

## Computers and Dust Collectors - Interfacing Anarchy in the Shop

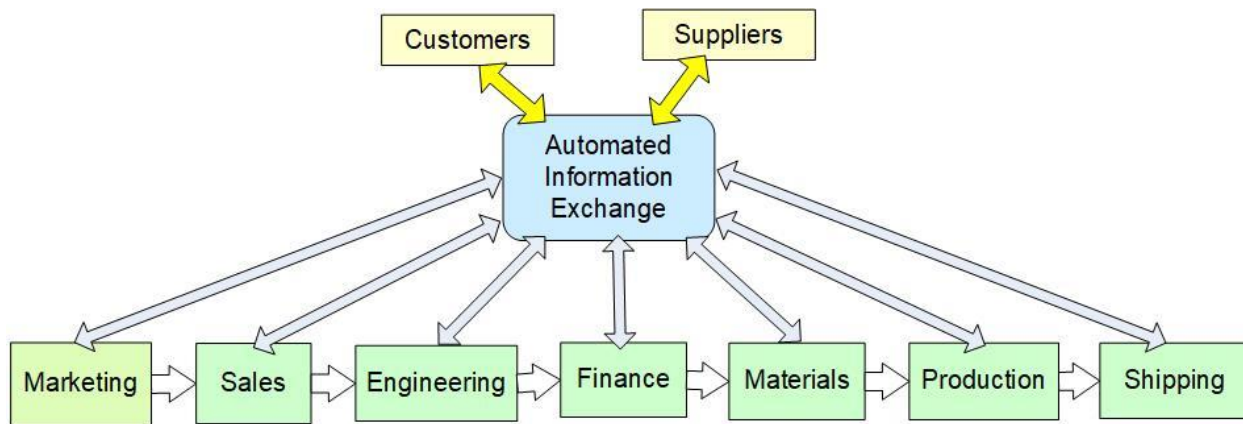
### Introduction

I finally got fed up with sawdust all over my basement workshop, which spread to the rest of my house; so, I purchased a dust collector, shown at right, from Harbor Freight Tools.

Easy, I thought, just buy a few flexible tubes, from the local hardware store, hook them up, and I would be done. But no; every tool in my shop has a different size dust collector tube, and some, like my trusty old table saw does not even have a dust collector attachment.

Soon I was up to my elbows in a design with different size pipes, adaptors, blast gates, vortex separators, minimum flow calculations, and even worries about explosions due to static build up. Even better, I was soon watching You-Tube videos on how to fabricate adaptors from PVC pipe!

As I was sat contemplating my new integrated dust collection system design, I was struck by the thought that this was similar to the problem that my clients face in integrating different software components into an integrated operations management system for their mid-sized manufacturing operations.



Instead of miter-saws, sanders, band-saws, drills, and saw benches, my clients are faced with integrating accounting systems, ERP systems, warehouse management systems, production management and process control systems, labor tracking and payroll systems, customer relations management and digital marketing systems, as well as E-Commerce systems.

When a manufacturing plant is small, it can use separate systems for each function and rely on interpersonal communications, supplemented by Emails and spreadsheets, to enable the organization to function efficiently. But as the organization grows, and individual people become departments, in order to handle the work-flow, it becomes increasingly difficult to maintain efficiency of communications. As a result, paperwork forms proliferate, and the organization starts to reach a sales plateau, typically around \$10 Million in annual sales, due to lack of an integration between their systems.

A similar thing happens with sawdust collection, when the shop is small and does not generate much sawdust then you can put a dust collector bag on some tools and vacuum up the sawdust from others. But as the volume of projects (and sawdust) grows then it becomes much more efficient and safer to have a centralized dust collection system.

## Technology Choices

As with the dust collection system, the choices are similar, you could:

1. Keep using all the (software) tools that your people like and are familiar with and use a central dust collector/information exchange system. This is generally the lowest cost solution, which requires the least disruption and retraining, but is typically requires the most planning and making interface adaptors.
2. Throw out all your old (software) tools and purchase a new integrated "ERP" system, at great expense, which does everything your old tools did (hopefully), but includes integrated dust collection/information exchange. The analogy here is to systems like SAP and Oracle, which offer an integrated suite of software tools.

