

Integrating Manufacturing into Collaborative Business Model

Branko Pecar, Ph D

Gloucestershire Business School

bpecar@chelt.ac.uk

The whole concept of e-business is based upon two elementary assumptions. The first one is that your company has integrated most of the back office applications, or preferable you have an ERP (Enterprise Resource Planning) system, and the second one is that you enjoy the benefits of the Internet. The Internet without the ERP backbone enables only some form of e-commerce, which is a subset of e-business. However, if you want to build more complex business models based on properly structured e-business idea, then ERP is almost essential.

There are many fine ERP systems on the market and one of the most prominent is R/3 from SAP. The ERP systems have successfully replaced the old-fashioned legacy systems and helped us start planning and utilising our corporate resources more successfully. They also made promises that we'll be able to manage our supply chain better, but this is the point where we begin to be somewhat doubtful. ERP systems are execution systems only. They track, report and measure transactions. They do not necessarily engage in optimising the supply chain (with a few respectable exceptions and SAP is certainly one of them). Despite all the business process reengineering, sometimes they just take a bad supply chain and enforce it. If you are lucky, they might try to optimise it by generating some knowledge, but this is it. Being transactional systems, they certainly cannot handle events, which implies that they are not real time systems.

So what is needed to successfully manage your supply chain? By definition, the supply chain goes beyond the physical boundaries of one enterprise and transcends the processes and transactions generated in one single company. It inevitably involves partner and participants populating the chain downstream and upstream from us. This simply means that to optimise such a chain, you need to share your processes, transactions, services and possibly even user interfaces and some applications with your partners. Not only this, but this process of sharing and executing transactions need to be done in real time. This is the zone of collaborative business concept where e-business begins to gain a respectable shape and goes beyond simple credit card transactions over the Net.

If this is the case, what is the problem for anybody with an ERP system and access to the Internet to build a successful e-business? Well, the problem is in ERP systems. They have not quite delivered what they originally promised, and this has now come to haunt us. Despite a promise to integrate the whole organisation, most ERP systems failed to do this. One of the major blind spots of most of ERP systems is manufacturing. Many ERP systems come with various manufacturing related modules (such as PP, PPPI, PM or QM from SAP), but it remains a fact that these modules do not go deep enough. They continue to be reliant on either manual data entry, or some basic and primitive file transfer protocols. What companies really need is a method of integrating their real time manufacturing data, on a continuous basis, with the rest of the corporate data. This will create a modern enterprise capable of reacting on events, rather than transactions, which is the case today. This will take us into the era of

collaborative manufacturing, which should be an integral part of any contemporary e-business strategy. This will assist companies with meeting their objectives and beating competition.

To achieve such integration today should not be a big problem, nor should it be terribly expensive. Providing the company invested in the right infrastructure, this could be achieved without a major involvement of the third party consultants. With the right infrastructure, system integration becomes a natural extension of current operations, rather than a one-off, isolated solution to a particular problem. The infrastructure we have in mind are the fundamental technologies, such as Microsoft COM/DCOM and various ERP applications and solutions, such as SAP R/3.

It is amazing how much has changed over the last year and half since we entered this decade. The ERP and manufacturing issues are still with us, but the Internet applications moved at the speed of light. Microsoft is busy formulating their .Net strategy and SAP launched a very successful mySAP.com strategy that opened up possibilities of a brand new concept of collaborative business, as described above.

As the intrinsic value of most companies is created in manufacturing, if manufacturing is not integrated with the rest of the organisation in real time, the whole concept loses its punch. This is why, no matter what business model we pursue, manufacturing needs to be an integral part of all the real time transactions and events that are recorded and acted upon in any enterprise.

We recognise that manufacturing is typically one of the most dynamic systems in any organisation. Events could take place at a millisecond resolution and the whole system is a subject to various variations, disturbances and constraints. It is obvious that corporate systems, such as ERP, were not designed to deal with such issues at the plant floor level, but neither was a manufacturing systems designed to deal with the transactional issues at an enterprise level. On the shop-floor level, there are separate dedicated systems and applications that deal with these problems and this is the reason for the emergence of the layer we today called MES (Manufacturing Execution Systems). The difference between a contemporary ERP system (such as SAP R/3) and a cluster of MES systems is slowly disappearing. ERP systems are absorbing many traditional functions executed by MES systems, and knocking on the door of typical manufacturing systems, such as Distributed Control Systems (DCS). However, it still remains a challenge to integrate your real time millisecond data into your corporate system.

The challenge is not just of the technical nature. As a matter of fact, the technical issues are the simplest. Most of the control system manufacturers, if we take an example of process industries, have adopted NT operating system, TCP/IP protocols, Ethernet physical layer standards and Microsoft COM/DCOM technologies (OPC is an example, which stands for OLE for Process Industries). But the difficulty is primarily cultural. The world of manufacturing is still considered a special case of automation, rather than a natural extension of one, common and unifying IT strategy. Another problem is that a fast real time process will generate millions and millions of milliseconds data and no commercial, office type IT system can cope with this. So what is the solution?

The first part of the challenge could be easily eliminated. Manufacturing systems need to become a part of the day to day responsibilities of IT departments. Fundamental technologies are identical to those deployed on the corporate level. Needless to say, the culture would need to change. IT departments need to realise that they now inhabit the world which is truly a real time world. One hour of your email server being down is damaging, but nowhere as damaging as having your plant down for an hour.

