

# Consistent Innovation is key to the profitability of Established Companies

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## Abstract

*The continued existence of established companies hinges on their continued ability to adequately and properly exploit their respective industries to maintain profitability. History is replete with established companies that were unable to sustain dominance of market positions in the face of changing market dynamics and increased competition. This report investigates how established companies rely on consistent innovation to not only maintain dominance of market segments but to also fend off competition from new entrants and maintain profitability. Importantly, innovation is used here to not only refer to improvements on product quality but expands to include adaptation of business models to meet the needs of changing market paradigms and evolving customer expectations. Six companies are investigated to validate the hypothesis about the role of innovation to the profitability of established companies. The history of these companies was explored while the evolution of their business strategies and financial positions were investigated using company annual reports and technical industry reviews by reputable industry and business experts. The findings show that five of the six surveyed companies adopted innovative business models and product offerings to stay ahead of competition and maintain profitability unlike the other which declined in the face of more innovative competitors.*

# 1 Introduction

The ever-changing world of business sees companies of different sizes and strengths competing for the dominance of ever-changing, evolving and dynamic markets. The evolution in particular business environments could be due to any number of reasons such as technological innovations, change in the taste of customers or unfavourable political and socio-cultural factors. Interestingly, history is replete with examples of companies that were subsumed by changing business environments mostly because they were unable to adapt to a new economic paradigm; a new way of doing things. Companies like Nokia, Research In Motion (RIM) makers of the Blackberry, Kodak and East India Company are examples of few companies that found themselves on the wrong side of changing markets leading to their significant decline. Conversely, companies like IBM, Sony, Intel and BT present examples of companies that were able to weather the storm even in the face of very stiff competition and evolution of their traditional industries.

Commerce has existed for thousands of years, arguably since the development of means of communication itself in man's early history, and fundamentally has not changed as it basically still involves the exchange of goods and services between different parties. One party trades goods or services with the other to mutually benefit both. However the scale of modern day business has changed dramatically, with popular products selling thousands or in some cases millions of units a year. The understanding of factors of production has also evolved with a greater emphasis placed on technical know-how, making the problem of assessing a company's success no longer a simple measure of the quantity of goods produced or services provided; success is the result of many more factors, some of which a given company has little or no control over, such as a changing business climate. Furthermore, there is a high correlation between the ability of companies to maintain dominance in a speedily evolving business market and their longevity and continued profitability. Most companies rely on the adoption of innovative business models and technologies to respond to such changing and dynamic markets.

This report presents an overview of how consistent innovative business models and technological approach enable established companies to not only maintain profitability in the face of increased competition but also in the face of unpredictable business environments. As stated in [1], "innovation is defined as the adoption of internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organisation and it encompasses the generation, development, and implementation of new ideas or behaviours". The primary focus of the report is on established companies which, for the purpose of this report, are defined as companies that "have existed or done something for a long time and are therefore recognised and generally accepted", according to the Oxford English Dictionary. This definition in the context of technology leaves a lot to be desired, as both general acceptance and lifespan of a given technology or product can change dramatically in a relatively short space of time; whereas it may take over 100 years to become established in other industries (i.e. Coca Cola established in 1886), relatively new players can claim dominance of almost an entire market in a fraction of that time (i.e. ARM established in 1990). It is therefore mostly general acceptance that will be used as a base measure of establishment for the purpose of this report. The ability not only to make a single profitable product but to continually and innovatively improve and adapt that product to meet new challenges allows established companies to 'make money' across multiple product cycles and thus stay profitable.

As part of this report's study, a number of established companies are understudied to observe and investigate their use of consistent innovation to not only stay profitable but also maintain dominance. Section One looks at three established companies - Domino Printing, ARM and Imagination Technology - and explores how they have stayed dominant in their respective markets and industries based on a series of presentations given by their personnels. Section Two on the other hand presents an overview of how three other established companies - BT, Intel and Nokia - have relied on innovative

practises to maintain dominance in their various industries. This section relies on a number of books, technical reviews by industry experts and company annual reports to ascertain the companies' varied business models and financial positions. While BT and Intel remain big players in their respective markets, the same is not the case for Nokia which has seen a decline in its dominance of the mobile phone market in the face of stiff competition in recent years. The Conclusion section summarises the report and draws conclusions on the role played by consistent innovation on the current standings and profitability of these six established companies.

## 2 Overview of invited companies

### 2.1 Domino Printing

Domino Printing, founded in 1978, is a leading supplier of Inkjet and laser printing products used primarily for the printing of packaging for consumer products. Domino is perhaps the ‘odd one out’ amongst the reviewed companies, with its main business removed from integrated circuit design and its market share not in high-volume consumer devices. However Domino qualifies as established for its prevalence in the packaging industry, providing printing solutions capable of keeping up with modern mass-production techniques. Most recently Domino launched its N610i, an inkjet printing press to rival the established UV flexography (effectively a modernisation of the letter press) in quality but with improved throughput. In this way the company supports the hypothesis that consistent innovation is key to the profitability of established companies.

