# Business and Data Architecture for the Future

Jon Andresen, 19 February 2014

One of the key challenges we face is how to design a business solution or a system, that will allow us to move into the future with as little pain as possible? What will that future look like? No one is very sure but we know it will be different than what we are doing today, and therefore require changes from what we are doing today. The discussion below suggests ways to make that transition between here in the future as painless and as productive as possible.

The primary challenge is that of costs and benefits in the near term (<2 yrs), versus costs and benefits in the long term(>2 yrs). Minimizing the costs now will also minimize the benefits in the future; incremental change begets incremental benefits. Another approach is to not design a system to todays' requirements only but to design for the change that inevitably will come. The way to do that is to design the system to be as modular as possible and to be as intelligent as possible. Those two concepts are powerful by themselves, but when used together they act as multipliers to each other to deliver a 'future-proof' result. A third leg of this concept will be the use of AutoID technology.
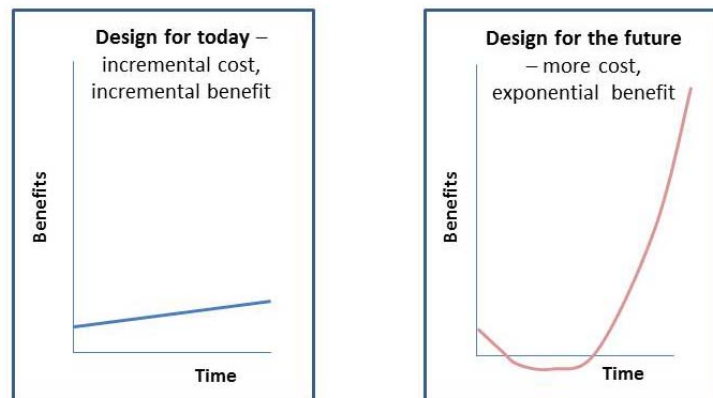
Modularity

In our industry, the modularity piece comes from identifying and tracking the 'eaches' – each Serial Numbered item (versus the part number family). If we can first uniquely identify each item then our systems can be built to track that item automatically cradle-to-grave. If we can uniquely identify the "eaches" then our business processes and systems can begin to associate the "eaches" in meaningful and useful ways, e.g., this particular Serial Numbered item can be associated with a uniquely identified shipping container. That association can then be severed at a later time and each unique item can go on to be associated with something else that serves the business need. That modularity allows the business to mix'n'match their assets as the demands of the business change.
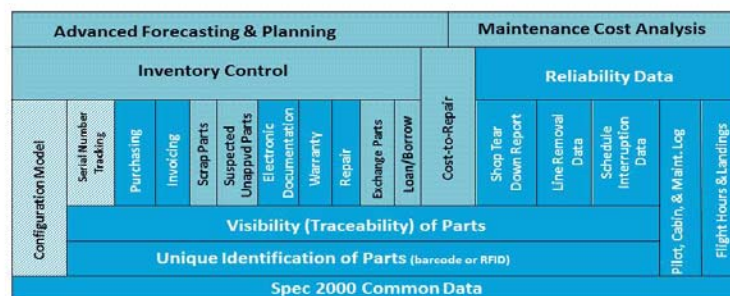
Intelligent Data

 The second piece of moving painless into the future is to utilize "intelligent data", and by that is meant not using just a string of numbers who gain their understanding by secondary characteristics like what the number starts with, how long number is, where it is located on a the paper, etc. You may be able to train your own people in this tribal knowledge of, out of all the numbers you see, what is the correct number to type into the system but it will never work for your suppliers, your contractors, or your partners who need to work with many company's systems.

In aviation, since 1985, we have had an industry standard that defines such intelligent data. Initially designed for digital transactions between airlines and suppliers, in this world of constant change in outsourcing, insourcing, partnering and re-partnering around the world, the ATA Spec2000 data structure is the common way to add intelligence to the data to allow every player to understand what the string of numbers mean. There are over 1000 "Text Element Identifiers (TEIs)" that are all documented in a Common Standard Data Dictionary (CSDD) used across the entire global industry. Such intelligent data is easy for computers to understand, but it is also easy for people to understand as they no longer need the pre-printed paper form (costly) with the number typed or written clearly in the correct box (costly) to understand the data they are looking at: PNR is the Part Number, SER is the Serial Number, BOX is the box number – simple!

Use of AutoID Technology

Because most everything we do is eventually entered into a computer, the use of AutoID technology – typically barcode and/or RFID – is a huge enabler for both the Modularity and Intelligent Data aspects. At a minimum, barcode reading is 10X faster and 100,000X more accurate than typing, and using RFID technology will add another 100X factor on top of both those measurements! The speed and accuracy enable many things to happen that would be impossible from a cost and practicality point of view. Using RFID, we even have 'Transparent Data Collection' so that some important transactions can be done automatically and instantly without any human typing at all. The first pieces of data we need to always know before we get more sophisticated is: who are you, where are you, and when are you there? From that data we have basic **visibility** of where things are when and can make other business decisions based on that.

Functional and Data Architecture

Designing for the Future

With these 3 pillars – **Modularity**, **Intelligent Data**, and **AutoID technology** – we can build systems that can (more) easily adapt to our changing business requirements in the future. We should not presume that the future will all be based around the systems, processes or the parts that we have today, but what needs to survive into the future is the intelligent data used to make our business decisions. Whenever data is exported to the outside world, via human readable print, barcode, or RFID encoding, the data should be made intelligent using the industry standard TEIs. The Spec2000 industry standard even allows for "proprietary TEIs" – something only understood with your own processes – so there is little excuse not to make all data (outside a computer system) that humans need to interact with, intelligent data using TEIs.

A common example to explain the power of intelligent data is to find the Part # off the part. Some parts have three different Part #s – the OEMs Part #, a Boeing Part #, and a re-order Part #, called an Airline Stock Number. Intelligent data would have a different TEI on the front of each of those Part #s so it would be clear to both people and computers (e.g., handheld barcode reader) which kind of Part # was being recorded, and in fact could reject some barcodes reads because it was the incorrect Part # scanned. Intelligent data helps prevent errors every time the data is read by a human or a reader.

A fear that is often expressed is that the intelligent data, being read back into a computer system via barcode or RFID reader, will have these extra TEI characters on the front that will not be compatible with existing data in the legacy systems. Any commercial barcode equipment purchased in this century will have the capability to automatically strip off the TEI characters and just pass through to the legacy system the data is has always expected. Short of changing those legacy (or even the developing) systems to accommodate intelligent data, some barcode systems can take multiple fields of intelligent data found in 2D barcodes and automatically populate the correct data fields on a legacy system screen

Summary

The combination of Modularity, Intelligent Data, and AutoID technology will allow your new systems, and the redesign of your old systems, to flex with changing business requirements in the future. Business processes are changing too fast, and "our systems" (proprietary) are changing too slow to keep up, so systems designed with these concepts are the only cost effective way to keep up with the future.