When Business As Usual Intersects with Disruptive Technology:

How Organizations Can Optimize their Readiness for RFID

By

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Introduction and Background

The field is plowed, the seed planted, and the produce is harvested. The produce is shipped to the mill where it is prepared, packaged and distributed for sale to the consumer. These work processes and logistics are documented and accounted for at each step in the chain. Successful businesses and the economies of developed nations rely on regular, dependable processes that are linked and well understood.

When a new technology is introduced into the workplace, the method and means of implementing work processes often must change in order to take advantage of the potential efficiencies of the new technology. For a disruptive technology like RFID, its impact on internal and external business processes in many organizations promises to be both widespread and demanding, challenging business to higher levels of agility and responsiveness to customers. It's no surprise that many organizations are struggling to realize the promised return on their RFID investment. Like any new technology, its full value will not be realized if new work processes enabled by the technology are not properly designed and implemented

This paper describes the RFIDba Work Standards Model[tm] , an approach to business process improvement for organizations moving to adopt RFID within their operations. The RFIDba Work Standard Model (WSM) is being developed as part of a global research project involving a number of industries and international organizations. This project, sponsored and funded by the International RFID Business Association (RFIDba), is quantifying and assessing the skills and knowledge needed in the workplace for businesses to be successful with RFID. The Association is also currently developing internationally-recognized and accepted standards for RFID education, training and certification based on the RFIDba Work Standard Model. Expected to be released later this year, the RFIDba WSM and these industry-specific standards are designed to help any organization adapt rapidly to changes in their work processes to gain the full benefits offered by RFID and related technologies.

New Technologies Impact Business as Usual

New technologies reduce the labor needed to create products and services, raise industrial productivity, and improve nations' standards of living. The continual introduction of new technologies is a critical driver of successful industries and successful economies. Understanding the impact of new technologies on work tasks, work processes, and worker knowledge, skills, and abilities is critical to achieving the full benefits and increases in productivity that new technologies can bring.

New technologies affect work in different ways. Some new technologies, such as the typewriter and the word processor, enabled workers to do the same work better, faster, and cheaper. Other technologies disrupt the job tasks and work processes workers perform or completely eliminate them. Eli Whitney's cotton gin and Cyrus McCormick's mechanical reaper turned worker tasks into machine tasks. Tasks performed in the vacuum tube industry were eliminated by the 1947 invention of the transistor by Bardeen, Brattain, and Shockley. And some technological advances have all of these impacts on work processes. Examples of these are Bessemer's steel manufacturing process, the introduction of robots into manufacturing plants and, more recently, the installation of Enterprise Resource Planning (ERP) software across entire businesses.

Regardless of the type of impact, technological advances impact the tasks a worker performs and the knowledge, skills, and abilities the worker must possess to perform the new or altered tasks successfully. Successfully implementing change in work processes that is wrought by new technologies is critical to achieve the gains in productivity and the other benefits made possible by new technologies. But it is difficult to do. Many readers can surely cite their own experiences when a new technology delivered far less than was expected. It turns out that it's often less about the technology than about organizational readiness for business process change.

Poorly designed work processes waste resources, are less safe, reduce productivity, increase errors, and in highly regulated industries such as the food and pharmaceutical industries, they create legal risk. Managers frequently misdiagnose bad work processes and send workers to more training or believe they must hire better workers. Managers and organizations frequently lack the time and resources to evaluate critically their work processes.

The Processes of Integrating a New Technology

The truth is that understanding work processes and tasks as well as the knowledge, skills, and abilities workers need to perform tasks is complicated. It is complicated not only because it requires a high degree of detailed knowledge about the job being described, but because it also requires defining tasks, knowledge, skills, and abilities. There are no generally agreed upon definitions of a task, knowledge, skill, or ability. These terms are often used interchangeably. Additional terms such as competence, behavior, work activity, capabilities, etc. further complicate the picture. To make matters worse, persons defining work processes often describe work at very different levels of granularity. Some describe work processes in a few broad strokes while others provide very detailed descriptions of each element of work.

There are four characteristics of work processes that are important to understand when analyzing work.

- First, work evolves to a simpler form over time. This evolution is driven by changes in technology and the desire of managers and workers to simplify work. Work begins as a complex or effortful set of tasks. As experience is gained with the tasks, they are broken into related components and "routine-ized." Some of these routine tasks are simple and are turned over to less skilled and less expensive workers. This is the reason for outsourcing. Routine tasks are given to the least expensive workers anywhere in the world. Eventually routine tasks are simplified and "routine-ized" to the point that they are performed by machines and computers. The automotive industry is a good example of this evolution and simplification of tasks. Autos were first produced by skilled engineers and craftsmen. Henry Ford redesigned the tasks into simple and "routine-ized" components when he invented the production line. Since that time, many auto manufacturing tasks are now performed by the least expensive workers in the world or by robots.