However Domino’s approach to innovation is somewhat less direct than that of ARM and Imagination. These two companies rely on innovation and on an IP (Intellectual Property)-based approach to provide significant increases in performance between product offerings in order to maintain dominance. Domino on the other hand professes that a sizeable proportion of its business is founded on a technology created in the 1950’s (referring to inkjet). Domino takes the view that “the future is already here, it just isn’t evenly distributed”, and it is therefore in the distribution of its core technology that Domino strives to excel. This can be seen in the many applications inkjet technology is applied to across their range of printing products and its adoption in the market. It is very much this innovation in the application of long-standing technology to new or varied problems in addition to its refinement that secures Domino Printing’s future profitability and has made it a resilient player in its respective industry. Furthermore, this innovative business model is also buttressed by its identification of growing global markets especially in emerging markets such as in South America and Asia, the capture of which has transformed Domino into a profitable global player in the printing industry.

### 2.2 ARM

Although relatively young, founded in only 1990 as a joint venture between Apple Computers, Acorn and VLSI Technology, ARM now holds over 95% market share in the smart phone industry and over 60% in embedded (the two largest portions of its business). This huge dominance in its market, as well as its house-hold name, qualifies ARM as an established company. ARM’s business model is founded on intellectual property; the Cambridge-based company does not manufacture any of the microprocessors it designs. In fact the intellectual property on offer cannot be put directly to silicon without significant modification. ARM designs microprocessor cores to be used at the center of clients’ own system-on-chip (SoC) designs. It can often take years for licensed technology to make it to end users, and it is mainly when a chip containing ARM licensed technology goes into production that the company makes any long-term gain. According to the strategy detailed for investors on the company’s annual report<sup>\*\*\*</sup>, ARM aims to recoup the research and development cost of a product from selling licences of that product alone. However, as well as a licence fee for access to the technology, ARM receives royalties from each device made once the chip goes into production. In this way the company is able to secure its future profitability by its ability to leverage the market share and production capability of its partners and licensees.

It may appear that ARM’s contribution is a potentially expendable part of the SoC design process. Companies could choose to design their own processor cores from the ground up. Although this may well be an option for the largest multi-nationals, for the vast majority it is simply unaffordable.

Despite the length of time taken to integrate an ARM Core into a working product design, the cost of a licence for a core design is dwarfed by the time and vast capital expenditure involved in designing a comparable microprocessor from scratch. Therefore, it is reasonable to conclude that so long as ARM continues to offer quality microprocessor cores and remain at the forefront of the industry, companies will choose to licence its technology rather than risking the development of an in-house solution. This sits perfectly with the hypothesis that consistent innovation, where innovation in ARM's case is a significant increase in performance and power-efficiency and an IP-based business model, is key to the profitability of established companies, as without its leading edge in the embedded microprocessing industry, licensees may choose to move their business to competing IP purveyors with similar product offerings (such as Imagination technologies discussed in Section 2.3 below).

## 2.3 Imagination Technology

Another relatively young company, founded as VideoLogic in 1985, Imagination has also made its mark in the consumer electronic device market. Imagination Technologies licences its PowerVR graphics and DAB digital radio technology in a similar way to ARM, discussed above. Again, Imagination's prevalence in consumer smart phone and tablet devices, as well as its dominance in the DAB digital radio market (manufacturing their own Pure branded radios) earn's the company its "established" status. It is easy here to draw comparisons between Imagination, also a UK based IP firm, to ARM. Both offer intellectual property for a licensing fee, with royalties paid once a design reaches production. In fact the companies are in direct competition with each other. ARM's Mali line of GPU's (graphics processing unit) competes with Imaginations key offering in the smart phone and tablet industry, its PowerVR line. In addition, Imaginations recent acquisition of MIPS (one of the few architectures supported by the popular Android OS mobile operating system) brings the companies into further overlapping market space. Both can now offer potential licensees an integrated CPU GPU solution, reducing the further development required to produce a working SoC design.

However Imagination is also heavily invested in what it calls the RPU (radio processing unit) market space. It is this technology that powers its in-house Pure digital radio products. The company has been a driving force behind the promotion of digital radio technology, initially operating at a loss to produce its first sub £100 radio receiver the Evoke-1, in order to establish the technology and its position of dominance in the new market. Imagination now aims to further secure its future profitability by developing a general-purpose RPU, akin to the more popular general purpose processing units (a.k.a the CPU). Imagination recognises the current gap in the the consumer market for a technology capable of communicating over the variety of radio standards consumers have come to expect from their devices (WiFi, Bluetooth and FM radio to name but a few) in a single SoC package. The traditional solution to this problem is to include a dedicated chip for each standard a device is required to meet, a situation which leads to complexity and increased cost. As a testimony to its commitment to consistent innovation, Imagination aims to address this problem for consumers by providing a simpler,cheaper and seamless solution using its RPU. In this way the company supports the hypothesis that consistent innovation is key to the profitability of established companies.

