

# **Building a Business Case for Auto-ID at Dell**

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Submitted (pending approval) to Jennifer Proctor,  
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## INTRODUCTION

With the development of low cost radio frequency identification (RFID) chips, it is now technologically feasible to do large scale tagging of objects within supply chains. This opens exciting new possibilities for improving visibility and the elimination of such structural problems as theft and out of stocks. Managers at all levels are beginning to realize that Auto-ID technology has great potential to enable better monitoring and coordination.

For example, some industry groups estimate that theft accounts for over \$25 billion in lost profits in the North American retailing industry alone. Given this type of opportunity for improving profits, companies are eager to identify areas where Auto-ID technology can provide quick bottom line results and where it makes long-term economic sense to implement.

However, as a practical matter the calculation of costs and returns on investment becomes difficult because many elements of Auto-ID technology fall into the category of corporate overhead. Application of tags to individual objects represents the only true variable cost. Since the cost of tags is projected to decrease to 5 cents per unit within the next several years, the primary cost of Auto-ID will result from changes to infrastructure in many cases.

For most firms information technology infrastructure is overhead that supports many different functions within a business. Often it is hard to assign a proper allocation of overhead that is a fair representation of the amortized asset cost in relation to specific business processes. Further, it is also hard to identify both quantitative and qualitative benefits that arise from Auto-ID technology. With a bias toward high returns and quick

paybacks on investments, there is additional pressure to develop methods of fairly evaluating the financial and qualitative impact of Auto-ID technology in practice.

This article provides a case study along with a method to evaluate the costs and benefits of Auto-ID technology. In April 2003, the Dell strategic supply chain group decided to do a detailed analysis for the justification of Auto-ID technology in tracking and tracing components used in the manufacturing of microcomputers. The results of the study include an initial means to evaluate Auto-ID technology that is applicable to similar business processes within other firms.

Before exploring ways to evaluate economic contributions, it is important to understand how Auto-ID technology differs from RFID, and why the role of infrastructure is critical to the success of building an Internet of things. The differences between Auto-ID and RFID are important in developing a method to analyze financial returns for the practical application of the technology.

## **AUTO-ID VS RFID**

The infrastructure needed to manage the Internet of things is Auto-ID technology, an intricate yet robust system that utilizes RFID. Release 1.0 of Auto-ID technology is being managed by GS1. This group is a result of the merger between the Uniform Code Council (UCC) and European Article Naming Service (EAN). The UCC was responsible for implementing standards for bar codes beginning in the 1970s. This has been one of the most successful efforts in establishing universal standards during the entire recorded history of commerce. Arguably, bar codes top the list for innovative technologies developed during the 20<sup>th</sup> century.

While RFID, like bar codes, has contributed a great deal in the past, most applications are proprietary. From an investment standpoint, RFID often offers acceptable financial return for a limited scope project because all of the investments can be readily identified. An example is the application of active tags to railroad cars. This has been done for more than ten years and the results are impressive in practice. The cost of the tags and infrastructure to support this RFID application are identifiable in that all computing systems are stand-alone. This makes the job of financial evaluation straightforward.

In contrast, the important feature of Auto-ID technology includes open standards and protocols for both tags and readers. This means that a tag produced by one manufacturer can be read using equipment produced by a different manufacturer. This type of interoperability between tags and readers is essential for wide-scale application within supply chains, but also complicates financial justification because part of the systems becomes a significant element of corporate overhead.

Underlying the open standards for tags and readers is a sophisticated information technology infrastructure that utilizes an architecture that resembles the fundamental concepts of the Internet. This lays the groundwork for the intelligent value chain of the future.

Creating "smart products" that sense and respond with the physical world requires unique identification, which is an element of Auto-ID technology. With this capability, distributed control systems can interact and give instructions to a specific object.

For example, some time in the future smart objects within the consumer goods supply chain might dynamically change price based on sensing demand and communicate

this information to ERP systems without human intervention. Because it offers much more than merely identifying objects using radio communication, Auto-ID technology holds the potential to drive rapid advances in commerce by providing the infrastructure for true automation across supply chains.

However, to achieve these capabilities the computer infrastructure must be justified based on financial savings through improved business processes. Though there are few concrete examples to demonstrate financial evaluation techniques for Auto-ID, some leading companies have undertaken early attempts to establish methods for financial analysis in this exciting area of business technology.

### **THE AUTO-ID SCORECARD**

Taking insight from various efforts to evaluate corporate balance sheets and supply chain costs, Dell has designed a scorecard approach for the financial analysis of Auto-ID applications (See Figure 1).

