

RFID Today



RFID compliance problems PAGE 10

IN ASSOCIATION WITH:

ADA Application Development ADVISOR

13 Marketing plus or privacy negative?
ROBERT BOND



04 Thinking beyond 'slap and ship' – optimizing RFID by overhauling the back-end

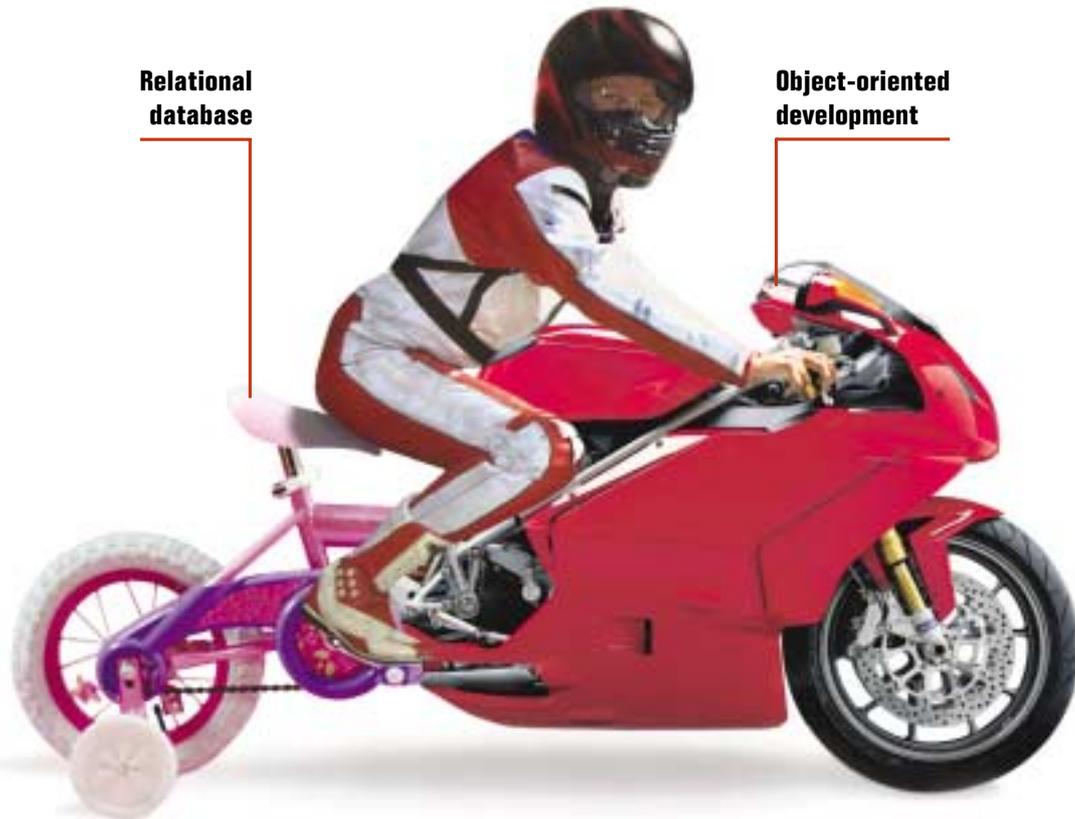
06 Seven principles of effective RFID data management

09 RFID Developers' Forum – putting heads together to plan for enterprise RFID

INTERSYSTEMS

ObjectStore.
A Division of Progress Software

RFID Developers' Forum



**Relational
database**

**Object-oriented
development**

A BETTER DATABASE CAN SPEED UP YOUR DEVELOPMENT CYCLE

If your relational database isn't a good match for your object-oriented development, you need a new database.

Caché, the *post-relational* database from InterSystems, combines high-performance SQL for faster queries and an advanced object database for rapidly storing and accessing objects. With Caché, no mapping is required between object and relational views of data. That means huge savings in both development and processing time.

Applications built on Caché are massively scalable and lightning fast. They require little or no database administration.

More than just a database system, Caché incorporates a powerful Web application

development environment that dramatically reduces the time to build and modify applications.

Caché is so reliable, it's the leading database in healthcare – and it powers enterprise applications in financial services, government, and many other sectors. With its high reliability, high performance and low maintenance, Caché delivers your vision of a better database.

We are InterSystems, a specialist in data management technology for over twenty-six years. We provide 24 x 7 support to four million users in 88 countries. Caché is available for Windows, OpenVMS, MAC OS X, Linux, and major UNIX platforms – and it is deployed on systems ranging from two to over 50,000 simultaneous users.



See us at
**METAmorphosis
2005**
Barcelona
26-28 April

Try a better database. For free.

Download a free, fully functional, non-expiring copy of Caché or request it on CD at www.InterSystems.co.uk/match3

© 2005 InterSystems Corporation. All rights reserved. InterSystems Caché is a registered trademark of InterSystems Corporation. ADA/AD125b

ROGER LEWIS

Look at the wider picture

IN THE WORDS OF THE SONG "MONEY MAKES THE WORLD Go around" How true this is, but how it seems to pass me by with regular monotony. And I suspect that I am not alone. But just where is this untold wealth resting?

In the last issue of this publication I raised the question of whether the implementation of RFID would give financial benefit to companies as well as achieving better control of stock, smooth supply chain movements, improved manufacturing flows and a reduction in stock. All of this to result in improved profits and if so who gets the profit?

Whilst I contend most vehemently that RFID is bigger than supply chain it is still the area that seems to be getting the biggest press. But first let's throw some legal obligations and compliance pebbles into the pool and watch the ripples.

Last issue I asked if we could witness and report on the steps taken in the implementation of a RFID project. It was inevitable that there would be no reply; but I had to ask! However embodied within this request was a hidden motive that will hit all of the supply chain people like a sledge hammer in the fullness of time.

Some of these are called SOX (and everyone must have heard about Section 404 of Sarbanes-Oxley - but have a look at section 302); the eighth and tenth EU directives, Chapter 27 of the Companies Act and many many more!

It is claimed that SOX is only for US companies and that on this side of the pond we do not have to worry. And even then it is only designed for large companies quoted on the New York Stock Exchange. Hmmm I wonder.

So where are we?

Software companies claim that their system will deliver wonderful ROI. If one accepts these at face value your company's money can start to go round again.

First one needs to define just what Return on Investment is?

At the risk of being boring (well most accountants are!) you would also need to look at cash flow.