- Second, the tasks that comprise a work process change slowly over time and these tasks tend to be the same from organization to organization. Differences in work processes arise, not in the tasks, but from how the tasks are accomplished. That is, while the tasks tend to be the same, the machines, tools, and equipment workers use to accomplish tasks and the knowledge required to use the machines, tools, and equipment is the primary source of differences in work processes.

- Third, because work processes evolve and are performed differently over time, if they are to be analyzed and tracked, the work processes have to be defined in a manner that facilitates revision and updating. Tracking and knowing how work evolves over time enables organizations to identify best practices, change quickly, and maintain high levels of productivity.

- Fourth, managers in organizations group work processes and their tasks in various ways to create job titles. Organizations group tasks and work processes differently depending upon their size, worker expertise, and the organization's culture. Large organizations group tasks into smaller combinations and have more specialist job titles. Smaller organizations require workers to perform a wider array of tasks and therefore have larger numbers of tasks. They have more generalist job titles. Some organizations cross-train workers extensively, others do not. The job titles associated with the former include more tasks than the latter[1]. Because of the somewhat arbitrary association of job titles and groupings of tasks, job titles are not a good basis for performing studies of work processes.

Because there are work processes that apply to a wide range of organizations within an industry and because the work processes can be defined, updated, and tracked over time, it is possible to create a standard set of work processes and best practices in an industry that validly apply to a wide range of work in any organization in that industry.

These work standards can then be used to track and guide the evolution and design of work processes in an organization. The work standards can, with modest time and expense, be customized to a particular organization - greatly reducing the time required to analyze and define an organization's work processes. Organizations that possess customized work standards will gain a deep understanding of their work processes. They are then able to change their work processes rapidly when technological advances provide the opportunity to do so. Consequently, they will increase productivity and compete more successfully compared to those who cannot change quickly.

What is a Work Standard Model?

A **Work Standard Model** (WSM) is a description of work and workers. A WSM describes work - work processes, tasks, and task elements that are performed in an organization and the interrelationships among them. The WSM also describes the worker – the knowledge, skills and abilities that he or she must possess to perform the work successfully. When developing a WSM, the work must be defined first. Under the aforementioned research project sponsored by the RFID Business Association, various interview, observational and analytical techniques are being used to codify common RFID-related work processes and best practices. This information is then used to define work processes, tasks, and task elements. Once the work is described correctly, then the worker knowledge, skills, abilities and the machines, tools and equipment which workers need to perform the work successfully are then defined. Thereafter, an iterative process of modeling, testing and validating assumptions and findings is employed to quantify and codify the work, the worker information and the various interrelations among them.

The methods used in this project to define, develop and continuously maintain the RFIDba WSM were originally derived and sanctioned by the National Skills Standards Board. As such, this approach offers businesses and governments a formally validated approach to ensuring the readiness of their workforce to implement and execute RFID-enabled business processes. While many organizations have competency models and job descriptions, the approach described here is more rigorous and scientific than are found in current job description and competency model practices. This is especially important in regulated or hazardous environments, or when information security and privacy are impacted by RFID and related technologies.

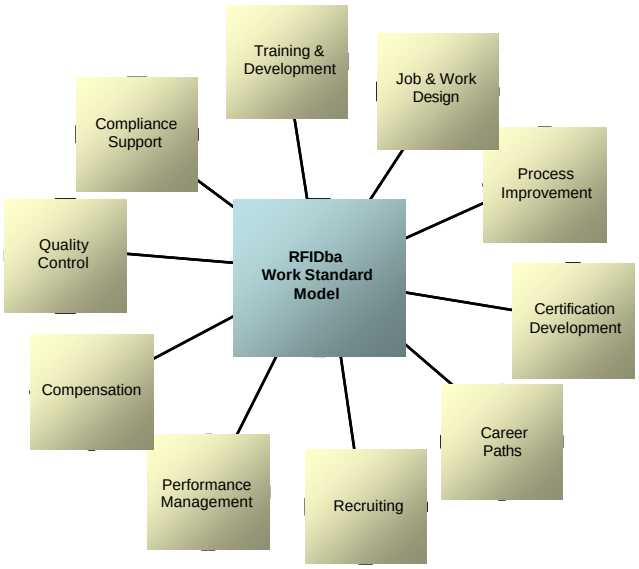
[1] Research on work processes indicates that workers in high-performing organizations perform a wider array of tasks than workers in organizations not rated as high performing.

The RFID Business Association plans to continually update its research and delineation of required job skills and knowledge in specific vertical industries through its various international technical committees comprised of end users, educators, systems integrators and technology vendors.

