

Let's make it better, together

Just-In-Time-Information
(JITI) for better Field
Service Management

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Did you know?!

Unplanned downtime costs industrial manufacturers an estimated \$50 billion annually. Equipment failure is the cause of 42% of this unplanned downtime¹.

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FSM Challenges

All too often, field service management (FSM) is a fire fighting job. Sure, your maintenance managers might plan service schedules and assign engineers. But on the day a machine or piece of equipment somewhere goes down, it's all hands to the pumps and the schedule has to wait. Perhaps production is being lost at a cost of \$\$\$\$ every hour. Or a customer of your facilities management business is hurting because a key facility is playing up and you're expected to get it fixed - now!

Process inefficiencies

Of course, you don't always know the fault in detail or the cause, nor what work will be needed to fix things. Having to send successive engineers and diverting them from their schedule is inefficient. Then on arrival at the job, do they always have access to schematics, work history, the right tools or spares? Perhaps you don't even have the replacement parts in your inventory? All of this is costly and inefficient, extends downtime and leads to frustrated engineers, unhappy production managers and customers.



Automating and digitizing field operations can deliver 10 - 30 percent productivity gains²

Servicing equipment to a regular maintenance schedule isn't always optimal. Perhaps a machine has been under-used and servicing could have waited. Or it's worked harder than normal and earlier attention would have been advisable. Maybe a service isn't due, but a key component is days from failure - but nobody knows, and so downtime is inevitable.

Digital Transformation

Digitally modern FSM companies provide field technicians up-to-date information at their fingertips. This makes them more efficient and the whole FSM operation more cost-effective. It cuts downtime and its associated costs, boosting customer satisfaction.

At Mendix we see multiple ways in which better information cuts FSM costs and reduces downtime. For example, remote monitoring to track asset health and create predictive maintenance plans. More intelligent field service scheduling with which you can assign the right technicians at the right time to specific work orders. Better work order execution information to enable the technician to efficiently and successfully perform the job.

We're talking about moving away from pen and paper processes, from legacy and isolated systems and poor data quality, and from scarce information and its cumbersome management. We're proposing an evolution to digital from which both service providers and their customers (internal and external) can benefit.

Enter 'Just-In-Time-Information' - JITI.

Digital transformation success requires capturing the right information and getting it to the right place at the right time for decisions and processes to be optimized. We call this 'Just-In-Time-Information' (JITI).

By following JITI in their FSM digital transformation projects, our customers are dramatically improving service levels and the customer experience, increasing efficiency and productivity, and creating new value. These customers include Mitsubishi Elevator Europe, Mammoet, DSM, Enexis, Sibelco and many others.

JITI - Just In Time Information



Moving from isolated systems to connected ones that support effective decision making and execution

During the second half of the 20th century, Toyota developed the Toyota Production System (TPS) to improve efficiency and produce high-quality vehicles fast. The value of TPS has been widely recognized and it has been adopted on a global scale. One of the core concepts of TPS is the 'Just-in-Time' concept, in which each process produces only what is needed for the next process in a continuous flow.

At Mendix FSM, we've taken this concept from the physical world and applied it to the digital one. Via JITI, we pursue digital transformation projects, the support of effective decision making and execution via ensuring the right information is provided at the right moment to the right person (or process) at just the time it's needed.

JITI is the ideal future state for managing digital information within your organization. If you were to imagine that anything is possible, then what information would you want to make the most effective decisions/run the most effective facilities management operation? Forget isolated systems and rigid solutions. What if everything you wanted, in terms of information and insight, was possible?

A revolution

Capitalizing on JITI, a number of our industrial manufacturing and facilities management customers have revolutionised core aspects of their organizations. They've cut costs, improved workforce productivity, accelerated time to repair, reduced machine downtime, seen a fall in the time their technicians spend traveling and undertaking repeat visits. Those that measure key performance indicators (KPIs) talk of improved planned vs unplanned maintenance, reduced time to repair, higher first-time fix rates, reduced frequency of asset failure, reduced production scrappage, and greater overall equipment effectiveness (OEE).

JITI - Four Pillars to Success

For the manufacturing sector, digital transformation offers huge potential; and not just because so many processes are still run in old-fashioned information silos just waiting to be liberated. There's much more too.

Smart sensors can measure and inform on almost every possible dynamic throughout your supply chains, manufacturing plants, assets and customer implementations. This allows smart, automated decisions to be made in real time towards both process optimization and best outcome for you, your partners and customers.

