TRIZ PREDICTS MAJOR SHIFT IN INFORMATION TECHNOLOGY

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Abstract
This paper uses TRIZ to show IT will shift dramatically toward the On Demand model. We show the model is already in the first phase of the S-curve, and highlight which TRIZ principles have made the On Demand approach possible. Next, we focus on the TRIZ trends to show how the currently most active part of IT can be expected to change in the future. While studying these trends, we see that the On Demand approach is best suited to implement these trends. Self-Star has created an On Demand solution in line with the TRIZ trends, and its R&D works to achieve the full potential of the predictions.

Keywords: TRIZ, Information Technologies (IT), Business Intelligence (BI), Business Process Management (BPM), Business Activity Monitoring (BAM)

1 TRIZ Predicts IT Will Change

There is an ongoing debate within the Information Technologies (IT) industry triggered by Nicholas Carr's book "Does IT Matter?" [Carr 2004], following his article "IT Doesn't Matter" in the Harvard Business Review [Carr 2003].

Nicholas Carr states that although IT is essential to competition, it is inconsequential to business strategy. In his view, IT can be compared to electricity, in that you can't run a business without it, but few companies builds their business strategy around electricity.

Others in the industry claim the opposite is true. According to them, Information Technologies are the basis of competitive advantage. The huge spending in IT is a reflection of the huge impact and benefits IT can have on the bottom line. Howard Smith and Peter Fingar [Smith 2003] wrote a book that is an extended critical analysis of "IT Doesn't Matter". At some point, it seemed like everyone in the IT industry needed to choose sides.

In reality, the discussion appears to boil down to two observations:
- Information Technologies are a support function to the business, and should be performed at the lowest possible cost;
- Business processes are key business differentiators, and can provide strong competitive advantage. Business processes run on information, and as such, how you handle your information is key to competitive advantage.

Are these views really contradictory? Does information handling require Information Technology as we know it today? TRIZ suggests this is not the case. The Ideal Final Result for IT would be the manipulation of information and processes without the cost or effort associated with IT as it exists today.

While Gartner at the time argued against Carr's view, it did so by saying that IT as hardware and networks truly was a non-strategic commodity, but "the essence of IT is information. Successful firms will use information […] in new ways to solve business problems and create customer value." [Gartner 2003]

While the discussion rages on, the cost of IT has risen year after year, and it is rising still, by about 7 to 8% in 2005 alone [Gartner 2006]. It seems that the whole industry is drifting away from the Ideal Final Result that TRIZ predicts. That suggests that current technologies are incapable of achieving the customer's expectation, and a new S-curve is likely to replace the current one. A disruptive new approach is required in IT, one that enables business to use information to create customer value, while avoiding the huge investments and running cost. That IT disruption has already started.

2   Two Worlds of IT

Business users today are confronted with two very different worlds of IT, which we'll abbreviate as the "On Demand" world, and the "On Premise" world.

On Demand indicates that the software is not delivered to the customer, but rather runs on the servers of the supplier. The user typically accesses this software using a browser, although smart clients can also be used. Best known On Demand companies include Google for search, blogging, mail and other tools, and Salesforce.com for Customer Relationship Management (CRM), and Microsoft for search, blogging, amongst others.

On Premise is the IT we all know so well. The concept is to buy the software from the supplier, buy the hardware, and run your own data centre. Well known On Premise products are Microsoft's business products, Oracle , SAP and most Siebel CRM installations.

When we look at searching for information within the company, and searching for information on the Internet, the difference could not be greater. Whereas we can search billions of pages online in less than 0.2 seconds, it usually takes a long time to find anything within the company. One could argue that this is not due to an inherent benefit of the on demand model, but that the real reason is that search was not properly implemented within the company (because few products are available, if any). Still, differences in approach is an issue that comes back often within the debate about the current state of technology. The On Demand approach provides new ways of doing things, and provides services (and speeds) previously unthinkable. The true power of the On Demand approach is in part the freedom of the supplier to innovate at a rapid pace, and provide new features to the customer without requiring any effort on the part of the user.

So, will traditional line of business software continue to thrive on premise? Customer Relationship Management software used to be one of the key software packages that needed to run On Premise. When Salesforce.com -that provides CRM On Demand over the web-launched, it met with a lot of criticism. Today, it has forced On Premise leaders such as Siebel to provide an On Demand solution as well. Salesforce.com runs the software and the servers, and corporate users can use the solution without any local installation, integration or setup. They can use it from any Internet-connected PC.