Benefiting from the RFID Work Standard Model

The potential of RFID to benefit industry and the challenges to change work processes are great. The development of a WSM for the supply chains in key industries can facilitate the adoption of RFID by defining the work processes and worker knowledge, skills, and abilities associated with an RFID-enabled supply chain. The availability of a WSM for an RFID-enabled supply chain will enable an organization to implement RFID more successfully and attain the full business value and ROI that RFID technology promises to offer.

Applications & Benefits of the RFIDba Work Standard Model



The availability of a WSM for an RFID-enabled supply chain provides many benefits. As stated above, the availability of an industry-based WSM developed from field-research and input from thought leaders, practioners and subject matter experts in an industry provides a supply chain template for an organization that can be used to guide the rapid change of their work processes as they seek to exploit the full benefits of an RFID-enabled supply chain. A WSM for an RFID-enabled supply chain speeds the introduction of this new technology in an organization and in the industry overall. The WSM provides other benefits as well. Examples are as follows:

Using the WSM for Curriculum Maps

The RFIDba WSM can be used to create a curriculum map that ensures the quality of RFID education and training programs. The WSM can be used as a reference model to ensure that programs developed to teach engineers, IT professionals, technicians, and managers about RFID are up-to-date and, most importantly, are job related. Too often vendors offer RFID courses that are of poor quality, insufficiently job related, and focus on the vendor's product rather than building expertise in understanding and applying RFID technology successfully.

Using the WSM for Certification Standards

The RFIDba WSM can be used to develop fair and accurate assessments and certifications that identify the extent and level of a person's RFID expertise. Currently many groups and organizations offer RFID certifications without reference to a scientifically established WSM. Those who offer these certifications provide little or no evidence that their certification standards are job-related, fair, or accurate. They seem

little aware that there are professional and legal guidelines for developing valid assessments and certifications. These guidelines mandate the use of a WSM.

Using the WSM for Quality Control

The RFIDba WSM can be used as the basis for developing a statistical quality control system for work processes. The standardization of work processes and the detailed work and worker information provided in a WSM make it possible to measure tasks and worker expertise. These measures can be used to analyze statistical information about tasks and knowledge, skill, and ability information about workers. The analysis of task and worker information provides insights into the quality of work processes and the competence of the workforce.

Using the WSM for Recruitment

The RFIDba WSM can also be used to develop recruiting and resume screening criteria, develop performance appraisal tools, support career planning programs, create job descriptions, aid in job evaluation, and design jobs.

Summary

New technologies such as RFID have significant impacts on work processes. Most organizations focus their resources on implementing a new technology and focus significantly less resources on planning and changing work processes. Analyzing and modifying work processes can be complex, time consuming and expensive. RFID will have a disruptive impact on supply chain work processes. The availability of an industry specific, continually updated WSM for an RFID-enabled supply chain can significantly reduce the time and cost required for an organization to change their work processes and fully exploit RFID technology. A WSM can speed up the introduction of RFID in an industry and substantially reduce the time required for an organization to gain the full benefits made available by RFID technology.

The RFIDba Work Standard Model[tm] is the foundation from which various technical committees within the RFIDba are working together to develop international standards for RFID education, training testing and certification. With a focus on both supply chain and closed-end-loop RFID technologies, these standards will address RFID skills and knowledge for both technology and business professionals in specific vertical industries and disciplines. The RFIDba Work Standard Model[tm], together with its derivative standards for education, training and certification, are designed to help any organization adapt rapidly to changes in their work processes to gain the full benefits offered by RFID and related technologies.

About the Authors

Dr. Paul Squires is President of Applied Skills & Knowledge (AS&K), an education and work standards firm based in Morristown, NJ, with extensive experience in the development and validation of work standards for the manufacturing, retail, biotechnology, information technology and communication systems industries. AS&K serves as lead researcher and outsourcing partners for the National Skill Standards Board (NSSB). As an extension of the NSSB work, AS&K also develops work standards and assessments for corporate clients and governmental agencies including US Forest Service, Ingersoll-Rand, Avon, US TSA, State of North Carolina, Merrill Lynch and Verizon.

Douglas Neary is Senior Vice President, Chief Operating Officer of the International RFID Business Association. Founded in 2004, the Association represents a diverse, global community of end-users and systems integrators dedicated to assuring business success with RFID through the establishment of international standards for RFID education, training and professional certification. His experience includes serving as the Chief Information Officer for a $1.5B international manufacturer of consumer packaged. He has also held senior and executive management positions with the IBM Corporation and Cap Gemini Sogeti, where he served clients in the pharmaceutical, manufacturing, transportation, telecommunications and energy sectors.