The reason that I have lots of different single function tools in my workshop is that they all do a single function very well. I have a passionate dislike of tools that do many functions, but none of them well. This is similar to all of my clients, who use separate software systems for different functions within their operation, because each system does what they need and is typically inexpensive to use.

I understand that integrated ERP software suites are loved by CFOs of large multi-national corporation, as they can do financial roll-ups and drill-downs over hundreds of manufacturing plants and warehouses worldwide, at the press of a button. But, in my experience, these systems are a disaster for most mid-sized manufacturing plants (even those that belong to large multinational corporations).

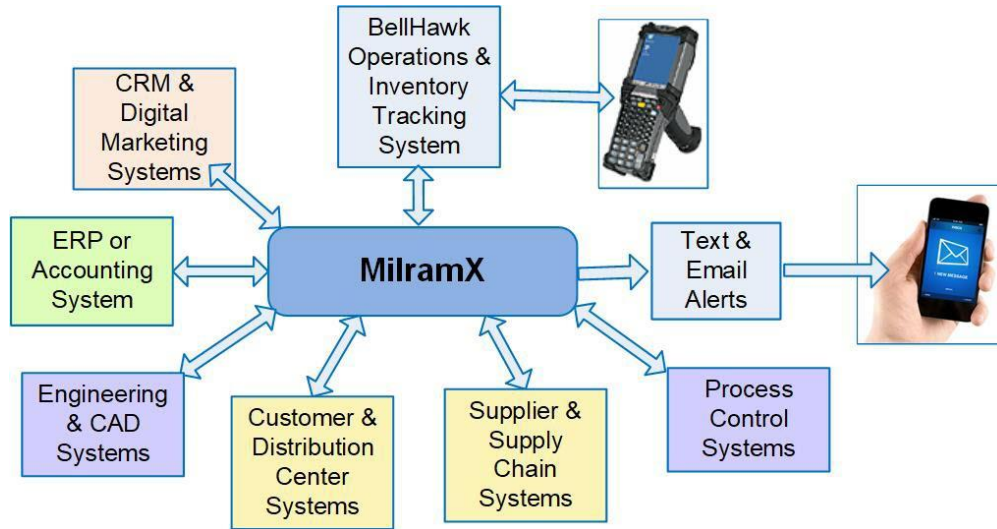
The best example of this, for me, was when the Hershey Chocolate Plant, in Hershey, PA, switched from using individual systems to using an integrated SAP system and nearly ran out of chocolate two weeks before Easter (I guess the Easter Bunny was a little late that year ☺).

Systems like SAP and Oracle are designed for long-run manufacturers, who do long-range materials requirements planning (MRP), for multiple plants, based on sales forecasts for months ahead. These MRP systems are integrated with CRM (Customer Relations Management) and accounting systems to create ERP (Enterprise Resource Planning) systems that will work over multiple plants, in multiple tax jurisdictions, in multiple languages, and with multiple profit and loss centers.

Most of my clients are mid-sized manufacturing plants in the USA, which make products to order on a short-run, quick-response basis. Here long-range MRP has little or no role to play as our clients have only a few days or at most weeks of visibility of new orders. Instead they need real-time scheduling of operations and dynamic pull-based materials management to ensure that customer orders get delivered on time.

As a result, even if they do use an ERP system, my clients typically use their ERP system as a glorified accounting system, with maybe the use of the CRM system because long-range MRP materials planning does not work for their make-to-order operations.

