product offerings. To compete with these new product offerings, the incumbent product company needs to either reduce the price of its product or enhance the product's perceived value in terms of quality, brand etc. to justify the price being charged to the consumers. To compete in the market place, a product company is forced to continuously invest in enhancing its product offering and improve its operating efficiencies to increase profit margins. Often the product enhancements get constrained due to lack of resources or in house capabilities. Operational efficiencies also tend to decrease over time due to law of diminishing returns (the principle that a continual increase in effort or investment does not lead to a continual increase in output or results), as the product and its production and distribution mechanisms becomes more efficient.

Product companies realize that over reliance on one successful product is detrimental to its long term success and hence, at some point the company looks to innovate again and introduce a new product that follows a similar lifecycle. Every time a company launches a new product, it goes through the same cycle uncertainties and risks to make it successful.

Key challenges with each new product launch or enhancement to an existing product are:

1. *Will the new product or feature be successful? Is there a way to avoid the risks and uncertainties associated with launching a new product?*
2. *How does the company continue to benefit from its existing successful product in the long run?*
3. *How can a company maximize adding additional value and overcome financial resources and technical challenges to introduce new features in an existing product?*
4. *Can the product company eliminate or marginalize its competitors without getting into a price war, especially when the product or underlying technology is not protected by intellectual property rights?*

To address the above concerns, traditional product companies need to look beyond the existing product centric business models. The next section discusses the growth of internet across multiple generations and how companies leveraged this growth to develop alternate business models that overcame the limitations of the linear product development business model. It further highlights how digital economy has created new challenges for the product companies and how they can benefit by embracing these new business opportunities.

2.3 Growth of the Internet and Emergence of new Platform Business Models

Internet penetration has increased from 0.4 % of the world population in 1995 to 40% in 2014 (Number of Internet Users (2015) - Internet Live Stats n.d.). During the same time period, the number of websites increased from 23,500 to 968,882,453. The first billion internet users were reached in 2005, the second billion in 2010 and the third billion in 2014 (Total number of Websites - Internet Live Stats n.d.). Over the years, popularity of the internet has been on a constant growth trajectory, as shown in Figure 2, primarily due to companies coming up with new business models to leverage the power of connected world and engage and create more value for the end users.

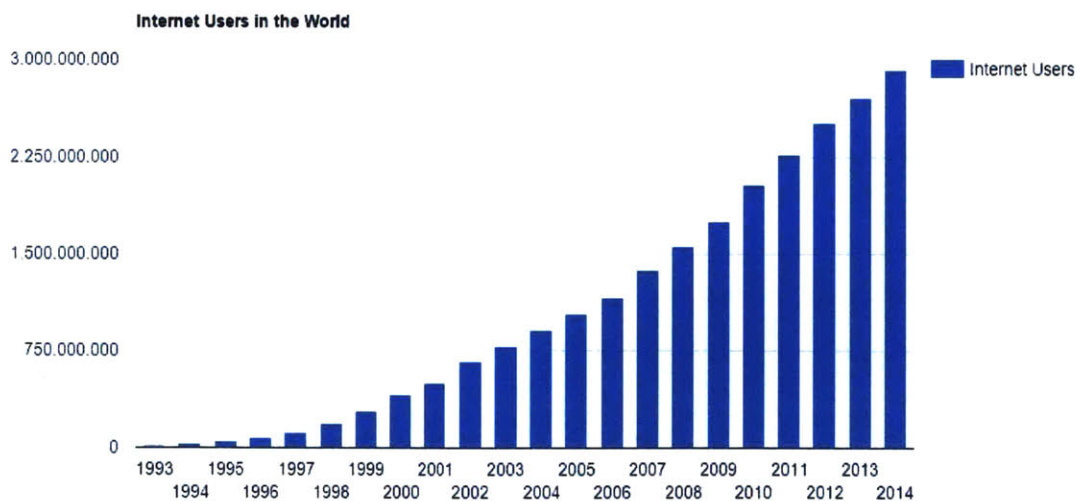


Figure 2: Internet usage growth over the years (Number of Internet Users (2015) - Internet Live Stats n.d.).

Based on both business and technology advancements, the growth of World Wide Web (internet) till date can be broadly classified under four phases, as below. Each phase

is an incremental step towards greater internet penetration and builds on top of the learnings from the previous phase, leading to new innovative ways of doing business.

1. **Web 1.0:** Often referred to as the *read only* phase of internet, Web 1.0 phase of the internet helped broadcast information to the users. Most of the websites in this phase were static and mono-directional, with very limited repeat value for the users to come back to the website. Most companies published websites in this era to promote their presence to the users and acted as an online version of the brochures and catalogs that they normally would distribute to spread awareness. However, unlike the printed material, one big advantage with publishing a website was its universal reach beyond a given geographical location. Certain businesses were able to leverage the location independence to their advantage. For example, newspapers such as NY Times were able to distribute news online to a much wider audience globally. E-commerce websites such as Amazon were able to sell products online to a wider customer base, without being restricted by the presence of physical brick and mortar stores. Commercial software companies such as Netscape were able to leverage internet to allow users to download their software without requiring a physical medium like CD/DVD to be shipped.

However, a big limitation with Web 1.0 phase was the lack of any interaction between the producer and the consumer. This limitation was one primary reason for the dot.com bubble burst during the 2000, where a number of startups such as Boo.com, with \$188 million investment to build an online fashion store, went bankrupt (Boo.com - an example of a failed ecommerce strategy n.d.).

2. **Web 2.0:** Web 2.0 phase, also referred to as *read-write* phase, introduced newer technologies such as dynamic html, asynchronous JavaScript, XML etc. that overcome the limitations of Web 1.0. This phase enabled consumers to interact with the producers and made the communication between them more interactive and participatory. Not only did this help the companies to get a direct feedback from the end users, it also helped users to share their knowledge and experiences with each other. For example, reviews by actual users allowed consumers to make better decisions while purchasing products; comments on news articles allowed users to

share and discuss their view points on a given subject; and experts could write articles or give their opinion on any given topic in the form of blogs. This massive increase in information exchange across multiple websites made it hard for the users of internet to find the right information and led to the need for collating all the information in one single place.

To solve this problem, a new breed of mashup companies came into existence that used content from multiple third party sources and displayed it on a common single interface. There were multiple mashup genres that were introduced including Mapping mashups such as Google Map API, Photo & Video mashups such as Flickr, Search & Shopping mashup such as Dogpile & Dealnews, News mashups such as Diggdot.us etc. (Merril 2003).

The increased consumer to consumer interactions led to a new breed of social media companies such as Myspace, Facebook, LinkedIn, YouTube etc., who unlike traditional news and media companies, did not generate their own content but provided infrastructure for consumers to create content and exchange it with other consumers.

Web 1.0	Web 2.0
DoubleClick	Google AdSense
Companies	Communities
Client-Server	Peer to Peer
Taxonomy	Tags
Owning	Sharing
Netscape	Google
Web forms	Web applications
Screen scraping	APIs
Dialup	Broadband
Hardware costs	Bandwidth costs
Advertising	Word of mouth
Services sold over the web	Web services
Publishing	Participation
Britannia Online	Wikipedia

Table 1: Comparison between Web 1.0 and Web 2.0 (Aghaei 2012)

As shown in Figure 3 below, by the end of Web 2.0 phase, the total global internet traffic increased from 500 PB/month to 5000 PB/month. This increased engagement led to a spike in online advertising taking traffic away from the traditional print and electronic media.

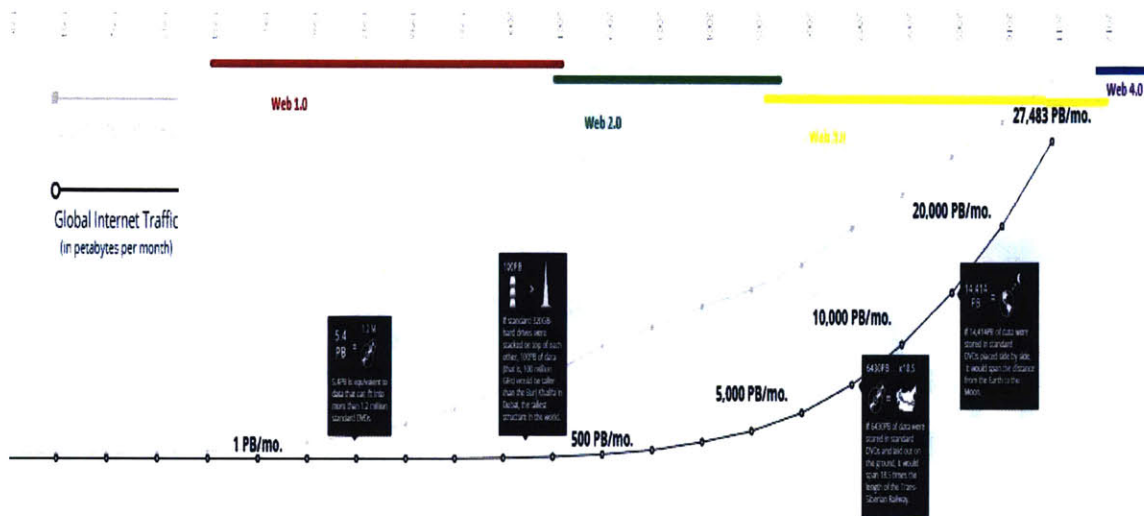


Figure 3: Showing the growth of internet traffic across different phases of World Wide Web (Infographic: Evolution of Browsers and the Web n.d.)

This phase, however, limited the full harness capability of the available information as the documents available on the internet were primarily for human usage. Besides, due to the enormous volume of information available and the escalating rate at which content continues to get published, Web 2.0 as a system was unable to integrate data that originated from different sources or in different formats.

- 3. Web 3.0:** This phase, also referred to as *read-write-execution* phase or semantic web i.e. the study of meanings behind words and information on the web, provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries. One of the largest organizational challenges of presenting information on the web was that web applications weren't able to provide context to data, and, therefore, didn't really understand what was relevant and what was not. By combining a semantic markup and web services, the Web 3.0 allowed the applications to interact with each other directly, and facilitated broader searches for information through simpler interfaces. Web 3.0 helped improve data management, support accessibility of

mobile internet, simulate creativity and innovation, encourage factor of globalization phenomena, enhance customers' satisfaction and helped to organize collaboration in social web (W3C Semantic Web Activity Homepage n.d.).

Web 2.0	Web 3.0
Read/Write Web	Portable Personal Web (mobile)
Communities	Individuals
Sharing Content	Consolidating Dynamic Content
Blogs	Livestream
AJAX, XML	RDF, Big Data
Wikipedia, google	Dbpedia, igoogole
Tagging	User engagement
Physical hardware	Cloud

Table 2: Comparison of Web 2.0 and Web 3.0

Web 3.0 helped existing internet businesses to further optimize their operation model. For example, it allowed search engines such as Google, Bing etc. to tailor make the search and advertising experience to individual's preference, helped online retail outlets such as Amazon, eBay etc. to offer customized shopping recommendations, specific to a consumer by analyzing all the previous transactions of the user and other users with similar purchasing habits. Web 3.0 enabled online streaming websites such as Netflix to offer recommendations based on prior viewing habits and interests of the user, and even leverage these insights to predict what type of movie or media content is more popular amongst the consumers. This helped them to streamline their investments in acquiring licenses for new media content. Facebook's Open Graph is a simple semantic service connecting site experiences together through shared data. The Edge Rank attention algorithm allows Facebook to publish a news feed by collating user generated content in terms of affinity (relationships with other users), type of post (some posts garner more response than others), feedback from other users (both positive and negative comments) and time (how fresh is the post). Twitter allows third parties such as Flipboard and Zite to curate magazine-style web experiences based on a network (or graph) of interests of followers.

Earlier, a big constraint for startups and existing product companies trying to enter internet space was initial capital for setting up and scaling the hardware. Cloud computing changed the economics of computing by allowing to pay only for the capacity that is actually used and it can scale rapidly based on demand. For example, Tivo, a startup in media broadcasting, leveraged the power of Web 3.0 to provide a digital video recorder that can search the web and read what it finds based on predefined user preferences. Most internet based startups, be it social media startups such as Pinterest, SnapChat, Yelp etc., online education startups such as Khan Academy, sharing economy startups such as Airbnb etc., all leverage cloud based infrastructure.

In Web 3.0 phase, widespread availability of smartphones further increased the growth of internet. Smartphones allowed internet to become accessible to even a wider audience and that too in real time, without requiring the end user to invest in a physical computer machine. As of 2015, as per eMarketer report, there are close to 1.91 billion users of smartphones. By 2018, this number will grow to 2.56 billion users, almost one third of the world's population (2 Billion Consumers Worldwide to Get Smart (phones) by 2016 - eMarketer n.d.). Accessibility to this larger user base of smartphone users has created many new business opportunities. Rovio, a gaming company, was able to transform its entire business model around one single mobile game, the Angry Birds. Angry Birds is one of the most widely downloaded app on smartphones across the world. Leveraging the power of its user base, Angry Birds franchise was able to generate revenue of \$200 million based on advertising, licensing fees from TV, films, theme parks, and merchandise such as toys, food products etc.

Yet another set of businesses, such as Lyft, Relay Ride etc., leverage the power of mobile internet to connect users and allow them to share their goods and services. These companies follow the sharing economy model by facilitating optimization of resources through the redistribution, sharing and reuse of excess capacity.

In a nutshell, with Web 3.0, businesses have been able to personalize the user experience and, provide mobile and always connected users with intelligent information to not only become engaged consumers but also as major contributors. Rapid growth of many startups using Web 3.0 technologies, even in B2B space, such as Synapp, Firefly,

and AppDynamics etc. has forced big enterprise corporations to leverage the vast amount of data and resources on the internet and provide a much richer user experience to the end customers.

However, Web 3.0 phase does raise some fundamental concerns regarding privacy of sensitive data and still poses challenges for highly regulated industries such as healthcare, finance etc. Even though linked data with machines helps infer much more intelligent information for the end user, participation is still human driven from producer to consumer.

- 4. Web 4.0:** Web 4.0, also referred to as *symbiotic* web i.e. interaction between humans and machines living in close physical association, typically to the advantage of both or *read-write-execute-concurrency* web, is still an idea in progress and is not clearly defined. On a high level, Web 4.0 envisions the entire internet to be a web operating system, which can act as a massive web of highly intelligent interactions in parallel to the existing human interactions. Machines can leverage the internet data to take intelligent decisions for humans without their actual intervention. For example, machines can act as intelligent agents and help you perform tasks be it motivating an individual for exercising, or ordering food based on your eating habits, or even scheduling your appointments based on your availability. Customer engagement will not be restricted to just the known customers but also to the unknown potential customers. Intelligent agents can empower customers to engage the businesses in the right place, at the right time.

