

# Physical to Digital Transformation: Any *new* opportunities?

By

Ashok B. Boghani, Sc.D.<sup>1</sup>

Maria Taborszki<sup>2</sup>

## Abstract

*Physical to digital transformation affects not only the way products and services are made but the offerings themselves. The opportunities appear real, and in many situations, the question is not whether such substitution will take place but when and how rapidly. This paper provides examples of this transformation, and outlines an approach to systematically evaluate this transformation in order to identify and exploit new opportunities, as well as manage threats.*

1: Director, Monitor Technologies, Monitor Group, Cambridge, MA 012141, USA, [Ashok\\_boghani@monitor.com](mailto:Ashok_boghani@monitor.com)

2: Intern, Monitor Innovation, Monitor Group (2006-2007), now in Budapest, Hungary, [maria\\_taborszki@hotmail.com](mailto:maria_taborszki@hotmail.com)

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## 1. Introduction

The transformation from physical to digital marches on.

In the beginning, this transformation changed the *way* products and services are designed, manufactured or distributed. This meant many changes, such as:

- Replacing or augmenting the use of physical objects (for designing, for getting customer reaction, for testing, etc.) by virtual ones
- Replacing or augmenting processes that require physical interactions by those that can be done virtually (e.g., web conference)
- Replacing or augmenting the use of people (e.g., assembly line workers) by digital ones (robots)

So, nowadays actual crash testing of vehicles is done sparingly...most of it is conducted virtually using math models. The prototypes of new designs often appear as 3D rendered models instead of actual objects. Cash transactions are all but gone, replaced by electronic transactions, and plane tickets will soon be officially replaced 100% by e-tickets.

A more interesting transformation is when the product or service *itself* is replaced by a virtual equivalent. Digital photography, digital books or digital encyclopedias are some of the examples. The Massively Multiplayer Online Role Playing games (MMORPGs) represent another whole set of virtual products that are still evolving.

This type of transformation will have some impact on most businesses, but *profound* impact on some businesses, especially those that develop virtual products/services or find their physical products/services replaced by their virtual equivalents.

In many situations, the question is not whether such transformation will take place but when and how rapidly. There are many factors (regulatory, technological, consumer acceptance) that create uncertainty in the pace of transformation. The eventual outcome will depend on how these factors play out. However, a forward thinking firm may not want to wait until the uncertainties reduce to such a level that all of the competitors jump in, reducing the chance of exploiting emergent opportunities. Also, more ominously, the transformation can also create products that make a firm's products obsolete. There is no need to wait until that becomes a reality.

In this paper, we have outlined some thoughts on how to make decisions under the uncertain environment and be prepared to embrace the change in a deliberate way rather than scrambling when what is almost inevitable actually does happen.

## 2. The Transformation

Let us first look at some examples of what has happened and is happening in terms of physical to digital transformation. Before we do so, it is useful to have a framework such as that shown in Figure 1 below, which divides a business enterprise into several simple categories.

