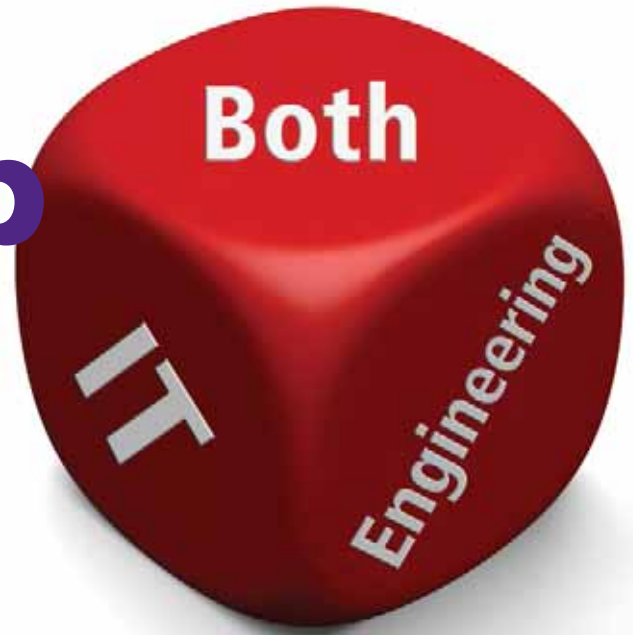


MES ownership up in air



IT or engineering? Users need both

By Bianca Scholten

"MES typically is an IT layer, and it ought to be an IT responsibility," one user said. Conversely, another said, "Our IT colleagues do not have any process knowledge. It is essential that you understand the processes about which MES reports, well. If not, you are reporting rubbish."

Everybody agrees, more or less, the manufacturing execution system (MES) is the responsibility of users, mostly production. But where can production go when they want to select and implement a new MES? Where can they go with their questions about changes and maintenance of the system?

A small and informal survey made it clear that not only are there different opinions, but also, in reality, there are different ways in which industrial companies handle these issues. Traditionally, there are two parties that take care of automation: IT and engineering. What can they learn from each other? How can they combine the best of both worlds in order to develop, select, implement, and maintain better MES solutions, and last but not least, to use these solutions?

A production manager said she wanted to purchase an MES solution. She contacted the engineers for help, but they sent her to the IT department. When she went to the IT department, they sent her back to engineering.

IT departments traditionally handle ERP and other systems used in the office. The functionality in these systems, like order processing, administrative material management, and cost accounting, belongs largely to ISA95 level 4. These

IT people "speak" Java, .Net, and other programming languages. Engineers are working in a completely different world, namely the world of instrumentation, PLC, SCADA, and DCS with programming languages like ladder diagram, SFC, and function blocks. They are active on ISA95 level 2, 1 and 0.

But who takes care of the automation of activities at ISA95 level 3, often called the MES layer? This is about activities like finite production scheduling, recipe management, data collection, tracking, and tracing. Traditional level 2 process control system vendors have offered more level 3 functionality over time, with historians, standard production reporting, and recipe management. These systems closely integrate with the systems on level 2, so it is essential to have thorough knowledge of the process and its automation. This suggests engineers are the ones to support MES and execute MES projects.

On the other hand, there are reasons to think MES should be supported by IT. MES software vendors have based their historians, reporting functionality and recipe management on the operating systems, programming languages and network protocols characteristic for IT environments. Moreover, the term Manufacturing IT is becoming more predominant today.

Quick snapshot

In an effort to gain more insight into who really owns MES, I decided to conduct an informal, non scientific survey among a series of users to get a snapshot of what they were thinking

about the issue.

“It can not be a coincidence that we keep addressing the same subjects,” was the reaction of one MES project leader. “I’ve just become a member of a European working group to investigate this very same subject. It appears that in our plants in Europe, we think differently about it. The purpose of the working group is to develop a recommendation for a boundary between the different disciplines and the related organization. The final goal is to develop a common approach.” Others responded enthusiastically. It appears to be a hot topic that needs clarification.

