

## **Just in Time and Just Enough!**

**By Thom Quine**

Just in Time and Just Enough! The phrase has become "just enough" of a cliché in the information industry as to have all but lost any meaning. Many people working in training and documentation seem to have forgotten the important truths behind the cliché - if indeed they were ever introduced to them in the first place.

That's unfortunate - because the concept of "just in time and just enough" is critical to the success of any enterprise in the information age.

### **The Business of Information Delivery and Retrieval**

Consider this:

At the turn of the century, 85% of all North American workers worked in agriculture or agriculture-related industries.

In 1950, 75% worked in manufacturing.

Today, less than 2% of all North American workers work in agriculture, and over 50% work in information delivery and retrieval. That percentage is growing every day.

It has been estimated that the amount of information available in the world doubles every seven years - and that more than half that information becomes obsolete within five years.

In this context, delivering information - just enough information, because there's already too much, and just in time, when it's needed, and before it becomes dated - is "mission-critical" to any business.

The North American economy is shifting incredibly rapidly away from reliance on manufacturing to reliance on information processing. The growth of the Internet and the Web is the greatest proof of that. The Internet is the fastest-growing human endeavor in history, and it has all taken place within the last few years.

Manufacturing involves the creation, transport, storage, and retrieval of goods. Information processing involves the creation, transport, storage, and retrieval of information. We who work in training and documentation need to understand that we are in the forefront of the new priority for human progress - the timely movement of information.

### **Just-in-Time Manufacturing**

Let's draw a parallel between the information industry and the manufacturing industry.

The term "just-in-time" originated in the auto industry. In the sixties, American car manufacturers were outperformed by Japanese auto firms, who had re-engineered their processes to invent what was called "just-in-time" manufacturing.

The typical American car plant in Flint or Detroit in the sixties was a gigantic facility covering more than a square mile. Much of that was warehouse or parking space, in which were stored millions of auto parts at one end of the assembly line, and thousands of unsold cars at the other.

Let's imagine a worker on the assembly line, putting bumpers on cars as they move past. There's not much room beside an assembly line for a big supply of bumpers or other auto parts, so a typical autoworker of the 1960's relied on a warehouse worker to bring car parts from the warehouse to the assembly line.

The auto companies needed very large warehouses, so they wouldn't run out of parts and be forced to stop the line. They had to keep track of all the parts in the warehouse so they would know what they had and when to order more. And they had to pay for warehouse workers to move parts off the delivery trucks and into the warehouse, then out of the warehouse and next to the assembly line. The cost of maintaining inventory was huge, and the Japanese recognized this.

So auto manufacturers like Honda and Mitsubishi re-engineered the process. They closed the warehouses, and told their parts suppliers to deliver parts only at the exact time they were needed - "just in time" - to be put onto the car being assembled on the line. They rebuilt their plants, so that the delivery truck bringing bumpers backed up to a loading dock that was right next to the auto worker who put the bumpers onto the car. And they asked the delivery company to unload the truck themselves.

If they knew that a truckload of bumpers would only last for three hours, they didn't order two truckloads, and stack the bumpers up beside the assembly line - there's not enough room for that. Instead, they made sure that another truckload was scheduled for delivery in exactly three hours. They made sure the delivery was "just enough" - and no more - to enable the autoworker to keep working smoothly and without interruption.

At the other end of the line, they adjusted production so that every car that rolled off the line had already been purchased. They did not waste money producing cars so they could rust in a parking lot.

Just enough to do the job - and just in time to do it. That's the principle that's been driving manufacturing ever since. That's the principle that has made today's manufacturing companies like Dell computers best in class. And that's the principle that has to drive the information economy.

### **Computers and the Human Brain**

Human beings reproduce themselves in nature. They do this by building tools that do labor so their physical bodies don't have to. Human beings can dig with their hands, of course. But they invented shovels, backhoes, and front-end loaders to dig more efficiently. Human beings can run, but they invented cars and motorcycles so they could go faster. Human beings have brains, too. But they invented computers so they could free their minds up for more important things - like watching The Simpsons on TV.

