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The HUMAN ELEMENT of Quality in Manufacturing

Tapping into the power of observational data

> *Even the most automated facilities still need **human operators** to configure, maintain, and monitor the machines.*

With the rise of the Internet of Things (IoT), smart manufacturing, and machine learning, today's connected manufacturing plants are streamlining operations while producing more output than ever before. They're also generating and exchanging more actionable data than ever before. This surge of new information is helping operational leaders leverage Statistical Process Control to find new ways to continuously improve and make course corrections to optimize production – all in real time.

But what about the human element in manufacturing? Sure, the connectedness of today's modern world is generating great returns, but even the most automated facilities still need human operators to configure, maintain, and monitor the machines.

Where does the data go when their work is inspected or audited? Shouldn't that also be part of the information pool when making strategic decisions?

In this white paper, we'll discuss the human element of manufacturing and how mobile software and observational data can be integrated into the picture for a better look at how operations are working as a whole. While data gathered from IoT is certainly driving innovation, **it's the combination of IoT and people that truly provides a holistic view** of how the shop floor is performing.

The Effect of Human Behavior on Quality

There's no question that IoT is transforming the manufacturing industry as we know it. But when it comes to measuring and managing quality, human behavior will always play a critical role. After all, while IoT can tell you that a machine's temperature is out of whack, it can't tell you that it's happening because its operator just fell asleep at the helm.

Human error doesn't have to be inevitable, impossible to stop, or something that takes constant scrutiny to prevent. In fact, you can dramatically decrease human-driven problems when you make it easier for managers to aggregate and analyze data gathered from QA/QC inspections and audits.

The first step to achieving this is for operational leaders to eliminate error-prone paper-based processes. Manufacturers that still use paper forms and checklists for 5s audits, Gemba walks, or walkthroughs run the risk of losing recorded data and information before having the chance to add it all into a spreadsheet or QMS. This situation can lead to someone not ordering necessary parts or not fixing a critical defect, which can often lead to millions of dollars in losses due to recalls, returns, and generally unsatisfactory brand perception.

Since manufacturing companies spend $178 billion on IoT each year, doesn't it make sense to also invest in form software that can aggregate and share data with your existing systems? The good news is, this can all be done with a simple mobile interface that's customized to work with your current processes.

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The Benefits of a Mobile Interface

Unlike old-fashioned data collection methods (like spreadsheets and paper forms), mobile quality software is easy to use. It can manage tons of paper-based forms on a single front-end interface that communicates and shares data with all of your systems. Even better, feedback happens instantly on a mobile device so operational leaders can immediately make course corrections and adjustments to ensure the same issues don't keep popping up.

Data collected from mobile evaluations can help determine which processes are running as expected, and where the company can make procedural and training tweaks to optimize performance. Best of all, a comprehensive business intelligence platform can be used to share information with employees to show them why certain decisions are made and why certain procedures are in place.

Mobile software can also provide the constant teaching and development a manufacturing plant needs to drive continuous improvement. Not only will employees get better at performing quality control inspections, but the inspections themselves will trend more positively as employees gain a deep understanding of proper procedures. When your whole team is constantly improving, you can be sure your products will do the same.

Quality Control

Manufacturing quality control involves gathering and unifying quality data through your entire process—from suppliers to customers—and across all manufacturing sites, to gain a new level of visibility. But do you really have visibility if the data captured from QC inspections isn't integrated with your IoT data?

Mobile software can help manufacturers capture and integrate data into various systems when performing any of the following QC checks:

SUPPLIER AUDITS
(Vendor Facility Checks, 2nd Party Audits, Raw Materials)

ASSEMBLY INSPECTIONS
(Initial Production Checks)

PRODUCTION LINE CHECKS

FINISHED QUALITY CONTROL
(Final Random Inspections)

FINAL CHECK
(Customer Loading Check)

POST-SALE
(Installation/Warranty/Service; Root Cause)

Quality Assurance

How do you know whether the shift change-over procedure was followed? Did the operator properly apply thermal grease? Was the gasket properly aligned? Who in Sector 7G is producing high-quality goods consistently?

Again, while manufacturers are pumping billions into IoT, machine data still can't answer these questions. And while all this information can be captured the old-fashioned way, paper or spreadsheet-based evaluations make it challenging to do what mobile software can do, such as providing the ability to quickly analyze data to spot trends, gain insight, and capitalize on lessons learned.