The survey went out to 18 end users; 15 responded before the deadline. The respondents all work for international companies with headquarters in Europe and in the U.S. Every one of them has a good understanding of the ISA95 standard, so I am relatively sure we all have the same basic idea of what is meant by level 4, 3, 2, 1, 0, and MES.

Most of the respondents work in pharmaceutical and chemical industries, but some work in food, tobacco, energy, and biotechnology. Almost a quarter of them is active within level 4 IT, almost half of the group is active within level 3 IT, almost a quarter is active within engineering, and one works for production.

Except for one, all of these companies have implemented one or more MES systems. The other is using SAP on level 3, for electronic batch records. In 33% of these cases, support of MES projects and maintenance are the responsibility of IT. In 20% of cases, it is the responsibility of engineering, 40% have shared responsibilities, and 7% have not decided.

When asked how closely IT and engineering are working together in their companies, 20% said there is no collaboration at all, 43% said they work together in case of projects, and 23% said they work together closely on a daily basis. The remaining 13% could not give a single answer because there are too many differences between divisions.

“In my opinion, IT and engineering do not collaborate in our company,” an engineer said. “Even worse, they are opposed to one another. Although the technical gap between IT and engineering is getting smaller, the chasm between the departments still is huge. I think this heavily impacts the success of MES implementations.”

One respondent said within MES projects, their IT and engineering departments work together closely, but for the support of MES systems, the collaboration could improve.

In case of daily collaboration, IT and engineer-

ing usually report to the same entity. Several respondents said the relationship between IT and engineering strongly improved from the moment they had to work on an inte-

grated architecture. This led to more clarity about roles and responsibilities, and they started to trust each other more. Establishing a level 3 IT department also seems to positively impact collaboration. Nevertheless, people keep competing, and IT people seem to stay convinced the ERP system can do anything.

Some of the survey participants emphasized the level of cooperation between IT and engineering strongly differs per division. “Generally speaking, there is not enough cooperation,” one of them said. “Nevertheless, it is becoming clearer that there is a need for a separate manufacturing IT entity. Neither engineering nor IT can offer enough for effective MES functionality. We need a bridge, and we can build that bridge by establishing a dedicated manufacturing IT group that combines IT skills with automation skills,” she said.

Can’t we get along?

Survey respondents mention strong points and weak points of IT as well as engineering, concerning the question, “Which party would better support MES projects and maintain MES systems?” Not surprisingly, strong points of IT are weak points of engineering, and vice versa.

IT strengths

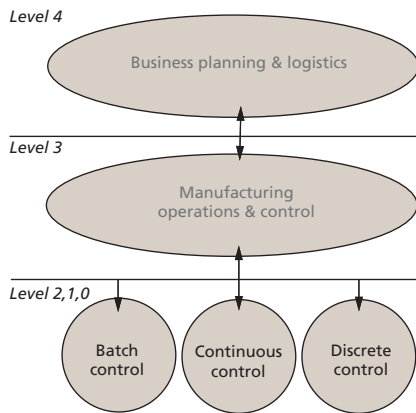
One of IT’s strong points is its knowledge of information technologies, like Ethernet, the IT infrastructure, networks, protocols, topologies, databases, MES data, data management, security and software development technologies, tools, and methods. “An MES is an application that is oriented toward interfaces and databases. Databases are not part of a technical engineering environment,” one respondent said.

Another respondent said, “Engineering in most companies has been stripped to the bone and fragmented to provide support for manufacturing systems and equipment in diverse sites. This severely limits the talent pool at any single site.”

Several respondents said IT tends to be more professional when it comes to system maintenance. IT is better at systems monitoring, making back ups and developing system documentation. Engineering, on the contrary, does support

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- IT has strong knowledge of information technologies.
- Production knowledge is a strong characteristic with engineers.
- Combining strengths is easier said than done.