It is important to quantify just how much money has to be invested today to get the project moving and

Remember that cash today with a promise of profit tomorrow has killed many a good company



how long will the project take to deliver this return on investment.

Remember that cash today with a promise of profit tomorrow has killed many a good company. Just look at how high IT salaries are today as compared to 10 years ago. Money is worth a lot less.

Some of the questions are (a) would it be better to put the money in the building society (b) what is the cost of the risk of putting in the system when compared to the potential benefit? Answering these questions might stop you from starting the project.

However suppliers to Wal-Mart or Tesco would seem not to have this problem as unless they invest then they do not have a business. So system implementation is virtually obligatory.

And whilst this path is being travelled, as a reminder, one should watch over one's shoulder at all of the compliance issues.

My first thought was that I did not just want to be a bearer of bad tidings but there are things out there that are really needed to be considered.

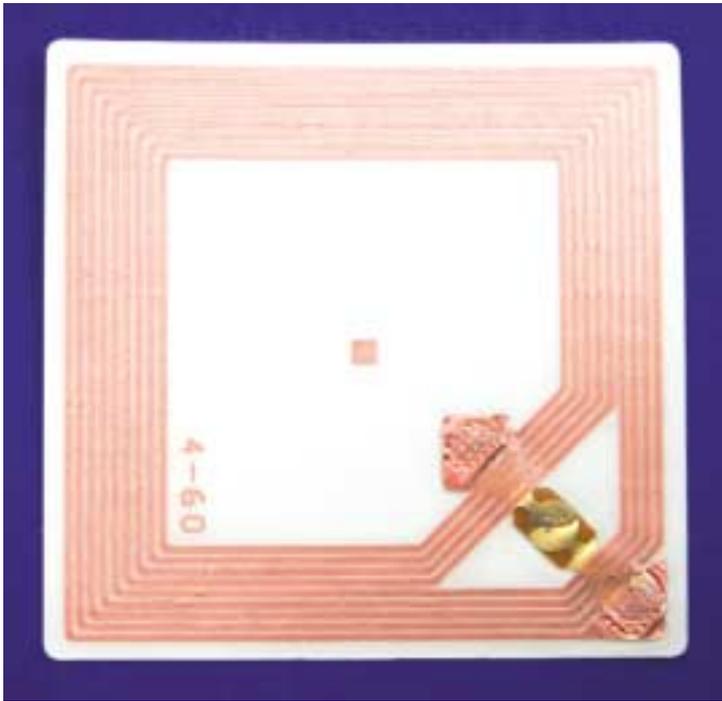
RFID offers huge potential to make these savings and improve cash flow but RFID is about process improvement and system changes. Implement RFID whilst watching out for these other facts and you are starting to take in the whole picture.

The best that is available at the moment is probably CMMI (capability maturity model integration). This is all about proper control of your process improvement and when coupled with ITIL (IT Infrastructure Library) which covers variety of disciplines including Capacity Management, and IT Financial Management. CMMI and ITIL offer a good controlled route that can save the enterprise a lot of money in the long run. They are not the panacea to all ills; but they do help. When a company reaches CMMI Level 3 (out of 5 levels) it can gain a competitive edge over the competition and give itself one enormous commercial advantage. When ITIL is implemented it provides a tool of best practice.

These areas will be addressed later on in this issue but the implementation of an RFID project is more complex than at first it would seem. It will need to be driven by the overall business controls and not just by the desire to see the RFID system work. Perhaps the project manager should have a wide range of knowledge and be able to understand all of the business drivers whilst being able to guide the RFID and computer software along the right path.

The man or woman should be a key member of a Compliance Committee (more on this later too) and be the "architect of the solution".

Let's not be negative as there is potentially a lot of money in RFID but it is important to make sure that when the money goes around that a little of it settles where you want it. ■



Thinking beyond ‘slap and ship’ – optimizing RFID by overhauling the back-end

FEW TECHNOLOGIES HAVE CREATED SUCH LARGE scale excitement, and at such a cross-sector and global level, as RFID. The technology, and the connected, efficient and integrated supply chain that it will create, is set to eradicate the current inefficiencies that characterise many of the world’s supply chains today. In fact, some analysts estimate that 2-3% of all products are currently lost in the production and shipping process. This means that the overall market opportunity for RFID is huge. It has been predicted that the global spend on the technology this year alone could be the realms of some 390 million dollars.

But this does not mean that the market will not face its challenges and RFID technology will not be implemented overnight. The issues of stan-



Duncan Allen,
InterSystems

dards, cost, privacy and security remain to be resolved. For example, governments and organisations will need to communicate effectively on RFID standards development, interoperability between markets and the future potential for the technology as it develops. In particular, the EU wants to develop its own RFID standard to reflect its own concerns and interests, but this standard will also need to be interoperable with RFID solutions in use elsewhere in the world. This in itself represents a real technological challenge.

One of the greatest stumbling blocks, however, to wide-scale RFID implementation is a real and effective business case for the technology and many businesses are adopting a wait and see attitude. A big reason for this is that the underlying issues around RFID are not *only* standards, cost, privacy and security. The level of data exposure and data flow that the technology will entail means that a lot of legacy databases and back-end systems will need to be overhauled in line with supply chain management infrastructures to enable the technology to deliver return on investment.

RFID as a technology is not new, and in fact has been in use since the 1940s. However advancements mean that it can now be applied much more widely in commercial environments with

The benefits of InterSystems Ensemble

INTERSYSTEMS ENSEMBLE IS A COMPREHENSIVE and architecturally consistent Universal Integration Platform that enables fast integration and rapid composite application development, again perfect for use in RFID solutions. Its Unified Service Architecture allows new business solutions to integrate data and orchestrate processes while retaining the value of existing applications.

Ensemble is a single integrated product, making it is easy to learn, use and maintain. It provides editable business process diagrams, which allow developers to quickly build business process applications and use RFID technology to automate previously manual tasks. Such applications are inherently flexible, as the business process components are easily reconfigured. The technology is ideal for managing integration with other RFID technologies, third party software and existing systems.

The Ensemble application can act as an intelligent buffer between RFID readers and external systems and has additional benefits such as reliable delivery and message tracing.

very real business benefits. In the last twelve months to two years, numerous organisations have embarked upon trials with positive results, meaning that companies are now starting to apply the technology where they see a business advantage in doing so.