## 3 Overview of selected companies

### 3.1 BT Group Plc

BT is reputed to be the worlds oldest telecommunications company having directly descended from the Electric Telegraph Company; the very first national telecommunications company in the world

which was established in 1846 [2]. Over the years, BT has grown from being a public company to being a wholly private enterprise since 1984 when the UK government privatised BT. Today, BT is a global enterprise with a market reach extending to over 170 countries. However, the journey to its current global status was not exactly a smooth one. With the deregulation of the UK Telecommunications sector in 1984, the industry was opened up to competition. Thus, from being a government-owned monopoly, BT now had to compete for market share with new entrants into the UK telecommunications sector while at the same time being answerable to its shareholders and investors; in essence, continued profitability was essential to continued survival and dominance. Interestingly, with the UK being the first European country to deregulate its telecommunications industry, BT was the first privatised telecommunications company forced to deal with new entrants and competitors in its domestic market [3].

To adapt to the new market dynamics and stay ahead of competitors, BT undoubtedly had to resort to new ways of doing things, in other words, innovative ways of doing business and delivering the best customer experience. This required innovativeness in not only the product offering but crucially also in the business model and improved operations since innovation goes beyond just dealing with customer experiences or improved technologies [4, 5]. For example, improved knowledge management techniques enabled companies like BT to adapt internal capabilities faster than the rate of change in the industry both nationally and globally [6]. Furthermore, another approach brought about by the increased focus on innovativeness was the increased focus of BT on internationalisation, i.e. its expansion into the global economy. In a sense, this is similar to the approach of Domino printing in expanding into emerging markets as illustrated in Section 2.1. This business model saw BT build alliances and even acquisitions [7, 8] in order to gain access to new markets so as to increase revenue, all aimed at improving its overall position and standing in the telecommunications industry. This strategy has seen BT metamorphose from a company with the UK business contributing over 96% of revenue in 1998 [9] to one in which the global operations especially emerging markets now contribute double-digit figures in revenue [10].

Another aspect of BT's response to the increased competitive market was improved product offering, partly driven by the transformation of the telecommunications sector to now include the delivery of integrated systems which include voice, data and video transmission over integrated networks [7]. The push to deliver improved QoS (Quality of Service) and improved product offerings (and value) to its customers (individual and business) also fuelled strategic acquisitions and alliances such as the formation of Concert - a company formed by BT and AT&T - aimed at pursuing a local-to-global-to-local network strategy to deliver better value to customers [7]. This increased focus on different aspects of innovation has enabled BT not only stay competitive globally but also led to impressive financial results which allow it to continue to invest in what it calls Investing for the future aimed at ensuring current gains are maintained and improved upon.

This strategy has also seen BT maintain a healthy annual investment in Research and Development of new products and technologies with the recent set up of BT Sport - which has now signed up more than 2 million customers - a clear example of this strategy [11]. BT's research partnerships with other companies such as Intel and Alcatel-Lucent also ensure it stays at the forefront of current industry technology. This is further evidenced by BT filing patent applications for 69 inventions in the 2012/2013 financial year to add to its over 4400 portfolio of patents and applications that year [10]. Furthermore, investments in innovations have seen BT improve broadband coverage and speed, transform costs and improve video delivery in recent years [10]. These improvements have also led to strong financial results in 2013 with BT maintaining the largest market share in the telecommunications sector (Internet and phones) [12] and increasing earnings per share by 26.6% and full year dividend by 9.5% [10].

### 3.2 Nokia

Nokia is a Finnish communications and information technology multinational corporation. It was once the largest mobile phone producer and advanced telecommunication technology developer. However, Nokia was not set up as a mobile phone technology company as mobile telecommunications had not yet even been invented when Nokia was founded in 1865. After World War II, Nokia was involved in many business areas including: paper products, footwear, communications cables, televisions and other consumer electronics. This diversity brought Nokia a lot of fortune but also a huge problem: the bloated company with too many market segments affected the company's future development plans and severely delayed the improvement design of products. Eventually, producing outdated products pushed Nokia into serious financial problems. Fortunately, as an established company, Nokia had enough resources and previous experience to stay relevant in the changing business environment it found itself in. For example, during the 1990s, the rubber, cable and consumer electronics divisions were gradually sold as Nokia continued to divest itself of all of its non-telecommunications businesses.

Interestingly, prior to the strategy change, Nokia had already developed many technologies on telecommunication area and merged with several radio communication partners. Those achievements gave Nokia major advantage over its competitors[13] and even led to the production of one of the very first mobile phones [14]. This new strategy based on innovation further enabled Nokia take advantage of new opportunities and technologies to drive innovation in the mobile telecommunications market. For example, Nokia was one of the first players in the mobile space to recognize that there was a market opportunity in combining a game console and a mobile phone, which many gamers wanted [15]. In the early years of 2000s, Nokia was always one step ahead of competitors in both mobile phone software and hardware development, such as self-developed smartphone operating system Symbian [16] and touch screen technology on phone [17], long before Apple's iPhone.

