

## 5 Charlie's Skypeout Strategy: The Chocolate Factory Relocates to Tallinn

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**Figure 23.** Dr Shoumen Palit Austin Datta.

### 5.1 Epilogue

On 17th November 2005, during a conversation in my office at MIT, I was requested to write a short article, on future trends in e-business, to be included in a publication to accompany the successful completion of the Tekes supported e-logistics program (ELO) in 2006. It was suggested that I send the completed article in about six weeks to allow for translation in Finnish.

Nearly a fortnight later, on 30th November 2005, while waiting at the airport en route to Taipei (Taiwan), I started to work on this article by extracting some pieces from other articles that I had authored in the recent past. The sterility of my article (in progress) was increasingly obvious because synthesizing a new article without any refreshing context is merely an editorial regurgitation that only demonstrates proficiency in “cut and paste” using Microsoft Word. My quest for a fresh contextual relevance (in order

to discuss my suggestions) simmered while travelling from Boston to Frankfurt. While settling down in seat 83K on the connecting Lufthansa flight from Frankfurt to Hong Kong, the “contextual relevance” jumped in front of me at the moment the air hostess came around to offer magazines before the flight departed. As I reached out for *The Economist* of 3rd December 2005, it was clear that I should find examples of business and government processes in this issue which may connect to my suggestions, if, at least some of my ideas, were to offer solutions for the evolving global thought process.

#### 5.1.1 Introduction

My suggestions for the future are not new, at least, not anymore, since I posted my article (1) on the web during August 2003. However, my original article and the various versions since 2003 are not really about e-business or logistics or supply chain management. My rambling thoughts may be classified as the future of decision systems that hints about the combinatorial convergence of tools, technologies, concepts and ideas to catalyse innovation in order to make better decisions. I hasten to caution the readers that I have invented nothing new. The “tools, technologies, concepts and ideas” are the discoveries of others based on centuries of visionary research. I have simply assembled them in the context of various decision systems that may be applicable to processes used in business, government, manufacturing, defense, healthcare, security, logistics, services, finance, supply chain, customs operations and related pursuits.

More innovations can and shall arise from borrowing and combining ideas rather than from isolated inventions. Better decisions (including the profitable ones) stems from an informed convergence of several processes that culminate in an action or transaction that leads to an improved outcome. It is often and erroneously assumed that informed convergence is directly related to and dependent on or even proportional to data (assuming data is accurate and available). Analytical introspection suggests that data is not equivalent to information and even if information may be extracted from data, it does not imply that that information is valuable or it may trigger actionable decisions that may offer value.

Inability to generate value from data may be rooted in the fact that the analytical tools in use (software, algorithms) are simply inadequate, unable to adapt to changes and/or are simplistic representations of complex real-world scenarios. The cumulative inefficiencies stemming from the lack of insight with respect to analytical handling of data, information, transaction and decision may be traced back to the inability to ask the right questions at the right time. Such inabilities are pervasive and are irrespective of the investment in technology (for example, to facilitate the acquisition of real-time data). For the global logistics sector alone, more than US\$3 trillion have been spent in 2004 and this represents almost 12% of the global GDP. Given the enormity of this spending, inefficiencies in the global logistics network, estimated at 20% or more, indicates losses (due to inefficiency) of at least US\$600 billion. The latter is a glaring example representing an immense opportunity for organisations to improve decision making. However, businesses cannot grow by “saving” money, hence the prudence of the aphorism that growth occurs mostly through innovation.

Innovation in this domain (of dynamic interdependence of data, information and process with actionable decision making) may be the only plausible road to the future of how a broad spectrum of interoperable (software) systems may utilize such innovation to their advantage to improve profitability, aided or unaided by humans. It is this theme that I shall discuss in this article. Hopefully, I may even succeed to provoke the readers to consider how pivotal this theme of logical interdependence may be because we might find that this interplay is reiterated, in some form or the other, in the context of random global cases (non-fiction) selected from a magazine with above average credibility (The Economist, 3rd December 2005).

### 5.1.2 Connecting Bits To Atoms: Does it Guarantee Value From Use of Resulting Information?

Information (bits) about goods (atoms) is therapeutic to consumer product businesses and their friends (retailers, distributors, suppliers, manufacturers). Therefore, connecting bits to atoms, in a systemic sense, may be the holy grail for all those involved in producing and consuming physical goods but only if they also learn to become experts in “bit dribbling” or the ways in which to use the bits to gain value from atoms. Certain characteristics of goods (colour of iPod, storage temperature of milk, percentage of titanium in an alloy) are important to select sectors of consumers (my daughter Emma, Tesco, Boeing) who may choose a variety of channels to gain to such information (customer relationship). Online retailing is one example of bits connected to atoms and the growth of the internet serves increasingly as the medium or channel of choice for consumers to seek or exchange such information (2).

Therefore, the “now-classical” model (barely a decade old) of Amazon to sell books without any physical inventory is undergoing an evolution where once-warehouse-less Amazon can no longer claim to hold zero inventory or succeed without warehouses. The convergence of brick-and-mortar stalwarts on the dot.com channel is evident from increasing number of online visitors to tyrannosaurus establishments such as Wal-Mart. As shown below, figure 24 (modified from The Economist, 3rd December 2005) offers interesting clues for future developments. I shall briefly comment on the following:

- Shopzilla and comparison-shopping
- Amazon and its foresight to collaborate
- Apple and the inevitable communication convergence
- Why American Greetings and Target are indicators sweeping demographic changes.