The knock-on effect of this is that new applications will have to be built to serve these business functions, and existing applications will need to be re-architected. There will be a number of challenges that will have to be overcome to do this.

First, while companies around the globe will begin implementing the technology and researching where they will reap benefits from it, the market is such that no one company will be able to provide complete end-to-end solutions for RFID. This means that developers will be key to any organisation that is considering introducing RFID applications into their business. Recent news stories, however, have highlighted the fact that there may be a lack of skilled RFID staff in the near term. In addition, these developers will need to have the requisite skills to enable them to work closely with other technical and operations staff.

Another challenge will be that RFID projects will need to focus on the real cost of business benefits – the greatest benefits may require changes to business processes. This means that the development processes and applications will need to be flexible enough to cope with the changes that will take place throughout the life-cycle of any given RFID implementation.

Unlike typical business applications, RFID applications receive physical measurements – tag reads – in (near) real-time; these are known as events. This is where the large volumes of data will be created. Business events will also be generated, which will need to be communicated to existing systems, ideally in real-time, representing another issue to overcome from an IT perspective.

Finally, RFID applications will capture vast amounts of event data that has not been available to the business previously, and so companies will now need to determine what information they need, to what detail and when. For example, an RFID tag typically identifies an individual product item or transit container, and therefore RFID systems will generate much larger amounts of data than have been seen in the supply chain to date. This can therefore potentially result in huge pressure being put upon RFID applications in terms of the amount of data they need to capture, filter and store.

The InterSystems solution

InterSystems has two main product offerings that can help overcome some of the above challenges, namely Caché and Ensemble. Its technology solu-

The benefits of InterSystems Caché

INTERSYSTEMS CACHÉ IS A HIGH PERFORMANCE database management system with the performance of an in-memory DBMS, perfect for use in RFID solutions. It provides rapid application development through its Unified Data Architecture, allowing developers to build applications using both objects and SQL technology.

Caché supports rapid development without sacrificing performance, providing the flexibility needed for RFID development. Persistent objects can be used to access local RFID static data, dynamic data, and persistent event data directly. Transient objects may be used for business logic, event filtering, and transient event data. Caché supports fast inserts and updates with simultaneous fast queries, to support real-time event capture and processing.

Caché supports a variety of development technologies including Java, COM, .NET as well as an in-database object scripting language. It provides very low latency for database operations which is necessary to meet real-time performance requirements.

tions, which are easy to implement and use, can help form the lynchpin around applications using RFID. Indeed the company's experience in capturing, managing and representing data means it is well positioned to capitalise on this market and aid companies in successful roll-out (please see box-out for further information).

Caché offers a rapid application development and high-performance database platform that is capable of handling the vast amounts of data which RFID applications will generate. Additionally, Ensemble offers a services oriented and event driven integration platform solution which is key to integrating RFID information with the rest of the enterprise (please see box-out for further information).

For organisations to take full advantage of RFID technology, whatever the sector they work in and whatever specific applications they are using it for, they will have to move beyond 'slap and ship' applications and consider how to best use the data generated. In essence, as RFID will generate significant amounts of information, they will have to give serious thought to how back end systems will cope and adapt their systems at every level to this new scale of information flow. ■

Duncan Allen, InterSystems

Caché offers a rapid application development and high-performance database platform that is capable of handling the vast amounts of data which RFID applications will generate

By Mark Palmer, mpalmer@progress.com

Seven principles of effective RFID data management

THOUGH THE RECENT PUBLICITY MIGHT SUGGEST differently, Radio-Frequency Identification technology – RFID – is not new. RFID first appeared during World War II when Allied aircraft carried transponders that would acknowledge radar interrogations from friendly aircraft. Since then, both the size and cost of RFID tags have followed the progression of Moore's Law to where it's now feasible to attach RFID tags to a package of razor blades. But in fact, RFID has been used in commercial applications for years, from automated toll systems like E-Z Pass to automated manufacturing facilities. But in 2003, triggered by mandates from Wal-Mart and others, a media feeding frenzy ensued. Such mandates have validated that RFID just might enable a new era of business optimization where a Proctor and Gamble can instantly know its inventory stock levels, a Gillette can eliminate razor blade theft, and a Wal-Mart can squeeze even more cost from its supply chain by reducing the labor associated with bar-code scanning. This value, accumulated millions of times daily, will add up to billions. And that's just the beginning: visionaries see RFID impacting anything that involves physical items where keeping track has value: baggage tracked by airlines to improve security; Alzheimer's patients monitored in real time; pharmaceutical shipments to curtail counterfeiting.

But every opportunity carries its challenge, and there are many challenges posed by RFID. One of the biggest hills to climb is dealing with the flood of data RFID generates: in-store RFID implementation at Wal-Mart has the potential to generate as much data in three days as is contained in the entire U.S. Library of Congress (based on estimates from analyst Jim Crawford from Retail Forward). And it's not just a problem for companies the size of Wal-Mart – even modest RFID deployments will generate gigabytes of rapidly changing data a day. The volume and velocity of RFID data will exceed the capacity of existing technology infrastructure.

Capturing large volumes of data at high velocity is just the first step. Woody Allen once said: "I took a course in speed reading and was able to read War and Peace in 20 minutes. It's about Russia." If all you learn from massive volumes of RFID data is the most general conclusions then the value of that

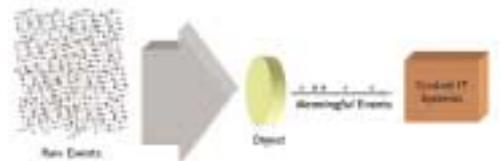
Instant decision-making on high-volume, high-velocity data streams is not a new challenge

data is lost. It is as if one looked at a 250 gigabyte disk drive filled with useful information and concluded simply that it contained 10,424 files. If all you do is capture RFID events, then most of the value is lost because the advantage of RFID is real time knowledge, not data collection.

Instant decision-making on high-volume, high-velocity data streams is not a new challenge. It is the same problem found in the program trading systems of large investment banks, the command and control applications used by the military, and the network management applications in telecommunications. Based on experience in those industries, as well as RFID system development, I pose seven principles to help you effectively manage your RFID data.

Principle #1: Digest the data close to the source

You could water your lawn pretty quickly if you used the fire hydrant on your street. But hooking your garden hose directly to the hydrant will only serve to get you a hose blown apart, a big pool of



water and a very angry fire chief. Try to deploy an RFID system by directly connecting RFID readers to your central IT systems and the results will be similarly disastrous.