**Figure 1 – Radio Frequency Identification Scorecard**

<b>Benefits</b>		<b>Cost</b>	
<b>Characteristics of the Affected Process</b> Labor Intensive Process High Rate of Errors Ineffective Optical Scanning	<b>Current Situation?</b> _____ _____ _____	<b>Implementation Complexity</b> In a Limited Footprint On a Limited Number of Products Within One Company	<b>Will Imp. Be?</b> _____ _____ _____
<b>Benefits</b> Reduce Labor Reduce Errors Reduce Inventory	<b>Will Imp. Allow You To?</b> _____ _____ _____	<b>Operational Expense</b> Be Able to Share Investment Cost Tag a Reusable Asset Tag at the Pallet/Case Level Avoid Item-Level Tagging	<b>Will You?</b> _____ _____ _____
<b>Future</b>			
<b>Longer Term Considerations</b> A Scalable, Repeatable Solution Increased Visibility Increased Velocity		<b>Does Imp. Lead To?</b> _____ _____ _____	
Yes = Advantage No = Disadvantage			
<b>Other Considerations</b> Increased on Shelf Availability Unified Anti-Theft Device Anti-Counterfeit Solution			

One common theme from all early Auto-ID implementation efforts is that achieving an acceptable return is difficult when application occurs on a limited scale. Being a networked based technology, there is no question that the full benefit of Auto-ID will not be achieved until all firms within a supply chain implement the technology. In this regard, implementation resembles that of a ground based telephone system. A partial network of telephone lines does improve communication; however, it is only though coast to coast wiring of every home that the full potential of a telephone network can be realized.

It is similar with Auto-ID technology. The emphasis at Dell has been to identify opportunities where acceptable returns can be achieved through limited application of Auto-ID technology. This assumes the realization that much larger benefits will probably

happen through full implementation, however, a limited project offers the opportunity to become familiar with Auto-ID technology while still achieving positive financial results in practice. In many ways, this approach resembles experimentation that is needed for all innovations, with each experiment being chosen based on the likelihood of financial success.

The scorecard is a simple set of critical questions designed to assess if a particular Auto-ID application is worth pursuing. In the case of Dell, each question is weighted to reflect the importance and strategic direction that management wants to promote. After completion of the scorecard for each process, all of the scorecards are gathered together and evaluated relative to each other. This provides a simple yet effective method to screen business processes for the best candidates. Once a subset of high potential candidates are identified, detailed financial analysis is conducted. Using this approach, Dell is able to screen a number of businesses quickly, focusing only on the best candidates for detailed analysis of hard savings.

Figure 2 shows an example for a high potential Auto-ID application ( Business Process A) at Dell.

**Figure 2 – Radio Frequency Identification Scorecard with Relative Advantages for Process A.**

<b>Benefits</b>		<b>Cost</b>	
<b>Characteristics of the Affected Process</b> Labor Intensive Process High Rate of Errors Ineffective Optical Scanning	<b>Current Situation?</b> ___Y___ ___N___ ___N___	<b>Implementation Complexity</b> In a Limited Footprint On a Limited Number of Products Within One Company	<b>Will Imp. Be?</b> ___Y___ ___Y___ ___N___
<b>Benefits</b> Reduce Labor Reduce Errors Reduce Inventory	<b>Will Imp. Allow You To?</b> ___Y___ ___Y___ ___N___	<b>Operational Expense</b> Be Able to Share Investment Cost Tag a Reusable Asset Tag at the Pallet/Case Level Avoid Item-Level Tagging	<b>Will You?</b> ___Y___ ___N/A___ ___Y___ ___N/A___
<b>Future</b>			
<b>Longer Term Considerations</b> A Scalable, Repeatable Solution Increased Visibility Increased Velocity		<b>Does Imp. Lead To?</b> ___Y___ ___Y___ ___Y___	

Yes = Advantage  
No = Disadvantage

Advantage	10
Disadvantage	4

This simple analysis identifies the current state of a business process and the potential benefit if Auto-ID were employed. The intent is to identify situations subject to high rates of error and that are labor intensive in terms of tracking and tracing. Applying Auto-ID in these situations will give Dell a higher payback.

In addition, Dell identifies areas where existing data-capture technologies such as barcodes are not working to peak performance. Since bar codes represent a means of ubiquitous identification, it is likely that Auto-ID technology, which overcomes the some of the limitations of bar codes, might prove an appealing alternative.



Dell examines Auto-ID justification as it does for all new types of technology. Hard savings take precedence in making the investments with particular emphasis on savings in reduced labor, errors and inventory carrying cost. Though Auto-ID technology has great potential to make significant contributions in all three of these areas, partial implementation increases the difficulty in justifying leading edge applications that in the long-run will return the greatest amount of value to Dell.

### **A CONSERVATIVE APPROACH**

To reduce the cost of the initial implementation, Dell has taken the approach of looking for a promising subset of the supply chain for early applications within their own operations. By narrowing the scope of application, less hardware such as readers for tags are needed and there are fewer coordination problems.