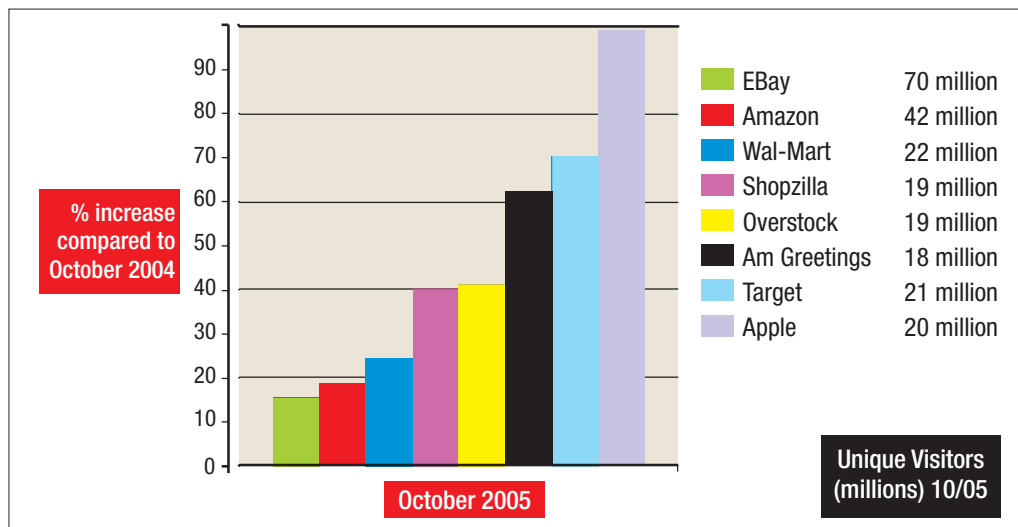


Figure 24. Connecting Bits to Atoms: A Model of the Physical World?

### **a. Shopzilla and comparison-shopping**

Buying the same brand from stores located in two different parts of the same city may offer a considerable price differential. But the cost of savings is diminished if time and travel expenses are taken into consideration. This age old concept is now facilitated by the internet and anyone can take advantage of e-comparison provided one has made a basic investment to access the services. If H&M were to disclose its database of items and prices to a 3rd party (such as Shopzilla in the US and/or Ciao in EU) then the threat of such competition may catalyse M&S to do the same. The growth of such comparison shopping may make the end-user (consumer) the principal beneficiary. The operating scale of Shopzilla is still in its infancy although its ability to attract visitors is appreciable (40% increase when comparing number of unique visitors for October 2004 vs October 2005, see figure 24).

Consider the scenario that Arrow brand shirts, a respectable US mid-market brand, are sold for €50 in Dublin's Brown Thomas and for 45 in Helsinki's Stockmann. However, comparison-shoppers also find a No-Name outfit in Dhaka (Bangladesh) selling the identical Arrow SKU for €15 and advertises that the shirts are authentic Arrow brand being sourced from the manufacturers of Arrow, who are in fact in Dhaka. Globalization and its discontent cannot be more aggravating for Arrow shirt-makers! Should Arrow continue to outsource its manufacturing to Dhaka? Should WTO-like organisations empower Arrow to prosecute No-Name and its partners in Dhaka? Will the tide of ethical globalization disable Arrow to procure shirts at €5 from the East and sell for €50 in the West?

Suddenly comparison-shopping and its intended transparency meets the conundrum of global supply chain or the dilemma that your online Christmas shopping can be completed in China. Ciao Target! Ciao, Ciao Wal-Mart!

However, in the short term, Shopzilla or Ciao's potential for success may be minimally affected by the forces of ethical globalization. Rather, the possibilities for comparison-shopping are limited by the chasm in interoperability of systems that must be accessed by Shopzilla or Ciao to offer true value to online comparison-shoppers. If H&M and M&S are the only two entrants in this transparency battle then Shopzilla or Ciao remains an unattractive service to serious bargain hunters given the proliferation of discount stores or pre-scheduled major sales events (Yellow Bag Day in Stockmann, Helsinki or January Sales in the US). The number of online hyper-enthusiasts may fail to offer sufficient economies of scale for survival of comparison-shopping unless the problem of systems interoperability can be addressed to gain credible transparency of inventory across a critical mass of stores and multiple brands with minimum effort but maximum security.

Technology sympathizers and analysts may offer a grossly different perspective celebrating the 19 million unique vis-

itors to Shopzilla.com during October 2005. In keeping with what is in vogue, this will be touted as the reason why item level radio frequency identification (RFID) tags may increase consumer savings through comparison shopping services. Several assumptions must be made in promoting this line of thought but that is nothing new given that the entire hype curve of RFID usage catalysed in part by MIT's Auto ID Center, made blatantly irresponsible assumptions (for example by Price Waterhouse Cooper Consulting white paper "Focus on the Supply Chain: Applying Auto-ID within the Distribution Center" in 2002) and predicted with confidence fall in RFID tag prices to under 5 cents (US) by 2005. In reality it is not the cost of technology (for example, RFID tags) that matters in the long run but the value that it delivers to its users. Peering through the lens of history, it appears that lack of imagination fueled by short term corporate gains has plagued the adequacy of value extraction from several technologies and RFID may not be an exception. The immense potential for judicious use of RFID tags (in various forms) as a data acquisition tool remains to be realized but item level tagging for comparison-shopping on Shopzilla is not my recommended knee-jerk reaction.

### **b. Amazon and its foresight to collaborate**

Mr Jeff Bezos and Mr Jeff Wilke at Amazon headquarters may be less than ecstatic with less than 20% increase in traffic over the same period a year ago despite the 42 million unique visitors to Amazon.com during October 2005. For growth of Amazon in line with the imagination of its senior management, a bit more than paranoia is required. I shall borrow from Mr Andy Grove's "only the paranoid survives" and add a string of adjectives to suggest that only the "insightful collaborative paranoid" shall triumph by exercising their imagination to adapt, consistently.

Hence, Amazon can no longer be classified as an online retailer despite the fact that on face value its online business model is the subject of a multitude of mimicry. To the millions of end-user or consumer it shall continue to grow as an online store for anything they wish to buy, with peace of mind. To a vast number of small and medium businesses who aspires to be an Amazon but cannot, it serves as a channel to sell their wares as individual businesses operating under the credibility of the Amazon Mall that also offers the ability for comparison shopping. In this respect, eBay is nearly a carbon copy of the Amazon Mall except for the method of price determination. The astute use of centuries-old auction pricing sets Pierre Omidyar apart as the innovator sine qua non.