A better approach is to digest your RFID event traffic close to the source – at the "edge" of the enterprise – and forward only the meaningful events to central IT systems. This digestion process is more than basic filtering – it's data cleansing, consolidation, and summarization; it's exception handling of many types – automated and human-made; it's compensation for unreliable technical infrastructure – application, hardware, network failure; it's adjustment for unreliable RFID tag-reader environments. Digestion of data close to the source allows this complex processing to occur, and exceptions to be handled locally thus protecting central IT systems from the flood of data.

Digest RFID event data close to the source of RFID activity to ensure greater reliability and protect your IT infrastructure.

Principle #2: Turns simple events into meaningful events

Complex Event Processing (CEP) is a new field that deals with the task of processing multiple streams of simple events with the goal of identifying the meaningful events within those streams. Examples of simple events include a church bell ringing, the appearance of a man in a tuxedo, and rice flying through the air. A complex event is what one infers from the simple events: a wedding is hap-

pening. CEP helps discover complex, inferred events by analyzing other events: the bells, the man in a tux, and the rice flying through the air.



According to Gartner, CEP will become a common computing model within five to ten years. But developers aren't sitting still

– you can build CEP systems today in languages like Java or C++.

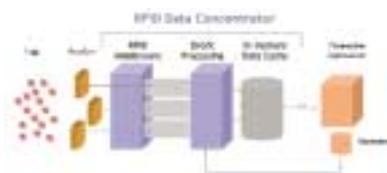
Whether you use a CEP tool or build your own, principle #2 is: turn simple events into meaningful events to derive actionable knowledge from discreet events.

Principle #3: Buffer event streams

You could water your lawn using water from a hydrant if you could step down the pressure and flow. One way to deal with the gush of RFID data is to develop RFID data “concentrators” that help buffer the flow of RFID event streams.

An RFID data concentrator is software that collects and processes raw RFID event flows close to the source of the data (principle 1). There are three primary elements: RFID middleware, event processing, and an in-memory data cache.

RFID middleware provides the interface for applications to receive events from RFID readers. There are many commercial implementations of RFID middleware available today. Additionally, the EPCglobal standards organization is in the process of defining a standard for RFID middleware, the ALE (Application Level Event) standard, which defines a reader-neutral interface for receiving events from RFID readers.



Event processing handles high-volume, high-performance flows of events by organizing raw

events into pipelines. Pipelining is a concept found in hardware and software systems of many types, including the central processing units (CPUs) in your computer, in software designed for handling stock market feeds in real time, and transaction processing systems that your credit card company uses. Pipelines allow the events to be categorized, then processes those categories with a set of simple tasks, as each thread gets a slice of processing time from the CPU. By performing a large number of operations on data in small “bursts”, overall throughput is increased, and the average speed that any individual event can be processed is increased, as well.

Finally, an in-memory database or data cache, such as the ObjectStore RFID Accelerator, makes the concentrator work in realtime. In-memory data management techniques are crucial to accommodate the real-time nature of RFID. It's a basic law of physics: memory is 1,000 times faster than disk. Physics is the reason why MIT's Auto-ID center included a “Real Time In-Memory Event Database,” or REID, as part of its first RFID reference architecture. Similarly, Stanford's CEP research has employed an “in-core-memory” database. While this cache provides much the same reliability, availability, and fault tolerance of a database, the distinction of calling this element a “cache” is to distinguish it from the enterprise application database, shown at right in the data concentrator diagram.

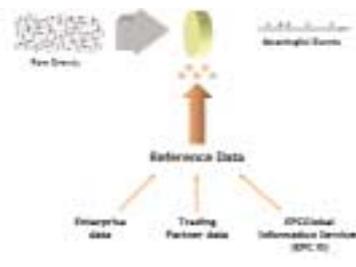
Employ data concentrators that buffer event stream flows by combining RFID middleware, event processing, and an in-memory data cache to achieve the reliable speed you need.

Principle #4: Cache context

Most RFID data is simple. Unless you're using sophisticated, expensive tags, all you get is an identification number for the item, a time, and a location. Determining complex events from simple RFID event data requires context. And context typically comes from “reference” data, in a variety of forms.

For example, context can come from information in an advanced shipping notice (ASN). As provided by a manufacturing

plant, the ASN can be used to confirm that tagged items sent by the manufacturer were actually received. Context may also come from an EPC Information Services directory (EPC IS). EPCglobal is defining standards to allow the



EPC IS to serve as the framework for trading partners to exchange detailed product information. The EPC IS allows anyone with proper authorization in Kellogg's supply chain to learn whether the EPC tag 01.0000A89.00016F.000169DC0 is a 24 ounce box of Kellogg's Corn Flakes or a Gillette Mach3 Turbo razor. In addition the EPC IS will allow you to determine where it came from, where it's going, when it was produced, and so on. Reference data may also come from internal enterprise systems. For example, RFID-enabled baggage handling systems use data from passenger information systems to ensure that RFID-tagged bags get on the same plane you do.

Just as principle 3 leverages in-memory data caching for event data, context data needs the same approach. EPCGlobal's next generation (Gen2) standard of RFID readers specifies read rates of 1,800 RFID tags a second, which means a distribution center with 20 readers could generate 36,000 events a second at peak rates. Adding 36,000 SQL requests to your existing warehouse database probably isn't feasible, so it's best to replicate, and cache this data in your data concentrator such that is available in real-time.

By caching reference data, your data concentrator can process RFID event data, in context.

Principle #5: Federate data distribution in near real time

Principle #1 advocates processing data close to the source to manage complexity and protect central IT systems. But the items you're tracking won't stay put for long. For example, an RFID baggage tracking system must distribute data about your bags to your destination airport far in advance of your arrival. And since most operations are distributed, you must plan to distribute RFID data, in near real time.

The definition of federated, from Merriam-Webster, is: “united in an alliance.” Federating data is hardly new – trading systems federate data daily among different financial centers and do it in near real-time. For RFID, federated data distribution unites the RFID data concentrators in an alliance – whereby meaningful RFID events and context data is shared among members. A reliable, distributed middleware fabric facilitates data federation, integrated with the data caches at each con-

centrator, thus enabling meaningful events to be distributed among concentrators.