Furthermore, while Kaizen, Lean, and Six Sigma are excellent business improvement approaches for helping manufacturers prepare for and produce good work, these audits are typically fragmented across the plant. For example, you could have 3-4 auditors doing a Gemba walk across the same manufacturing floor. That's 3-4 different forms coming from 3-4 different people – all with their own ways of entering data. It's easy to imagine how human error could make it difficult to consolidate this data into a uniform format that lines up neatly.

With the right mobile data collection software, however, manufacturers can standardize all of their forms to avoid the human error that goes hand-in-hand with manually entering data from various sources, and perform QA checks and evaluations to measure the effectiveness and consistency of:

- **TRAINING**
- **EQUIPMENT AND CLOTHING**
- **WORKFLOW**
- **BEHAVIOR**
- **POLICIES AND PROCEDURES**

Data Fluidity

Most large manufacturers already have a large number of systems in place. Today, most paper-based processes and procedures have been replaced by a number of intelligent platforms and programs, including Enterprise Resource Planning (ERP) Human Resources Management (HRIS), Work Order Management (WMS), Quality Management (QMS), and Environmental, Health and Safety (EHS).

The problem is, those responsible for analyzing all the data gathered from these systems are pulling it from several different tools and sources. None of it really interacts or works together. The process can be arduous and clunky, making it extremely time consuming to get a high-level look at everything. Without the seamless integration of all your data, you're not working with all the information.

Not only can mobile software help you collect better data, but it can also give you better access by serving as an aggregating hub for data to flow in and out of these systems.

Process improvement

Companies that focus on process improvement consistently analyze and refine their existing procedures – regardless of size and scale. After all, process improvement isn't just about making big, sweeping changes; it's also about making several small, but necessary ones as well.

To fully optimize processes and maximize efficiencies, you must have ongoing access to all your data in the same place. Ideally, you'll also have the ability to implement automated processes and use the lessons-learned from finding and fixing local problems to make strategic decisions that drive continuous improvement globally.

By using trends spotted in data analysis to influence the decision-making process, companies with distributed operations can increase the likelihood that each outlet delivers high-quality products.

While this sounds good in theory, executing is easier said than done. After all, anyone can poke holes in processes and point out operational problems. Discovering and understanding exactly why the problems are happening and finding a data-driven way to apply solutions that help all locations improve – that's the real way to drive process improvement.

Standardizing processes with plants all over the globe

With plants all over the world, it's not unusual for manufacturers to be producing the same product using different standard operating procedures at each plant.

But with 40 different versions of data, how does one know what good actually looks like?

With the right mobile software, operational leaders all over the world can ensure they're all working with the same playbook. Procedures and workflows are standardized, data is normalized and complete, and a comprehensive view of how things are working at each location can finally be achieved.

Streamlined Procedures

Efficiency is paramount in modern-day manufacturing, which means there's no time for complicated instructions or manuals, especially for new employees who are still learning on the job. Instead of asking in-depth questions, mobile software is more photo-centric, providing easy-to-understand pictures that can be referenced quickly and without explanation (think IKEA instructions).

Also, intelligent forms feature text hovering to explain further, maps that direct employees to different locations on the plant floor, and answer prompts that eliminate any guesswork. These same forms can also contain educational information about products and procedures so if someone has a question, or isn't sure about something, they'll be instantly provided with the answers they need to learn every time they're on the

Employee Performance Measurement

The key to optimizing the human element of manufacturing is to help employees apply the knowledge they've gained in a way that helps them continuously improve. But without prompt access to data, how do you establish a benchmark from which you can measure success? How do you pinpoint where things are going well and where things are breaking down? How do you find those teachable moments that can lead a knowledgeable employee to improve their performance without affecting their engagement?

With a mobile data collection app and a centralized platform pulling data from disparate systems, companies can gain an understanding of how compliant a particular plant is against your brand and quality standards. This information can be reviewed and analyzed on a local and global level and used for future learning moments and strategic decisions.

How mobile technology and software can help

By habitually performing internal evaluations, inspections, and walkthroughs with data collection software, you can gather a steady stream of information.

At first, you'll get a peek behind the curtain to establish a baseline understanding of how operations are going. But as data builds and accumulates, you'll quickly able to analyze large sample sizes where you can spot trends and opportunities that will help you improve.

Mobile Manufacturing Software: 7 FEATURES to Consider

1 Intelligent forms

Intelligent forms dynamically change for users based on who's using them, where they're using them, and what they are doing on the manufacturing floor. When a user logs in and syncs with their mobile device, all their approved forms are updated, and tasks and notifications are instantly available to them.