Salesforce.com is interesting, because it truly separates the concept of software customization and integration from On Premise installation. A company can customize or integrate the On Demand solution in every way that an On Premise solution can be customized or integrated. Salesforce.com truly does provide the manipulation of information and processes without the effort traditionally associated. Today, their total cost of ownership (TCO) is only marginally less than On Premise solutions [Gartner 2005], but this is primarily due to profit strategies. When driven to a price war, Salesforce.com is in a stronger position than the On Premise alternatives, because it has more cost parameters it can control directly.

Salesforce.com also demonstrates that the notion that data should never leave the company is starting to be overturned. If both the On Demand and the On Premise solution are deemed secure, *customer purchase focus* shifts towards convenience and cost, as the TRIZ trend predicts.

3   TRIZ Principles of the On Demand World

Quite a few TRIZ principles are involved in achieving the On Demand IT. The On Demand IT *takes out (2)* the local server. It does this by creating software that serves the needs of all customers. Integration costs are radically reduced, because they are designed to work *universally (6)* for all customers (as opposed to the customer specific integration processes that is done by consultants over and over in the On Premise world). Whereas the On Premise IT delivers software to the customer site, the On Demand IT delivers the data to the vendor site *(other way around, 13)*.

Bringing all the computing needs to central servers creates a computing bottleneck. This is resolved by On Demand suppliers by *segmenting (1)* the server. Rather than scale the server up into a huge mainframe that serves everyone, *the opposite is done (13)*: the server is scaled down and *copied (26)* many times into huge data plants that achieve the required performance. Each of the smaller servers is a *cheap short-living object (27)*, in which a minimal amount of money is invested. In fact, rather than use real servers, companies like Google and Self-Star use ordinary cheap PC's. Of course, these cheap PC's have a higher failure rate than expensive servers. This failure rate is *beforehand cushioned (11)* by sending the same data to three or more different PC's. That way, when one of the PC's fails, the data on that PC is simply *discarded and recovered (34)* from other PCs, some of which will detect the failure and send copy of the failed data to another PC in the local network. The replication of data also makes it possible to reformat computers or swap them easily whenever needed. But the robustness requirement to keep three or more copies of the same data is actually a *blessing in disguise (22)*: the system asks all copies at the same time for the answer to the question. By taking the first answer that comes in, the system is not compromised by PC's that have become slow for whatever reason (heavy load, failure mode, etceteras). This is how Google achieves its legendary sub 0.2 second responses.

Typically, in the On Demand IT, suppliers will offer a specific solution. Salesforce.com offers *Customer Relation Management (CRM)*, Self-Star.com offers *Business Intelligence (BI)*. The corporate data is stored on the servers of various suppliers, and each supplier optimizes the performance of its application. This is an implementation of *dynamics (15)*,

where the internal corporate data center is replaced by loosely coupled suppliers. Dynamics is hugely cost saving, because both systems integration and maintenance are substantially more straightforward. Most suppliers will empower the user with *self-service (25)* tools that take away the complexity, and allow the user to adapt the On Demand software to his needs.

Companies like Google and Self-Star import large amounts of data, and want to serve answers to their customers fast and accurately. It is usually impossible to search the raw data fast enough, which is why these companies take *prior action (10)* by preparing data in formats better suited for quick searching. Such prior action consumes large amounts of computing power, so these prior actions are done *periodically (19)*. That way, they can *use* the *existing* data plant *resources* when they are less utilized. Because the customer is using the software running on the supplier's site, the supplier has *feedback (23)* on the usage of the software. This ranking feedback is used to further improve the user's experience.

Most observers agree that the existing line of business software industry is very mature. We see lots of mergers in order to grab more market share (e.g. Oracle), or heavy price competition from newcomers (e.g. Microsoft). The On Demand IT on the other hand is in the early phases of its development. But as psychological barriers of the past are easing, we are sliding up the On Demand S-curve and we can expect to see a rapid take-up in the coming years, especially in cost-sensitive industries.

How will On Demand radically change things in most actively developing part of IT?

4   Business Intelligence Trends Predicted by TRIZ

Because of the maturity of the existing IT, total cost ownership (TCO) of existing applications is coming down. Nevertheless, as previously noted, total spending on IT is still going up year over year. The main culprit for that is increased spending on Business Intelligence (BI), Business Process Management (BPM) and Business Activity Monitoring (BAM). In fact, according to Gartner [Gartner 2006b], business intelligence is the number one technology priority for business IT spending in 2006, reaching $2.5 billion (up 6% from 2005). By 2009, the business intelligence software market should climb further to $3 billion.