Web 4.0 can help achieve a critical mass of participation in online networks that delivers global transparency, governance, distribution, participation and collaboration into key communities such as industry, political, social and other communities (Aghaei 2012).

For Web 4.0 to become a reality, machines or products other than just computers, tablets or mobile phones also need to be connected to the internet. Internet of things (IoT) is one step in this direction. IoT is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data (Internet of Things Global Standards Initiative n.d.). IoT allows objects to be sensed and controlled remotely across existing network

infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. Today, IoT is getting a lot of steam and a lot of companies are competing in this space. For example, many companies are trying to compete in the smart home space by connecting the different electronic devices over internet and leveraging all the data from these devices to facilitate monitoring, controlling and securing homes. Samsung with its SmartThings subsidiary is leveraging its existing electronic appliances business to build smart IoT appliances including television, refrigerators, vacuum cleaners, dishwashers etc., all interconnected along with the Samsung smartphone to build a complete connected home experience, where all these home gadgets can be controlled and monitored from a single interface. Similarly, Google entered the smart home market with the NEST thermostat acquisition and Apple launched the homekit framework for communicating with and controlling connected accessories in a user's home.

2.4 Digital economy Challenges and Opportunities for Product Companies

As discussed above, internet over the years has seen a rapid growth and greatly tweaked the way businesses are run. Today no successful business can afford to ignore the power of internet. Adopting digital technologies is a necessity than an optional growth avenue. As shown in Figure 4 below, internet growth in different phases led to multiple new business opportunities starting from ease of geographical reach to engaging users in content sharing via social platforms or goods lending via sharing platforms, or transforming the way users interact with machines.

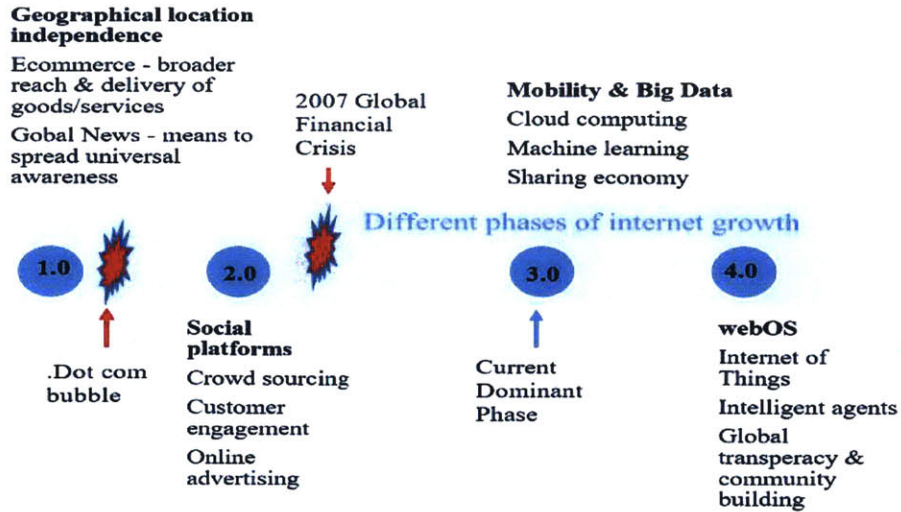


Figure 4: Showing the key business models that evolved along with internet growth.

Customers today are attracted to products that provide a comprehensive solution to solve a given problem. Product companies try to build a product that addresses customer problems, but are often restricted by both financial and human capital to build a comprehensive solution. Product companies can now address these limitations by:

1. **Connecting to a global audience using digital marketing:** Digital marketing campaigns have two major advantages as compared to traditional marketing: one it is more cost effective and second, the marketing impact can be measured in quantifiable terms. During the 2012 Olympics, Nike for example, instead of going to the traditional route of hiring elite expensive athletes, went with the average athletes and reallocated its resources towards running a digital marketing campaign. Nike was able to add additional 166,718 fans on its Facebook page and its digital campaign was much more effective as compared to traditional marketing (Nike Wins Facebook Brand Battle During Olympics | SocialTimes n.d.).
2. **Leveraging user driven innovation to innovate beyond the actual in-house product:** Product companies can successfully leverage outside company resources for innovation if:
 - the company is willing to share necessary information with the crowd
 - single individuals can do the pieces
 - enough individuals can be found and are sufficiently motivated to participate

- gaming and sabotage can be managed satisfactorily

To encourage individuals to participate and contribute to the product company's innovation process, product companies need to create incentives in the form of either financial benefit, or love in the form of entertainment, or socializing with others or contributing to a cause (Malone, Laubacher, and Dellarocas 2009). For example, Starbucks with its "My Starbucks Idea" program is able to request customers to submit their ideas on how Starbucks can serve them better. Starbucks evaluates each of the submitted ideas, validates it by asking other customers to vote on the idea and even implements some of these ideas based on its business strategy and financial goals. The crowdsourcing effort not only helps Starbucks to crowdsource company's innovation efforts but also helps increase customer loyalty and increase social interaction between the customers.

- 3. Providing collaborative experience to customer engagement:** Companies can leverage the digital technologies to provide personalized experience with the product and thereby, increase customer engagement. Cosmetic companies such as L'Oréal, Sally Hansen etc. are leveraging augmented reality technology to provide mobile applications that allow customers to try on makeup, nail polish colors etc. without actually using the physical product.
- 4. Exploring new avenues of value capture by leveraging intelligent data:** Growth of internet and social media networks has led to exposure of vast amount of information. Companies can run sentiment analysis on customer interactions related to their product to get more insights about how customers perceive their products. For e.g.: Lenovo built a "Lenovo Early Detection" system that performs text analysis on customer's feedback on its products. The system, within six months of its launch, allowed Lenovo to reduce issue detection time by 50%, 10-15% reduction in warranty costs and 30-50% reduction in the general information calls to its call center (Lenovo Shines an LED on Customers' Perception of Quality n.d.).

Internet has become an integral part of doing business at scale and has removed the barriers for individuals and smaller companies to create value without being handicapped by the limitation of huge capital investments. Product companies need to look beyond

physical products and traditional means of communication. In order to compete and remain relevant, product companies need to leverage internet for global customer reach, use data analytics to get more insights into customer behavior and business performance efficiency, facilitate complementors to create additional value to increase product stickiness and improve the overall customer experience. A more formalized way of achieving these objectives is to implement platform business model.

The next section discusses what we mean by a platform business model, different types or variations within platform business models and why platform businesses are advantageous as compared to product only businesses.

3. HOW IS A PLATFORM BUSINESS MODEL DIFFERENT FROM LINEAR PRODUCT BUSINESS MODEL

Before, we discuss on how a platform business differs from a product business, it is important to establish a common definition of what do we mean by the term *platform*. For an organization that plans to move from product business model to a platform business model, it is essential for all key stakeholders to have a common understanding of what constitutes a true platform.

3.1 What is a Platform?

Oxford dictionary defines platform as “*a raised level surface on which people or things can stand*” (platform: definition of platform in Oxford dictionary (American English) (US) n.d.). To elaborate on this definition further, this raised surface provides the speakers a place to stand and address the audience. For the audience, it helps them to clearly see and listen to the speaker, since the speaker is standing on an elevated stage. In the absence of this raised surface, the speaker will be a part of the audience and it will be difficult for him/her to address the audience in an effective manner. However, the elevated stage in itself does not provide much of utility if there is no speaker to stand on it and speak or there is no audience to listen to. At the same time, the elevated stage or platform will be more economically viable, if it can be used by multiple speakers to address multiple audiences across different events.

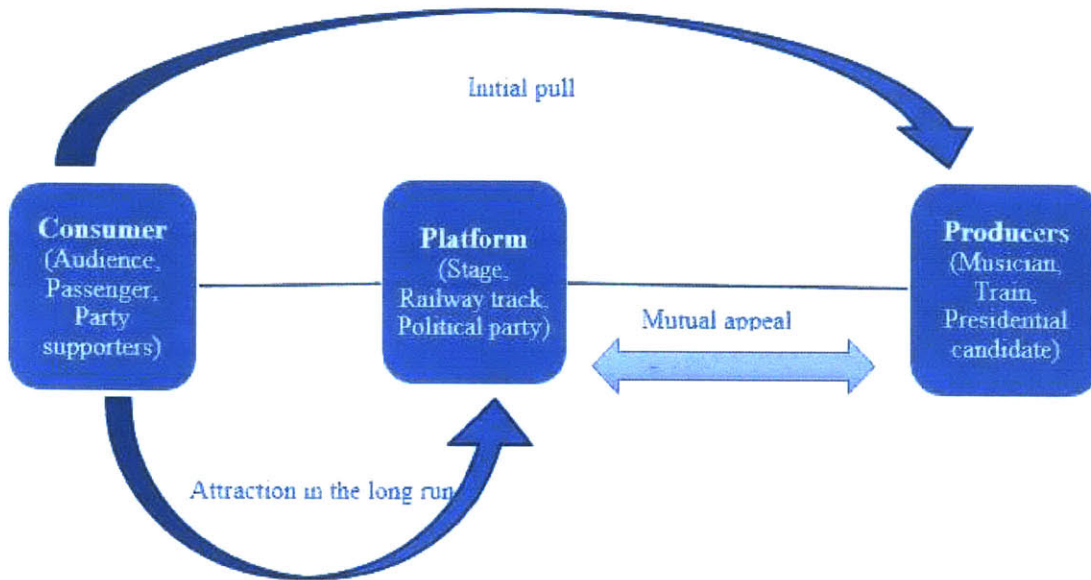


Figure 5: Showing basic concept of platform.

In summary, as shown in Figure 5 above, a platform provides an infrastructure for the producer of a content or service to interact with the consumer of that service. In the beginning, the consumers get pulled to the platform by the quality of producers. But over the long run, as the platform achieves trust and recognition from the consumers, it acts as a gatekeeper and filters out the good producers that generate maximum value for both the consumers and the platform.

3.2 Types of Platforms in an Organization Context

1. Internal platforms

Many research scholars and technology strategists have defined platforms in terms of either technology, industrial or business context. Prof Cusumano, in his paper “Industry Platforms and Ecosystem Innovation”, broadly categorizes platforms into two types: internal and external. Internal platforms are as a set of assets organized in a common structure from which a company can efficiently develop and produce a stream of derivative products (Gawer, A., Cusumano 2014). With internal platforms, the primary goal is to increase operational efficiencies to help launch multiple versions of a product in quick time without reinventing all the components for every new version again and again.

Two key advantages of implementing internal platforms are reducing complexity and overall development time. Nokia leveraged internal platform strategy with its multiple phone launches across different market segments. Over the years, Nokia defined multiple numbered series each having the same base mobile phone chipset and Symbian operating system with few additional features, mostly cosmetic look and feel, to create a different model of mobile phone in a very short development cycle. Nokia 1100 GSM mobile phone sold 250 million units and still holds the record for the largest selling mobile phone. For this phone, Nokia launched multiple versions, each with a slight variation such as 1100a, 1100b, 1101, 1108 etc. and each leveraging the same base internal platform.

Car manufactures leverage a similar internal platform strategy, where they invest considerably in building a common platform for multiple car models to reduce the overall development time. However, it can be costly and time consuming to build such internal platforms. Unless there is a clearly defined strategy on how to fully utilize the internal platform to leverage economics of scale, it can be a loss making proposition for the organization. The W-body is an automobile platform from General Motors that was built at the cost of \$7 billion and it took about 7 years to become operational. It was used to underpin mid-size cars with front-wheel drive such as Buick Regal, Oldsmobile Cutlass Supreme, Pontiac Grand Prix, and Chevrolet Lumina etc. By the time the platform finally got operational, General Motors was losing \$2000 on every one of its cars produced (Bhandari, Verma May 2013).

Another heavy usage of internal platforms is in software industry. With the growth of internet and heavy usage of computer software across every domain, be it healthcare, finance, manufacturing or any other industry, software over a period of time became quite complex. To ease the complexity of software, certain design patterns or best practices were defined. A key advantage with software as compared to hardware development process is the flexibility to make changes late in the development life cycle without incurring too heavy penalties in terms of cost or scheduling. This led to some of the key best practices in software development such as the concepts of modularity, abstraction and reusability.

Modularity in software design refers to logically dividing the different features or functionality of the proposed software into multiple sub units, thereby reducing complexity

and also, facilitating multiple teams to work on different modules within the software without creating any major dependencies between them. Another advantage of modularity is the plug and play approach. If a given module needs to be replaced in future, it can be done so easily without having to change or update other modules in a dramatic way. The definition for modularity can vary based on the industry. For example, in industrial design, modularity refers to an engineering technique that builds a product by combining multiple components. Each component may be further subdivided based on how economical it is to commercially produce the subcomponents and then combined into a component as compared to developing the component in its complete form. In industrial design, with modularity, the goal is to make the product as simple as possible and reduce overall complexity. Similarly, in manufacturing, the system that is being built is modularized, with clear specifications for each module to allow third party build those modules. This allows the manufacturing firm to work with multiple vendors without impacting the overall system quality.

Abstraction is another key concept used in software design wherein the goal is to hide the implementation details of a particular functionality, allowing clear separation of concerns. The abstract layer is a general implementation that can be further enhanced or customized by multiple products. This allows some sort of standardization across products and improves interoperability. For example, a user may be able to use a single sign on for logging into multiple products.

Finally, reusability in software design allows one to use the existing assets from a previous product into the new product and tweak it to the new product requirements, instead of spending time and effort into building the functionality from scratch. For example, if the previous product supported an export to text file feature, it can be reused and enhanced by the new product to export a file to excel format.

A key advantage of leveraging the above practices in software development led to a more formalized approach of building software called application programming interfaces or APIs. APIs by design expect specified form of inputs, use the user provided inputs to perform some operations and finally, generate outputs based on the processing they performed to the invoking user. Each division within Amazon, for example, has its own set

of APIs that expect a standard input and generate a standard output. This allows the different divisions within Amazon to leverage each other's capabilities with minimal human interaction and no ambiguities in understanding the exposed functionality.

2. External platforms

External platforms as products, services or technologies are similar to the internal industry platforms but provide the foundation upon which outside firms (organized as a 'business ecosystem') can develop their own complementary products, technologies, or services (Gawer, A., Cusumano 2014). With the growth of internet, these external platforms evolved into two distinct set of business models or ecosystems.