The implementation details of this near real time distribution fabric is beyond the scope of this paper, but the principles are the same as we've described: process data close to the source, utilize data concentrators, cache data in concentrators, filter and

handle exceptions. Ultimately, one must forward meaningful events to members of a distributed "alliance" to enable as close to a real-time view of the system as possible.

Federate data distribution so your RFID system can scale globally and as close to real time as possible.

Principle #6: Age RFID data gracefully

Even if you're Wal-Mart, you probably won't be adding 7 terabytes of disk capacity daily to accommodate your RFID data. By continuously aging RFID event data, you can reduce your working set, augment event data appropriately, and reduce load on down-stream systems, all at the same time.

An airline baggage handling system must track events from the gate to the plane, but they don't all have to be stored forever. Yet RFID-enabled systems must permit operators to see the end-to-end baggage flow. The value is in understanding the baggage origin, how long it was on the conveyor belt, where it was handled, and how long it was handled. Furthermore, the basic flow of information will need augmentation – for exam-



ple, at what time was the bag loaded into the aircraft and which cargo bay was it placed in? Finally, performance and scalability typically requires that the storage of these events be optimized as the system runs. The RFID concentrator can delete events that are superfluous (e.g., redundant reads of baggage), supplement events that require context (e.g., associate a cargo bay number to a "bag loaded" event), siphon data off to other systems (e.g., save all baggage events for security subsequent security audits), and prepare event data to be distributed to other airports. At every step of aging process, the data concentrator's cache (principle 3) is kept transactionally consistent to provide system recoverability.

Age RFID data to keep your working set of data manageable, enrich raw data with required context, and reduce the load on down-stream systems

Principle #7: Automate exception handling

Exception handling is the primary job of any RFID system. Exceptions include our bride at our wedding event who gets cold feet and doesn't show up at the church, or when an airline baggage handling system needs to take a bag off the plane that's already been loaded. In the world of today, people handle these

exceptions. The maid of honor searches for the bride; the baggage handlers search for and retrieve bags by hand. In RFID-enabled systems of the future, your software must both detect exceptions and then automate the handling of those exceptions.

Though detection of events is done by complex event processing, exception handling requires knowledge of what hap-



pened leading up to this event. That operation requires an algorithmic approach to corrective action. The combination of CEP and event replay is what makes exception handling possible.

Event replay requires the storage of RFID events in a data cache such as ObjectStore RFID Accelerator, that operates much like a TiVo for your RFID data. Just as TiVo has revolutionized the way we watch television, with flexible archival and random playback capability, RFID event replay can help automate exception handling. When an exceptional event occurs (e.g., bag must be reloaded), the data cache can replay the events for a particular item to figure out where it was last seen, which operator is physically closest to the item now, and then send a message, for example, to that person's pager.

Without event replay, the RFID system has no ability to go back in time to discover when a bag was loaded, which section of the plane it was loaded into, and what to do to correct the exception.

Automate exception handling to improve overall business efficiency – our final principle of effective RFID data management.

Pulling it together

Mature RFID deployments will change the face of enterprise IT by making real time data processing commonplace. This shift in computing style requires data management near the source of the data, turning simple events into meaningful events, buffering of event streams, caching reference data to discover context, data federation in near real time, graceful data aging, and automated exception handling. These principles ensure reliable, real time, accurate decisions so that you're ready to tackle the challenges, and exploit the opportunities, that RFID presents. RFID may be relatively new to the "masses", but there are current day examples to illustrate how to be successful – and principles that can guide the way.

Mark Palmer is RFID Technical evangelist with ObjectStore, an operating company of Progress Software. ObjectStore® RFID Accelerator transforms raw RFID event streams into meaningful business data. RFID Accelerator's proven, scalable architecture facilitates the real-time query and analysis of RFID sensor data as it is captured, the historical time-series analysis of such data, and the integration RFID into key business applications that can leverage RFID information to better understand and manage their assets. For more information about ObjectStore please visit our website at www.objectstore.com or mail us at info-emea@objectstore.net.

RFID (Radio Frequency Identification) technology that identifies, tracks and traces items automatically, is set to have a major impact on future system development and integration projects

RFID Developers' Forum – putting heads together to plan for enterprise RFID

THE RFID (RADIO FREQUENCY IDENTIFICATION) REVOLUTION is gaining momentum. As major retailers widen their RFID deployments, thousands of their suppliers are beginning to plan how to benefit from the likelihood, if not inevitability, of automated data capture in their supply chains.

Yet RFID is not a solution in itself, but a technology that must be successfully integrated and implemented. And that's when the real challenge starts for the IT professionals who will need to plan the infrastructure, software and systems to handle vast quantities of RFID data and deliver the promised business benefits of RFID investments.

Planning for the impact of RFID on enterprise systems is likely to take longer than the time a retailer gives its suppliers to comply with a mandate. Hence many companies are initiating pilots and conducting RFID impact assessments now, to gain the knowledge they need to prepare for later enterprise wide deployments.

The RFID Developers' Forum, taking place on 4th May 2005 at the Sheraton Skyline London Heathrow, is designed for all those involved in developing, integrating and implementing systems to deliver supply chain business solutions across the enterprise.

It's the first event of its kind, designed to help IT professionals plan systems that will deliver the business benefits of RFID. The purpose is to bring together software developers, system architects and other IT professionals to gain knowledge, exchange ideas and address the challenges, and untap the opportunities that lie ahead.

The RFID Developers' Forum has a unique networking and learning format. In addition to presentation sessions and vendor briefings, this unique forum enables participants to meet each other on a pre-arranged basis, either one-on-one or in small roundtable discussion groups. This approach creates superb peer-to-peer networking opportunities for all attendees.