But what is Business Intelligence (BI)? Today, BI consists of huge data tables that can be queried along many criteria, with formulas calculating totals, averages, etceteras. Using BI is a big step forward in corporate reporting, but user expectations change over time. What can we expect the user expectations to be in the future, according to TRIZ? What will $3 billion buy?

4.1 Better Business Intelligence for Organisations

Most experts agree that business processes are at the core of competitive advantage in many industries. Many of the trends we present here will focus on business processes, but will also frame them much broader and make them an integral part of business intelligence.

Matching Non Linearity. Almost all business process monitoring tools make the assumption that business processes are linear. The most advanced tools allow for conditional

branching to partially accommodate non-linearities. The reality is that real business processes (BP) emerge from the collaboration of many. Someone or something always does something different, or at a different moment, than was anticipated in the predefined flow charts. Executives are often surprised when discovering how their operations *really* work. Business process analysis tools should fully accommodate non-linearities by deriving the business processes from the real operations, instead of the other way around. In our experience, arrays of servers are needed periodically to perform the computationally very intensive action of finding the business processes within the data. This seems to suggest that matching non linearity is better suited for an On Demand approach, where computing resources can be shared to ensure good utilization of resources.

Increasing Transparency. Increased automation has hidden the business processes from view. Industry-specific solutions contain large number of built-in processes, and consultants of the past have customized them to fit your organization, sometimes in undocumented ways. When applications are black boxes, optimizing your business processes becomes very hard. Today, the best BI solutions try to obtain partial transparency by looking at status fields set by applications. A completely transparent solution must use all of the information in the database to detect the actual business process status (even when status fields are erroneous).

Controllability. Monitoring business processes manually (direct control action) is insufficient for larger companies. The business intelligence system should actively notify them of actions to be taken ("action through intermediary"). In the future, steps should be taken to further increase the controllability of business processes, into fully adaptive and self-learning systems. It is clear that increasing controllability takes both highly technical expertise that is very expensive to maintain on premise, and consumes substantial computational resources.

Design Methodology. When business intelligence started, it simply put together the data from various applications. It was quickly discovered that this doesn't work due to conflicting data, and the need for a *single truth* in business reporting. Therefore, transient effects were included, in industry terms called *data cleansing*. Huge amounts of resources are used in large organizations to implement data cleansing, mostly because thing keep going wrong and new rules need to be defined. The saying *garbage in, garbage out* is now almost classic in the BI industry. But it doesn't have to be so. TRIZ predicts slow degradation, cross-coupling effects and eventually design for Murphy will radically our change expectations of business intelligence. Good business intelligence should bring insights out, even when garbage is entered.

Reduced Damping. As controllability and design methodology improve, there is less need for filtering data that doesn't fit our models. Such filtering or data cleansing is actually a very negative factor in obtaining that one truth. Filtering is usually done on a technical basis, whereas the results are studied to gain business insight. But many business insights, in particular those pointing at where processes go wrong, are rendered invisible by data cleansing. In other words, you might be missing out on the most important results of business intelligence. The goals is to reduce data damping all the way down to working with unfiltered data, while still achieving all of the above factors, and while still providing integrated and sufficiently abstracted results to the users of the business intelligence.

Increasing Transparancy (II). Another hot topic in business intelligence, is the ability to translate finding in financial results. Being able to express issues financially, and hence rank them accordingly, makes it a lot easier to inspect them, and target your energy on the most important aspects.

4.2 Implications for Suppliers

There are off course also issues for the suppliers, such as **market evolution** which implies that business intelligence will move towards a service and beyond. **Boundary breakdown** suggests that services provided by different suppliers should be easily brought together in a mash-up fashion to provide just the right mix, at no additional cost. **Controllability** allows suppliers to better understand how their services are used, and where to improve them first. **Reduced human involvement** is imperative for a supplier who wants to scale his system. The **macro to micro** trend suggests that solutions for large customers should be easily tailored for small customers, both SMEs and small divisions in larger organizations who want solutions specific to their own needs.

Suppliers like Self-Star, who choose to implement all of the above using the on demand concept, must overcome the fact that data is inside organizations behind a firewall. TRIZ principle 24 suggests using an *intermediary*. This intermediary works from the inside to detect changes in the various applications, and transmits these securely to the data center.

5   Conclusion

The creation of the On Demand model has drawn heavily on the TRIZ principles. Many TRIZ trends point to the On Demand model overtaking the On Premise model. However, the nature of software itself will also radically change. Specialized software packages will provide end users with much more in depth results, while hiding the complexity and leaving customers free to create a mash-up of the services they need for their business unit. Self-Star is focused on providing this service today. Its R&D team is focused on pushing the limits further along the TRIZ trend lines.

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