First business model allows the producers and consumers to interact with each other by providing the infrastructure for them to exchange and share information. In this business model, the primary goal is to engage as many producers and consumers as possible. Without the producers and consumers, this business model has no value creation of its own. The business model in itself does not provide any standalone product or services that it sells directly to the consumers based on its internal or ingrown capabilities. We can call this business model as *external engagement platform*, as it closely matches to our original definition of a platform, as shown in Figure 5 above (Section 3.1). Facebook, Angelist, LinkedIn, YouTube, Lyft etc. are examples of external engagement platforms.

Second business model that evolved over time is the product specific external platform. As companies optimized their internal operations by building internal platforms, they realized that other organizations may be running into similar issues. These companies used APIs to partially expose their internal functionality to the outside world over the internet and leveraged the power of crowdsourcing to allow new innovations on top of the existing products. For e.g.: Apple launched iPhone, a revolutionary product but at the same time opened up its operating system software partially to the outside developer community in the form of developer APIs. This allowed third party developers (producers), who are not actual employees of Apple, to develop applications on top of the Apple operating system. These applications further created additional value for the Apple iPhone customers. In this model, Apple still creates most of the value with constant upgrades to its smartphone. This business model can be defined as *external product platform*, as major part of the consumer

value creation still comes from the main product. Amazon extended its internal infrastructure and web services to the external world in the form of Amazon Web Services (external product) platform. Products such as DynamoDB and Elastic BeanTalk that were originally developed by Amazon to support online booksellers, were exposed to the outside world as virtual computer instances (Clark 2012). Amazon AWS platform not only exposed its internal platform capabilities to the outside world, but also allowed third parties to build products such as Scalr, CloudMGR and Enstratus etc. on top of the existing AWS infrastructure and tools (Third-party, open source AWS management tools offer unique benefits n.d.).

To summarize, internal platforms help an organization to optimize its internal resources and improve operational efficiencies. Product companies that plan to build internal platforms or have already established successful internal platforms can leverage internet to transform their internal platforms into external platforms and in the process open up new ways of creating value for their customers.

3.3 Advantages of an External Platform over Linear Product Business Model

A key question for product companies is why they should consider adopting the external platform business model. If one looks into the billion dollar startup club data from Jan 2014 till Oct 2015, the number of startups with evaluation of \$1 billion or more have increased from 43 to 125 (The Billion Dollar Startup Club n.d.). In the same list, within the same time period, the number of external platform companies grew from 14 to 60. Further, if we analyze the Fortune 100 companies based on market capitalization, the number of external platform companies have increased from 10 to 17 from 2010 to 2015 (FORTUNE 500: 2005 Archive Full List 1-100 n.d.). Many traditional product companies in the Fortune 100 companies such as General Electric, Walmart etc. are already leveraging the power of Web to transform themselves into an external product platform.

There are a number of reasons why external platform business model is advantageous as compared to a product business model. Some of the key advantages are highlighted as below:

- 1. Network Effects:** In economics and business, a network effect (also called positive network externality or demand-side economies of scale) is the effect that one user of a

good or service has on the value of that product to other people. When a network effect is present, the value of a product or service is dependent on the number of others using it. The stronger the network effects for a given product, the lesser is the significance of quality in determining its market success. Network effects can be classified into two types: Direct (same side) and Indirect (cross sided or multi-sided) network effects (William J. Wales, Parida, and Patel 2013). Direct network effects happen when the increase in usage directly leads to increase in value of other users. For example: many engagement external platforms such as telephone systems, fax machines, social media interaction etc. value direct linkages amongst users. Indirect network effects happen when the increase in usage of a product increases the value of complementary product and vice versa. For example: two sided markets such as operating systems, gaming consoles etc. have indirect network effects between the users and developers. External product platforms by exposing internal capabilities to outside world in the form of API and other tools help partners to engage and create additional value on top of existing platform infrastructure, thereby, increasing the network effects.

2. **Pull rather than Push:** Traditional linear product based approach is based on a Push model, wherein, a business starts with building a forecast of the product demand and then aligns all its resources to meet that demand. Success of the product is determined by the accuracy of the demand forecast. External platform business model, on the other hand, leverages the Pull based approach, which is based on attracting the users to the platform. This allows the platform to scale gradually as the demand grows. Attraction in Pull based approach can be on multiple levels: short term transaction based (eBay), long term relationship based (LinkedIn), bringing users together for a collective goal (Linux, Awaaz) or facilitating users to learn from each other (LiFung).
3. **Ability to scale quickly:** A standard product adoption cycle, as per Bass Diffusion Model, is based on the fact that adopters can be classified as innovators or as imitators and the speed and timing of adoption depends on their degree of innovativeness and the degree of imitation among adopters. In terms of system dynamics, new product adoption can be shown in terms of two major loops: Advertising and Word of Mouth, as shown in Figure 6. External digital platforms reinforce both these loops. By leveraging digital

marketing techniques, external platforms are able to greatly increase the overall adoption from advertising. Besides, the complimentary products offered by third parties on the external platform, further increase social contacts and hence, increase adoption from Word of Mouth loop. Lastly, with the large amount of user data captured internally or by acquiring user base from other services, external platforms can provide great efficiency in discovery and matching of the right output and further, enhancing the probability of contact with potential adopters.

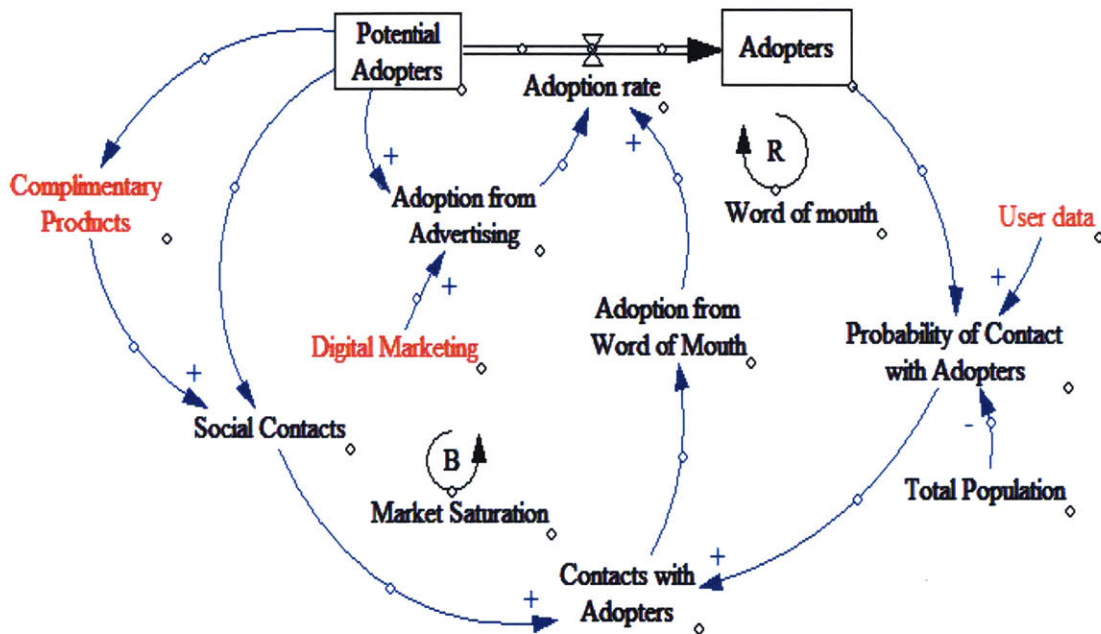


Figure 6: Bass Product Platform Adoption Model for External Platforms (Sterman 2013)

- 4. Ecosystem benefits without additional creative investment & liability:** In the external platform business model, the partner takes all the risk associated with the success or failure of the functionality it develops. Users may or may not like the feature offered by the partner. The external platform has the option to focus on the successful partner applications and find a way to take advantage of it. For example: Android OS included the torch functionality in its subsequent releases, as the torch applications became popular in its Play Store. Similarly, Amazon has all the data of third party sellers and the most popular products being sold by them. Instead of experimenting with stocking up inventory with items that users may or may not buy, it can optimize its strategy for adding new items to its catalog based on the sales data for these third party sellers.

5. Long term competitive advantage: Traditional product life cycle starts with a new innovation, which allows it to create a new market. It is often followed by multiple entrants who are able to replicate the innovation and introduce similar products in the market. However, in the case of an external platform, once it obtains a critical mass and if there are strong network effects, it is very difficult for new incumbent to dislodge the existing player due to high multi-homing costs. Often, the entrant external platform needs to find a new niche to enter into the market rather than just replicating the incumbent's features. For example, even though Google Search and Bing are comparable search engines with respect to functionality and search results, Google Search still dominates the market primarily due to its large amount of user data and ability to generate maximum value for its advertisers.

As the above points highlight, external platforms can be very lucrative and once successful can extract much more value than a standalone product. At the same time, since the barriers to entry are low, many new entrants can easily venture into the platform businesses space, especially in engagement external platforms. External platforms are difficult to execute and at times can take years to fully establish themselves. For example: it took more than 7 years for Alibaba to establish itself as a dominant ecommerce platform. Airtime, a Napster equivalent external engagement platform, took close to 2 years with \$33 million budget to build but still failed to gain attraction. Myspace and Friendster, social media engagement external platforms, gained initial attraction, but were unable to sustain user engagement in the long run.

In the next section, we will discuss how product companies instead of starting a new external engagement platform; can leverage their existing product and internal skills to build a successful external product platform.

4. HYBRID APPROACH – EXTERNAL PRODUCT PLATFORMS

Most successful product platforms in the current Fortune 500 list started as a product first and then later transformed themselves into external product platforms. This transition is often challenging both in terms of effort and resources. Before looking into the actual transformation of product to product platform, it is important to understand the challenges

involved in building an external platform. The next section highlights these challenges and gives examples of how successful companies have been able to overcome them.

4.1 Challenges with an External Platform Business Model

In a traditional product business model, user acquisition is quite straight forward. The product company needs to innovate by coming up with a product that meets the unmet customer needs and then define a good marketing strategy to create value for the customers and in the process extract value. However, in a multi-sided external platform business model, both producers and consumers are important. User acquisition, especially, on the producer side is challenging. The platform not only needs to provide the right tools for consumer engagement but also enough incentives for the producers to curate for the platform. Some of the key challenges faced by external platform companies are:

- 1. Understanding the “winner takes all” dynamics (WTD) markets:** For an external platform to become a monopoly or a “winner takes all” market, it needs to have strong positive network effects, high multi-homing costs and target a niche market with limited need for differentiated products. Very few companies have been able to achieve all three factors successfully. For example, Google Search dominates the search engine market, Microsoft Windows dominates the PC market, Amazon did it with its publishing business, and Bloomberg did it with its desktop terminal. All these companies started with a quality product and once it reached a critical mass, continued to scale due to strong network effects (Zhu and Iansiti 2007). Figure 7 below, shows how quality and install base are related to strong network effects. For an entrant to dislodge an incumbent dominant external platform is quite difficult. Only exception to the scenario is if the underlying technology becomes obsolete and users migrate to a better alternative. For example, with the increase in smartphone usage, Microsoft Windows and Google Search are losing relevance as most users are leveraging mobile OS and applications to interact with the internet. If the market already has an existing WTD platform, it is quite difficult for an entrant external platform to dominate the market. The market may still be lucrative enough that even if the new entrant captures a small percentage of the market, it can sustain itself. If there is no dominant external platform and the market is not a WTD

market, then the existing external platform may be subject to constant market pressures from new entrants.

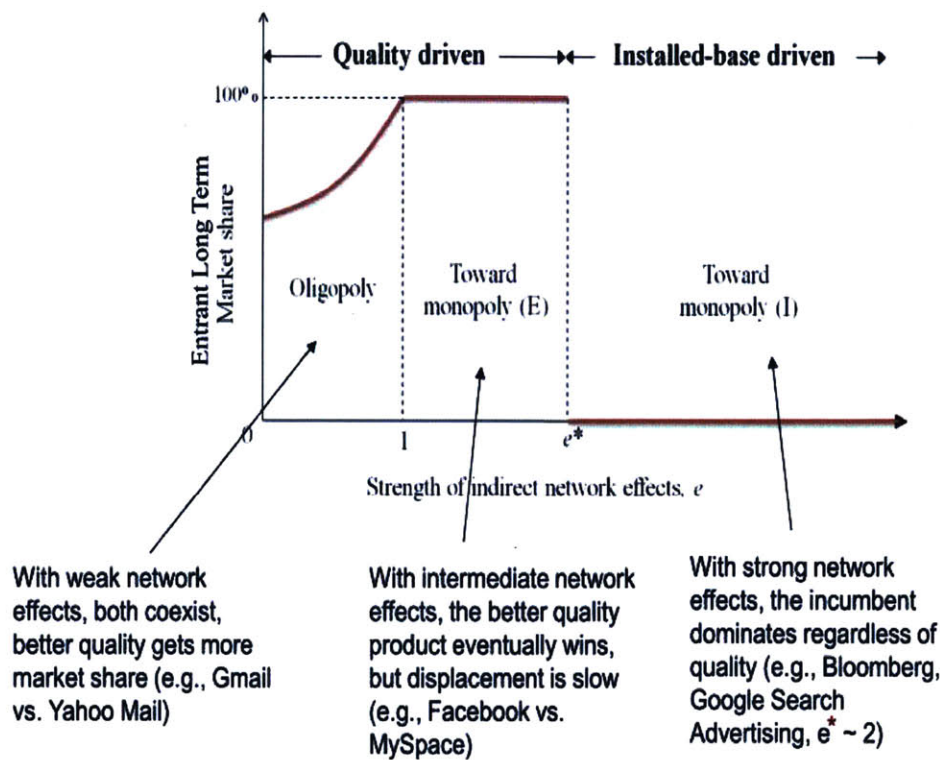


Figure 7: Correlation between network effects and platform quality vs installed base (Lakhani, Karim, and Iansiti. September 21, 2015.)