Apart from leading on the product innovation front, Nokia also focused on other business model related innovations as well, such as investing in new generation mobile network technology like GSM (Global System for Mobile telecommunication). Furthermore, Nokia overhauled its entire logistics operation in the mid-1990s, to make sure the products manufacture speed could meet up with the fast market requirements. These innovations and accomplishments worked to make Nokia the world's largest and dominant mobile phone manufacturer for the 14 consecutive years from 1998 to 2012.

With the solid success in the mobile phone market, Nokia's ambition was set into internet business where there was competition from the likes of Google, Apple and Microsoft. However, when Apple introduced its first iPhone into the market, Nokia didn't pay enough attention as Apple only owned 8.2% of smartphone market at that time, while Android only had 3.9% of the market at the time as well [18]. From 2007 to 2010, although Nokia still produced the best mobile phone hardware technologies over its rivals, the operating system Symbian was gradually outmatched by iOS and Android. Though Nokia released several improved models of Symbian, the slow innovation on the Symbian system in the face of the superior iOS and Android systems meant Nokia could just not compete adequately. This resulted in Nokia losing almost 30% of its mobile phone market share and many OEMs (Original Equipment Manufacturers) while Apple and Google on the contrary made extraordinary gains [19].

Eventually Nokia gave up Symbian[20] and allied with Microsoft[21] to compete with Google and Apple. However, despite this new partnership, the new Nokia phone with Window phone OS (Operating System) was still not favoured enough by the public to stop Nokias reducing influence and its market share continued to drop. In June 2011, Nokia was replaced by Apple as the world's biggest smartphone designer [22]. Most European franchisers believe that Nokia Windows phones compare less favourably with the Apple iPhone or Samsung Galaxy. Statements such as "They are overpriced



for what is not an innovative product” and ”No one comes into the store and asks for a Windows phone” summarise this perception [23].

Nokia's example illustrates the invaluable role that product and business model innovation plays in ensuring an established company maintains its competitive edge especially in the face of stiff competition from new entrants. While keeping one step ahead of its rivals undoubtedly contributed greatly to Nokia's early success, its inability to maintain or replicate this approach in the mobile phone market led to its downfall. Nokia could be said to have been caught out by its inability to innovate in such a way as to deliver products with better user experience than its rivals thus leading to a situation in recent years such as 2012 and 2013 where high investments and expectations have only led to poor and non-commensurate results [24].

### 3.3 Intel

Intel, founded in 1968, is a leading computer processor, chip set and graphics design and manufacturing company. Thanks to its 'Intel Inside' marketing campaign and early traction in the PC market, with the advent of IBM's 'Personal Computer', Intel has become the largest supplier of x86 architecture processors for desktop, laptop and server devices and dominates the high-performance computing market with over 80% market share in both consumer devices and servers to this day [25]. It is both the length of time the company has been trading, producing their first microprocessor in 1971 with SRAM and DRAM (static and dynamic random access memory) before that, and the extent of the company's market reach that qualify Intel as an established company [26].

In an environment where almost all microprocessor designers choose to operate without in-house facilities to commit their designs to Silicon (such as the likes of ARM and Imagination discussed previously) partly owing to the huge capital investments required [27], Intel stands out as the one company capable of producing leading IC designs on state-of-the-art Silicon chips. Intel's robust business model enables it distinguish itself on making higher quality microprocessors than its competitors, and has been working with Silicon transistors since its founding [28]. Intel was founded by Robert Noyce and Gordon Moore, of Fairchild Semiconductor who coined the famed Moore's law (predicting the sustained increase of transistor density over time). These two brought with them considerable expertise in the fledgling semiconductor industry which allowed Intel to adopt open innovation principles to make early progress in the sector and to develop a reputation for high-quality manufacturing techniques very early on. The adoption of open and sometimes closed innovation paradigms enabled Intel maintain the path predicted by Moore's Law and extend that success onto other sectors like communications and consumer electronics [29, 30, 31]. This not only ensured its long-term dominance but profitability as well.

This position of control over both the intellectual property and the state-of-the-art manufacturing processes of their microprocessor designs gave Intel a clear advantage over competitors [32, 33]. They are able to optimise their designs at every stage of the production process, and operate without the added expense of royalties per chip manufactured [34]. This results in unparalleled profit margins on its leading products that undoubtedly drives the company's profitability. That is not to say that Intel has remained unchallenged. The company has faced stiff competition from rival microprocessor design firm AMD, who offer comparable performance at a cheaper price point [35]. Intel was required to employ some very aggressive market strategies to keep AMD from gaining valuable market share, a tactic that cost the company over \$1.2 billion in settlements with AMD before its eventual decline [36]. However a superior product offering coupled with aggressive marketing and adoption of open innovation has allowed Intel to remain dominant in the consumer computing market.