FSM can benefit immensely from sensors within plant and equipment. Alerts can be configured to flag service needs for example, or to trigger an urgent work order if performance issues are detected. Information can be routed automatically to the right FSM team and to an appropriate technician's mobile device/tablet together with all the supporting information needed to perform the tasks required.

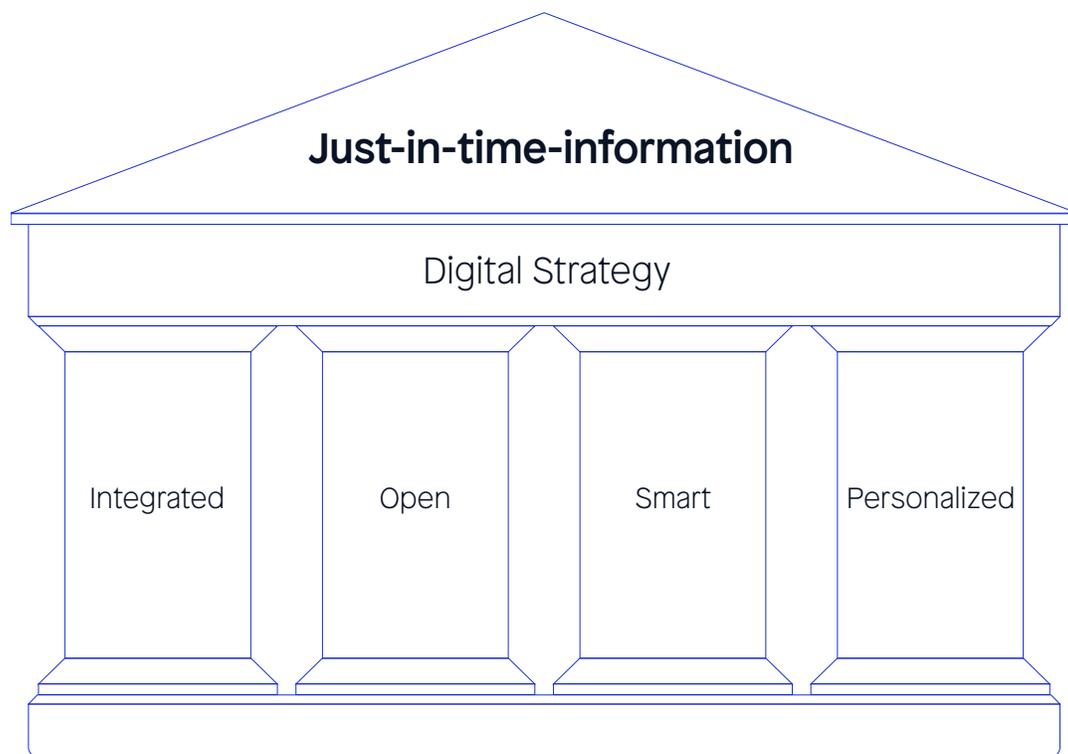
The effectiveness of FSM is dependent upon having insight into and managing so many complex variables. Imagine how much better FSM could be if intelligently automated? Planning could be optimized around jobs and the level of urgency of each. The availability and location of suitably skilled and certified technicians could be taken into account in the blink of an eye, along with granular information like traffic conditions. Your inventory of spare parts perfected. Change accommodated with less upheaval. Interconnected systems and multiple stakeholders kept updated.



JITI delivered a 45% productivity boost for the engineering team of one of our Dutch customers, a 1250-employee field services firm.

Of course a big question for any business has to be how far to go with digital transformation? What degree of effort, spend and risk offers the best potential outcome? It's all about information. JITI helps you picture your ideal information state, understand what's possible and justified, define your end goal and your digital strategy for achieving it.

At Mendix FSM, we see four conditions or pillars to JITI. Your information should be integrated, smart, open, and personalized for the immediate needs of the user. The four pillars rest on a firm foundation of Information Technology best practices. You can work on pillars separately but all pillars are equally important and you must take a holistic view. For each person and each stage in a process, you want to ask yourself in your current FSM set-up, whether these four conditions for maximizing the value of information are met.



Integrated

You want to optimize how you use your technicians' time. So let's move from having them type the same information into multiple systems (or write it on paper) and instead provide them with a mobile device presenting a single frontend that serves their input to all your applications.