- 2. Solving the chicken and egg problem:** With external engagement platforms, the biggest hurdle is to attract both the producers and consumers to join the platform simultaneously. Since both sides reinforce each other, it becomes critical to look which side is more significant. The platform needs to pick the side which is hardest to get. For example, for Lift, as a ride service engagement platform, riders will only be encouraged to use the Lift application if they can find enough drivers. Drivers, on the other hand, will join Lift only if it is more profitable for them as compared to current market alternatives such as taxis, other car sharing services etc. Lift can incentivize the drivers to join the platform by helping them with the cost of driving the vehicle such as procuring loans for buying a car, discounted used cars purchase, helping with liability insurance etc. Once drivers are on board, it can provide discounted rides to customers to help them onboard the platform. Other platforms may deploy different strategies. For example: Twitter leveraged celebrities to sign up for twitter accounts and used their fan

following to make twitter popular. Microsoft hosted a big Xbox release event with endorsements from big celebrities to establish a level of trust with the developer community that Microsoft is in the gaming business for the long run and won't bail out of the business in future. It further provided tools for the developers to import their existing applications from other platforms to Windows platform without too much of migration effort. Google, instead of building a new network to compete with Apple, built a consortium of open source community to promote Android. Product platforms, however, have an advantage in this regard as they are already a producer of a product that they can directly sell to the customers and hence, can easily gain momentum with the consumer side. For a product platform, customer decision of joining the platform can be weighed in more because of stand-alone product benefits as shown in the below equation:

$$\text{Third Party Network Benefits} + \text{Product Benefits} - \text{Price for customer to join} > 0$$

- 3. Identifying the right incentives for curation:** With the vast amount of resources available over the internet and limited user span of attention, it is essential for external platforms to provide the right tools that minimize the effort of user content curation. Even with the right tools, the external platforms need to build in right incentives in terms of monetary benefits or social recognition, self-expression or simply due to the love of sharing. For example: one big advantage with Amazon as a marketplace is the number of customer reviews it has for each product that it sells. Amazon makes it easy for customers to read the most relevant ones by leveraging the users to rate usefulness of the existing reviews, confirming the authenticity of the reviewer by validating actual product purchase and even highlighting the top rated reviewers. Often the top reviewers that volunteer for more reviews are contacted by new product manufacturers to review their product for a monetary benefit in terms of free product or a discount. External platform companies that are looking for encouraging third party applications need to attract developers by providing them the right APIs and tools for development, building trust that the platform is going to exist in the near future and offering enough monetization incentives to compensate for their time. Product platform companies have an advantage in this regard, as with an existing successful product in the market, it is easier for them to establish trust and provide monetary compensation.

- 4. Organization challenges:** External platforms take time to execute correctly and may not have immediate returns. For an engagement external platform that is just starting business, organization design can grow organically as the company grows and the strategies for customer acquisition evolve. Initially, their main goal is to acquire a huge user base and all their efforts are to facilitate more interaction on their platform. However, in order for established product companies to transform into product platforms they need to look beyond the actual product for value creation and capture. This implies that the product organization may need to redefine its vision, core values, organization structure, performance variables and, commitment to work outside the internal boundaries with third party vendors to encourage and help them create value. The product organization needs to become comfortable with the concept that the goal is to maximize value creation for the consumers and producers. At times, the value capture may come more from facilitating large number of transactions with lower margins and not from maximizing profits with small number of transactions. The internal product should not compete directly with other producers in the product platform. On a contrary, the product should be leveraged as an example or stepping stone for other producers to build on top of the existing product. For example, OpenTable platform leveraged its own in-house reservation system to help restaurant owners automate their manual process of tracking reservation. Once some of the restaurants were on board with this new reservation system, they were able to leverage this network to launch their platform of offering online table reservations for restaurants. OpenTable used its reservation system product as a stimulus to attract restaurant owners to open up their vacant inventory of tables to its platform and did not try to maximize its gains from the value being offered by the actual product.
- 5. Applying the right monetization strategy:** For an engagement platform in a multi-sided market to succeed, one side of the market needs to be subsidized heavily to attract consumers to the platform. Normally, the side that is most price sensitive is picked. For example: Adobe offered the reader free to every consumer to read and print its proprietary pdf documents. Adobe charged the pdf creators a fee to use its commercial pdf generator software. The ratio of number of readers to publishers for any document is more favored for the readers. Adobe subsidized the reader's side to attract a large

number of users and charged the pdf content creators, who are relatively fewer and less price sensitive than readers.

However, there can be multiple exceptions for price sensitivity in multi-sided platforms. Price sensitivity may be ignored if the given platform market is either scale sensitive (lobster market where a tourist may buy only one lobster and is not too much price sensitive and multiple lobster vendors who are price conscious but would rather have more tourists than not paying a fee for setting up the shop), competition sensitive (one side willing to pay more to prevent competition from joining the platform such as keyword ad bidding), has recurring usage (charging price sensitive apartment building management for security monitoring than temporary tenants even though security monitoring offers more value for tenants), price screening sensitive (if quality is an issue on one side, higher price to that side can be a filter such as eBay seller listing fee), or not habituated to zero (users not willing to pay for content that is normally free to use such as email, keyword search, product listing etc.) (Tucker 2015). Product platforms have an advantage as compared to engagement platforms, as they can subsidize the product cost to the consumer and increase the perceived value of the platform to the consumer (kindle book reader device) without impacting any specific side of the platform. At the same time a product platform can be pressurized to maximize shareholder return by extracting more value from the platform at the expense of expanding the user base.

- 6. Avoiding negative network effects:** Negative network effects or congestion effects happen when increasing the number of users on the platform lowers the value of services being offered by the platform. For same-side markets, negative network effects can be even stronger, since *word of mouth* reinforcing loop as shown in Figure 6 above, can become a balancing loop instead. For example, luxury fashion accessories platform that invites famous designers or brands to list their products/designs, if starts inviting every other average designer in the market, may start losing its niche of catering to a rich customer base and reputed designers and/or customers may leave the platform as it no longer provides them exclusivity. To prevent negative network effects, brands such as Apple, Levi etc. have signed exclusive agreements with Amazon to avoid allowing

third party vendors to sell their products. As a product platform, Apple was able to avoid strong negative network effects during its launch of budget iPhone 5C.

- 7. Balancing platform openness:** Openness of an external platform refers to how much in-house capabilities access the platform should provide to the outside world including consumers, third party developers etc. For example: New York Times has put in a paywall to restrict the number of free articles an unpaid subscriber can read on it's website in a given time frame. Opening a platform can spur adoption by harnessing network effects, reducing users' concerns about lock-in, and stimulating production of differentiated goods that meet the needs of user segments. At the same time, opening a platform typically reduces users' switching costs and increases competition among platform providers, making it more difficult for them to appropriate rents from the platform (Parker, Alstyne, & Eisenmann, 2008). For example: Apple dominates the high end smartphone market with iPhone and the iOS operating system installed on it is closed to other manufacturers. Android mobile OS, on the other hand, is open to all manufacturers of smartphones. In the short term, because of superior iPhone and first mover's advantage, Google has been able to capture more search advertising revenue from iOS than from Android phones across all manufacturers (Manjoo 2015). However, with time Android is gaining more and more market share. Even though iPhone along with iOS is a superior phone, it may struggle to compete with Android in the long run due to weaker network effects.
- 8. Envelopment threat:** Platform envelopment refers to one platform provider moving into another one's market, combining its own functionality with the targets, to form a multi-platform bundle (T. Eisenmann, Parker, and Van Alstyne 2011). With the advent of internet, technology markets evolve quite quickly and companies operating in the technology space are under constant threat of getting obsolete. For example: Phablets popularity has been enveloping the tablets market. Point and shoot cameras are getting obsolete because of constant improvements in inbuilt smartphone cameras. Sometimes these envelopment attacks are forcefully launched by adjacent market platforms to envelop the current incumbent platform. For example: Google with its Google Plus platform tightly integrated with google search and email unsuccessfully tried to

envelop the dominating social media platform Facebook. Microsoft, on the other hand, was able to successfully envelop Netscape browser with its own Internet explorer browser by bundling it with Microsoft Windows and making it freely downloadable.

The above points, as summarized in Table 3 below, can help compare and analyze as to why it is advantageous for a product company to leverage its existing strengths to build a product platform rather than starting with a new engagement platform.

External Platform Challenge	Risk for Engagement Platform (EP)	Risk for Product Platform (PP)	Remarks
Winner takes all dynamics	High	Medium	PP slight advantage than EP, since it can leverage product value creation to penetrate some portion of WTD market.
Chicken-egg problem	High	Low	EP needs to start from scratch. PP can leverage its existing customer base.
Curation	High	Low	EP needs to build the infrastructure for curation. PP can leverage its existing internal tools and extend it to outside world for curation.
Organization challenges	Low	Medium	EP normally does not have prior org. baggage and can grow organically. PP needs to restructure its existing product based organization, which may take time & effort. If done correctly, PP can leverage tying effect to strengthen its platform.
Critical mass	High	Low	EP needs to start from scratch. PP can leverage its existing customer base.
Monetization	High	Medium	EP needs to identify correctly the right side to subsidize. PP can subsidize product to create more value for platform users. However, PP may be pressurized to maximize shareholder value.
Negative network effects	Medium	Medium	EP negative network effects can be overcome by continuously improving the platform infrastructure to support higher traffic. PP may avoid them by offering multiple product offerings.
Openness	Medium	High	EP may intentionally out in checks to prevent user base migration to other platforms. PP may be reluctant to share its intellectual property (IP) or trade secrets to outside world.
Envelopment Threat	High	Medium	For EP, if the enveloper platform is able to divert the user base it can become successful. With PP the enveloper needs to replicate the core product as well.

Table 3: External Platform Challenges Comparison - Engagement vs Product Platforms

4.2 Moving from Products to External Product Platforms

Startups in the external engagement platform space are relatively easy to establish since they are not pressurized immediately by return on investment and are initially more concerned on achieving high volume user interactions. Once they achieve the critical mass, they find ways to monetize the sheer amount of data generated from the user interactions. However, in established companies, due to pressure from shareholders, product companies find it hard to start a new engagement only external platform as the return on investment takes time.

An alternative for established product companies who want to enter into platform business is to take the hybrid approach of becoming external product platforms. Prof. Cusumano in his paper “*A strategy toolkit for platform leader wannables*” argues that not every product can or should become a platform. In order for a product to transform into a product platform, three essential criteria need to be met:

1. It performs at least one essential function within what can be described as a “system of use,” or solves an essential problem for many actors in the industry.
2. It is easy to connect to or to build-upon, to expand the system of use as well as allow new, even unintended end-uses.
3. It is difficult to substitute for (Gawer and Cusumano 2007)

First criterion essentially implies that the product needs to be the nucleus of the entire platform ecosystem. If one takes the product out, the entire ecosystem collapses. In today’s digitally connected world, each product even though part of a larger ecosystem, has the ability to perform that essential function. Taking out the product may not disturb the larger ecosystem, but will take out the actors associated with the product. In Figure 8 below, the web of interconnected ecosystems or platforms, each though connected to one another, have a central nucleus around it. For a product to become a platform, it needs to ensure that the value created by the product always exceeds the individual complementors, even if the sum of value creation from complementors is greater than the product. For example, Threadless, a designer t-shirt platform, allows designers to submit t-shirt designs, which are then rated by the online community and the top voted designs are printed on t-shirts and other merchandise, available for purchase on its ecommerce

website. The company shares a part of the revenue generated from the sales of these merchandise with the actual designers. Threadless performs the core function of manufacturing the t-shirts and distributing it to the consumers, without which the designs submitted by designers and the customers won't have much significance.

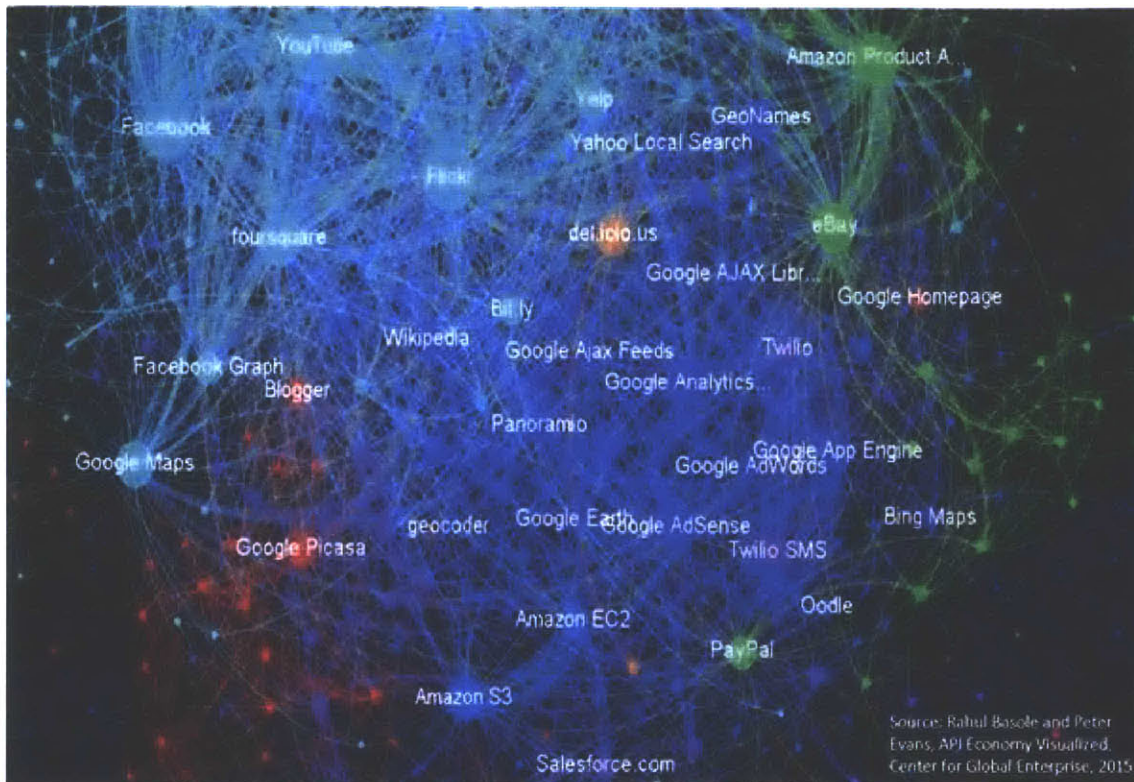


Figure 8: *Ecosystem of the Emerging Digital Platform Economy (Evans 2015)*

Second criterion involves the product providing the right infrastructure to allow third parties to create value. With the advancement in digital technologies and the rapid growth of internet, this criterion has become relatively easy to accomplish. Companies such as FourSquare and Bubble make it easy for products to set up websites and mobile applications with minimum technical knowledge. In the case of Threadless, it provides the right infrastructure for the designers and reviewers to contribute to the platform in terms of designs and reviews, respectively.

Third criterion expects the product to stand out in the market in the long run. However, this is true for any new product launch in the market as well. The product needs to be positioned correctly in order to distinguish itself from other competing

products. To stay ahead, the product needs to keep innovating with new features. Google Search got the initial attraction because of its PageRank algorithm. But over the years it has invested heavily in its search engine to remain ahead of competition. With the emergence of smartphones and the third party applications installed on it, search engine has become less relevant than before. The important difference between the product and platform is that in case of a platform, the company needs to find the right balance between enhancing its own product and improving the platform infrastructure for others to curate on it.