In addition, it is not possible to wire an entire distribution center or factory as a starting point for Auto-ID. Rather, Dell looks for a defined location within a facility and specific individual product flows. This enables the test to be completed with the minimum of tags and readers, thus reducing the initial hardware investment. Using this approach also diminishes the impact to ongoing operations. However, care must be taken that this approach does not oversimplify the issues relating to Auto-ID applications between trading partners.

As a final comment, all of the scenarios examined by Dell involve tagging at the case and pallet levels. To date, there has been no analysis of tagging finished goods. For the realistic future, Dell will focus on Auto-ID applications that deal with internal supply chain issues rather than in home applications that might involve computers or printers.

## **BUILDING THE BUSINESS CASE**

Once the scorecards for each process identify the best candidates for Auto-ID technology, the next step is to do the financial analysis of the benefits and costs. At Dell, all benefits must come from hard savings including reduced labor, fewer errors and lower inventory carrying cost.

There are many important questions to ask at this stage. How many readers are needed? What are the incremental computing requirements? How are tags applied? What software will manage the data provided through Auto-ID.?

Dell has concluded that although industries have focused on the price of tags as the biggest hurdle, the largest cost is in systems integration.

Figure 3 shows a **MOCK** payback calculation for a particular business process. In this business case, the payback was about one year.

**Figure 3 – Sample Auto-ID Business Case**

<b>Benefits</b>	
Reduce Labor	80
Reduce Errors	75
Reduce Inventory	0
<b>Total Yearly Benefit</b>	<b>\$155</b>
<b>One-Time Costs</b>	
<b>Hardware</b>	
Readers	5
Application Servers	8
Data Storage	4
<b>Software</b>	
Operating System	2
RFID and Database Software	18
<b>Subtotal for Hardware and Software</b>	<b>\$37</b>
<b>Installation and Integration Services</b>	<b>\$50</b>
<b>Total One-Time Costs</b>	<b>\$87</b>
<b>Recurring Costs</b>	
Support and Maintenance (15% of Hardware and Software costs)	\$5
Number of Cases and Pallets Per Year	100
Cost Per Tag	\$0.25
<b>Annual Tag Costs</b>	<b>\$25</b>
<b>Total Yearly Recurring Cost</b>	<b>\$30</b>
<b>Payback Calculation</b>	
Yearly Return @ Stabilization (Annual Benefits Less Recurring Costs)	\$125
Installation, Integration, and Stabilization Time (Years)	0.3 years
Years to Recoup One-Time Cost (One-Time Costs/Yearly Return)	0.7 years
<b>Payback</b>	<b>1.0 years</b>

**Recap**

Yearly Return  $155 - 30 = 125$

Years to Recoup One-Time Cost  $87/125 = 0.7$  years

## **MAKING THE DECISION**

After completing the scorecards and business case analysis, Dell has a structured approach for going forward that involves three options.

### **Go**

The scorecard shows an advantage and the business case has an acceptable payback period or ROI based on capital hurdle rates. In this instance, the project is implemented immediately.

### **Stop**

The scorecard shows no advantage over existing processes in the application of Auto-ID technology. The project is stopped.

### **Hold**

In the situation where the scorecard shows an advantage but the business case does not quite show returns that meet corporate objectives, the project is put on hold pending further developments. As cost change, it might become feasible to go forward with the project. For example, the mandates for Auto-ID technology from Wal-Mart, the Department of Defense and the Food and Drug Administration will drive greater production of tags, readers, software and systems integration. The increased volume of activity will result in economies of scale and more intense competition among vendors. In addition, technology performance will improve over time.

For most situations at Dell, Auto-ID technology falls into the category of hold. This is the case because the calculations for justification depend entirely on hard savings. Since Dell has already invested billions of dollars to develop business processes that are state of the art, it is often hard to find overwhelming savings from Auto-ID that justifies immediate implementation. However, this could all change in a relatively short period as the costs of Auto-ID technology decrease.

The greater value Auto-ID technology may be in the realm of customer service. It is very difficult to measure the benefits directly, however every business knows that when done right customer service is the key to long-term sales growth. Being able to track and trace parts by serial number, calculate the reliability of critical components such as hard drives, and deliver service by treating each computer sale as a unique event offers business activities of great benefit to customers. This type of capability also offers differentiation from competitors who have not yet developed methods to treat each customer uniquely.

As with any new technology, the development of Auto-ID will take many turns in practice. It is seldom that new technology finds application without a great deal of experimentation and a number of failures. In the case of Auto-ID, the direction is clearly forward because of the overwhelming possibilities for improving productivity. The task practitioners now face is the true measure of any innovation, finding widespread application through the efforts of many who deal firsthand with the everyday problems of business. In this regard, APICS in conjunction with industry is in an excellent position to lead in the application and development of Auto-ID technology in practice.