More than one science fiction writer has pointed out that when human beings invented the computer, they were attempting to reproduce the human brain. Computers have ROM - humans have DNA. Computers have RAM - people have thought, conscious and unconscious. Computers have hard drives - people have memories.

Human beings store memories in their brains in the same way computers store files on their hard drives - in the same way that auto manufacturers used to store auto parts in warehouses. People use the information in their brains to do the work they have to do.

People's ability to do the work they have to do - their performance - is improved by access to the right information, just in time, and just enough.

As performance improvement specialists, we are engineers of the process of information storage and retrieval. When a human being performs a job, they need information, in the same way an autoworker on an assembly line needs car parts. Our job is to rationalize the process, and to find the most efficient way to deliver that information to the user of that information - when they need it most.

### **A Case Study - The Cable Installer**

I recently worked on a major performance improvement initiative for one of North America's largest cable companies. Cable companies today face not only stiff competition, but also an expansion into telephony, digital television, and Internet services. The challenge was to bring thousands of "cable guys" up to maximum efficiency in the face of a tsunami of new knowledge.

The only way to approach such a challenge is to remember that performance improvement in the information economy is primarily the business of information retrieval and delivery.

This cable company had spent many years and hundreds of thousands of dollars developing a vast set of installer's manuals comprising literally thousands of pages of information and technical drawings. Their first thought was to create many more thousands of pages dealing with the new technologies the installers needed to become familiar with.

In reviewing these materials I uncovered a few important facts, not least of which was that the manuals had no index. Creating a set of manuals like this is like creating a huge information warehouse, just like an auto parts warehouse of the sixties. Creating these manuals without an index is like saying to an autoworker, "OK, go get me an alternator from the warehouse - it's in an unmarked box somewhere in the back."

Secondly, in profiling the target training audience, I learned that most - but not all - cable installers for this company had completed high school, and that a significant minority used English as a second language. A quick survey revealed that the number of installers who carried the bulky set of manuals in their truck, and indeed the number of installers who had even looked at the manuals twice since completing basic training, was next to zero.

Creating the manuals was a significant achievement. They contained everything required for a cable installer to perform their job, in the same way that an auto parts warehouse contains everything required for an autoworker to build a car. To take those training materials to the next step, however, required us to engineer a more efficient information retrieval and delivery process.

The typical person will never open a set of manuals thousands of pages long, except to answer the following question: "How do I do what it is I need to do?" Our challenge on this project was to engineer a sort of assembly-line conveyor belt to transport the relevant information to the cable guy when he asked that question - just in time, and just enough.

Think of the human brain as an information warehouse. Where is the most efficient place to store information? Do we store it in RAM, so it's always present? If the task to be performed is done continuously, such as, for instance, driving a cable truck, well then yes, we'd better make sure the driver has instant access to information such as how to brake safely, how to parallel park, what traffic signs mean, and so on. The only way to embed that information into the driver's brain is through competency-based training, refreshed periodically if necessary - and practice, practice, practice.

If the information is used very infrequently, and becomes obsolete almost immediately, a different approach is called for. If, for instance, a cable installer suspects that a customer has illegally tapped into a cable drop, they can't be expected to remember how many cable jacks are active on the customer's account. If they must call the office for this information, it is essential that they not be tied up on a long call while the information is retrieved. In this instance, performance improvement requires us to examine how customer billing information is stored, and the method by which it can be retrieved by the cable installer.

### **Engineering an Information Storage and Retrieval System**

As training or documentation specialists, we must ask ourselves, when starting any project, "What information will the user need, where should that information be stored, and how best can it be retrieved?" Should it reside in the user's brain as, for instance, driving skills should? Then we must train them. If it does not, then how close to the end user do we need to store the information they'll need to use? Does it need to be at their fingertips, or can it be a phone call away? Should it be stored in a job aid, or a user's manual, or a reference manual, or in some database on the Web?

And we need to remember that we are engineers of the process of information storage and retrieval, with one guiding principle: Serve the user!