Digital technologies have lowered the effort required to fulfill the above three criteria for setting up a successful external product platform. To become successful external product platforms, product companies need to evaluate their internal core competency, identify a niche market with a unique value proposition and then build infrastructure to facilitate others to contribute to the platform. The next section leverages two real work case studies: one new product launch and another existing product extension to demonstrate how external product platform business plans can be executed.

4.3 Case study I – Transforming a New Product into External Product Platform

Given Situation: *Modern car has more than 250 different sensors attached to it. Company A owns an intellectual property (IP) rights for a technology that allows reading all the sensor data.*

Problem Statement: *Company A wants to start a new business that will help monetize this technology.*

Solution

- 1. Product Approach:** Build a device called *HealthMeter* that can be attached to the car and can read all the sensor information from the internal sensors within the car.

Market Analysis

Evaluate the current offerings in the market for serving the used cars market and understand their strengths and weaknesses.

Company	Description	Pros	Cons
AutoTrader	Large selection of cars for sale by private owners and dealerships including certified cars.	Car buyers have more choice & can evaluate a wide selection of vehicles.	Dependency on dealers for doing the actual transaction.
Beepi	Allows customers to buy and sell cars online. Each car sold by Beepi goes through rigorous mechanical checks.	Cuts the middleman and hence, lower costs as compared to certified dealership vehicles.	10 days return policy is too little a time to detect mechanical problems that may occur in future and need costly repairs.
Edmonds	Provides extensive analysis & reviews of new and used cars including pricing.	Free to use and estimate true car value including competitive price quotes from dealers. Supports monetization through advertising and referrals.	Information provided is generic about a given car make and model and may not necessarily help a buyer to evaluate the quality of a used car.
TrueCar	Provides information on what price other buyers bought a given car and helps negotiate the lowest price from dealers.	Car buyers that want a lot of price data before purchasing a car and upfront prices emailed to them from certified dealerships.	No guarantee in terms of the quality of the used car purchase in the long run.

Table 4: *Competitive analysis for used car market products*

Unmet customer needs

After evaluating the above companies, it can be inferred that the current solutions do not provide any history of the car's usage patterns and future mechanical issues. The short term certification period may not be enough to guarantee long term reliability of the used car.

Value creation

The device will generate a score based on the driving history of the car. The higher the score, the better the car condition. This score can be compared with other similar car scores to come up with what constitutes a bad, average, good or excellent condition car.

- a. Used car sellers can use the HealthMeter device to read the sensor data from the car and establish a true market value of the car, beyond the standard criteria of evaluating a car in terms of make, model and mileage.
- b. Rental agencies can then use the readings from this device to extract more value while selling their cars.

Value capture (monetization strategy)

The device can be attached to the car at some initial cost and then car owners can pay a monthly subscription fee for the actual data capture.

Potential Product Challenges

In the above product strategy, the main focus is on how to maximize the value capture. There are multiple challenges in achieving this objective.

- *How can we convince the sellers of used cars to deploy this device and make them pay for it?*

To help solve this challenge, we interviewed multiple used car dealerships & rental car owners. For the dealers, though they value the insights from value meter, cost of the device was a big concern. The main understanding that came from the dealers was that their profit margins are already minimal and a dealership owner would not like to invest in any aftermarket device that will hurt their bottom line. Besides, years of experience have helped them optimize their internal process of evaluating which cars sell more and which cars may be a loss making investment for them. Unless, the OEM installs the device as part of factory fitting, they won't be willing to pay extra for it.

As for the rental car agencies, they mostly buy new cars in bulk and sell them off rather quickly before they get too old to show any mechanical problems. At

the same time, customers for rental agencies may misuse the car while renting, which may result in cars getting beaten up much earlier as compared to regular usage by a private owner. A device like HealthMeter may become a hindrance for them to sell their cars, as only a few of the cars in their fleet will score high. The majority of the cars being sold will have a low score. Hence, after averaging their net car sales revenues, they may lose money by installing this device.

- *How much should we charge for the device and subscription?*

The product based positioning for HealthMeter is show in the Figure 9, below:

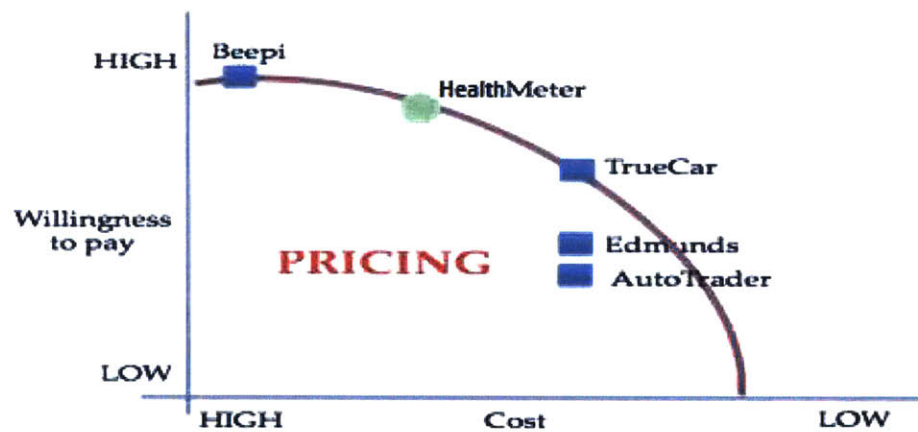


Figure 9: Technology frontier curve for used vehicle pricing market

Considering that the new car owners sell their cars on an average after about 6.5 years, an average family sedan sold by a dealership will have a difference of about \$1000 between an excellent condition car and a good condition car. Similarly, for rental agencies, even though the average life span for a car is 3 years, their margins between an excellent condition car and a good condition car are in the same range, due to the perception of the car being misused while renting. As per the latest used car industry report, Figure 10 below, the total used car market annual expected sales for 2015 are about 36.5 million, of which 23.4 million are certified pre-owned (CPO) vehicles. CPO vehicles pass through strict mechanical checks. There is not much value add a device like HealthMeter can provide to the CPO market, as all vehicles are roughly of similar condition.

So the actual used car market that the HealthMeter can capture is for the Franchise Used, which is about 11 million cars per year (Edmunds.com 2014).

Used Vehicle Sales Summary				
Year	Total Sales	Franchise Used	CPO	CPO % of Franchise Used
2007	38,279,709	11,254,935	1,696,050	15.1%
2008	36,145,967	10,172,824	1,694,950	16.7%
2009	35,621,479	8,573,516	1,529,800	17.8%
2010	36,911,180	8,726,558	1,640,150	18.8%
2011	36,920,834	9,386,972	1,742,400	18.6%
2012	37,582,716	9,992,034	1,833,700	18.4%
2013	35,775,755	10,793,385	2,082,900	19.3%
2014	35,909,884	11,241,271	2,340,500	20.8%
2015 est.	36,500,000			

* Franchise CPO Sales are included in Franchise Used Sales Total

Figure 10: US used car sales from 2007 to 2015 (Edmunds.com 2014)

After getting quotes from industry experts, the rough cost to fabricate a device like HealthMeter will be about \$10 million (very high level approximation). For a customer, true perceived value of HealthMeter is equal to the value of similar device in the market plus the additional differentiation that HealthMeter offers.

A device close to HealthMeter that is currently available in the market is “Automatic”, which provides the car owner driving record data and comparison of how the driver’s driving is compared to rest of the drivers using a device that fits into the car. It also provides additional features such as low fuel warning, code scanning, emergency alerts etc. The MRP of the device is \$99.5, though its price varies and is sometimes available on sale at Amazon for \$79.99. HealthMeter not only captures the car driving patterns, but also critical data related to vehicle condition (product differentiation).

$$\text{True customer perceived value of HealthMeter} = \text{value of similar product} + \text{product differentiation}$$

$$\begin{aligned} \text{Therefore, the true value of HealthMeter (approx.)} &= \$79.99 + \$21.1 \\ &= \$100 \end{aligned}$$

Break even cost analysis = \$10 million / \$100 = 100,000 units per year

= 0.91 % of total used car market of 11 million.

In order to calculate the monthly subscription fee, we can use the total customer lifetime value (CLV) of \$500 (considering the customer owns a used vehicle for 3 years before selling and having HealthMeter in the car will help the owner sell the car for additional \$1000 above the regular price).

Profit generated from the customer each year = x (to be calculated)

Revised customer lifetime value (assuming the dealer passed the HealthMeter price to the used car buyer) = \$500 - \$130 = \$370

No of years the customer uses HealthMeter = 3 years

Cost of customer acquisition = \$50 (fixed value in terms of marketing, promotions, trials etc.)

CLV = annual profit per customer * no of years – acquisition cost

$$\Rightarrow 370 = x * 3 - 50$$

$$\Rightarrow x = 420 / 3 = \$140 \text{ annually.}$$

Monthly subscription price = \$140 / 12 = \$11 (approx.)¹

- *How can we address the regulation challenges in terms of security & privacy? Who will own the data for the lifetime of a car? Will it be tied to the car, the device or the current car owner?*

HealthMeter will need to define clear segregation of user specific data and car specific data to ensure that the driver's personal location information is never disclosed. For example, if a user drives from location A to B, the actual driving path or time of driving will belong to the car owner who has the active subscription. However, the actual road conditions during the drive including tire

¹ Note: The above analysis is in no way complete or 100% accurate and is shown primarily for understanding the scope of value capture.

pressure, speed, highway vs city roads etc. will belong to the car and a new car owner can request for it similar to a Carfax report.

- 2. Hybrid approach (external product platform) for HealthMeter:** In a platform approach, we need to consider multi-sided market, the sellers, the buyers and other potential producers that can provide additional value to the platform. As discussed in the product strategy approach, the biggest concern for a used car buyer is the uncertainty around maintenance and repair costs in the long run. The product strategy is primarily focused on the sellers, since the sellers are the folks who can bring sales volume. In order to meet the breakeven analysis goal of 0.91% market share in one year, the primary customer shifts from the buyers to the sellers. However, seller's incentive may not be same as that of the buyer's. Sellers want to extract the maximum value from the used car at the point of purchase. As long as the used car doesn't turn out to be a lemon in the short term, a seller is not too much concerned about the future maintenance and repair costs. Having HealthMeter installed on the used car will help them sell a car at a premium.

Unmet customer needs – multi-sided market

- *Buyers:* Want to make an informed purchase for a used car and need a way to feel secure that the car will last for long time without any unforeseen costly repairs.
- *Sellers:* Have incentive for HealthMeter only if there is no upfront cost to them.
- *Third Party:* What incentives are available for them to build anything for HealthMeter platform, how easy is it to develop, what tools are available for developing applications on top of HealthMeter and what useful data does HealthMeter provide to help them build these applications.

Value Creation

To help define the product platform strategy for HealthMeter, we defined a full set of features/interactions that HealthMeter may need to accomplish to provide a comprehensive solution to the buyer. These features were validated through a small

survey of about 100 car owners. The participants were also asked to rate these features in terms of priority.

1. Predict future mechanical issues and repair costs
2. Compare given car's performance to similar cars and manufacturer's specifications
3. Guidance for operating, maintaining and troubleshooting the car
4. Store and access paperless maintenance records for the lifetime of the car
5. Discount on car insurance premiums based on good driving behavior
6. Access historical driving report (e.g., exposed weather conditions, highway versus city mileage etc.)
7. Fair valuation and pricing of vehicles based on HealthMeter score

Market Analysis

We expanded our market analyses based on the above 7 value creation goals and compiled a list of current organizations that provide these features in the market.

Table 5 below summarizes the findings.

Competitor	Req 1	Req 2	Req 3	Req 4	Req 5	Req 6	Req 7
alOBD scanner	No	No	No	No	No	No	No
Audiovox	No	No	Partial	No	No	No	No
Automatic	Partial	Partial	No	No	No	Partial	No
CarIQ	No	No	No	No	No	No	No
CarMD	Yes	Yes	No	No	Yes	No	No
CloudCar	No	No	Partial	No	No	No	No
Dash	Partial	No	Partial	No	No	Partial	No
GoPoint	No	Partial	No	No	No	No	No
Hughes Telematics	Yes	No	Yes	No	Yes	No	No
Imantics	No	No	No	No	No	No	No
Mojlo	Partial	No	Yes	Yes	No	Partial	No
Navdy	No	No	Partial	No	No	No	No
OBDroid	No	No	Partial	No	No	No	No
OpenCar	No	No	No	No	No	No	No
Piotek	No	No	Partial	No	Yes	Yes	No
Torque	No	Partial	No	No	No	No	No
Truvalo	Partial	No	Yes	Yes	No	Partial	No
Zubie	Partial	No	Yes	Yes	No	Partial	No

Table 5: Feature comparison for potential market competitors for HealthMeter

Value capture (monetization strategy)

After evaluating the 7 high level features, it is important that as a startup we realize that all the features cannot be built in-house and some of them may need help from the outside world.

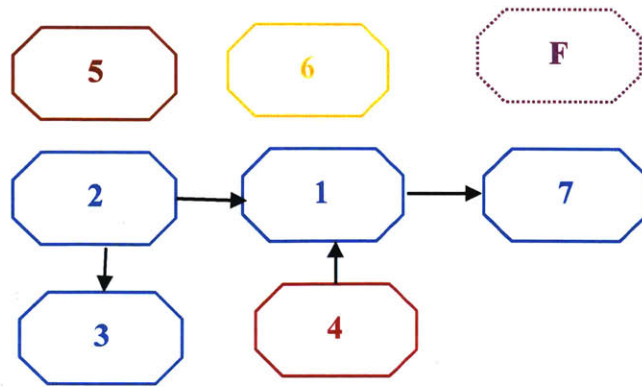


Figure 11: Showing feature dependency matrix for HealthMeter platform

The above Figure 11 shows the dependencies between different features and how they can be clubbed together as one common interaction. The boxes highlighted in blue color are dependent features and essentially form the core functionality of HealthMeter. The first criterion for a product to transform into a product platform is that it *performs one essential function, which solves an essential problem for many actors in the industry* (Gawer and Cusumano 2007). In other words, it targets a niche market, with little or no need for differentiated products, as discussed in Section 4.2 above. After doing market analysis on both car plugin devises and the current diagnostic tools, it became clear that none of the existing solutions target the uncertainty with future predictive maintenance and repair costs. The core functionality (features 1, 2, 3, 7) ensures that the consumers see HealthMeter as a valuable product that not only helps them overcome the apprehensions of buying a used car in terms of the right price based on the condition of the car but also help in reducing the uncertainty with future maintenance & repair costs. Including predictive maintenance as a core feature is essential for long term buyer engagement once the used card has been bought.