Are your employees working with siloed solutions (like old applications, multiple spreadsheets or even paper) and having to work across multiple systems to perform single, common tasks? It might seem obvious, but a slick FSM operation requires that users experience smooth uninterrupted work processes. This is only made possible if the organization first digitizes information and commits to presenting field technicians and other employees with integrated system frontends.

Digitalized The risks of siloed solutions shouldn't be underestimated. Such information isn't validated, contains hidden knowledge, might have duplicated data, and can't be used by other people in the organization for important insights. If that's typical where you work, you certainly should look at some degree of digital transformation, guided by JITI.

Mammoet, a heavy lifting and transport engineering firm, boosted technician productivity by 30 percent when it digitized a paper-based reporting process. A digital frontend updates integrated backend systems instantly, including 20+ SAP applications.



**Integrated
frontend**

At some of our customers we've seen information captured on paper by technicians on site, which they or others must later enter into a system manually. Other customers had technicians needing to draw on information from multiple systems, phone calls or emails to complete a ticket. Maybe they first had to locate parts, tools or manuals, check for health and safety risks for example, or ask about flight times or work van availability.

With an integrated frontend you can have one overview that presents all and only the necessary information for executing the job, with the backend being updated instantly any change is made. As a result you can have huge productivity gains and reduced errors. Your technicians shouldn't have to bother with managing different systems, search for information to perform regular tasks or do admin twice. Often employees work on certain processes every day so an integrated frontend offers workflow efficiencies that can significantly improve FSM effectiveness and reduce asset down time.

Open

From your chief operations officer and head of production, to shop floor managers and from your own technicians and those of your partners to your procurement and logistics people, opening information to your wider FSM community can be extremely beneficial to an effective operation.

Modern organizations function within a complex ecosystem of suppliers and partners that need to continually communicate with one-another. Yet still, in the second decade of the 20th Century, companies often have large numbers of processes that require human intervention to gather and relay information across that ecosystem.

With digital transformation and an eye for an appropriate degree of system interconnectivity or 'openness' across the ecosystem, most information can be relayed automatically, allowing for uninterrupted FSM processes. Open systems also allow authorized people across your ecosystem to view on any device, including mobile, whatever information they need access to, just as they need it, in order to perform their roles.

In an ideal state, work orders, generated automatically when an asset requires servicing or preventative maintenance or a repair, would intelligently update affected processes across the ecosystem. Field service scheduling would be triggered for an optimal time, the customer or production manager informed and asset utilization or production schedules automatically adjusted. People at all involved parties would have access to the picture that's appropriate to them, as systems would be openly connected.



Smart

Smart information requires your systems interrogate all available data across all your technologies to then distill and show you only the relevant information needed for the task in hand, at that moment and location.

Smart technologies are changing business models. Organizations slow to adapt will struggle to compete in terms of productivity, breadth, depth and quality of service. Three ways in which your FSM organization can become smarter include new information sources, intelligent data processing and new visualizations.

Information sources Technologies like RFID, machine learning and IoT sensors are becoming common elements in solutions today. These technologies have become less expensive and have lots of practical use cases. You never have to lose assets, tools or equipment anymore and can for instance have real-time performance insights.

Intelligent processing It's not the flood of data from IoT, RFID sensors and the like in itself that's of value. It's the information to be gained from it that can make a difference. First you have to decide what sort of thing you're looking for. Then how to get it and what to do with it. Machine learning can add additional value such as by helping track asset usage, pattern recognition in energy usage or perhaps vibrations in machinery. Rather than servicing assets to a fixed schedule, a team could move to predictive, data driven maintenance whereby work orders are based on a mix of data, algorithms and the manufacturer's recommended servicing frequencies.



New visualizations

Typical FSM schedules deliver to a service level agreement (SLA) designed to meet a rather generic set of 'headline' key performance indicators (KPIs). But with near real-time data comes the power to visualize service levels in real-time. If you can see there's a risk of an SLA breach (say an engineer is behind schedule and unlikely to reach a critical job today), then your planners can be alerted automatically alongside a suggestion of assigning the work order to another local, suitably qualified technician who happens to be ahead of schedule.



Mitsubishi Elevators Europe (MEE) adopted JITI in its digital strategies for FSM strategies to support the company switch from selling elevators to providing elevators-as-a-service. MEE's use of sensors and machine learning provides continuous insight into elevator usage and performance. Predictive analytics greatly improves maintenance helping ensure happy customers.