Amazon Mall is essentially an internet-catalysed Sumerian Bazaar and the plethora of such markets that existed 7000 years ago along the banks of the Indus River in the cities of Mohenjodaro and Harappa. But, the complexity of the interactions have undergone a radical change and calls for interoperability. Collaborative transparency may describe one aspect of Amazon Anywhere. It banks on innovative

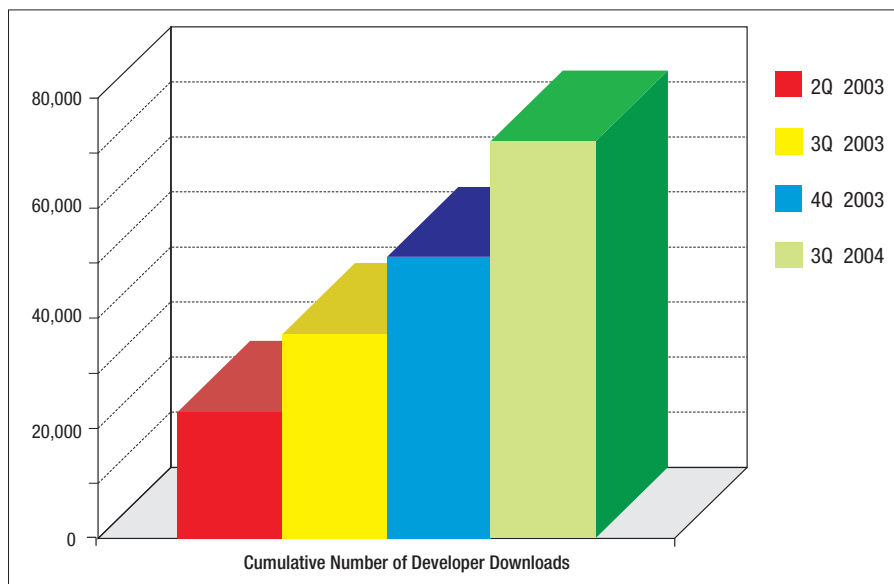
use of standards (and its brand credibility) that are emerging to catalyse the transition of the syntactic web to the semantic web. In view of the evolution of Semantic Grid Web Services (1), as a first step, Amazon is offering programmers virtually unlimited access to the foundation of Amazon's business: its product database. Developers can grab product data, reformat it, add related services and use it to attract visitors to their own sites. These parallel Amazons may have added marketing features for niche customers which may be an otherwise expensive proposition if Amazon wanted to control its content and reach those segments. Imagine the variations necessary to be a global online retailer in several languages catering to multiple interests. By opening up its product database, Amazon is probably the first to practice the nearly-one-to-one marketing that is pragmatic only through the internet. For this access, Amazon demands that visitors to satellite sites complete purchases through Amazon (site owners receive a commission). Exposing the world's largest product database — along with editorial content and personalization functions — is a counterintuitive business strategy but one which may distinguish Amazon as the pioneer in collaborative innovation.

Amazon is an example of how foresight, investment in new tools and use of standards may converge to generate software that acts as a vehicle for interoperability for thousands of developers who may be using varying markup languages leading to a cacophony of impotent proprietary systems. Amazon's web server software mitigates this diversity by creating (API) interfaces that could retrieve product data and reformat it for select devices (PDA). Amazon's success is rooted in its human capital, that is, software engineers attuned to the emerging Semantic Web and XML,

SOAP, OWL standards. Amazon, therefore, is a set of independent parts, including the database, shared interfaces for access and repackaging data (XML) for the site-specific layout preferred by a developer or site owner.

### c. Apple and the inevitable communication convergence

20 million visitors to Apple's website in October 2005 do not signal a revival of the PC buying craze, if ever there was one. Doubling of unique visitors since October 2004 suggest that the lure of the Apple may be in the flavour of the iPod du jour. Hence, the PC assembler and interface innovator (Apple Inc) is blurring the compartmentalization along industry lines in ways that earlier device manufacturers (Sony, Phillips) failed to penetrate. Apple did not stop at providing the receptacles for music, video and movies (iPod) but has organized services (iTunes, iMovies) that shall continue to prod Mr Steve Jobs to make frequent visits to the bank, online, of course. In other words, it is a re-hash of the old system where you get the telephone for free but pay for services or the reason why Xerox is eager to offer you a discount on the purchase of a photocopier only to sell you products with high profit margins (ink cartridges, paper). The uncanny innovator in Mr Jobs has extracted the service model through iTunes and may be poised to compete with the likes of Nokia or NTT DoCoMo. Skype-like features in an IPv6 enabled iPod will come with built-in 802.11g, 802.15.4 and 802.16 features (WiFi, Zigbee, WiMax) but aesthetically engineered to expose the crème de la crème of human-machine interface that is central to Apple's innovation. Wave your iPod.femto at a Marks & Spencer store to compare the price of the "collezione" charcoal grey pure cashmere scarf that you saw at Tie



**Figure 25.** Profit from Amazon: Give Away the Store (from MIT Technology Review, January 2005)

Rack, buy petrol and pay for groceries at Tesco or pause “Sleepless in Seattle” if Mum is Skype-in mode to you.

The scenario above is as incredible as the time you found a 12 megapixel digital camera under the Christmas Tree last year (movie screen resolution is achieved with 8 megapixels). Exponential growth of megapixels after CCD commoditization made that possible and feasible. Pervasive cell broadband with WiMax (802.16) and the inevitable merger of GSM with 3G will aid infrastructure interoperability. Location awareness (GPS, RTLS), identity of goods (UWB, RFID), multilingual speech, biomedical monitoring (nano-sensors) and their computational needs are all possible with enterprise-wide ontologies facilitating contextual understanding as well as increasing bandwidth between components (multi-core microprocessors and memory) with sharp drop in processing cost (Sony’s new PSP3 due to hit the retail stores in the summer of 2006 packs in a 8-core processor co-developed with IBM that operates at 2 teraflops for only \$399).

The iPod of the very near future can hold more than 40 petabytes (40,000,000 gigabytes) of data. But, only 10,000 gigabytes will be needed for the 20 million books in the US Library of Congress. With all that remaining storage capacity why not download all of the nearly 500,000 movies currently available in the world? The irony is that it is not inconceivable that all this is possible but it is truly incredible that these scenarios represent a march of reasonable convergence of innovation at hand and in progress. To see

a world in a grain of sand and hold infinity in the palm of your hand is not only the innovation of iPod in action but poetry (of William Blake) in motion as well as locomotion (see figure 26) when the iPod evolves as your secure-car operation platform.