The second criterion for a product platform is that *it is easy to connect to or to build-upon, to expand the system of use as well as allow new, even unintended end-uses*. As a platform, HealthMeter needs to provide the right tools and infrastructure for outside world to interact with it. For example, HealthMeter can provide a mobile application to the mechanics and car owners that allows them to upload any maintenance and repair records (feature 4) without much effort. The application will be intelligent enough to read

through the different repair/parts codes etc. and store that information in the cloud for future reference. One way to accomplish this goal is to become backward compatible with all existing auto mechanic billing systems and then generate a standardized HealthMeter repair and billing record keeping format that can be consolidated for the lifetime of every vehicle.

Finally, the last criterion is that *it is difficult to substitute for*. For HealthMeter, since the technology to retrieve sensor data is already protected with patents, it is hard for competitors to overcome this bottleneck in the short term. As discussed in section 4.1, under WTD markets, the platform needs to generate strong positive network effects to achieve scale and hence, move towards becoming a dominant platform. For this, HealthMeter needs to keep on innovating and building new interactions on its platform.

One such interaction can be based on usage-based insurance. Usage-based insurance (UBI) is a new type of vehicle insurance in which the costs are dependent upon type of vehicle used measured against time, distance, behavior and place. UBI is poised for rapid growth in the U.S. According to SMA Research, approximately 36 percent of all auto insurance carriers are expected to use telematics UBI by 2020. However, the market needs to address certain challenges such as driver switching insurances or car owner selling the car to another buyer, privacy of driver data, continuous insurance coverage etc. (Dimitris Karapiperis et al. 2015). HealthMeter can enter the UBI market and can introduce additional interaction between the car drivers and the insurance providers by exposing public API for the car insurance providers. Using Health Meter's uniquely calculated *health score* based on both the driving data and condition of the vehicle, insurance companies can reward responsible car owners by reducing their insurance premium. Since HealthMeter is tied to the end user directly, independent of the insurance provider, it can offer a centralized repository for storing a given user's driving habits. This way all insurance companies can equally leverage the same driving data without incurring any additional cost of installing a telematics device or worrying about porting driving records from one proprietary format to another. Meanwhile, the car owners can have direct control over what driving information to share with insurance providers and

can easily switch between insurance providers. In short, *health score* can become a standardized credit score equivalent for a given driver or vehicle.

However, for the UBI interaction to work successfully, HealthMeter as a platform needs to build trust between the two parties and also define the right monetization strategy for the two sided market. The car owners need to be sure that no sensitive personal information is being shared with the car insurance companies and the insurance companies need to be sure on the reliability of the *health score* shared with them, with no scope for the car owner being able to filter out or tamper with the actual data.

HealthMeter can also make the large amount of raw anonymous driving data available to outside world for them to build applications to manage traffic or road congestion, determine the efficiency of individual components such as charging etc. Figure 12 below summarizes these interactions in a multi-sided market context.

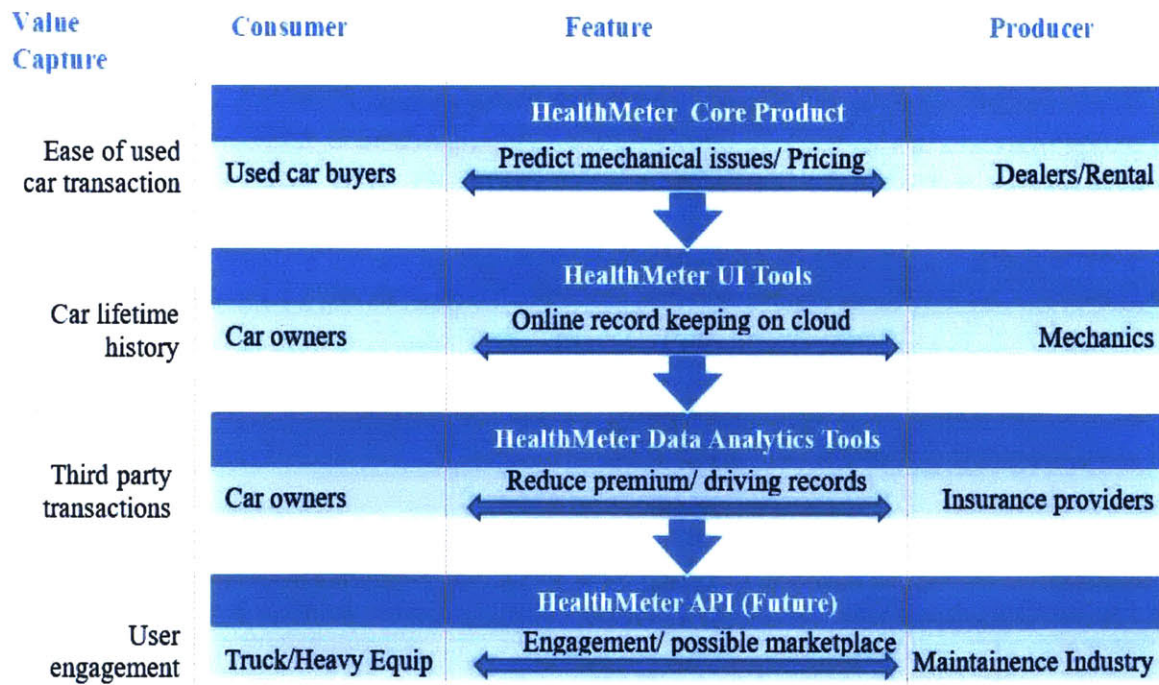


Figure 12: Possible multi-sided interactions for HealthMeter platform

Potential Platform Challenges & Opportunities

HealthMeter as a platform may take additional time to build as it will require time to build the right infrastructure for crowdsourcing these multiple interactions. Hence, the initial investment of \$10 million for hardware product production may not be enough and additional capital will be required to build the software part of the core component and additional external APIs for third party integration. It is important to prioritize these interactions based on maximizing initial user base to achieve critical mass. Focus should be on building one interaction at a time rather than working on every interaction at the same time.

HealthMeter can also envelop into adjacent markets of truck fleets and heavy construction equipment, which though a smaller market than used car market but can greatly benefit from the HealthMeter value proposition.

4.4 Case study II – Transforming an Existing Product to External Product Platform

Given Situation: *Company B is a leading player in factory automation equipment, automotive equipment, escalators, elevators, cooling and heating products, large-scale video displays for stadiums and arenas, solar panels and electric utility products. Company B wants to start a new business that will help them enter the building automation and energy market.*

Problem Statement: *The most energy consuming equipment in building automation is the HVAC unit. Company B already provides its factory automation customers with a solution called FAWorks that helps factories to optimize HVAC units and other factory related controls for energy efficiency.*

Company B also owns a 30% stake in Company Z, a software company that provides industrial automation software solution called INDAUTO for industries such as Automotive, Transportation, Building Control, Security, Food, Pharmaceutical, Machine Building, Oil, Gas, Petrochemical, Water and Wastewater and Renewable Energy. At present, Company Z partners with Company A in developing integrated software solutions for the Process Automation and Social Infrastructure global markets.

With the above assets how can Company B build a new business entity in energy management solution with revenue of \$100 million in the next 5 years?

Solution

- 1. Product Approach:** Company B can bundle Company Z’s product INDAUTO or FAWorks capabilities with the HVAC and Elevator business and sell it as a comprehensive solution to small medium organizations.

Unmet Customer Needs

Customers want an integrated end-to-end building automation and energy management solution that requires minimum human intervention. As illustrated in Figure 13, today’s building automation systems offer data collection and analytics capabilities for historical usage trends, predictive maintenance and benchmarking. However, current solutions require a lot of human intervention to ensure interaction between different building equipment and safety systems. Inherent complexity in handling multiple systems forces building owners to seek human intervention from specialized energy service management (ESCO) providers.

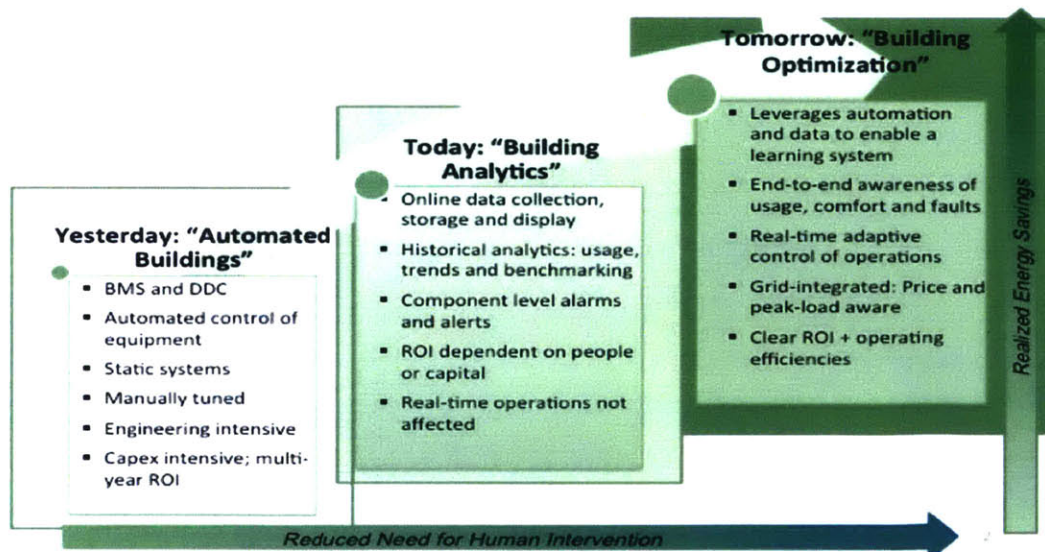


Figure 13: Illustrates how building automation customer needs are changing over time (Moore 2014)

Market Analysis

Building automation and energy management solutions can be divided into three broad market segments:

- a. MUSH market:** The MUSH market generally refers to properties that are owned and operated by government entities and by nonprofit institutions, such as municipal buildings, universities, other schools, and nonprofit hospitals. These governmental and institutional properties typically have tight operating budgets, but may be able to more easily access tax-exempt municipal leases or bonds to finance energy efficiency capital improvements. This market is primarily served by large energy management companies or ESCO providers (Kim, O'Connor, and Bodden 2012).

ESCO Competition Landscape

- Equipment affiliated - use performance contracting as a sales channel for their products.
 - Noresco (Carrier)
 - Honeywell Building Solutions SES
 - Johnson Controls Government Systems, L.L.C. (York)
 - Schneider Electric
 - Siemens Government Services, Inc.
 - Trane
- Utility affiliated - offer ESCO projects as a value-added service to attract and retain large customers and generally focus only on their utility footprint.
 - ConEdison
 - Constellation
 - FPL Energy Services
 - Pepco Energy Services
- Non-utility energy services - Non-utility energy services companies are product neutral, tend to have a larger geographic footprint, and typically offer a wide range of services from energy retrofits to renewable energy development.
 - Ameresco (Ennovate, E3, APS...Acquired)
 - The Benham Companies, LLC (SAIC Acquired)

- Chevron Energy Solutions
- Clark Energy Group LLC (formerly Clark Realty Builders, L.L.C.)
- Lockheed Martin Services, Inc.
- McKinstry
- Brewer Garrett

ESCO High Level Responsibilities

- Provide an Investment Grade Audit
- Engineer projects of appropriate size and scope
- Arrange project financing and assist the organization in understanding the available financing options.
- Procure and install the equipment
- Monitor and verify energy savings for as long as the customer wishes, often the entire contract term
- Provide, if requested, ongoing operations and maintenance savings
- Prepare reports for the customer detailing energy savings and a reconciliation plan if energy savings were to fall below projections

Energy Services Value Chain

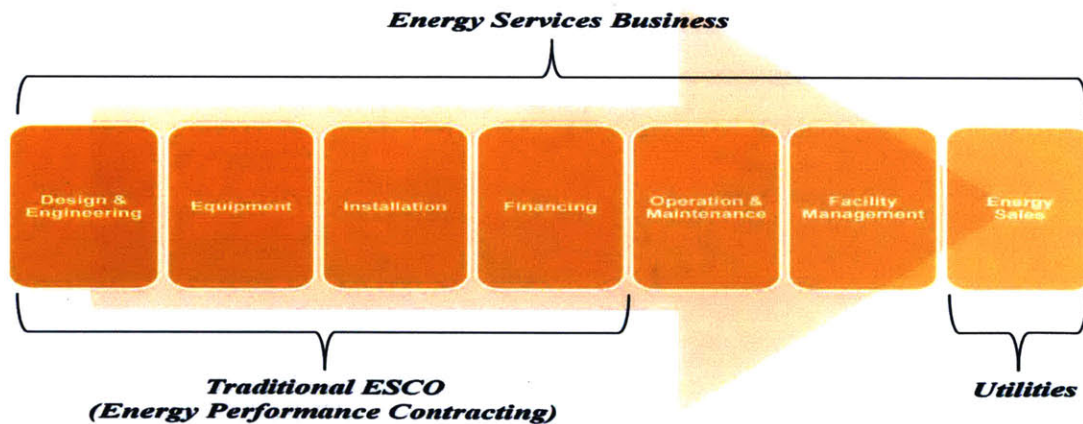


Figure 14: Showing the different services offered by ESCO (Morgado 2014)

ESCO Advantages

- Outsourcing of energy management with dedicated technical experts

- (turnkey solutions) focused on identifying and delivering energy savings
- Help customers understand their energy use and energy saving opportunities
- Can takeover risk and financing / investment

ESCO Weaknesses

- Not all ESCOs are capable of providing financial services and/or equipment
- Services can be considered expensive for most SMEs
- Contracts can be complex and require legal experts
- Sometimes focus on low cost measures (e.g. not building envelope)
- More expensive than if the customer did it on his own

b. Commercial & industrial market: This market is primarily concentrated on commercial facilities such as office buildings, apartment buildings, shopping malls, sports complexes, hotels & resorts etc. and industrial facilities such as logistics and distribution centers etc. The market is quite segregated and there are multiple players providing solutions for these standalone buildings. The solutions in this market are referred to as Energy Management Systems or EMS and are a combination of hardware and software solutions that are deployed on the building premises and the primary onus of maintaining the EMS system is with the building owners.

EMS Customer requirements (based on decreasing priority)

- Cost Savings
- Operation efficiency
- Corporate sustainability targets
- Compliance with legislation
- Risk mitigation
- Reputation Benefits

EMS Customer expectations (based on decreasing priority)

I. Must Have Features

- **Compatibility with existing BMS:** includes ability to extract data from existing BMS systems and perform data analysis.

- **Energy Monitoring:** includes energy efficiency identification, target setting and tracking, and trend analysis & forecasting.
- **Utility Bill Management:** includes ability to monitor basic utility payments to detect anomalies and process payments.
- **Problem diagnosis:** includes problem identification, maintenance scheduling and predictive maintenance through machine learning, beyond the basic equipment upgrades.