Personalized

As an end-user, you want to see the specific information that is valuable to you at that moment in the process. The information should be minimal; just the information you in your role need to see at that step in the FSM process.

Imagine if every morning, your field technicians could see on their mobile devices a personalized dashboard. From there they could view tickets for the day, all accurately assigned to them based on their location, experience, knowledge, skills and certifications. Rather than hunting down (or going without) key job notes, they simply drill into each ticket, in the one app, for more detail and for previous visit job notes, technical guidance, schematics. Any alerts regarding health and safety or specific compliance notes could be flagged. Notifications via a smart watch or even VR glasses can be appropriate in the right environments, if that's how your technicians want/need to work. You might even want to add a bit of gamification to help motivate engineers? How about small rewards for successes like best customer satisfaction scores or being super efficient?

Not only can easy access to personalized and job specific information help your technicians perform more efficiently, but they'd make fewer mistakes and also have fewer accidents at work. By making their lives easier, you might also become one of your industry's favored employers.



Mendix FSM: A Better Way

In this eBook, we've sought to communicate the value to be won from investing in digital transformation and the provision of just-in-time-information. We've explained how JITI is a foundation enabling an integrated, open, smart and personalized information ecosystem and an effective FSM operation.

The good news is that Mendix FSM can enable you to digitally transform your FSM operations quickly, affordably and successfully.

But no business is exactly the same as another. Each has aspects of processes that are unique. Software shouldn't force a business into a straightjacket of standardization, but should instead reflect each company's competitive differentiators. Hence, Mendix FSM develops complete and fully functioning applications, but in the form of what we call 'adaptive SaaS'. You can mold these applications to perfectly fit your operational uniqueness. You might ask Mendix FSM to define and perform these adaptations, or you might choose to work with your own Mendix developers.

Mendix FSM

Mendix FSM is modular. Choose our full application suite or select just the applications that meet your priorities for FSM efficiency improvement. Every application is highly flexible (built on Mendix) and can easily be customized to support your unique environment and competitive strengths.



Asset management

The asset management app is the basis of the FSM suite. In this app you can register your assets and manage them accordingly. Next to assets it is also possible to manage tools and spare parts, so these can be used in the most effective way when technicians get their work orders and need to execute these efficiently. If you don't have a system for asset management, this is a must-have in your journey of digitizing your field service management process



Remote Monitoring

With this app you can track asset health in real time. You can manage asset performance and create work order service jobs like maintenance, repairs and other operations. With the remote monitoring app you can also analyze the data of your assets in order to enhance your maintenance process and move towards a data driven maintenance strategy.



Field Service Scheduling

When work orders are created they need to be assigned to the right service technician. This can be done based on skills, availability, location and commute time or any other criteria which influence the most efficient way of scheduling your technicians. The scheduling application can automatically schedule your resources according to a trained algorithm. If that is too advanced for your organization, it is also possible to use the planning engine for job suggestions, which can be manually overwritten by the planners if needed. This app will save your planning team a lot of time, allowing them to focus on more critical tasks.



Work Order Execution

In this application the selected technician can accept work order(s) and then automatically receive all the information they need to successfully execute the service job; digital work instructions, bills of material, details of relevant spare parts and tools needed for the job, compliance, health and safety guidance and more. Next to having the right information at the right time, the app also provides the technician with an easy to use interface and workflow to execute the job in the right manner. The technician can add photos, documents and feedback during the execution and eventually can sign off with the customer. Additionally, the app can record for the technician the time they've spent traveling, executing the job, breaks, etc. All this data will then be saved. Automated invoice generation can be provided too. Using this application will save you a lot of time and increase customer satisfaction since service is better. You'll also boost employee engagement and satisfaction (the smooth service the technician is providing makes them proud and there's less admin).



Predictive Maintenance

Data collected from across the FSM suite is made available for analysis, such as required for implementing a data driven maintenance strategy. The predictive maintenance app can automatically generate work processes, drawing on data from any IoT systems you employ. It can alert service managers to predicted outages and if you require, automatically create a work order which can be routed right on time to the most suitable technician. The application cuts your costs and reduces unplanned downtime.

More apps to come

In addition to the above mentioned applications we are planning to develop additional applications in the FSM suite. These will be based on customer feedback and market trends. If you are interested in one of the above apps or have an idea for an app which should definitely be in our offering, do contact us!