#### d. Why American greetings and target are indicators sweeping demographic changes

My friend Helena in Boston insisted on sending us an actual paper greetings card by mail. It is rare but still deeply appreciated. Every time I am away from home, I, too, find it pleasant to write a few lines to my wife even though we speak at least six times each day on the phone no matter in which time zone I may be. Except for these fond exceptions, the remainder of our communications including birthdays, anniversaries and get well greetings are internet enabled. The 70% increase in number of unique visitors to American Greetings is a sign of the times and for the prudent observer a signal of what to expect with changing habits of a ‘grey’ demography.

With nearly equal number of unique visitors clicking on Target and Wal-Mart during October 2005, it is interesting to note that the number represents a 70% increase for Target but only a modest 20% increase for Wal-Mart. The visitors to Target may prefer better quality or wish to support enterprises with progressive corporate policies over the sole criterion of rock-bottom prices. Target shoppers may be clustered in geographies with higher broadband penetra-

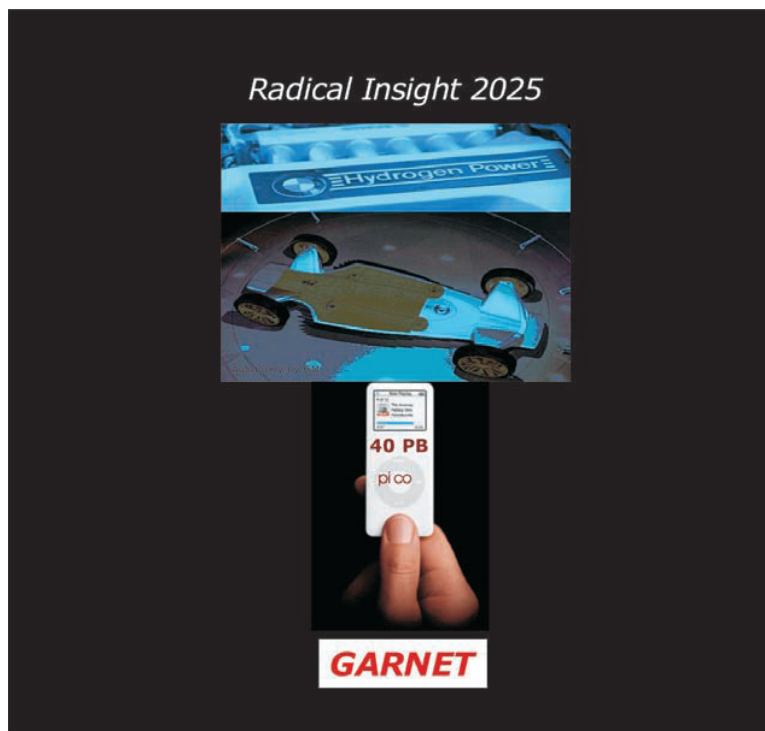
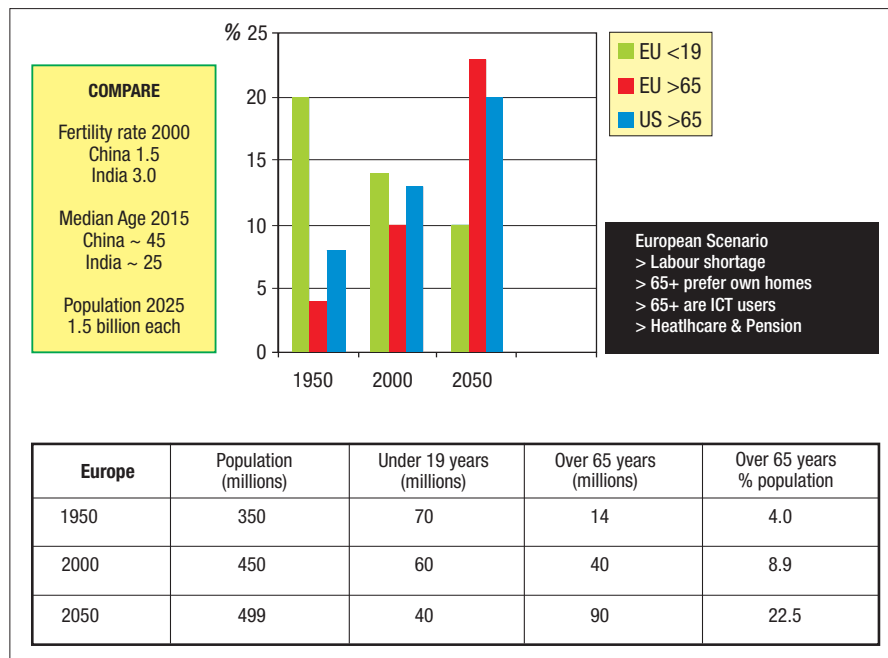


Figure 26. Radical Insight?



**Figure 27.** Is Age an Asset in the “Grey” Market ?

tion (urban or metropolitan zones) compared to Wal-Mart locations in non-urban or rural markets (USA).

The demographic spread of the point-and-click shoppers are rapidly changing as is the profile of video gamers. Semi-retired septuagenarians are increasingly the partners or opponents of the teenagers and grand-children in networked video games. The aging baby-boomers are mentally agile, physically active and ICT-philic. It is this change that shall create new markets for products and services in a manner that will be driven by indicators outlined in figure 27. In my article (1), the issue of healthcare was prominently mentioned and it appears that some countries are following similar paths, particularly Japan.

What fascinates me about Japan is the fact that they seem to rapidly create proof of concepts (POC). It is therefore rewarding to find at least two of my ideas already as POC projects in Japan. In the year 2000–2001, during weekly visits to Tokyo, I had discussions with a variety of strategic think tanks on use of RFID. One suggestion concerned data sharing as a mobile service for RFID tagged objects. Several months later, SAP Labs Tokyo forwarded me a link to NTT DoCoMo that unveiled a service for RFID tagged objects.

The suggestion (1) to use nanosensors in remote healthcare “sense and then respond” mechanism may have found an outlet through Synclayer, a Nagoya based cable TV & LAN integrator. According to the Economist of 3 December 2005, it has developed a means for the elderly living in their own homes to use a device that takes basic medical

measurements (such as, blood pressure) and transmit them to a local health database. Synclayer also makes a sensor that can be placed, for example, on the refrigerator door, to send a message when ever the door is opened. The latter is similar to an Intel initiative in Oregon (USA) which uses strategically placed RFID tags on kitchen cabinets and other areas to monitor eating or other indoor activities of Alzheimer’s patients who stay in their home.