Intel faces new challenges as microprocessor demand shifts towards mobile platforms, and away from ‘performance at any power cost’ computing. ARM has excelled by offering reasonable performance processing cores at very low power consumptions, and has therefore dominated the mobile computing market up to now. However, although maybe slow to react, the Intel design machine has turned its attention to low-power chip design, aiming to improve its standing in the growing server market space (growing as the PC market declines in the advent of cloud computing) and to break into the mobile market and compete with ARM for share in a market that continues to expand. If Intel is able to produce microprocessors of comparable power consumption and with the performance and backwards-compatibility of its current microprocessor offerings it may well be able to erode ARM’s near monopoly in the mobile device market. In any case, the company continues to offer year-on-year improvements in both the design and manufacture of its leading CPUs and will remain profitable whilst it continues to do so as posited by its annual report for 2012 [25] which showed its very strong financial position. In this way Intel’s business model clearly supports the proposition that its consistent innovation has been key its profitability and continued dominance.

## 4 Conclusions

In many ways, staying profitable in the very dynamic modern economic environment presents enormous challenges for any company, even the well-established ones. Failure to adequately adapt to the changing market environment could have dire consequences for such companies. As seen in the study of the presentations of Domino Printing, ARM and Imagination, these companies relied on a number of factors such as persistent innovation to maintain profitability. This hypothesis was further buttressed by the study of BT, Intel and Nokia which confirmed the relevance and importance of innovation to a company's viability. BT and Intel have maintained their dominance in their respective technology markets and are poised for continued dominance due to their ability to properly adapt to the changing market. However, Nokia on the other hand has seen a downturn in its fortune in the face of a changing mobile phone market mainly due to its inability to adequately innovate its business model to properly address the changing market environment. This has led to Nokia losing grip of its previously huge market share to now play catch up in an industry it had dominated for years.

The report's findings also posited that consistent innovation does not simply refer to a company updating its current products as fast as possible. Indeed, while companies could innovate existing products by using technologies, it is not the only option open for adapting to a changing and increasingly competitive market. Rather, innovation goes beyond the improvement of product quality to encompass the entirety of a company's business model and culture. The right business model enables a company make necessary changes that allow it continue to stay competitive in a given market and even capture new ones. BT and ARM were presented as companies that have been able to adopt this approach with attendant success as evidenced by their current strong financial positions and dominance within their respective markets. In fact, one of the ethos espoused by John Biggs of ARM during his presentation is that being able to maintain innovativeness is the true skill of doing business in a technical market, although he also admitted that this requires more than just experience and advanced knowledge. In essence, it could be said that only when an established enterprise fully understands the dynamic requirements and vagaries of its market, would it be able to adequately and consistently deploy innovative methods to achieve optimum profitability.

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## Appendices

<b>Group Member</b>	<b>Writing Task</b>
Arinze Ekwosimba	General editing of report, Wrote Abstract and Section Two (BT).
Kenneth Payne	Team Lead, wrote Introduction, Section One and Section Two (Intel)
Xuan Ban	Wrote Section Two (Nokia), Conclusion and Additional Notes

Table 1: Report writing task allocation

<b>Group Member</b>	<b>Research Task</b>
Arinze Ekwosimba	Gathered evidence on BT and Intel
Kenneth Payne	Gathered evidence on Intel
Xuan Ban	Gathered evidence on Nokia

Table 2: Evidence Collation task allocation

## A Statement of Contribution

Tables 1 and 2 below detail the contributions of team members to the project. While Ken Payne served as Team lead, Xuan Ban and Arinze Ekwosimba worked under his able leadership to ensure the project was delivered as required. All members did significant research and contributed to the report writing as well. The relative contribution of all authors is approximately equal.

## B Meeting Minutes

ELEC6049: Exploitation of Electrical and Electronic Technology (2013/2014) Group Meeting Minutes			
Date	05/02/2013	Location	59/Level 3 Labs
Time	10:40	Meeting No.	1
Meeting chair	Ken Payne	Note taker:	Arinze Ekwosimba
Attendees	Ken Payne Xuan Ban Arinze Ekwosimba	Absentees:	

Item	Subtopics
1. Project Requirements	<ul style="list-style-type: none"> <li>Discussed Report 1 - "How does technology make money: Established Companies"</li> <li>What are we required to actually do? We want to explore how established companies make money from technology (i.e., what strategy they use)</li> </ul>
2. Established Companies	<ul style="list-style-type: none"> <li>We briefly considered different companies - Google, Apple, Intel, AMD, ARM, Imagination</li> <li>Would have to narrow down list and carry out more detailed analysis of chosen companies.</li> </ul>
3. Visiting Companies	<ul style="list-style-type: none"> <li>We all to review financial statements (and relevant documents) of visiting technology companies - Domino's Printing, ARM and Imagination Technology. [Note: Task for all members]</li> <li>Try to understand their strategy (how do they make money? how do they stay ahead of competition?)</li> <li>Devise possible questions for speakers</li> </ul>
4. Question	<ul style="list-style-type: none"> <li>Are we expected to look at companies from one industry or can we look at companies in multiple industries? Does it matter? *Ask lecturers during tutorial next week*</li> </ul>
5. Next Meeting	TBC
6. End Time	11:12