ISA95 functionality hierarchy model (simplified)

“on the side.” It is not their core task and they handle it less professionally. Furthermore, IT can work with several disciplines.

Another advantage for the support of MES is its central place within the company. From there, IT has an overview over the complete site, or even over the company. So IT is familiar with the infrastructure MES uses and are already responsible for the desktops MES uses. Furthermore IT knows the other business processes and systems MES has to exchange information with.

From this central position, IT has a better basis for harmonization and standardization and to avoid double functionality. IT would be capable of developing a corporate MES strategy and integrate this with the corporate IT strategy. This would lead to synergy between plants. A company could reuse the implementation knowledge over all plants.

Engineers do not have this overview. Historically, they focus on local projects, with a scope that does not reach beyond a production machine or a production line. One of the respondents said their engineering department had once implemented OEE functionality for a production line that was not interesting from a business perspective at all because it had too much capacity. That could mean unnecessary sub-optimizations could result when investments do not undergo an assessment from a higher level.

It is about savings

IT's central position can lead to cost efficiency. It can limit implementation

and maintenance costs. Moreover, IT has professional negotiation power.

IT has knowledge of level 4 systems and their interfacing possibilities. If a company wants to realize all the possible advantages of the MES system, then it will have to integrate MES and ERP.

In short, the 15 respondents mentioned advantages where IT is responsible for the support of MES projects and the maintenance of MES systems. This suggests IT ought to be responsible. But let's see if there are any significant advantages if engineering is responsible.

Engineering strengths

Almost every respondent acknowledges production knowledge and affinity are strong characteristics of engineering.

“Even if process automation will be more and more influenced by information technologies, detailed knowledge will always be required about the production process, product specifications, and the limitations of the process and the equipment. I hope that engineering will always be available to deliver this knowledge,” one respondent said.

“When the production process is a mixture of manual steps (supported by MES) and automated steps (supported by the level 2 system), then MES will have to be in close harmony with the level 2 systems, and this is something that engineering can take care of,” another respondent said.

One of the companies deliberately put MES projects and support under the responsibility of engineering. “MES systems contain process information that process people need. Management information is only a summary of this process information. That is why we think it should be supported by engineering.”

IT is not known for its knowledge of the process. They are physically, as well as in their experience, far away from the processes MES deals with. One respondent said, “it is not feasible to train IT-people to be able to deal with this.” Another said, “the biggest challenge for an IT person is to think like a production person. For example: Reliability between the four walls of a production plant is much more important than corporate efficiency, being able to work at

a distance. You cannot decide just like that on a Friday night to shut down the system for a few hours of maintenance. The engineers within our company are realizing that much more than the IT people. They are much closer to the reality of the production process.”

Local support works

For production departments, it is better to have one party that can solve their problems and handle their wishes in the field of automation,” said one respondent. “Engineers usually report directly to production departments, and they are part of what companies call ‘production’ or ‘supply chain.’ ”

“Engineering people are familiar with the requirements of production and willing to develop solutions meeting these requirements. Engineering does not start after a functional specification is ready, but helps to get a user requirements specification and develops the

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functional specification on its own,” said someone who works for an engineering department. Many respondents mention engineering can provide 24/7 support, whereas that is not the way IT tends to work. “IT is not trained to help blue collar personnel and give support for a 24 hours/seven days environment. To shut down an ERP system during a weekend for maintenance is OK for an office but not in production.”

Knowledge is key

Some of the advantages of engineering supporting MES systems and projects relate to their knowledge of production process systems and methods. “MES will have to be integrated with level 2 systems,” one respondent said. “On level

2, there are many systems, all with their own specific technologies, and they can only be maintained by engineering. For integration, you need knowledge of these systems. The IT people are not familiar with the process automation landscape in which systems, platforms, and technologies are used that are sometimes more than 25 years old, but also very new software is used."