In Japan, with over 25,000 people over the age of 100 and another 30 million (25% of population) waiting in the wings to join the over 65 club by 2015, the “grey market” offers attractive business opportunities, such as, for Synclayer. Importing “gaijin” nurses may not be a long term solution in an immigration averse political climate. However, in 2004 the Government of Japan issued 80,000 visas for “entertainment” purposes to young Filipinas.

But the suitable high tech response to the needs of the Japanese elderly are evolving from the research on anthropomorphic robots developed for service. Already precursors are available in the market, such as the Snuggling Ifbot and Primo Puel, an interactive doll, which has become an unexpected hit with elderly single women although it was designed for boy-friend-less young girls. Equally appealing are the common sense solutions pioneered by the appliance maker Zojirushi, a brand trusted by millions of Japanese for rice cookers and electric kettles. iPot, developed by Zojirushi in collaboration with NTT DoCoMo and Fujitsu, has a wireless device which transmits a message to a NTT server each time the water-dispensing button is pressed. Then, twice daily, the usage record is sent to designated

mobile phone or email address of family, friend or health care provider.

The implication for e-business or any business is that making targeted products for an ever expanding 'niche' is one mechanism for businesses to grow profitably through innovative collaborative services. Elderly in Japan and in other affluent nations are likely to live healthier lives and may spend more on services than on goods. The average Japanese in their 60's has total net assets of ¥21 million (USD 200,000).

### 5.1.3 Connecting Bits to Atoms: Is Auto "Mobile" Platform an Innovation Down the Toilet?

In 2004, losses of €2 billion (\$2.5 billion) in cars for Fiat (passenger cars account for just under half the company's €49 billion in sales) dragged the whole Fiat group into a €1.6 billion loss. In 2005, the car division of Fiat may report an operating loss of around €360 million (but the Fiat group as a whole is expected to make a pre-tax loss of about €129 million buoyed by profits from its truck and tractor divisions). In October 2005, Sergio Marchionne, the Canadian-Italian who is the new chief executive of Fiat Group, reported a 70% fall in the group's third quarter loss (compared with a year earlier). With \$2 billion from GM (penalty paid to Fiat in 2005 to scrap the ill-fated GM-Fiat alliance) and the conversion of €3 billion-worth of maturing bank loans into equity, Mr Marchionne is trying to rebuild Fiat's passenger automobile business, panel by panel. Instead of closing plants, Mr Marchionne is taking advantage of the surplus workers parked in state-run unemployment schemes to engineer an investment of €10 billion over the next four years to bring out 20 new Fiat passenger car models.

Risk pooling and collaboration are the drivers. Future Alfa Romeo's (Alfa 159) will be made from the same basic platform, to reap economies of scale. Maserati will be repositioned at the top end of the Alfa range in the spirit of risk pooling to share components with the Alfa platform. The spirit of collaboration is in high gear at Fiat with three alliances with PSA Peugeot, a new venture with Ford to build cars in Poland, a licensing deal with Suzuki and talks of cooperation with China's Shanghai Automotive. Fiat may introduce even more changes in Europe's fast lane by transforming its vision into reality to build cars in collaboration with India's Tata not only in India but also extending the Fiat-Tata collaboration to build automobiles in South-East Asia as well as Europe.

Should we be impressed with this story from The Economist of 3rd December 2005 outlining the unimaginative traditional risk-averse re-engineering of Fiat's passenger car division through Method Marchionne? It may be what the strategic gurus at Harvard Business School may pontificate or the bean counters in McKinsey may prescribe. It

may be worth a reminder that according to Prof Clayton Christensen of Harvard Business School, McKinsey "is able to crank out high-quality work year after year because its core capabilities are rooted in its processes and values rather than in its resources (vision) ... these capabilities of McKinsey also constitute its disabilities. The rigorously analytical, data-driven processes that help it create value for its clients in existing, relatively stable markets render it much less capable in technology markets" (page 168-169 in *The Innovators Dilemma*). Critics might argue that getting out of the 'red' is more urgent than exploring new vistas. The critics may be right, too, in the short term. But what shall fuel the flame for potential Fiat car buyers?

The progress of classical automobile engineering (double wishbone suspension, antilock brakes) is slow and increasingly stirs less enthusiasm from buyers. Supply chain optimization and modular engineering doesn't influence Joe Fox. Electronics on the other hand is a high "clockspeed" subset of the automobile industry with remarkably impressive marketing impact. Thus we have witnessed the evolution of NorthStar and similar extensions of GPS in addition to NeverLost or other road navigation aids. Voice-dialing is standard in a few luxury sedans and the status of tire pressure may be monitored by the car "computer" and projected on the screen in a BMW. GE's VeriWise system tracks transportation equipment and vehicles with the aid of onboard monitors, GPS, RFID and other technologies. Music in the car is pre-recorded in some format (CD) or radio-station controlled. Although Norway first implemented the use of RFID tags in vehicles for toll collection several decades ago, not much has changed in the use of transponders for such purposes.

Technology appears to be a driver for automobile sales and thus a multitude of vendors have created individual products or services or diagnostics, with limited or no ability for interoperability or divorced from the use of a common platform that can aggregate products or services for the automobile industry and the consumer. You cannot Skype-out or Skype-in or have access to email (if you need to). If you are 65 and recovering from a myocardial infarction, perhaps your physician would like to keep an eye on you while you are driving but (at this present time) he cannot. Your onboard diagnostic LCD panel may alert you to decreasing level of fuel but cannot guide you to a nearby petrol station (retail gasoline pump). Your authorized Lexus dealer can call you to alert you for service but has no clue whether you have driven 3000 miles since your last oil change.

The innovation in consumer vehicles and automobiles that may precipitate the dispersed services is likely to be catalyzed, as a first step, simply by the introduction of a platform. It could be as unimaginative as a laptop PC in the car with the mouse and menu driven features that every PC user is already familiar with. If I have music downloaded on my iPod and wish to hear it on the speakers, the USB port of the iPod plugs into the PC. If the pressure gauge

reading is alarming, then an auto-Agent locates the nearby service station and offers direction. You can emergency Skye-out if you are trapped in a ditch or Google the license plate of the car in your next lane to get the name of the glorious being driving the convertible Mini Cooper! (OK, you shouldn't do that!)