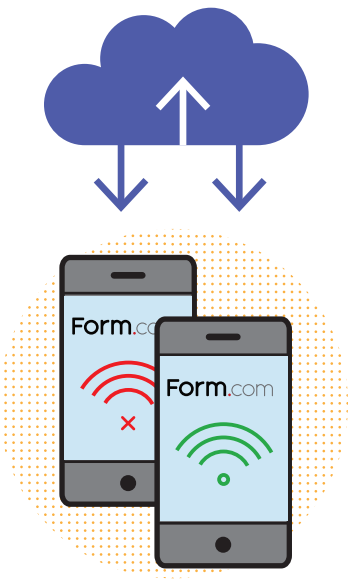
Visible data can be filtered by region, area, user responsibilities, etc. That is, employees are only asked questions that are relevant to the particular job they're performing. This is particularly helpful when you have plants located in different locations with different climates.

For example, a plant in Portland, Maine might have questions different from a plant in Houston, Texas. While those in Portland are accounting for weather factors like ice and snow during the winter months, those in Houston would not need to focus on these issues. Instead, the questions they're answering might take extreme heat into account. Intelligent forms ensure that only the inspectors in Maine see the snow-related questions (during the winter months only) while the Texans are presented with questions that focus on factors that are affected by higher temperatures.

> *"Intelligent forms dynamically change for users based on who's using them"*

2 Offline-first Approach

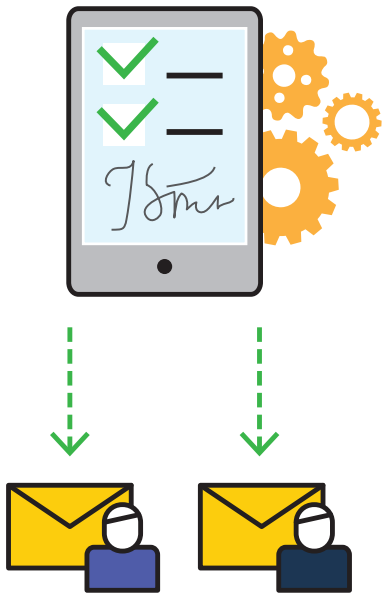
Operational leaders don't have time for mobile apps that stall or stop working entirely if network connections are slow or interrupted (a common problem on plant floors). That's why it's so important to employ a system with offline capabilities that lets them complete forms, collect data, capture photos, and schedule follow-up tasks regardless of connectivity (and without losing access to form intelligence).



It's also important to understand that not all offline experiences are the same. In fact, most applications with offline capabilities still risk providing a poor user experience when a connection is unavailable. This is because while they offer offline-access, they still rely on cloud-based

render the full app, with many parts of it affected by data transfer, network speed, and other online factors.

An offline-first app provides a seamless user experience whether the user is online and offline. Captured data is stored on a device, and the app displays the full user experience without connectivity. This lets users interact naturally with the app, making the data sync feel like a background process when a connection is restored.



3 Automated Tasks, Workflows, and Notifications

Automation is a critical feature to consider when shopping for a mobile solution. Not only does automation speed-up processes and communications, but the right mobile app can accelerate your entire operation by pre-populating information, kicking off operational alerts and notifications, and automatically trigging Corrective and Preventative Actions (CAPA).

Automation makes the CAPA process even more effective. Automated CAPAs can trigger activities based on any entry, response, or incident. Based on the information submitted in a form, the software automatically kicks off action plans, notifications, maintenance requests, or requests for audits or re-inspections. At the same time, when violations are found, submitted forms can automatically route reports or alerts to the right people in and outside of the company for follow-up or review.

> *"Automation makes the CAPA process even more effective"*

The key to CAPA is speed and accuracy. Time is of the essence when it comes to guest experience, so management must get things fixed as soon as possible and prevent problems from happening again. After all, if problems are occurring at certain locations because employees aren't following proper procedures, what's more important than getting that corrected right away and making sure it doesn't happen again?

4 Photos, Markups, and File Embedding

When considering software that utilizes smartphones and tablets, look for a solution that takes full advantage of all the features already built-in to the device. For example, mobile software that takes full advantage of the built-in camera can greatly enhance the QA/QC process while eliminating the need for a digital camera.