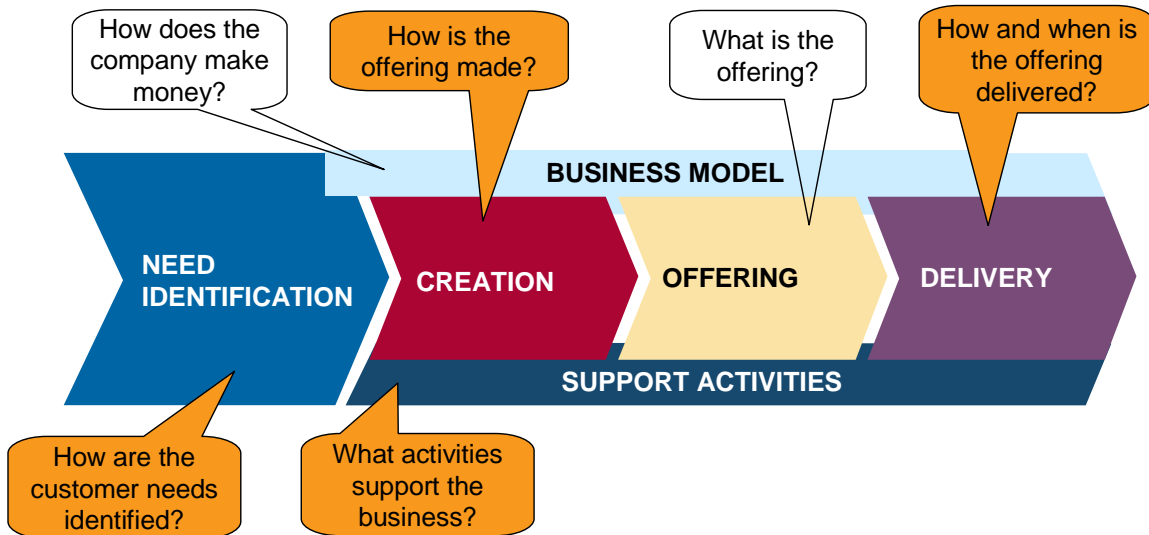


Figure 1: Framework for Physical to Digital Transformation

All of these categories are affected by the change. We will focus on two of these categories: “Offering” and “business model,” as they refer to the more profound change in which the physical product or service itself is replaced by a digital equivalent. The other four categories refer to the way the products/services are made, a change that has been going on for a longer time.

Here are a few examples of transformation in each of these categories:

*Need identification:* The physical focus groups are being replaced by the virtual ones. It is not just approaching customers by on-line means, but also they expressing their views unsolicited on blogs and on-line community forums. Physical prototypes are being replaced by the virtual ones, as shown below.



Figure 2: Virtual Prototype

Although this way of getting customer views on the future products is still not perfect, and physical models are still needed, the trend is definitely on the virtual side (See Ref 1).

*Creation:* There are of course many examples of how the product design, engineering and manufacturing have become increasingly digital. The product development teams are often geographically spread, acting as virtual teams, the robots build cars (and other products), and crash tests are done virtually, as shown below.

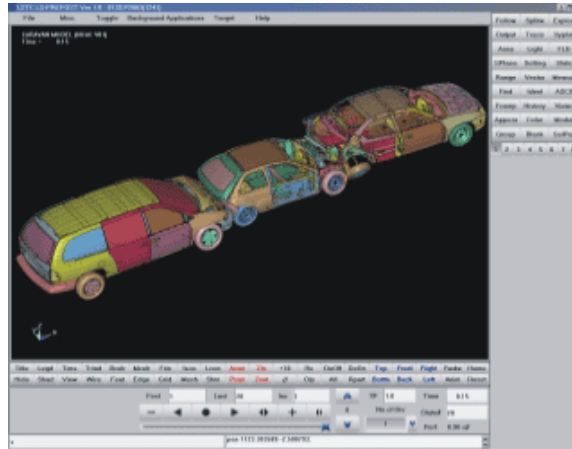


Figure 3: Virtual Crash Tests

*Delivery:* Beyond the obvious examples of cashless transactions and on-line shopping, one can envision several other delivery mechanisms as manifestation of physical to digital transformation. For example, the ability of a customer picking up zip cars without any attendant (the lock is opened by a code delivered on-line), or an unmanned “Pack Station” (see below) offered by the Deutsch Post as a substitute for going to the post office to pick up a package, are both examples of the transformation in the product/service delivery category



Figure 4: Virtual Post Office

*Support Activities:* Most of the support activities have also been deeply affected by the transformation. This would include the use of software for most business processes, the transformation that took place “ages” ago, to virtual decision support systems, and virtual platforms for training employees or customers, whether they are aspiring doctors or pilots. Figure 5 shows an example of virtual training.



*Figure 5: Virtual Flight Training*

*Offering:* This is where the review gets more interesting. Even here, examples of transformation abound. The transformation from chemical based to digital photography is almost complete, while that from physical book to the digital ones has been going on for some time, with (very) limited success thus far. The online encyclopedia has so thoroughly trounced the physical ones that the younger generation may not even know that such an entity existed not so long ago. Video games have become so good that they pretty closely emulate the real games (e.g., Wii of Nintendo for example, shown in Figure 6). The digital renderings in movies have become so realistic that it is a matter of time before real actors would be used primarily for their star power, not to tell a story. Digital pets, robotic assistants for the elderly population, and robots that clean the house or check for land mines are all examples of a physical offering being substituted by a virtual one.