Are you impressed with my unimaginative suggestion to get a PC to aggregate auto products and services? Is that innovative? Note: innovation may also arise from using common things. Think different! Think disruptive! To think about the next innovation in the automobile industry let us take a lesson from bathroom fixtures by TOTO. What TOTO has done for the everyday toilet offers a template for consideration by the auto industry.

The porcelain toilet bowl (top right hand corner in figure 28) may not have changed over the centuries but TOTO of Japan has certainly created an intrigue for its use. The dashboard (bottom left) for the toilet bowl may be mistaken for modern car control panel with its shiny knobs, buttons, switches, USB port, LEDs, radio, LCD panel, digital clock and several other functions inscribed in Japanese. Could I read my e-newspaper on the LCD panel while on the throne? Gives a whole new dimension to reading in the toilet, doesn't it? However, I had to request the cheerful help of the Duty Manager at the Sheraton Taipei in Taiwan to enable me to operate the controls.

TOTO has created an aggregate platform that not only flushes the toilet on command but offers the potential to accomplish a whole slew of chores and can act as a conduit of services. The automobile in the affluent world is emerging as an extension of our home or office. We already know how to do to turn on the dishwasher from the car or read the electronic grocery list (1) on the refrigerator before arriving in the grocery store pick-up bay on the way home. What mobility needs is not a separate set of rules and multiple handlers (point of contacts) but an "organizer" that acts as a central clearinghouse. The automobile industry may need this platform as an aggregator for service providers to converge and product manufacturers to integrate. Automobile manufacturers can upgrade the fuel injection algorithms through software downloads to the PC platform or you can insert the memory stick in your PC and hit "install" to get the job done. Send your blood pressure reading to the physician without getting out of the car. Evolution of the e-business model in the automobile industry for services, diagnostics, maintenance and new product marketing is in need of innovation and we need to look no further than the toilet to be inspired to innovate.

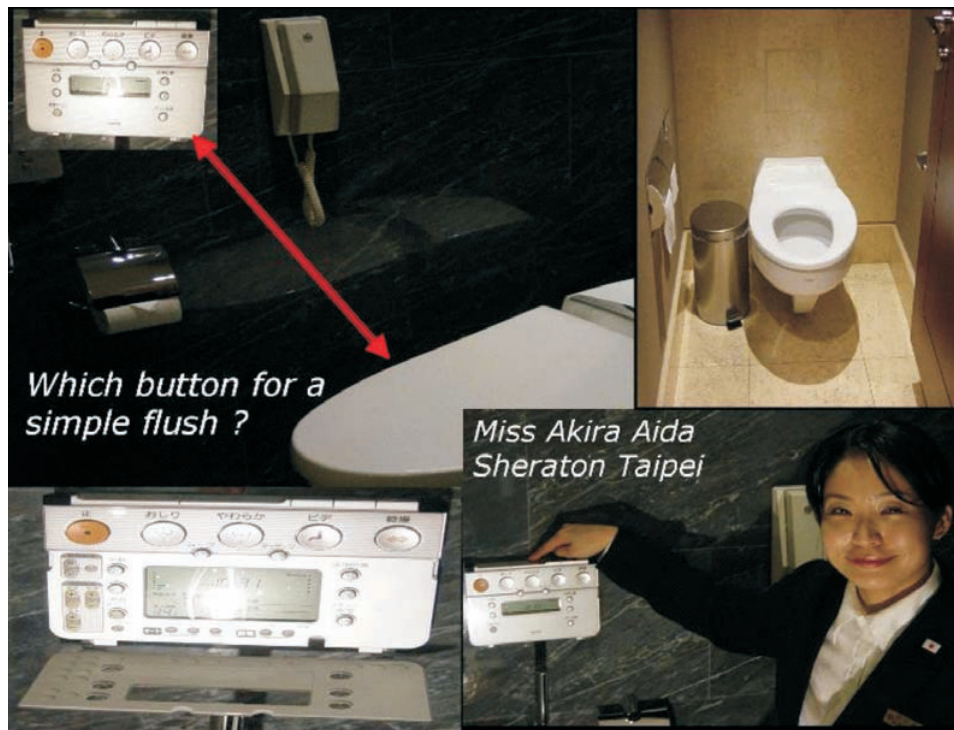


Figure 28. Innovation Down the Toilet?



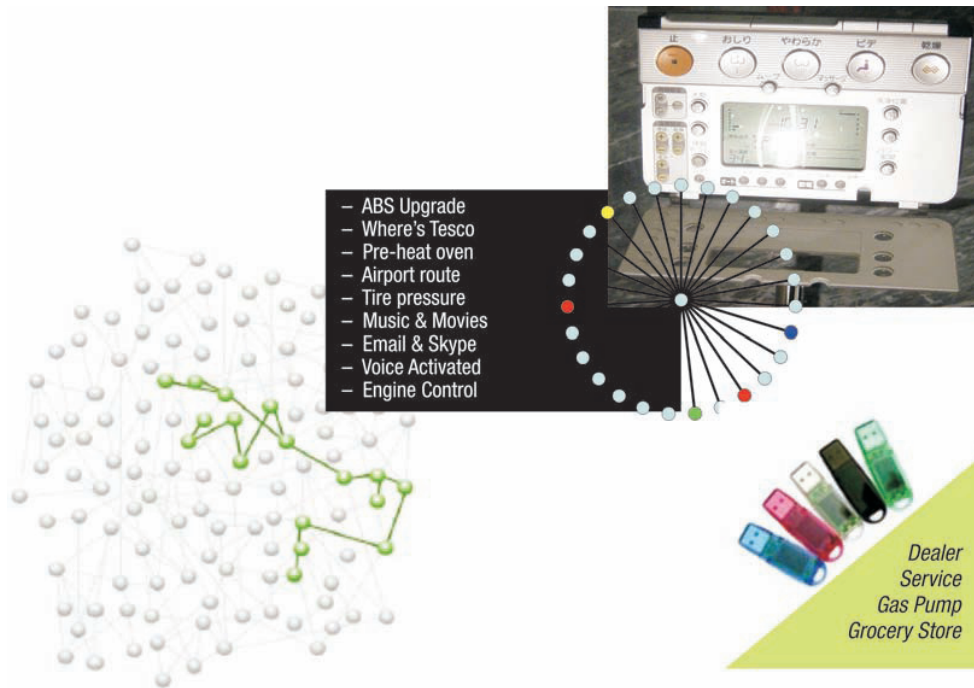


Figure 29. Paradigm Shift in Interoperability?