II. *Nice to Have Features*

- Data visualization for aggregated data including visual dashboards
- Real time monitoring of data
- Consulting services, for help with energy savings and data interpretation (CA Technologies, IBM, Schneider Electric Among EMS Leaders, Verdantix Says - Energy Manager Today n.d.).

EMS Major Players

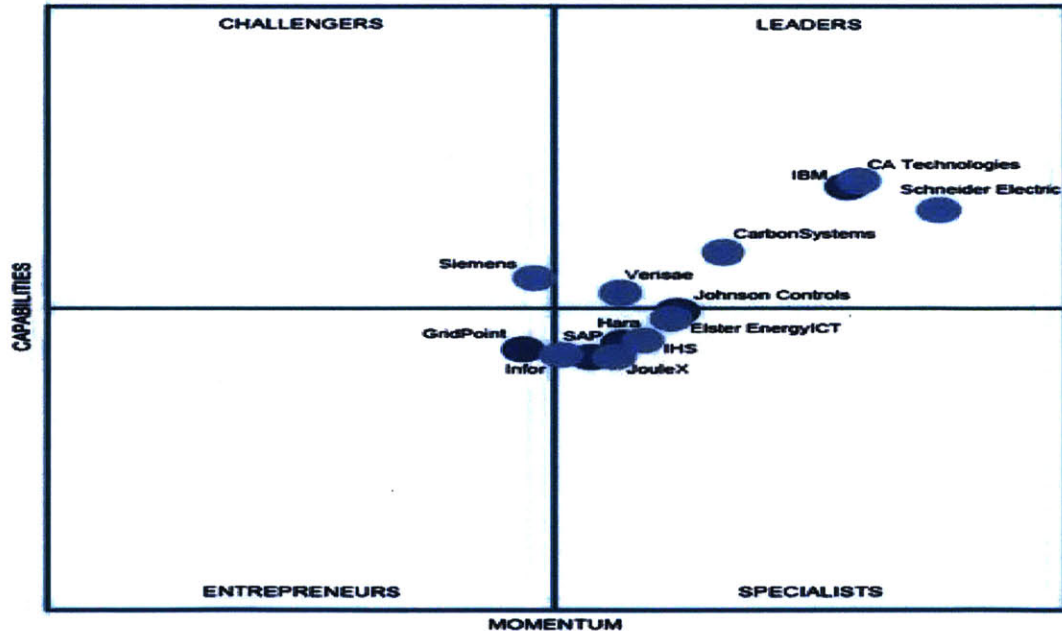


Figure 15: Showing major EMS players (Source: Verdantix Green Quadrant® Energy Management Software (Global) 2013)

c. **Residential:** This market is primary concentrated in solutions catered to individual residents and are generally driven by home use products. Companies such as Nest, Honeywell etc. make products for this segment. Even though this is a growing segment and multiple players including Intel, Apple, Wink, Samsung, Cisco etc. are entering this segment, Company B as a company does not have existing products or business to consumer (B2C) relationships to compete in this space. Most of Company B's products are for large establishments such as elevators, commercial HVAC units etc. Besides, this is a low margin market since energy savings in a home environment is limited.

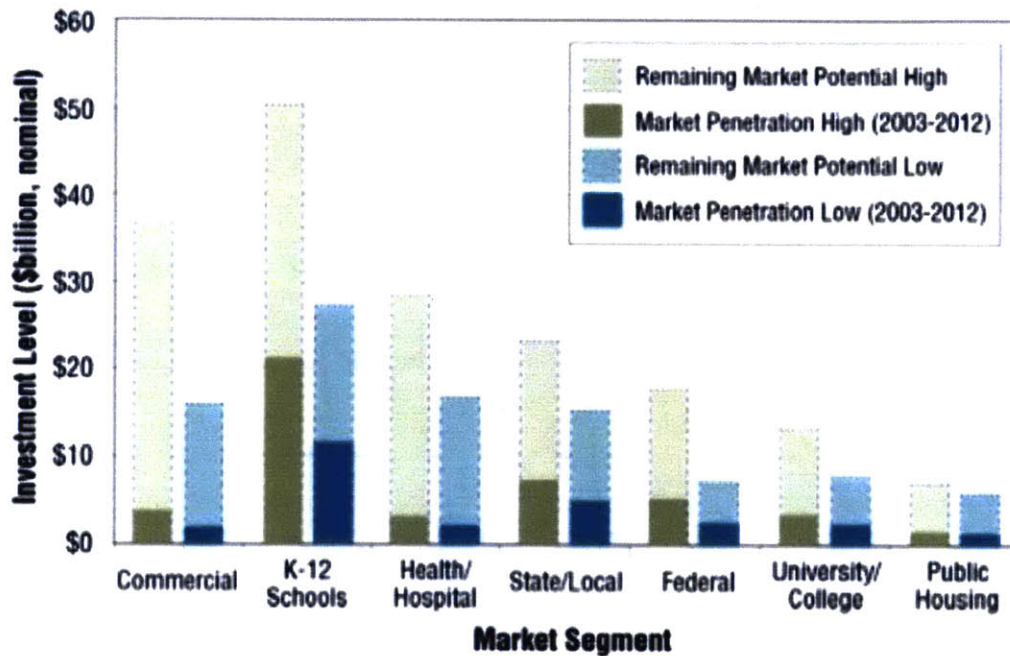


Figure 16: Range of estimated market penetration (2003-2012) and remaining ESCO market potential by market segment (Stuart et al. 2014)

As shown in Figure 16 above, commercial building sector has the largest remaining market potential and hence, looks the most attractive. Even though ESCO market is huge, becoming an ESCO provider is a very difficult proposition for Company B as it lacks the capabilities to build a full suite of functionality such as financing, service providers, performance contract bidding etc.

Value Creation

Company B can use its existing energy efficient equipment manufacturing capabilities and bundle it with INDAUTO software. As a bundled solution, it can offer an EMS package and HVAC hardware to the commercial market segment. It can also leverage its existing relationships with customers to promote this solution.

Value Capture

At present, Company B customers prefer buying Company B equipment due to its better reliability, support service and overall energy efficiency. However, many times these customers get influenced by the EMS solution providers that they use. Since INDAUTO software cost is marginal as compared to the hardware being sold, Company B can extract more value from the bundled EMS solution and hence, meet its financial goal for the next five years. Bundled offering will also make their existing hardware equipment more attractive to the existing customers.

Potential Product Challenges

With the above approach, Company B will have to compete head on with the existing EMS players who are already ahead in the game in terms of EMS features being offered. INDAUTO as a software works well for industrial sector. But in commercial space, users expect an experience similar to other commercial daily used software. Just to reach a point of parity, Company B will have to ensure that the following features are available in the INDAUTO software in order for it to become a successful commercial software:

- Energy monitoring and targeting (setting targets and tracking , analyze trends and forecasting, weather normalization, benchmark facilities, calculate building ratings, budget, efficiency opportunities)
- Utility bill management (account tracking, bill accruals and validation, multi-tenant billing, energy rebate validation, chargebacks)
- Energy reporting and certification (identify trends/events, mandatory/volunteer energy reporting, dashboard visualization)

- Energy Project and portfolio management (assist in equipment selection, create and prioritize energy saving projects and track their progress with respect to cost savings)
- Carbon reporting and certification (emission factors analysis, capture fugitive emissions, validating accuracy, reporting)
- Energy procurement and risk management (analyze costs and tariffs, risks with procuring energy, multiple procurement scenarios, manage renewable energy certificates)
- Building maintenance (identify faults, diagnose problems, assess asset conditions, predictive maintenance scheduling, asset power factors)
- Energy asset management (directly control energy consuming assets or BMSs, automatic energy optimization, demand response strategies)
- Commercial and retail building raw energy data capture (onsite energy generation, environmental etc.)
- Commercial and retail building energy systems data capture (HVAC, lighting, refrigeration etc.)
- IT System integration and manual input (existing IT systems and third party technology systems integration e.g.: utility bill capture, spreadsheet import)
- Market data capture (weather data, utility tariff rates, energy benchmark information, financial incentives)
- Data architecture and scalability (reach time data capture and analysis, data normalization for large datasets, customization to specific customer requirements)
- Security and data audit (data change and recovery processes, data estimation, uncertainty, exception reporting, secure hosting environment)
- Master data management (define, configure and change organization hierarchies, data tagging, geo location tracking)

For INDAUTO to offer the above features to commercial market, it will have to simplify its existing industrial software. INDAUTO being an independent partner may

not have the same priorities. To be competitive in the market, Company B will need a commercial EMS package and also, may have to get into a price competition, which may not be too attractive option considering Company B's existing hardware is slightly more expensive than its competition.

- 2. Platform Approach:** As discussed above, EMS is a complex software with multiple features associated with it. Since commercial market segment is quite segregated and every customer may not be looking for full suite of features that the EMS package offers. The three major energy consumption devices in a building are HVAC, lighting and refrigeration. Ensuring energy efficiency across these three areas can provide a small building owner up to 70% of energy savings. Some smaller customers may just want a subset of these three features. We can use a platform approach to incrementally come up with a solution by leveraging complementary products from both outside and within the organization, and integrate as the new BEAM (Building energy automation and management) platform.

To satisfy the first product platform criteria of "*performs at least one essential function*" (Gawer and Cusumano 2007), Company B can start with its existing HVAC product and provide its customers with a heavily subsidized software component to optimize HVAC energy savings, online support and in turn capture a lot of customer usage data. This component can be a redesigned, simplified and user friendly subset of in-house FAWorks product. Company B can leverage its existing HVAC customers to solve the chicken-egg problem and ensure some initial adoption from the consumer side.

Second product platform condition of "*easy to connect to or to build-upon, to expand the system of use as well as allow new, even unintended end-uses*" (Gawer and Cusumano 2007) can be accomplished by exposing a public API for integrating with its FAWorks product and build relationships with the most popular lighting and refrigeration companies to help integrate them with FAWorks. These third party vendors should be incentivized to join the BEAM platform, as the platform gives them access to Company B customers and helps increase their sales. In fact, together with these third party vendors, Company B can market BEAM as a complementor to the

ESCO providers, especially the non-equipment and utility types, since they are not concerned about selling their own equipment and will be willing to pick any of the available equipment in the market based on quality and cost. BEAM can further expose this energy consumption data from the hardware devices through an open API that allows third parties to build useful applications on top of the published data be it for utility management, security audit, energy procurement, weather or utility tariff data. Figure 17 below provides details of how BEAM can transform into a product platform by leveraging both its internal strengths and external resources and facilitating multiple interactions.

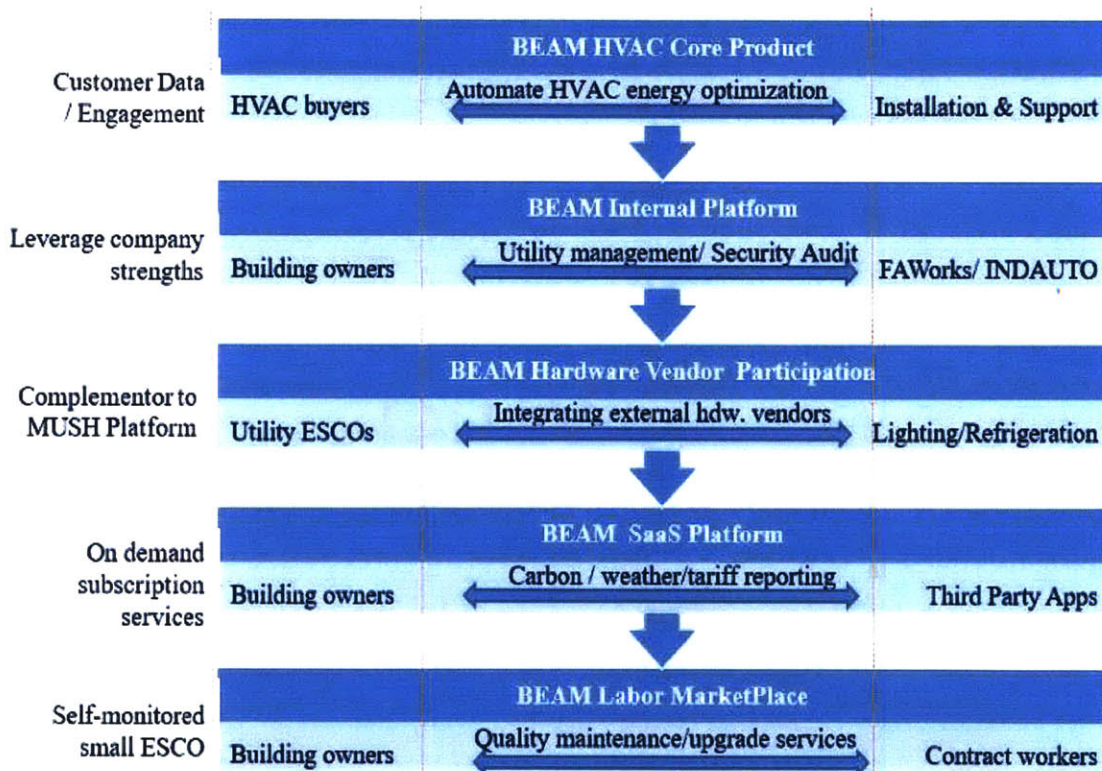


Figure 17: Possible multi-sided interactions for BEAM platform

Big HVAC manufacturers are busy addressing the larger and more lucrative MUSH market. Since the commercial market is mostly untapped and primarily driven by existing relationships and distribution networks, BEAM will be difficult to substitute by other non-equipment players. Thereby, satisfying the third product platform condition of “*difficult to substitute for*” (Gawer and Cusumano 2007).

Value creation

A big concern with the EMS solutions available in the market, based on the existing EMS customer interviews, is that they over promise and under deliver. Besides, every user has different set of needs and also wants to take control over what they want and how much they want to pay for it. Besides, small to medium customers do not have the infrastructure or the resources to deploy an on premise fully functional EMS solution.

BEAM platform with its cloud based application hosting can free the customers from expensive installation and maintenance costs including real time updates to their solutions. Besides, it can act as a SaaS (software as a service) based subscription platform, wherein the customers can choose and select the services they need (either internal or third party). BEAM can also provide useful insights to each of the customers on energy savings by collecting non-private data from each customer and doing analysis on the common patterns and best practices for energy savings. BEAM can provide a marketplace for building owners to directly employ contracts for equipment upgrades based on their quality ratings. Contracts can register with the BEAM platform to achieve better utilization and not over charge to offset their idle period in between contracts. Besides, BEAM can help quality contracts stand out based on the building owner feedback.