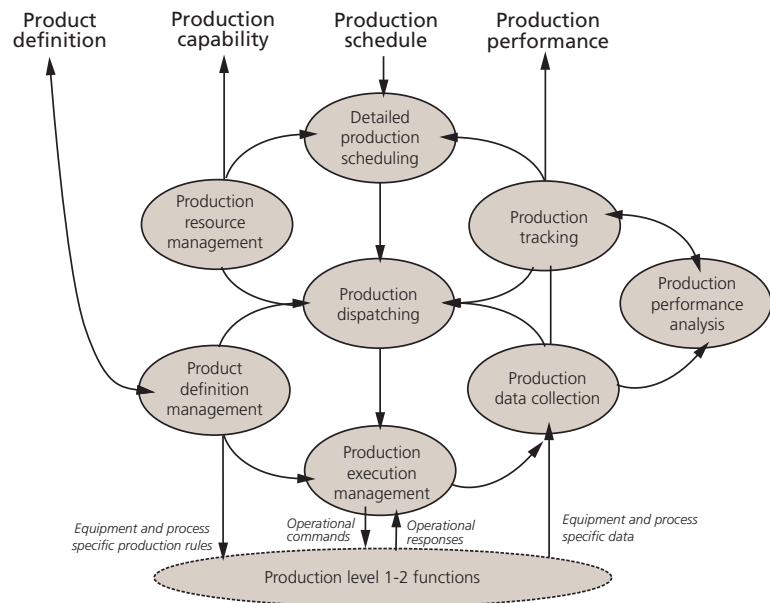
"A large part of the process data that are needed within MES originate from the PLCs, SCADA, and DCS systems," said another respondent.

MES projects and maintenance of MES systems have points of concern that have resemblances with the methods used by engineers. "Engineering projects have direct impact on production processes. Often these projects can only be realized by production stops. Those stops have to be as short as possible. This is an aspect that IT people are not familiar with," said one engineer. "IT people are not known for their understanding of real-time production environments and the impact of system errors on production," a respondent said.

End users' perspective

In short: Engineering and IT bring in important knowledge and skills for MES projects and support of MES systems. Companies seem to be in a situation where that has grown organically instead of it being the result of a conscious, strategic decision. The ones that did make a conscious decision did not all make the same decision. There still are many diverse options, and nothing points out that one scenario is better than the other. For example, you could make IT responsible and have them communicate with engineering on a project basis. This is also possible the other way around. Another possibility is to establish a dedicated manufacturing IT department. But such a department will have to communicate with IT as well as with engineering. Yet another possibility is to put IT and engineering under the same responsibility, to merge the departments.

It is not yet clear what the advantages and disadvantages of all these scenarios are.



Activity model of Production Operations Management

Finding utopia

Picture the ideal situation: There is this industrial company, taking a conscious, strategic decision about making IT and/or engineering responsible for the support of MES projects and the maintenance of MES systems. They purchase an MES from a solution provider that sells mature MES products, with a very high percentage of standard functionality, but also with enough flexibility to adapt it to the specific characteristics of the plant's production process. And finally the industrial company hires a system integrator specializing in the MES solution of this specific provider, and that has decided to combine the best of both worlds (IT and engineering) in its MES project approach. By the time this becomes true, that guarantees success, right?

Users have relied upon several parties: IT, engineering, the MES software supplier, and the MES system integrator. Nevertheless, there is one important task for them. If you want an MES project to be successful, it is very important the users prepare themselves for using the system. Already at the start of the MES project, they should start writing documentation, develop procedures and train colleagues in adopting these new habits, involve the communication department in order to send newsletters, and write articles on the intranet about the upcoming changes.

There are end users not aware of this necessity. This of course has something to do with the lack of clarity about responsibilities in MES projects, but it is also due to the fact that production people and other users of the system just are not specialists in the aspects of automation and IT projects.

In the end, there are quite a few questions, but no real answers. After more research, the issue may clear up, but until then, we can move forward on an individual basis, finding our own way.

ABOUT THE AUTHOR

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