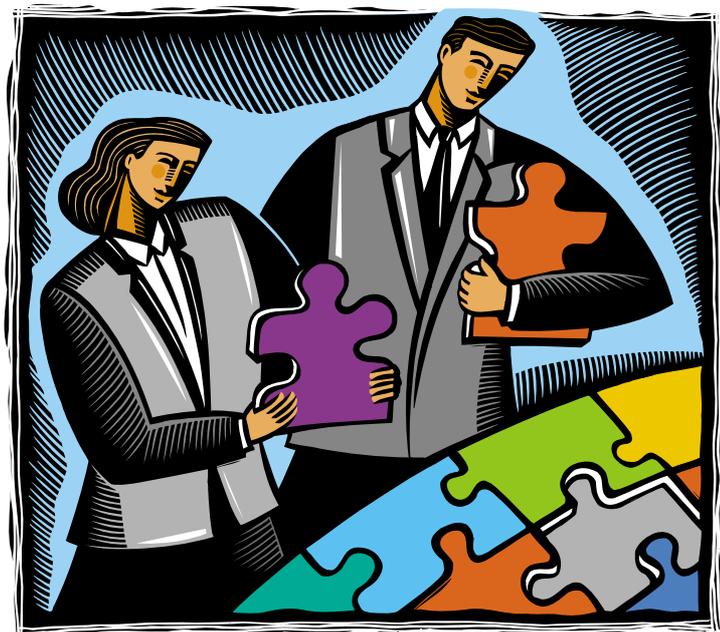
Registered participants can use the forum's web site prior to the event to connect with their peers and counterparts and set-up one-on-one meetings to share ideas and discuss challenges. And everyone can construct a Personal Agenda for their time at the event, tailored around their own particular interests.

Following the event attendees will also be able to stay in touch with one another, via an ongoing Developers' Forum knowledge network of IT professionals with an interest in RFID.

In addition to the peer networking opportunities of the RFID Developers' Forum, the conference programme brings together a number of leading speakers from some of the key RFID technology and middleware providers, including Microsoft, webMethods, SAP, Manhattan Associates, Oracle, RF Code and Oat Systems. Full details of programme and online registration facilities are available at www.rfidtech.com

The following day, on Thursday 5th May, the RFID Networking Forum focuses on the supply chain operations and business issues involved in RFID investments. The conference programme includes speakers from Tesco, Marks & Spencer, Proctor & Gamble, Nestle, Unilever, Goodyear, Volvo and EAN International. More details at www.rfidforum.com ■

Martyn James
Conference Programme Developer, The RFID Developers' Forum
T. +44 (0) 1883 344799



RFID

COMPLIANCE

PROBLEMS

BUSINESS IS CONSTANTLY LOOKING FOR WAYS TO improve its processes and systems in order to reduce investment in stocks, people and anything else that costs money.

It may be a rude word in many areas but without profit there is no business. That is unless you are owned by the Government (no matter which colour) and then increased funding can be obtained by raising this tax or that tax.

So with the advancement of technology and the benefits derived from the economies of scale RFID is a really good vehicle to increase profits.

However the engineering solution may not be cash positive over the whole business unless all issues are taken into consideration.

Broadcasting and the press are full of the after effects of Enron and WorldCom resulting in a plethora of legislation and corporate standards.

But we in Europe should not be complacent and point to the US as the place that all of this type of activity has been going on. In Europe we have seen Parmalat in Italy and Ahold which have been equally disastrous.

On top of this we have seen the impact of September 11th and the objective of stopping terrorists money laundering and curtailing their powers of purchasing explosives to further their horrendous activities.

In the US legislation quickly followed with the creation of the Patriot Act which was shadowed by Sarbanes-Oxley (SOX).

In Europe we are taking our share of legislation with Basel Accord covering financial movements, Chapter 27 of the Companies Act covering auditing standards and a whole raft of new International Accounting Standards and EU Directives that demand transparency of management and disclosure of information. Have a look at the 8th, 10th and 11th EU directives that are not quite the same as SOX but get pretty damn near to it.

What we are seeing is a convergence of control and legislation across the world.

So how does this impinge upon putting in an RFID project?

Imagine that the tags that are read are placed on the wrong pallets. Or that that tags in some way have been read twice or that there are tags and no stock

One aspect of what we are looking at is the valuation, control and confirmation of stock and all of the invoicing and statistics that follow. In fact RFID would become the means for driving the financial actions of the enterprise

Looking back to SOX much is written about section 404 that demands that: -

- Management has the responsibility for establishing an adequate internal control structure and procedures for financial reporting
- Within the annual report an internal report containing an assessment of the internal controls structure and procedures

So unless the RFID system is put in with these facts in mind a system could be developed that did not give a system that is controlled.

Imagine that the tags that are read are placed on the wrong pallets. Or that that tags in some way have been read twice or that there are tags and no stock.

Commercially this would be a disaster but legally a company could be reporting to its stock exchange interim or quarterly figures that are incorrect.

For large companies engaged in the supply chain or the retail sector, the results might be considered fraudulent as the share price might be overstated or understated and the interim results totally inaccurate.

Furthermore it would signify that proper control of the systems had not taken place.

But the matter goes further.

It is not just the CEO or CFO that is liable.

Under the legislation any person in a management position is responsible. Thus the IT manager or CTO becomes liable as does anyone involved in the development of a system.

It is almost inevitable that small or medium sized public companies will not have all of their internal controls documented. Thus the auditors of the company will have to rely on increased audit activities to ensure that the accounts are true and accurate. So up go the audit costs.

To overcome this it is necessary to ensure that the internal procedures are properly implemented. For the large quoted company caught under the furore of section 404 they will be required to verify that their supplies are properly controlled which in turn may mean that their suppliers have to be audited or that the supplier must produce a written confirmation that their systems are controlled.

This seems straight forward enough, but now look at section 302 of SOX

This section covers "Corporate Responsibility for Financial Reports." But this is not just for the bean counters.

The act says that: -

1. That the signing officers of the section 404 (whoever they are) have reviewed the report.



2. That the report is factual and does not contain an untrue statement, material omissions or can be considered misleading.
3. That the financial statement reflects a true position.
4. That the signing officers responsible for the internal controls have checked these systems within the previous 90 days.
5. That all deficiencies in the internal controls have been listed and information on any fraud that involves employees who are involved in the internal controls is noted.
6. Any significant changes to the internal controls have been listed and the impact of these changes.

So where are we now with the excitement of getting the RFID project in?

What we are looking at is the demand that a company will take on its own internal assessment and that this assessment will be on-going.

To achieve this standard it is obvious that what is required is a compliance committee that works for the main board ensuring that all of the internal processes are controlled and documented.

The question is - do the companies who are involved in implementing RFID in supply chain (or any other facet of business that affects the balance sheet and financial reports) properly document their procedures.

And what techniques have been implemented for continuous assessment and improvement?

As mentioned earlier this legislation covers the US stock market but the rules apply equally to any foreign company that is quoted on the NYSE.

Some companies have been trying to de-register but if they have more than 300 American shareholders anywhere around the world they are caught by the legislation and lose the benefits of the stock market listing.