### How We Solve This Problem at KnarrTek

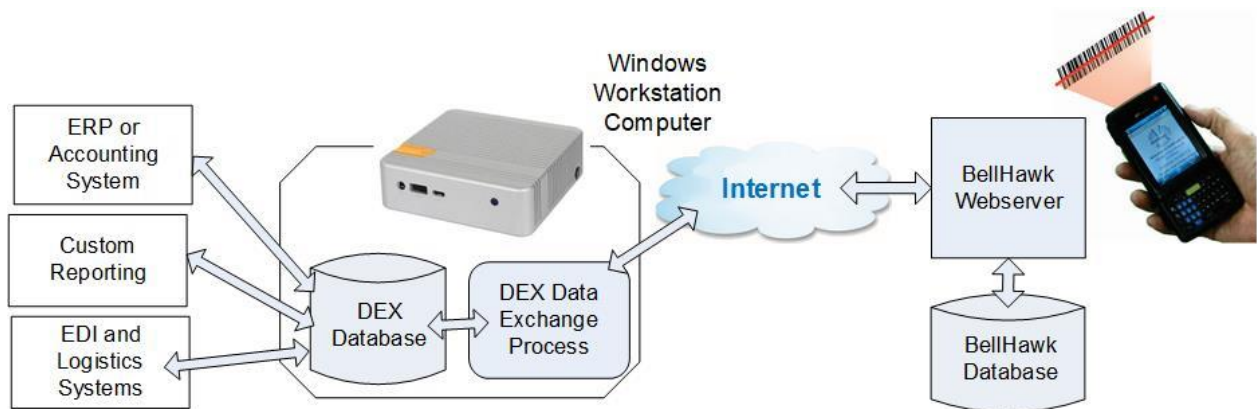


KnarrTek provides software solutions to manufacturers and other industrial clients.

At KnarrTek, we use the MilramX™ software platform to implement information exchange between the various systems in use by different departments within a manufacturing plant.

We provide MilramX at no cost to our client's IT staff but do charge for technical support services in assisting our clients to use this platform. While MilramX, [www.MilramX.com](http://www.MilramX.com), is a general-purpose information exchange platform, its primary use is in integrating the BellHawk inventory and operations tracking software with other systems, as shown above.

Components of MilramX are also used as the basis of the BellHawk® DEX data exchange interface, which provides a simple mechanism for clients to implement their own interfaces and to produce custom reports.



Please see the DEX datasheet on [www.BellHawk.com](http://www.BellHawk.com) for more details.

In this way, we enable our clients to integrate the software systems, which they are familiar with using, into an integrated system, with the improved communications between departments resulting in lower overhead costs, improved operational efficiency, reduction in mistakes, and improved customer service.

Sometimes we introduce new software tools if our clients are still using paper forms, Excel spreadsheets, and manual keyboard data entry to track their inventory and manufacturing operations. Here we will typically replace the current manual data recording with a system like BellHawk, which has an existing integration with MilramX, and saves time and money by automating data collection, and prevents expensive mistakes.

## **Commentary**

Some of the lessons we have learned in integrating these systems are:

1. Integrating systems used by different groups within an organization is not just a matter of moving data between systems. People need information in a form that directly relates to what they are doing, even if this means integrating and interpreting data from multiple other systems into the information that is needed.
2. Information needs to be delivered to the systems which people use on a daily basis. If you require people to go to 6 different systems to get the information they need they typically will not do this on a regular basis.
3. If time is of the essence to take action, then it is important to also send an Email or text message to the mobile phone(s) of the people who need to take action or know about the event.
4. The systems doing the information integration, need to have a significant level of embedded knowledge/intelligence about how each client's manufacturing operation functions and the needs of each group within that operation.

While these lessons are probably stretching the analogy to my dust collection system, I did watch a You-Tube video about someone who built a computer-controlled dust collection system, with automated blast gates. Next step - an AI based dust collection system, complete with IIOT devices and Cloud-based data integration? Or is that making it a little too complicated ☺?

## **Author**

This paper was written by Dr. Peter Green, who currently serves as the Technical Director of KnarrTek Inc. and Milramco LLC. Dr Green obtained his BSEE and Ph.D. Degrees from Leeds University in England. Subsequently Dr. Green was a senior member of technical staff at MIT and a Professor of computer engineering at WPI. Dr Green is an expert in materials and operations tracking and management within the industrial, medical, and construction supply chains. He is also an expert in using real-time Artificial Intelligence to assist managers with operational decision-making in industrial organizations.

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