#### 5.1.4 Is Interoperability a Catalyst for Change or is Change a Pre-requisite for Interoperability?

Interoperability may help the onset of pervasive computing with significant benefits for the commercial sector from reduction in information asymmetry. The \$600 billion savings opportunity cryptic in the global logistics operation mentioned in the ‘introduction’ is one example. However, software peddlers eager to sell products are at the heart of the vicious cycle of problems that lead to further inefficiencies through lack of interoperability stemming from proprietary systems. While the latter is a business strategy of software vendors to “lock in” customers, the inability of users (businesses) to successfully challenge such efforts are not primarily technological, but sociological. In the narrowest sense, if we consider innovation to promote interoperability, it is possible to make it happen but the movement necessary for adopting such innovation will be minimal unless innovation is connected to change (hence, our cultural heritage). Without change, innovation belongs to the problem set rather than the solution set.

Critics may cite the scholastic research of William Easterly in the Elusive Quest for Growth and vociferously argue that social or cultural heritage are lesser impediments than economic incentives. As evidence, critics may choose to point out the quantum leap of the open-source world wide

web browser demonstrated in 1990 by Tim Berners-Lee of MIT (while still at CERN, Geneva) and compare it to the pathetic rate of progress of Linux (first entirely GNU operating system) released by Linus Torvald in 1991. The world wide web consortium (W3C) standards (HTTP, HTML, XML) provides a platform for vendors to build for-profit services and hence the business incentive for adoption of W3C standards.

In sharp contrast, Linux OS is a “free” operating system if one can use it but the marketing avenue for Linux OS is feeble given that the sale of Linux OS is not supposed to be for-profit. In addition, the services that most users expect to use (word processing, database, spreadsheet, powerpoint) are stunted in their development because developers have almost no incentive (except altruism) to create products that cannot be used unless the platform on which the product is based (Linux OS) has reached sufficient penetration to create market demand. Thus, it reasons to forward the opinion that economic incentives are the true catalysts for growth from innovation.

Economic incentives for interoperability are necessary to stimulate the innovative forces dormant within ubiquitous computing. We have talked about ubiquitous computing in the industrialized nations for decades but the conventional reasons for its sluggish growth may be readily attributed to the “dead weight of old technology” and archaic forms of educational thought as well as resistance to change of hab-

its. However it is more than likely that lack of proper economic incentives has paralyzed the progress of ubiquitous computing. Ubiquity of computing cannot reach pervasive status unless systems are interoperable enough to exchange, understand, compute and distribute information. Such architecture calls for standards of interoperability that are globally acknowledged. For the past 15 years, the open-source Linux operating system has languished while the Win-Tel duopoly operates as the dominant monopoly.

It is remarkable that the new emerging economies (but not the Western nations) are pushing the envelope through their practise of some forms of ubiquitous computing, albeit, limited in current scope, in selected areas and between pre-organized users, using selected open source platforms that are largely incompatible with the mainstream. Leaving aside the socio-economic parameters, in general, widespread practice of ubiquitous computing requires ubiquitous programming. Ubiquitous programming is of necessity popular programming. It is disquieting that the populace in industrialized nations is not yet with the program. While ICT affinity within the elderly is gaining grounds, it remains a fact that a significant percentage of people above a certain age rely on their children to program their VCRs while arm-chair computer science policy wonks continue to pontificate about the magic bullet that will cause people to script correct programs without having to think. Instead, we need policies to enable how to teach people (students) how to think, provide tangible building blocks to create (ad hoc) valuable programs and learn how to ask the right questions to better utilize the cheap processing power of microprocessors.

The role or question of change repeatedly alluded to (above) is difficult to gauge, initiate, manage and measure. But change happens. Several observations discussed here provide some evidence. For example, economies that were teetering on the verge of hyperinflation only 15 years ago are now preparing to adopt the Euro. A decade ago, simply getting a truck to Poland may have involved a weeklong wait at the congested and corrupt border crossing. But that view of Eastern Europe (“it is like Africa but closer”) is changing. Supply chain adaptability is a driver for increasing interest in Eastern Europe despite lower cost of operation in China, India or South-East Asia. Zara is changing time to market trends through its “fast fashion” trend. eBay’s purchase of Skype for \$2.6 billion bodes well for its Scandinavian founders who used programmers from Tallinn, Estonia rather than California’s Silicon Valley or Bangalore, India. Skype employs 130 highly paid under-thirties mostly (four fifths) from Estonia. On the other side of Tallinn is Elcoteq, makers of mobile phone handsets for Nokia and other behemoths. Elcoteq’s middle-age workforce of 3000 performs repetitive, semi-skilled tasks, is modestly paid and entirely local. However, increasing prosperity may force changes. Elcoteq may have less than

5 years before it could become necessary to switch production to Russia to reap similar cost benefits.

Of course, lack of change in bureaucracy is still the single most overwhelming deterrent for locating operations in Eastern Europe despite its crucial geographic proximity to major affluent European nations. For example, Sciant, a Bulgarian software company, is opening offices in Vietnam plagued by administrative burdens in Bulgaria. Sciant employs three full-time employees necessary to deal with arcane record-keeping requirements for the state and getting the right stamps on the right paper for the sleepy customs service which takes two days or longer to release an incoming shipment. “I have a friend whose things were stuck in customs for four months” comments Steve Keil, chief executive of Sciant in Bulgaria. How can interoperability help without changes in the bureaucracy?

### 5.1.5 Can Standards Drive Interoperability?

It is rather difficult to institutionalize change and hence the quest for alternatives to bypass this quagmire in order to avidly pursue interoperability. Ironically, a standard is impotent without adoption and resistance to change delays adoption of standards. Thus, more than a century later we still have to switch between 110 Volts and 220 Volts or frequently seek electrical adaptors when travelling between countries even on the same continent. Therefore standardization is not the panacea that one is lead to believe yet it serves a fruitful reductionism approach. It reduces the chaos to an acceptable number of choices and allows a handful of mechanisms to be created that ensure ‘connectivity’ between standards, that is, interoperability, between a group of standards. In other words, it is better to be a part of an ecosystem of global standards and optimize collaborative processes or systems interoperability based on such an ecosystem. Hence, it may be an useful exercise to appreciate the process of emergence of various standards through the lens of history (excerpts from Tom Gibbs address to the GCI).