The law also applies to subsidiaries of US companies that have to comply with SOX anywhere in the world. In Europe the EU directives 10 & 11 address cross border trading.

And the audit trail could go further to any supply or subcontractor or off shoring supplier to these companies.

So how does this all fit with IT and RFID? It would seem to be miles off the target.

IT is the cornerstone of every business. Stock records, invoicing, purchasing, and every system in the supply chain is completed on a computer. So the CTO or IT Director/Manager is responsible. So too is the project manager who is driving any RFID project.

The system should be documented and reviewed by all disciplines within the company and perhaps by the auditors as the project continues.

But how can a system of continual system of process improvement and documented control be implemented?

The swift answer is carefully and with a determination to see that the RFID project is properly documented. To ensure that it is implemented in consideration with all of the other processes and procedures within the business.

A company will probably need to appoint a Compliance officer who steers a compliance committee.

I can hear now the cries of "not another committee"

But regrettably there seems to be little chance of achieving the standards without some form of internal control to oversee any

system changes.

Thus the RFID project manager should answer to or be the Compliance Officer. And this will not be a post that is given "old Jack" as he has been here for years and we think he is too old but too expensive to get rid of! He (or her if it is Jill) may be the right person because of their knowledge of the business but equally the company may have to recruit. And with the legal responsibility of the Officer they will not be cheap!!

So what methods are available to help achieve this compliance?

Well the first is CMMI. Some companies in the retail and supply chain area are already working on this. CMMI was developed by Carnegie Mellon University originally for the aerospace industry to assess its subcontractors and suppliers.

Now extended to CMMI the technique is an on-going process of self checking and improvement of the company systems and procedures.

Just what SOX needs.

The EU directives do not demand as much but if you stick with SOX you certainly will not fall short of what is required within the EU.

On top of this is by implementing IT Infrastructure Library (ITIL) the problem is largely solved. Briefly ITIL consists of 7 sets covering 5 disciplines. These are: -

- Service level Management
- Capacity Management
- Continuity Management
- Availability Management
- IT Financial Management

So when looking at the implementation of the RFID project a project manager must take these factors into the equation.

The cost of doing this should be brought into any ROI calculation but set against the costs that the business will save in audit fees.

If a company has CMMI level 3 and has implemented ITIL then the customers will be more than happy to trade with them if all other factors are right.

When Jo Soap (apologies to anyone of this name – this is purely co-incidental) arrives from the IT Company with the software that will give the ROI on an RFID project – beware.

Recently the VAT Inspectors have expressed a desire to have remote access to all of a company's accounting records for no less than 6 years data available, in order that they can interrogate them at will.

Thus RFID data retention could be huge – but this is only a request by Customs & Excise and it creates large problems with all sorts of legislation not least the Data Protection Act.

So in summary one should use RFID and get the project in but be careful of the pitfalls. Get it right and all of those nice things will land in the enterprise. Get it wrong and it could cost you dear.

Recently COMPTIA (the Computer Technology Industry Association) have identified from a survey that there is as much as an 80% shortage of skilled staff to implement RFID projects. In order to overcome the shortage they are launching a certification programme at the end of this year.

However Microsoft feels that the shortage will soon be plugged with the growth in RFID consultancies and their RFID Services Platform to be launched in 2006.

RFID is a profitable development so go for it. ■


**ROBERT
BOND**

Robert Bond of Faegre & Benson LLP addresses the privacy and information security issues associated with electronic product codes

Marketing plus or privacy negative?

MANY BUSINESSES ARE REALISING THAT, FROM A marketing and advertising perspective, the use of EPC provides a tremendous opportunity to “know your customer” and to provide a personalised marketing. By using tags on a wide variety of products, it is possible to logically link the data derived from the purchaser of one product, to other purchases that they make within a supermarket or a shopping mall and to harness that data for the benefit of more targeted marketing and advertising, whether on the basis of the data simply collected from the tags or, from a combination of that data with further information gathered on loyalty/credit cards used to make such purchases and the like.

Unlike barcodes, however, EPC tags do not require direct line of sight to be read and have the capability to identify not only the brand and model of the product but the unique item of that brand and product. This, for example, is an essential improvement for food traceability that can identify potential health issues from the feed lot to the packaged product. This traceability also permits more effective product recall and targeted consumer health and safety alerts. EPC systems may allow businesses to explore new ways to meet consumer needs, reduce costs and maintain inventory.

Apart from the use of tags to improve efficiencies and competition in the supply and distribution chain, there are numerous benefits to consumers including identification of counterfeit products, faster product recall, enhanced product availability, improve warranty service and potentially faster check-outs. On the other hand, rather than providing “personalised marketing” it is perhaps more appropriate to describe the use of this technology as providing “personal marketing”. In other words, whilst there are distinct marketing and advertising advantages in the use of EPC there



is also the potential to infringe personal data rights and privacy.

The technology

The simple barcode on products is gradually being replaced by smart tags that use wireless technology, such as WI-FI, RFID, Bluetooth, Global Positioning System Technology and General Packet Radio Service.

Product coding or tagging in the past, was generally restricted to bar coding which was a relatively passive form of tagging since it required the use of bar code readers to interpret data and the data itself revealed little more than the identity of the product.

More innovative product tagging, such as RFID has, until recently, been expensive to implement (and indeed is still relatively expensive) but this more sophisticated product coding technology now allows for, not only identification of the product itself but specific confirmation of the precise batch that a product came from and using wireless technology, the ability to track the movement of that product.

RFID tags can be either active or passive. Passive RFID tags do not have their own power supply because the minute electronic current induced in the antenna as a result of the incoming radio frequency scan will provide enough power for the tag to send a response. Consequently, the lack of power means that the amount of information that can be managed in a passive RFID may be limited to an ID number only. Passive RFID tags can be extremely small but have limited transmission ranges from 10mm up to about 5m.

On the other hand, active RFID tags require a power source but have longer ranges and larger memories than passive tags.

Although RFID tags are assumed to be a relatively recent innovation they were, in fact, in use during World War II when, in the form of transponders, they were fitted to allied aircraft and known in the forces as IFF (Identification Friend or Foe).

Implementation

Global companies such as Gillette, Phillips, Procter & Gamble, Wal-Mart and others see huge savings

to be made from the use of EPC and there are numerous pilot projects underway for which are indicating savings to be made in supply chains as well as the ability to add value to both product owner, product reseller and customer.