Figure 1: Minutes of the first group meeting



**ELEC6049: Exploitation of Electrical and Electronic Technology (2013/2014)**  
**Group Meeting Minutes**

<b>Date</b>	19/02/2014	<b>Location</b>	59/Level 3 Lab
<b>Time</b>	10:40	<b>Meeting No.</b>	2

<b>Meeting chair</b>	Ken Payne	<b>Note taker:</b>	Arinze Ekwosimba
<b>Attendees</b>	Ken Payne Arinze Ekwosimba	<b>Absentees:</b>	Xuan Ban

<b>Item</b>	<b>Subtopics</b>
<b>1. Company selection</b>	<ul style="list-style-type: none"> <li>Discussed whether to overview companies in the same or different market segments</li> <li>Agreed to consider companies in different market segments as long we can establish a common theme (this is a requirement for the report)</li> </ul>
<b>2. Proposed Companies</b>	<ul style="list-style-type: none"> <li>Intel [Ken]</li> <li>BT [Arinze]</li> <li>Blackberry/Nokia/Kodac/IBM [Xuan]</li> </ul>
<b>3. Tasks</b>	<ul style="list-style-type: none"> <li>Prepare a background summary and evidence for chosen company by Friday [ALL]</li> <li>Get background summary and evidence for invited company - ARM [Ken], Domino [Arinze] and Imagination[Xuan]</li> <li>Report Writing: <ul style="list-style-type: none"> <li>Abstract [Arinze]</li> <li>Introduction [Ken]</li> <li>Section 1 [Ken]</li> <li>Section 2 [Xuan and Arinze]</li> <li>Conclusion [Xuan]</li> </ul> </li> </ul>
<b>4. Next Meeting</b>	<ul style="list-style-type: none"> <li>Friday, February 21, 2014 after the Imagination lecture</li> </ul>
<b>5. End Time</b>	10:21 am

Figure 2: Minutes of the second group meeting

**ELEC6049: Exploitation of Electrical and Electronic Technology (2013/2014)**  
**Group Meeting Minutes**

<b>Date</b>	24/02/2014	<b>Location</b>	59/2201
<b>Time</b>	17:05	<b>Meeting No.</b>	3

<b>Meeting chair</b>	Ken Payne	<b>Note taker:</b>	Arinze Ekwosimba
<b>Attendees</b>	Ken Payne Arinze Ekwosimba Xuan Ban	<b>Absentees:</b>	

<b>Item</b>	<b>Subtopics</b>
<b>1. Progress</b>	<ul style="list-style-type: none"> <li>• Introduction needs proof-reading; written by Ken [AE]</li> <li>• Conclusion needs proof-reading [AE]</li> <li>• Abstract to be written [AE]</li> <li>• Section One to be finished [Ken]</li> </ul>
<b>2. Outstanding tasks</b>	<ul style="list-style-type: none"> <li>• Section One; in progress [Ken]</li> <li>• Proof-read Section One [AE]</li> <li>• Proof-read Section Two [Ken]</li> <li>• Appendix 1 - Table of members' contribution [AE]</li> <li>• Appendix 2 - Minutes [AE]</li> <li>• Appendix 3 - Additional Notes [Ken (include Xuan's notes on the Google drive)]</li> </ul>
<b>4. Next Meeting</b>	<ul style="list-style-type: none"> <li>• Friday, February 28, 2014 (to discuss Report 2)</li> </ul>
<b>5. End Time</b>	17:18

Figure 3: Minutes of the third group meeting

## C Additional Notes

### Overview of presentation (Notes from presentations and research)

#### What is an established company?

Being an established company means it usually have experience from the past and can have a lot of references to help making good decision for next move. During the growing up the company also have the strong connections/gain great loyalty from its partners/customers. This is great news because there is no better marketing than your customers. An established company could build a portfolio of testimonials, case studies and stories for interview or invited conservation, the things that a start-up could ever dream of. Established company spend as much time talking to its current customers as new ones. Really understanding their needs, wants and challenges is the key to connect with new clients faster and easier. Looking at the marketing plan with this in mind can help figure out how to prevent the other guys from getting to your client. Also, the company is flexible to use the idea from a start-up: focusing on what's wrong with current market and what needs weren't being satisfied yet.

If you can at a place as a frustrated customer just like the people you are appealing to, they will listen, provided you have hit one of their true frustrations. But bear in mind that if an established company is in a known industry, they will have a very difficult time overcoming current perceptions – their brand is out there. In short, the best defence is a good offense.

#### How did they become established?

Domino case study: The Company was found in 1978. At the time it was based on ink jet technology. At the beginning of company expansion it was concentrated on geographic expansion, then its focus is slowly switch to technology expansion. Domino realized that only the revolution of technology cannot provide the success of the business, the products must be able to infiltrate into many areas. At 2000, the company starts sector specialisation so the sales can become diversification.