In 1855, Henry Bessemer established the metallurgical process which allowed the manufacture of high grade steel. Rapid improvements in rail technology were possible with steel but several forces held back the introduction of the railroad in a manner not uncommon from the Luddites who opposed introduction of technology in the textile industry. The railroad dissenters came from a number of public avenues including Canal owners who had only recently finished enormous investments to develop the Erie Canal in New York State (which arguably led to the creation of New York harbor as the port to the world). Canal owners of the day were quoted in the Boston Globe in the late 1820’s that “there would as likely be a rail road to the moon as one that would link Boston to New York.”

Finally, railroads were made possible by the use of two standards: rail track gauge and time zones. The evolution of rail transportation was largely funded by individual entrepreneurs and they attempted to compete by winning share with unique gauge which locked the other company out, in much the same manner that software vendors use proprietary practices, today. The issue with time zones stems from the reluctance of the general population to adopt a standard time citing the need to optimize local agriculture to the position of the sun.

Great Britain was the first country to adopt one standard time. William Hyde Wollaston (1766–1828) suggested the idea and it was popularized by Abraham Follett Osler (1808–1903). The first railway to adopt London time was the Great Western Railway in November 1840. On 22 September 1847, Railway Clearing House, an industry standards body, recommended that GMT be adopted at all stations. By 1855 the vast majority of public clocks in Great Britain were set to GMT. The last major holdout was the legal system, which stubbornly stuck to local time for many years, leading to oddities like polls opening at 08:13 and closing at 16:13. The legal system finally switched to GMT when the Statutes (Definition of Time) Act took effect through the Royal Assent on 2nd August 1880.

Standard time zones were instituted in US and Canada by the railroads on 18 November 1883. However, Detroit kept local time until 1900 when the City Council decreed that clocks should be put back twenty-eight minutes to Central Standard Time. Half the city obeyed, half refused. After considerable debate, Central time was adopted by city vote in 1905. Standard time zones were established in the US by the Standard Time Act of 19 March 1918.

It is interesting to note that standardization of time in specific time zones in US and UK required 30 years or more for adoption. A study conducted by Norman Poire also reveals (see figure 30, below) that it takes about 30 years for new technologies to be adopted. One reason may be that it takes an active generation to retire before the younger generation can adopt the advances from and reap the benefits of innovation.

### 5.1.6 Concluding Comments

Scores of personal computers linked together can outperform a giant mainframe, argued Chancellor Angela Merkel in her first speech to the Bundestag on 30th November 2005. That was the image this former physicist chose to describe a fragmented programme that promises many little steps in the general direction of reform, rather than one big leap.

Innovation is a collective process that stems from confluence of ideas, concepts, tools and technologies rather than one Big Bang. Biology provides important lessons in this regard. Distributed computing, alluded to by Chancellor Merkel, is a rudimentary form of our understanding of the memory and visual system of Octopus that leads to high maneuverability of the arms and the capacity of the peripheral nervous system to perceive and process chemical and tactile information. The coordinated propagation of the bend and the neuronal activity is achieved by local feedback from proprioceptors in the muscles.

In other words, the Octopus is coordinated in its local and global optimization. The latter is extremely difficult to

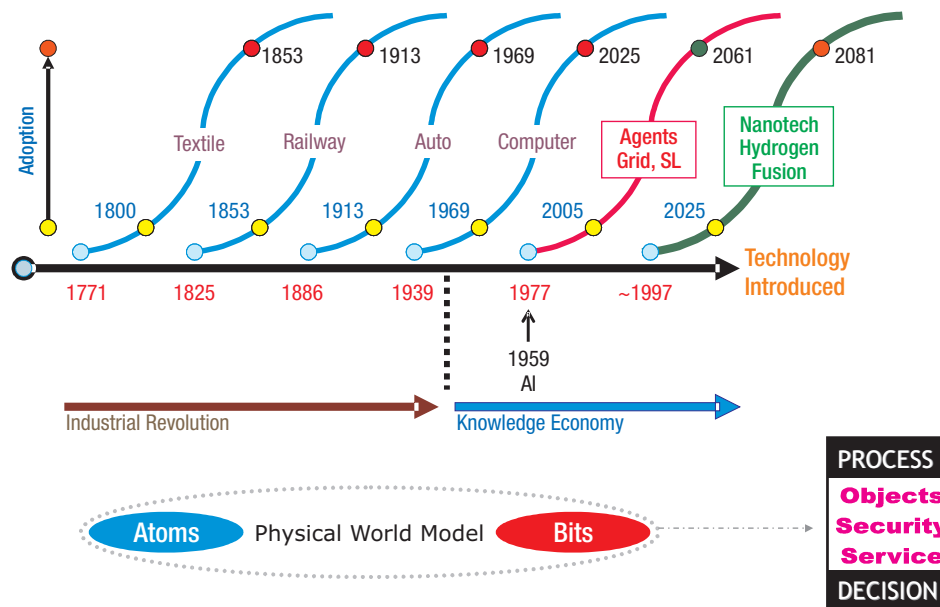


Figure 30. Why does it take three decades for adoption?

achieve for decision systems and leads to monumental inefficiencies. The stomata in plant cells also offer an advanced system for distributed computing. The ability of ants to help routing algorithms is well documented but there are many more lessons from the ant. Decision systems and the humans involved in their design might find it stimulating to explore biological systems in search of innovation and interoperability which is key to global business.

## References

1. Datta, S. Adopting Decisions, Optimizing Facts and Predicting Figures.
2. The concept of connecting bits to atoms may be traced back as far as Claude Shannon (in 1948 he was the first to use the word “bit” in his paper) and J. R. Licklider (MIT) who lead the DARPA team to create the internet in the 1950’s. At MIT, these topics have been explored by Sanjay Sarma and David Brock in the article “The Internet of Things” as well as Nicholas Negroponte and Neil Gershenfeld (Media Lab).

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