*Figure 6: Virtual Sport*

It is the Massively Multiplayer Online Role Playing games (MMORPGs) where the most exciting developments are taking place. Examples are EverQuest, Ultima Online, World of Warcraft, the Sims on line, and of course, the Second Life. For those living in virtual (meaning real!!) isolation, and/or without young family members, Second Life is an Internet based virtual world imagined, developed

and owned by its residents, a virtual and graphic community of millions of users. They use avatars, or virtual personalities, to interact with each other and virtual surroundings in much the same way we do in real life, as shown in Figure 7.



*Figure 7: Virtual Life! (Second Life)*

The most intriguing aspect of Second Life is that people spending *real* money to purchase “Linden” currency that is used in the virtual world. This currency can be used to buy virtual land or objects. Real companies and entrepreneurs are drawn to Second Life to start business, do marketing, and make money. The question is how will this play out?

*Business Models:* Continuing the above thought, the question is how does one make money in offering a digital product? The cyberspace is littered with failed business models, but some of them have started to succeed. Charging subscription instead of purchase price seems to work for some of the MMORPGs. Also, making money out of advertising, instead of the service of doing a search, works for Google. The online communications providers (like Skype) provide free basic service but charge for the premium ones.

All this brings us to a point where we need to think about where this is heading and how should an organization decide whether there are new opportunities and/or risks posed by this transformation.

### **3. Implications and Trends**

As mentioned in the beginning of this article, these developments have and can pose some opportunities to almost all organizations, and significant ones for some of them.

In the “some opportunity for all organization” category, we have already discussed the improvements in product development and manufacturing processes that are made possible by the transformation. Virtual prototyping automated manufacturing processes and virtual testing are some of the examples of process improvement areas. Examples of more cutting edge areas are where it is difficult to substitute a human being by a machine... but progress is being made nevertheless:

- Robotic surgery (there are already examples of this being accomplished)
- Artificial olfaction (e.g., a virtual “nose” for perfumes and wines)
- Face detection (virtual surveillance)

- Virtual human body (for training doctors)

These substitutions result in cost reduction and improvement in quality of the process being performed.

The more significant opportunities are made available to organizations that are able to create *new products and services* both in terms of virtual products/services *themselves* but also equipment needed to enable them (e.g., powerful graphic cards for MMORPGs).

In a very gross sense, those products and services that are consumed solely through eyes and/or ears of the consumers are most easily transformed...music/movies (from CD/DVDs to on-line delivery), information, entertainment, books. Those that engage the other senses (smell, skin, taste) are more difficult to transform. For example, a vacation experience is harder to substitute by a virtual reality offering, because it engages more than the eyes and the ears. So, the travel industry or the airlines are protected so far.

That leads us to the flip side of the transformation, which is the risk posed to the manufacturers of products and services that are being substituted. (Also included in this category are the professionals being displaced by a computer or a robot.) The bad news is that the difficulties in creating user accepted virtual products, and a sound business model that permit the developer make money, have led to a new set of firms taking lead in almost every instance and not the incumbent who currently makes the physical product. The new comers do not have a vested interest in keeping the status quo and can take the risk! So, it is the Wikipedia Foundation that created an on-line encyclopaedia, not Encyclopaedia Britannica; it is Skype, a new start-up, which brought the internet based telephony, not one of the more established players, and so on. The issue in each case has been...will there be customers who will forsake the physical product/service for the virtual one and what type of business model will allow them to make a profit.

The transformation indirectly affects even those companies that are making products and providing services that are not being substituted. This is because the transformation changes the customer *expectations*. For instance, in many cases, the virtual product/service *more readily satisfies* the desire for instant gratification by consumers. Also, by being able to change more rapidly, they make consumers expect the product life cycles to become increasingly shorter. For products and services that do not provide instant gratification and/or do not change often would face the displeasure of these modern consumers.

As the transformation continues, some of the most exciting developments may end up taking place in the realm of virtual worlds. It is clear that the boundary between reality and virtual reality will continue to get blurred, at least for a segment of the population. "Avatars" now go clothes shopping; the real participation in group activities (concerts, movies, sports events) are being substituted by those in the virtual world, and it is possible to travel to the real destination virtually before deciding. On a philosophical note one can argue that if most pleasure is derived from the senses, what difference will it eventually make if the senses are excited by real things or the virtual ones? Will success in the virtual world be as close to being satisfying to one's ego as that in the real world?