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Two case studies

Mitsubishi Elevator Europe



Continuous insight into elevator usage and performance improves maintenance through predictive analytics.

Mitsubishi Elevator Europe (MEE) performs elevator maintenance and renovations, but is also no stranger to some beautiful custom made builds. Indeed it recently launched an entirely new line of elevators, the MOVE. This new generation of elevators has a sophisticated operating system which gathers data for hundreds of parameters of every individual MOVE elevator. Realizing the potential of JITI, MEE chose to leverage the Mendix FSM platform to help it provide better service and maintenance.

First, a remote monitoring service (RMS) application was developed (on the Mendix low-code platform) to capture data from the elevators' operating system. Now linked to the Mendix FSM platform and its enormous storage capacity and powerful analytics capabilities, MEE support and R&D personnel have insight into each elevator worldwide, its past and current functioning, and its service needs.

"At Mitsubishi, we apply innovative technology to provide our users with the best service possible. That's why we work together with partners who have the mindset. For us, Mendix FSM is a partner who brings this into practice every day. We are very satisfied with the end result and our collaboration." - Evert Visser Managing Director, Mitsubishi Elevator Europe.

Continuous insight into elevator usage and performance greatly improves maintenance through predictive monitoring and analytics. MEE can react to small things that might lead to an issue before there is any disturbance for customers. Mechanics can view remotely the actual number of runs the elevator has made since the last maintenance and can gauge whether the specific elevator might need some extra care and attention due to heavy usage.

All this information is also extremely valuable for MEE's R&D department, helping them further improve the MOVE Elevator. And with everything accessible via the single application of Mendix FSM, customer contact runs more smoothly and is significantly faster.

Mammoet



The digital transformation of maintenance administration and reporting, boosted productivity by 30%

Mammoet provides engineered heavy lifting services to customers in the energy, construction, mining and maritime sectors. It uses a range of equipment including cranes, specialized trailers, gantry systems and more to move heavy loads safely and efficiently.

The management processes surrounding maintenance of trucks and cranes was primarily paper-based. But with some 35,000 maintenance orders being created annually around the globe, locating files and key information held within them was becoming cumbersome and inefficient. Increasingly too, it was recognized that enhanced visibility and transparency was needed and the decision was made to build a digital work order solution.

Mammoet worked with Mendix and its partners to build the application on the low-code development platform. This took just eight weeks, including integration into Mammoet's SAP environment (25+ SAP Odata services) to ensure a single and up-to-date source of information across the business.

Transition from the old, to the new way of working has been highly successful. Mechanics and other stakeholders were involved from the beginning of the project and as a result, the application is so intuitive, Mammoet is able to fully train mechanics on it in just a couple of hours. And because the application is built on Mendix, it can be molded to accommodate any desired enhancements in just days or weeks, rather than in the months or years it might take in traditional code-based software environments.

The most important result of the application is a 30% improvement in maintenance engineer productivity, primarily as a result of the user-friendly application that instantly updates SAP. With the digital work order application, mechanics work less on administration and more on Mammoet's equipment!

Mendix FSM

Mendix FSM, our field service management software business, specializes in the digital transformation of business operations in the manufacturing industries. Our solutions digitize inefficient paper-based processes to make them better and faster, and create integrated systems environments that boost operational efficiencies, cut downtime and improve decision making and execution. Mendix FSM applications are adaptive SaaS. They are highly adaptable applications that are built on Mendix, the Siemens low-code rapid application development platform. This allows perfectly fitting solutions to be built at speed, for every customer's requirements and environment. These solutions can then easily be extended as needs change over time. Mendix FSM applications include those for work order execution, automated scheduling, predictive maintenance, remote monitoring, asset management, parts management and more.

About Mendix

Mendix is the fastest and easiest platform to build and continuously improve mobile and web applications at scale. Recognized as a market leader by leading analysts, we help our customers digitally transform their organizations and industries by building, managing, and improving apps at unprecedented speed and scale. More than 4,000 forward-thinking enterprises, including SUEZ, Philips and North Carolina State University use our platform to build business applications to delight their customers and improve operational efficiency.



- i. <https://partners.wsj.com/emerson/unlocking-performance/how-manufacturers-can-achieve-top-quartile-performance>
- ii. <https://www.mckinsey.com/business-functions/operations/our-insights/the-coming-evolution-of-field-operations/>