Nevertheless, a much more challenging issue is the overwhelming amount of manufacturing data that we would need to handle. How do we store thousands of manufacturing variables that get reported on an exception basis virtually every millisecond and who needs to know all that? Well, the manufacturing people need all this data and they would typically store it in a data historian, either embedded in their control system or purchased as a separate piece of software (PI from OSI Software, for example). Other people in the organisation need only a summary of such data, or to be more precise, key performance indicators (KPIs) that originate from manufacturing. In order to achieve this, your data historian needs to elevate itself to a Plant Information Management System (PIMS). PI from OSI Software we mentioned is a good example of such PIMS system. By complying strictly with Microsoft technologies, it enables an easy and seamless integration of various manufacturing data with the rest of the enterprise.

On the other hand, sharing KPIs and other manufacturing data with the rest of the organisation is one thing, and integrating it in your ERP system is another. Fortunately, both companies we mentioned in this article (SAP and OSI Software) came together and offer a unique solution for this. By using some common Microsoft solutions, such as SQL server, they created a piece of middleware (called RLINK) that will enable you to push and pull all the relevant information from your SAP R/3 ERP system to any manufacturing control system you have. This solution bridges all your islands of automation and enables you to create one, integral and real time enterprise system. This creates a foundation for entering the world of collaborative business and supports a proper e-Business strategy.

Building a collaborative business model is all about competitive advantage. Competition is just a mouse click away. How do you keep your customers and how do you preserve the preferential treatment given by your suppliers in such an environment? No doubt, the solution is in sharing the processes, knowledge, services and tools. This creates the intimacy, and the necessary dependence, between the parties in the supply chain and consolidates everybody's position. As manufacturing is the heart of many businesses, without integrating it with other parts of enterprise, we do not have a necessary platform for full collaborative business model.

Not only this, but the complete body of knowledge we are capable of generating with such an approach, and share it with our partners, enables us to optimise our supply chain. We can now go beyond ERP systems that only track internal transactions and enter the world of optimising our supply chain. We go beyond execution systems and enter the world of real time collaborative management systems. Our ability to share this knowledge over the Net and build a collaborative business model guarantees additional competitive advantage. Without the manufacturing function being fully integrated with the rest of the organisation, there is no collaborative business and we do not run a proper e-business model.

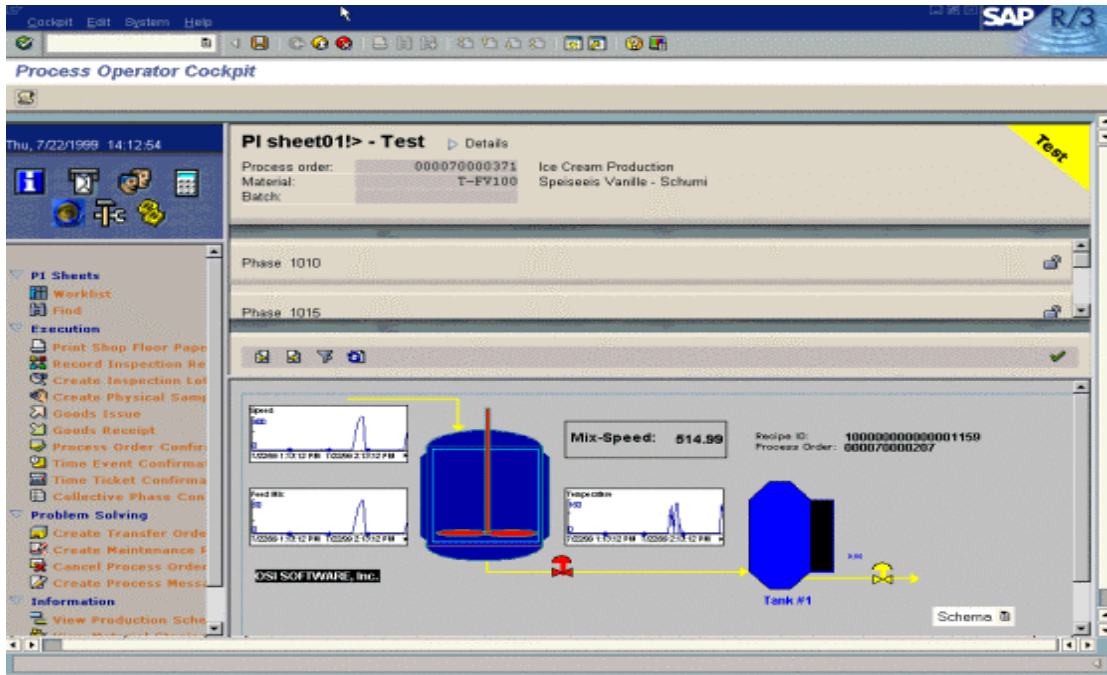


Fig.1 An example of embedding manufacturing data coming from a PI system directly into mySAP.com web browser user interface

Branko Pecar, Ph D (bpecar@chelt.ac.uk). Prior to joining Gloucestershire Business School as a Senior Lecturer Branko spent a number of years in senior management positions with Fisher-Rosemount, a leading process control manufacturer. He also runs his own consultancy PiCom Ltd specialising in Plant Information Systems integration.