Value Capture

There are multiple avenues for value capture. With the BEAM internal platform, existing and new customers can get more value from their HVAC units purchase due to better control over its energy consumption patterns. This will help increase HVAC equipment sales. Partnerships with complementors such as access control, lighting and refrigeration companies will help building owners to pick and choose the equipment upgrades based on their budgets and potential expected savings, all through the common BEAM user interface. BEAM can charge a transaction fees for allowing other equipment partners engage with its customers. BEAM can expose some of the non-private energy data including equipment sensing data to allow third parties build additional applications on top of it such as carbon footprint monitoring, auto adjusting hardware equipment based on outside weather, diagnostics advisor for faults, IoT integration etc. Customers

can pay a subscription or one time fees to purchase these services over the integrated BEAM platform. In the long run, BEAM can enable more user engagement and collect large amounts of energy data, which can be used in future for more creative monetization strategies.

Platform Challenges

Building automation and energy management is a complex industry, with client having their own proprietary hardware equipment and existing building automation solutions. Backward compatibility with the existing infrastructure can be both time consuming and costly. BEAM will need to carefully analyze the consumer and industry market segment to identify the customers and their existing install base. To start with it will have to select the most common hardware equipment provide support for it.

Since most of the building automation projects happen due to existing relationships and strong word of mouth, BEAM will have to build a strong sales & customer support team to build a strong reputation. Each interaction within BEAM platform make take a lot of time to execute. Hence, enough due diligence needs to be performed to pick the interaction that can be scaled fast and has better monetary potential.

5. CONCLUSION

Advancement in digital technologies has made it imperative for product companies to look beyond the traditional product based approach and embrace newer methods of engaging and empowering the customers be it crowdsourcing, digital marketing or advanced data analytics. New emerging platform business models are quite powerful and have the ability to grow exponentially due to strong positive network effects. Once a platform achieves high critical mass, it can easily define the rules for the entire platform ecosystem, often to its own advantage. Product companies instead of getting associated with such a dominating platform, can form their own product platforms. Moving into external product platform model can allow the product companies create more value for the customers and stay relevant in the long run. The actual product gets shielded from price wars as even when the competitors can offer an equivalent cheaper product in the market. The new entrant product cannot offer the long tail of complementors that come with the incumbent product platform, which provide

collective value far greater than the standalone product. Once a product reaches market saturation, instead of building a new product from scratch, a product platform company can build more interactions on the platform and leverage its tying effect to launch products in the adjacent market. From real world case studies that show how product companies can transform from products to product platform, one can generalize certain best practices that can be applied to any such transition.

5.1 Guidelines for Transforming from a Product to External Product Platform

Based on real world experience of working with the above case studies and best practices learnt from platform domain experts, below are some of the key guidelines that any product organization should consider while moving to a product platform space.

- 1. Organization buy in:** Moving from product to platform approach needs often need mindset changes as both have different objectives. Product is focused on maximizing value capture whereas platform is focusing on maximizing the user interactions. Important thing to highlight is that even though the product platform is centered on the core product functionality, the collective value created by the complementary products around a successful platform is far greater than the individual product. Platform strategy needs a long term vision as it may take many years to curate a successful platform. Key stakeholders in the organization need to be on board and the metrics for evaluating the product platform success should not be primarily based on direct product sales but on the number of interactions and partnerships that happen on the product platform. Often, the product may need to be subsidized to initiate these interactions and in the short term, product platform may seem to be less profitable investment than a standalone product.
- 2. Evaluating in house capabilities & strengths:** A high level evaluation of the strengths and weaknesses of the internal organization structure: the existing product portfolio and the expertise in digital space such as web, mobile, analytics, partnerships and dependencies with outside vendors and market conditions etc. needs to be performed.
- 3. Avoiding existing WTD markets:** Winner take all dynamics market tend to incline towards becoming a monopoly. Unless the product company has a large amount of

resources and wants to compete directly head on with the current incumbent, it should avoid launching its product platform in the same competing market.

4. **Identify a niche:** The product company needs to identify an existing successful product or a new product that can capture a niche in a specific market and has the potential to leverage the strengths of the digital economy. Having a small niche market ensures that the platform's addressable market remains manageable and it is easier for the platform to cater the customer's unique needs. Besides, sticking to a small market allows the platform to avoid too much competition as there is little or no need for a differentiated platform.
5. **Moving away from the feature approach:** In a product based approach, the goal for every subsequent release or iteration is to improve the quality and perceived value of the product by introducing new features. Technology becomes a key enabler in implementing these new features. However, in a platform approach, every new feature or functionality is to enable more and more interactions. A product platform company needs to balance its finite resources between updating the platform with a new feature and facilitating the third party providers to create value through external applications.
6. **Prioritize interactions based on maximum returns:** In order to grow, a platform builder can try to build multiple interactions. The key is to prioritize each interaction based on the platform company's overall goal be it to increase user base, finding a way to monetize the existing interaction or increase in its own product sales.
7. **Leveraging existing customer base and knowledge:** Product company needs to leverage its existing technology innovations and internal platform capabilities and reuse it by exposing it to the outside world in the form of APIs. For testing the platform functionality, the product company can leverage its existing employees, product consumers, supplier network etc.
8. **Building trust:** Trust is an important factor for third party vendors to join your platform. Having a successful product helps a product platform company to gain trust as it creates confidence in the market place that the company is invested heavily in promoting the product platform. Another way to increase trust is to expose part of the in house product

specific feature design and technology to the third party developers. Even though exposing the internal functionality may lead to imitation by product competitors, it ensures the third party developers that they are not competing directly with the product part of the platform product.

9. **Willingness to embrace failure:** Curation on platform is a difficult challenge to solve. Every planned interaction may not always have the desired effect. It may be impacted by other external factors such as market conditions, technology changes etc. It is important to leverage data to learn why a certain interaction failed and then use the learnings to build a new interaction. Due to limited resources and the chance of getting distracted, it is always preferred to work with one interaction at a time.
10. **Building the infrastructure for scalability, backward compatibility and ease of use:** The goal of the product platform should be to make it an effortless experience for both the consumers and the producers to engage with the platform. This means that the product platform should be backward compatible with existing similar platform or products and can scale quickly if the product platform experiences heavy traffic both on the product and the platform.

As Peter Sondergaard, Gartner Senior Vice President in 2013 quoted at the Gartner Symposium “*In the new digital industrial economy, every budget is an IT budget, and every company is an IT company.*”(Gartner: Internet of Things Plus Big Data Transforming the World n.d.) It is for product companies to decide whether they want to live in the traditional linear product only world and constantly being threatened by an existing dominating platform or embrace digital technologies and transform themselves beyond products into digital product platforms.

LITERATURE

- “2 Billion Consumers Worldwide to Get Smart(phones) by 2016 - eMarketer.”
<http://www.emarketer.com/Article/2-Billion-Consumers-Worldwide-Smartphones-by-2016/1011694> (January 18, 2016).
- Aghaei, Sareh. 2012. “Evolution of the World Wide Web : From Web 1.0 to Web 4.0.”
International journal of Web & Semantic Technology 3(1): 1–10.
- Bhandari Arabinda, Verma Raghunath May 2013 “General Motors - A Corporate Governance Case Study. *Book Strategic Management: A Conceptual Framework ,Chapter 4 Strategy Formation*”
https://web.archive.org/web/20081105061020/http://www.ragm.com/books/corp_gov/cases/cs_gm.html (January 18, 2016).
- “Boo.com - an Example of a Failed Ecommerce Strategy.”
<http://www.smartinsights.com/digital-marketing-strategy/online-marketing-mix/boo-com-case-study-a-classic-example-of-failed-ebusiness-strategy/> (January 18, 2016).
- “CA Technologies, IBM, Schneider Electric Among EMS Leaders, Verdantix Says - Energy Manager Today.” <http://www.energymanagertoday.com/ca-technologies-ibm-schneider-electric-among-ems-leaders-verdantix-says-088053/> (January 19, 2016).
- Clark, Jack. 2012. “How Amazon Exposed Its Guts: The History of AWS’s EC2.” *ZDNet*.
<http://www.zdnet.com/article/how-amazon-exposed-its-guts-the-history-of-awss-ec2/> (January 1, 2016).
- Dimitris Karapiperis et al. 2015. “Usage-Based Insurance and Vehicle Telematics : Insurance Market and Regulatory Implications Dimitris Karapiperis.” *National Association of Insurance Commissioners & Center for Insurance Policy and Research* (March).
- Eisenmann, Thomas, Geoffrey Parker, and Marshall Van Alstyne. 2011. “Platform Envelopment.” *Strategic Management Journal* 32(12): 1270–85.
- Eisenmann, Thomas R et al. 2008. “Chapter 6 in *Platforms, Markets & Innovation* (ed. Gawer, 2009) pp 131-162 Harvard Business School Entrepreneurial Management Working Paper No. 09-030

- Evans, Peter (Center for Global Enterprise). 2015. "Energy Intelligence - Rise of the Data Layer." *2015 SEEA & AESP Southeast Conference. Atlanta, Georgia, October 28th to 30th, 2015*. <http://www.seeaconference.com/wp-content/uploads/2015/11/Keynote-Peter-Evans-Center-for-Global-Sustainability.pdf> (January 25, 2016).
- "FORTUNE 500: 2005 Archive Full List 1-100." http://archive.fortune.com/magazines/fortune/fortune500_archive/full/2005/ (January 18, 2016).
- "Gartner: Internet of Things Plus Big Data Transforming the World." http://www.datanami.com/2013/10/09/gartner_internet_of_things_plus_big_data_transforming_the_world/ (January 19, 2016).
- Gawer, Annabelle, and Michael Cusumano. 2007. "Appropriability, Proximity, Routines and Innovation. A Strategy Toolkit for Platform Leader Wannabes." *Druid Summer Conference* (1): 34.
- Gawer, A., Cusumano, M.A. 2014. "Industry Platforms and Ecosystem Innovation." *Journal of Product Innovation Management* 31(3): 417–33.
- Hauser, John R, and Ely Dahan. 2008. "New Product Development." *Marketing Management: Essential Marketing Knowledge and Practice* (2003): 179–222.
- "Infographic: Evolution of Browsers and the Web. <http://www.evolutionoftheweb.com/> January 18, 2016)"
- "Internet of Things Global Standards Initiative." <http://www.itu.int/en/ITU-T/gsi/iot/Pages/default.aspx> (January 18, 2016).
- Kim, Charlotte, R O'Connor, and Kendall Bodden. 2012. "Innovations and Opportunities in Energy Efficiency Finance." ... */WSGR-EE-Finance-* <https://www.wsgr.com/publications/PDFSearch/WSGR-EE-Finance-White-Paper.pdf> (January 18, 2016).
- Lakhani, Karim, and Marco Iansiti. September 21, 2015 "Class Notes: Module 2 : Facebook and the Economics of Networks." Harvard Business School Class: Digital Innovation and Transformation Section 01

- “Lenovo Shines an LED on Customers’ Perception of Quality.”
<http://blogs.sas.com/content/mfg/2015/04/14/lenovo-shines-an-led-on-customers-perception-of-quality/> (January 18, 2016).
- Malone, Thomas W, Robert Laubacher, and Chrysanthos Dellarocas. 2009. “Harnessing Crowds : Mapping the Genome of Collective Intelligence.” : 1–20.
- Manjoo, Farhad. 2015. “A Murky Road Ahead for Android, Despite Market Dominance.” *New York Times*. http://www.nytimes.com/2015/05/28/technology/personaltech/a-murky-road-ahead-for-android-despite-market-dominance.html?_r=0 (January 17, 2016).
- Merril, D. 2003. “Mashups: The New Breed of Web App-an Introduction to Mashups. *DeveloperWorks IBM*” : 1–13 <http://www.ibm.com/developerworks/library/x-mashups/x-mashups-pdf.pdf> (January 18, 2016).
- Moore, Brandy. 2014. “Optimizing Buildings Using Analytics and Engineering Expertise. Schneider Electric <http://www.schneider-electric.us/documents/buildings/br-optimizing-bldgs-using-analytics.pdf> (January 18, 2016)”
- Morgado, David. 2014. “Energy Service Companies and Financing. *International Energy Agency. Energy Efficiency in Emerging Economies* https://www.iea.org/media/training/presentations/latinamerica2014/8A_Energy_Service_Companies_and_Financing.pdf (January 18, 2016)”
- “Nike Wins Facebook Brand Battle During Olympics | SocialTimes.”
<http://www.adweek.com/socialtimes/nike-social-bakers-olympics/400405?red=af> (January 18, 2016).
- “Number of Internet Users (2015) - Internet Live Stats.”
<http://www.internetlivestats.com/internet-users/> (January 18, 2016).
- “Platform: Definition of Platform in Oxford Dictionary (American English) (US).”
http://www.oxforddictionaries.com/us/definition/american_english/platform (January 18, 2016).
- Sterman, John. 2013. “Bass Model System Dynamics.” <http://ocw.mit.edu/courses/sloan-school-of-management/15-871-introduction-to-system-dynamics-fall->

2013/recitations/MIT15_871F13_rec4.pdf (January 18, 2016).

Stuart, Elizabeth et al. 2014. "The U . S . ESCO Industry : Recent Trends , Current Size and Remaining Market Potential. *2014 ACEEE Study on Energy Efficiency in Buildings*" <http://aceee.org/files/proceedings/2014/data/papers/3-319.pdf> (January 18, 2016).

"The Billion Dollar Startup Club." <http://graphics.wsj.com/billion-dollar-club/> (January 18, 2016).

"Third-Party, Open Source AWS Management Tools Offer Unique Benefits." <http://searchcloudprovider.techtarget.com/feature/Third-party-open-source-AWS-management-tools-offer-unique-benefits> (January 18, 2016).

"Total Number of Websites - Internet Live Stats." <http://www.internetlivestats.com/total-number-of-websites/> (January 18, 2016).

Tucker, Catherine. 2015. "Pricing Platforms." *Session 12, Pricing Class*, MIT Sloan: 1–8.

"W3C Semantic Web Activity Homepage." <https://www.w3.org/2001/sw/> (January 18, 2016).

William J. Wales, Vinit Parida, and Pankaj C Patel. 2013. "Too Much of a Good Thing? Absorptive Capacity, Firm Performance, and the Moderating Role of Entrepreneurial Orientation." *Strategic Management Journal* 894(June 2006): 12.

Zhu, Feng, and Marco Iansiti. 2007 "Role of Installed base, Platform quality and Consumer expectations." Harvard Business Review Working Paper 08-031 http://www.hbs.edu/faculty/Publication%20Files/08-031_18af2edb-02de-45e6-b0ee-e10de3c99ef7.pdf (January 18, 2016).