If the money being spent is any indicator, the answer may be yes! The money being spent on subscription to virtual games alone is about \$600 million (DFC Intelligence, Ref. 2)! This does not include the real money being spent on acquiring virtual property, goods and services. Second Life claims the rate of money being spent on that to be above \$1 million per day! And, we may be still seeing only the tip of the iceberg.

Value chains are being established to support both the virtual consumers and corporations. To see how real this is becoming, consider the following examples:

- In China, for example, there are “gold farms”, employing perhaps 100,000 people to play World of Warcraft and collect gold coins that could be sold for real money to those who do not wish to work hard for these virtual coins (Ref 3)
- The virtual world of Eve Online recently hired an economist (Eyjolfur Gudmundsson) to find out if inflation is going on in their virtual world (Ref 4)
- Italian IBM workers called a virtual strike in Second Life to protest low pay (Ref 5)
- Epidemiologists were able to see how a pandemic would spread based on very real behavior of virtual participants of World of Warcraft to an accidental release of a virtual virus (Ref 6)
- A real estate agent is reported to have made \$1 million (real) through virtual land deals (Ref 7)

Real companies see real opportunities here. Many large companies have established presence in Second Life for awareness, marketing, and social networking (e.g., Reebok, Toyota, and IBM). By 2011, 80% of internet users and major companies will have avatar of themselves on line (Gartner).

However, there are quite a few uncertainties related to growth in virtual life commerce (Ref 7):

- Several legal, regulatory, and societal issues remain unresolved.
  - Will there be tax on commerce? How will it be collected?
  - Will increase in pornography attract clamping down on these websites? Turn of customers?
  - How will gambling be allowed?
  - What about intellectual property protection? Real property protection?
- Technology is still a barrier
  - There is still a lack of standard for an open 3D world
  - The simulations are still difficult to use for an average user
- The consumer acceptance (beyond the core group) is still uncertain
  - What are the segments of consumers and what are their characteristics?
  - What products and services will interest them?
  - How fast will the acceptance grow?

Overall, it is clear that something is going on that warrants interest from executives of most organizations. If it is possible to open store front, market products and even sell them for real money, it deserves attention. If increased participation in the virtual world is going to lead to a *reduction* in the current physical world activities, it deserves even more attention.

How does one set about identifying new opportunities from this transformation and what needs to be done to exploit them? Let us very briefly discuss how to start the process of doing this

#### **4. Any New Opportunities?**

So what new opportunities are there for your firm in this environment? How should you go about following up on them?

We suggest you start addressing these questions by follow the following steps:

- Decide what business area you are and likely to be in (make the definition broad to include adjacencies)

- Envision the world of the future when the transformation from physical to digital has reached some level of maturity (this is when the rapid transformation phase is over, some solid business models exist, and the changes are more incremental)
- Describe in great detail what the future world looks like...what products and services have been transformed? What consumer needs are being satisfied? What additional needs have emerged?
- Brainstorm your company's participation in this world...as a supplier of some of these products/services, as provider of enabling technologies/products, as user of new channels made available under this new world
- Identify uncertainties involved with the part of virtual environment of interest to you. Lots of uncertainties surround the MMORPG offerings (i.e., the virtual world), as mentioned above. These uncertainties may not necessary be relevant to your firm unless that turns out to be the area you decide to focus on
- Create scenarios based on these uncertainties...this is a multi-step process that develops some interesting and possible ways in which the future world may be described
- Develop the vision of the world under the different scenarios and identify what would be the most desirable way for your firm to position itself and participate in that world
- Articulate what would the firm look like under that positioning and participation...products/services that would be offered; customer/consumer segments that would be targeted; and the supporting structure that would need to be set up---organization, processes, resources, corporate culture, etc.
- Identify what is new and different in that vision of your firm compared to what it is now
- Develop a change management plan for a scenario that seems more likely and a system that can provide an early warning on what scenario is unfolding, so that the direction of the firm can be changed to match the scenario

If these steps are taken, the company will be prepared to embrace the change in a deliberate way and be able to exploit opportunities early-- before the competition gets there.

## 5. Closing

The transformation from physical to digital continues to affect businesses in every industry, providing opportunities to create current products/services more efficiently and effectively. Even more important, there are opportunities to create a whole new set of products and services. The time is ripe to take a close look to see if your firm is missing out on any of the benefits of this transformation...and also to see if there are potential threats that you have not yet considered.

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