“The future is already here. It’s just not evenly distributed.” –William Gibson

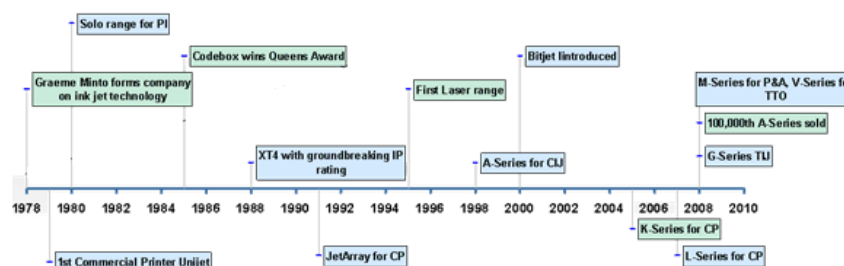


Figure 1: The history of Domino

#### What advantage do they have over new entrants?

- Technology advance.
- Loyal customers.
- More organized working schedule and market planning.
- Better understanding of what the customer wants.
- More reputation in the area. More reliable/realistic solution to customer enquiry.

### How do they stay established?

Trying to understand what customer really wants. But it is not simple as it sounds. In the most of cases, the customers the company deals with knows how they want to experience from the product, but cannot always know how to properly express this. This is because they usually are not engineers, thus cannot describe the problem in the terms of engineering. This could result in misinterpretation of what the customer actually wants, which leads to the final design not matching the market requirement. The customer will refuse to pay for it and the amount of investment and time would have been wasted.

- “But its great technology, why don’t you want it?”

Therefore the real skill is in determining the actual customer requirement and it is in capturing those desires and translating into solution concepts with technical description or specification that companies succeed (Engineering and marketing skill combination).

“Try to understand the person you are dealing with, and *how* they see the world, this is *why* I see the world as I do...”

V-model requirement analysis represents a software development process (also applicable to hardware development). Instead of moving down in a linear way, the process steps are bent upwards after the coding phase, to form the typical V shape. The V-Model demonstrates the relationships between each phase of the development life cycle and its associated phase of testing. This model nowadays is also redesigned to fit business analysis purpose.

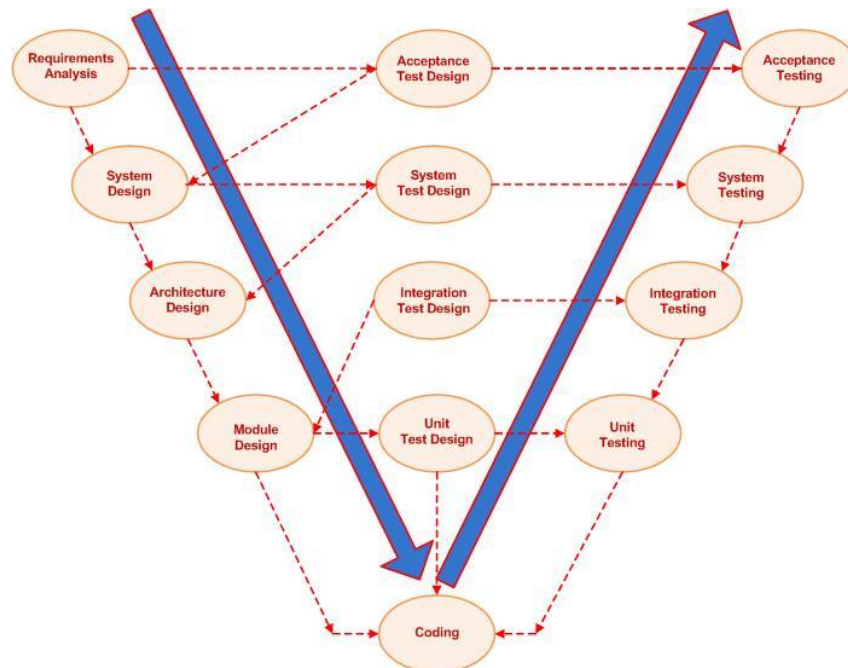


Figure 2: V-model

It contains two different phases: Verification phases and validation phases. Verification phase entails Requirements analysis (5Y), system design, architecture design, and module design. Validation phase involves unit testing, integration testing, system testing, user acceptance testing and release testing.

5Y (5 whys): The **5 Whys** is an iterative question-asking technique used to explore the cause-and-effect relationships underlying a particular problem. The primary goal of the technique is to determine the root cause of a defect or problem. (The "5" in the name derives from an empirical observation on the number of iterations typically required to resolve the problem.)

However, 5Y is not perfect:

- Tendency for investigators to stop at symptoms rather than going on to lower-level root causes.
- Inability to go beyond the investigator's current knowledge - cannot find causes that they do not already know.
- Lack of support to help the investigator ask the right "why" questions.
- Results are not repeatable - different people using 5 Whys come up with different causes for the same problem.
- Tendency to isolate a single root cause, whereas each question could elicit many different root causes.

Diversity within the company

Domino is an international company and even within each branch the developing team could be formed up by different people. By that it means the diversity of team members in culture, education psychology, etc... To be a successful company it is the key to respect everyone in the team. Diversity is a strength, not weakness.