Whilst RFID technology and the like will make savings in the supply chain, they may also produce a range of smart solutions, such as refrigerators or waste bins that automatically create shopping lists, products tagged for store returns, reduction of the risk of fraud and theft and smart travel tickets that indicate your location in airports, stations and so on. Howev-

er, privacy groups and consumer associations have expressed concern that the same technology may have invasive features since, if the technology can track the product, then the same technology can track the product purchaser.

Several of the companies named above, such as the Gillette Company, Procter & Gamble and Wal-Mart have joined together with other well-known companies such as Hewlett Packard and Johnson & Johnson to create International standards for the use of RFID tags and EPC in general and many of the same companies are also actively involved in the International Chamber of Commerce (ICC) Task Force on EPC which recently published its own guidelines for the responsible deployment and operation of EPC.

Although currently a number of the new tagging technologies can only be read over short distances there are suggestions that if there are connected sites with suitable readers, it is feasible that the purchaser of an RFID tagged product could be tracked from the points that the product is put into a shopping trolley to the point of payment and indeed beyond. Such tracking enables retailers to build up sophisticated profiles on purchasers but at the same time may, potentially, breach human rights and in particular the Data Protection Act 1998. Companies which see commercial and marketing value in the use of electronic product codes may dismiss issues like data protection on the basis that EPC technology utilises information about products and not people and contains no personally identifiable information. This view is not necessarily shared by the regulatory authorities in Europe.

The Data Protection Act 1998 defines personal data as “data which relates to a living individual who can be identified either from that data or from that data and other information which is in the possession or is likely to come into the possession of the data controller.” So data from an RFID tagged product, when read in conjunction with the purchaser's loyalty card, swiped at the point of payment, produces a record of product purchase to purchaser and in conjunction with other products purchased at the same time builds a profile. If those tagged products are readable outside a store it is possible that yet more data can be gathered to track and profile the purchasing style of that individual within a locality.

However, it is not the tagging in itself that is potentially a breach of data protection laws but the subsequent collection processing of data derived from the tagged product that causes the problem.

Examples of conflict between the technology and the law

On the 15 July 2004 Peter Schaar, in his capacity as the Chairman of the Article 29 Data Protection Working Party created in the European Union under the general Data Protection Directive, gave an opinion to Howard Beales, Director of the Bureau of Consumer Protection of the Federal Trade Commission in relation to the above issues. In his letter Mr Schaar provides some useful examples of cases where RFID technology clearly uses personal data and says “as a first example, consider where a manufacturer of pharmaceutical products puts tags on a series of medicines which are sold under presentation of a prescription. When the consumer buys the medicine, the information regarding the individual, the type of medicine bought, the time of day, are entered into a database. If the individual returns for a refill, the retailer reader immediately identifies him/her. The information about the refill is logged and his/her behaviour is monitored.

As a second example, consider where a conference organiser decides to tag conference badges which are delivered to dele-

gates upon arrival and registration for a conference. RFID readers are placed in different parts of the conference premises. This allows the conference organiser to collect data regarding the location and movement of the conference participants. The data is linked to each participant and entered into a database.

In both the above scenarios, the provisions of the Data Protection Directive would apply.”

Other real-life examples, include the inclusion of an RFID within an implantable cardioverter defibrillator, in order to enable the device manufacturer the patient and the surgeon to monitor performance of the device and to give a more efficient and timely aftercare service to the patient.

Data protection issues

The data protection legislation in the UK requires that individuals are notified of data processing activities and are given sufficient information about the way which such data will be stored and used to be able to give informed consent.

Apart from notifying individuals of their rights under the Data Protection Act 1998 and obtaining their consent to the use of their data through an electronic product code system it is equally important to consider information security issues. The 7th principle of the Data Protection Act 1998 states that “appropriate technical and organisational measures shall be taken against unauthorised or unlawful processing of data as well as against accidental loss, destruction or damage to such data”. In many cases the EPC system will comprise of the tag itself, the communications network over which data may be transferred and other systems in which the data may be stored and processed. Furthermore, aspects of the system may well be outsourced to third parties including network operators and data processing operators.

Any business that collects personal data through an EPC system primarily remains responsible for management and security of personal data and therefore may be at risk where the processing of that data is carried out through third parties.

The 8th principle of the Data Protection Act 1998 makes it clear that personal data cannot be transferred outside the European Economic Area (the 25 member states plus Iceland, Liechtenstein and Norway) to any other country in the world that is not deemed, by the European Commission, to have adequate data protection laws. Very few countries, so far, come up to the standards set by the European Commission and yet in the case of multinationals it is highly likely that any personal data obtained using EPC will be shared on a global basis. This, again, is a compliance issue which needs addressing.

Conclusion

It is important that any business that intends to utilise EPC technologies considers the following practical steps:

- Ensure that, in general, the business is in compliance with the applicable laws including data protection laws;
- Guarantee that the business has in place adequate information security and asset management policies and procedures to keep personal data secure;
- Notify individuals of when and how their data may be collected and processed through the use of EPC;
- Put in place contractual controls where personal data is being processed by third parties;
- Allow individuals to have the right to disable tags if they so choose. ■

What John doesn't know about quality and requirements management in a safety critical environment isn't worth knowing

Valerie loves a challenge. Apart from being a CMMI Lead Appraiser she drove the attainment of CMM level 3 in a pan european software team

off-shoring?
Talk to Andy, the last deal he worked on was worth over £500m

Kieran helped ensure the success of one of the first CMMI maturity level 3 organisations in the UK



Ask the experts...



www.lamri.com | 01748 821824

RFID Developers' Forum

4th May 2005 - Sheraton Skyline Hotel, London Heathrow, UK



Software Development ... Integration ... Infrastructure

As retailers and other early-adopters widen their RFID deployments, thousands of manufacturers and suppliers are planning how to benefit from the likelihood, if not inevitability, of automated data capture in their supply chains.

The RFID Developers' Forum is designed for all those involved in developing, integrating and implementing systems to deliver supply chain business solutions across the enterprise.

Topics to be discussed include: software development required for enterprise RFID solutions * leveraging existing network infrastructures * RFID middleware * technology strategies of RFID vendors * integration with enterprise systems * implementation methodologies.

Supported by:



www.rfidteched.com

Sponsored by:

Microsoft