Take the guess work out of engineering decision making

Understanding process capability is quite important for technical company. Even if you don't manufacture the products (provide the design and license to 3<sup>rd</sup> party manufacturer), you still must have 100% understanding about your design: how big is the fail zone? Testing the product to failure point helps discovering the weakness before the customer does. It could increase the customers' confident in the company and improve the brand's reputation, which means more opportunities and more investment!

Keep updating the "toolbox"

Embrace new ideas and techniques.

This presentation can be briefly described as how an established technology company makes money, from the eyes of an engineering project leader. Although he didn't really mention the general strategy Domino uses to develop for the future, he stated many quite mature product developing techniques, which is summarized from lesson learnt from the company developing though those many years.

## ARM

### How the company started?

Founded in 1979 (not really), started as Acorn.

### How did they become established?

Acorn wanted to license the 80286 core but Intel refused because they need more powerful processor. So Acorn decides to develop the CPU on its own.

Small & cheap design for hand-held device was the Acorn's initial direction. Low power was a valuable bonus. (Because low power was driven by limited battery power on mobile device)

After first some designs, ARM was founded on 27<sup>th</sup> Nov 1990, funded by several companies like Apple, IP and VLSI. At the beginning, the company only had 12 engineers. So the company decided to hire a CEO to manage the business affairs.

### How do they stay established?

Business strategies used:

SWOT analysis:

- **Strengths:** characteristics of the business or project that give it an advantage over others.
- **Weaknesses:** characteristics that place the business or project at a disadvantage relative to others
- **Opportunities:** elements that the project could exploit to its advantage
- **Threats:** elements in the environment that could cause trouble for the business or project

SWOT analysis groups key pieces of information into two main categories:

1. internal factors – the *strengths* and *weaknesses* internal to the organization
2. external factors – the *opportunities* and *threats* presented by the environment external to the organization

## SWOT ANALYSIS



Figure 3: SWOT analysis

Robin promoted some engineers into management role. Because ARM as a technology company, it really doesn't need a lot of strong marketing managers or salesman, but people have both business and technical awareness.

#### Mean & lean "Cash is King":

Tight cost control

Customer focused:

"Don't fight over the size of the pie, make the pie bigger"

Partnership model:

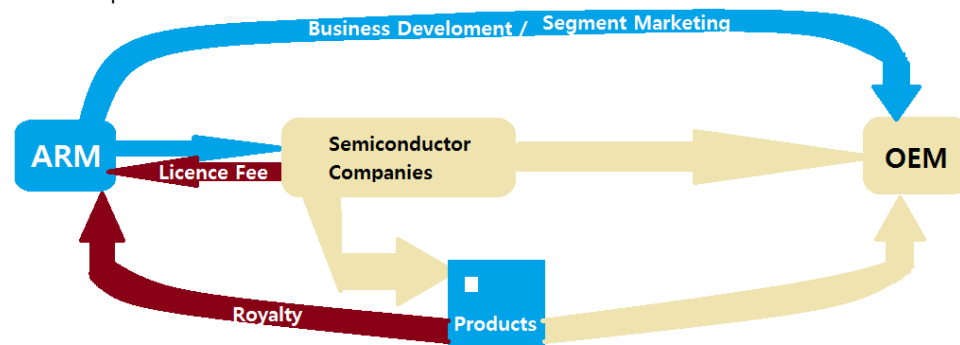


Figure 4: Partnership model

ARM doesn't manufacture the chips, not like Intel. Instead it builds up a partner relationship with other companies. (A little bit similar to Domino). In the partner network, they share the risk (the proportion of development costs)/reward (help partner to get volume) to keep the royalty of the customers (other manufacturers). Licensees are what ARM rely on!

#### Licensing model:

Perpetual license: Traditional implementation license

Term License: Time limited but with perpetual manufacturing rights

Per use license: single use, time limited with perpetual manufacturing rights

Architecture license: Allows optimized implementations of the ARM architecture.

Foundry program: enables fabless semiconductor companies to access ARM IP.

Design start program: Enables partners new to ARM to access to subset of ARM IP.

#### What advantage do they have over new entrants?

##### 2 advantages for the design team:

No people: small team meant simplicity in design was an absolute requirement

No money: everything was done in-house using simple, home-grown tools

It is all about simplicity!

Changing era Awareness: ARM has more evidence to predicate the evolution of processor. This enables ARM to have an accurate developing direction and can move one step ahead of its opponents. (Domino mentioned this point as well)

Customers (mainly licensees) are the important factors to ARM's success. ARM listen to what customers think. Setting up branches around the world and close to customers, it helps ARM to divide staffs into small groups, faster respond time to customers' request and have more global perceptivity.

Special partnership model helps ARM to build strong relationship and loyalty. This is very important because loyalty from your customers is the complicate thing. "Got long tails"

ARM has strict control on license distribution. Special license model and customer loyalty help to prevent design leakage/ stolen and sold across different licensees.

Figure 4: Notes taken for given presentations and independent research