Photo capabilities let users capture and attach pictures to digital forms, providing visual information that a textbox cannot. Users can even draw on the photos with their finger and upload them directly to the system. Simply circling or pointing at a specific area on a photo helps to avoid confusion while clarifying details. This can be a major time saver, eliminating 'the work after the work' for those companies who are still spending countless man-hours manually validating photos and attaching them to spreadsheets or paper-based forms after the fact.

"Mobile software that takes full advantage of the built-in camera can greatly enhance the QA/QC process"

5 Customization

Large manufacturers need a mobile platform that meets their exact requirements while seamlessly integrating with existing systems and processes. It should also look how you need it to look and work how you need it to work. If you want certain guidelines to pop-up at certain times and places, you should be able to do so. And it should be ready for deployment as quickly as possible.

You could customize something in-house (or contract someone to do it for you), but homegrown solutions take too long to build, are quickly outdated, and expensive to maintain. Meanwhile, off-the shelf-solutions are restrictive, forcing you to compromise your brand and operational needs. Look for a third-party solution that utilizes rapid mobile development. This is the best and fasted way for you to customize the entire look, feel, and functionality of your application without waiting years to go live.

6 Rapid Deployment

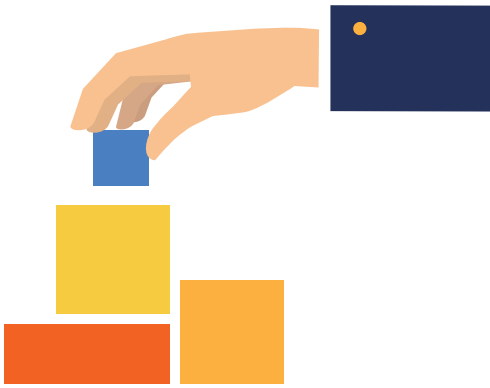
Once you've decided that mobile technology is necessary, it's common to struggle with the decision of whether to build or buy a solution. Your first instinct might be to build, especially since you already have technical resources in-house to create a custom solution that checks all your boxes. But you also know that any major internal build can be unpredictable and take a very long time complete- probably longer than you or your stakeholders can wait.

"Look for a mobile technology partner that utilizes a rapid approach to deployment."

You've probably also crossed paths with a few technology sales reps claiming that their preconfigured solution can satisfy all your requirements and get you up-and-running in no time. But you know that most out-of-the-box solutions can't be customized, and the way your company operates is far too unique for an off-the-shelf platform.

To get the best of both worlds, look for a mobile technology partner that utilizes a rapid approach to deployment. These partners combine the customization capabilities of an internal solution with the speed-to-market of an off the shelf solution.

They do this by starting your project on a core pre-configured platform that can be customized on the front-end (visual design, logic paths, data pre-fil, etc.) and custom engineered on the back-end (triggers, workflows, alerts). By building off a "core" platform, these companies have the head start they need to implement an enterprise-level data collection solution in just about 3 months – that's 9 to 20 months faster than a traditional custom build.



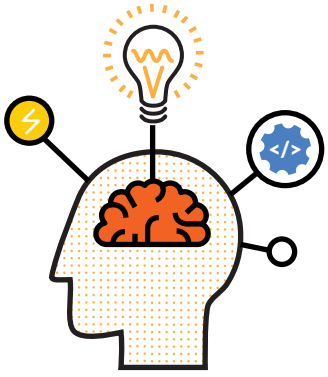
7 Professional Services

Last but not least, look for a partner that offers professional services and development teams that will ensure your solution looks and work the way you expect it.

FRONT-END CUSTOMIZATIONS: A solution with a bad front-end or poor usability can quickly become frustrating to those who are 'forced to use it.' Look for a professional services team that takes user experience into account with every decision they make. Make sure they can customize everything (visual design, logic paths, data mapping, etc.) to ensure your new platform makes it as easy as possible for your employees to do their jobs.

BACK-END CUSTOMIZATIONS: On the back-end, find a partner that can handle integrations, and configure how your processes will work, and how automated triggers for workflows, tasks, and corrective actions will operate. Finally, make sure this partner can fine tune your reporting structure to ensure you can view and export data in a way that works for your business.

If you're looking to ensure that your organization is operating as efficiently as possible, a good professional services team will work with you to determine how to best use technology to streamline your operations. They'll analyze your existing processes and workflows, find areas to tweak and improve, and work with you to implement automation into your business. This expert guidance will help you find innovative new ways to expedite the distribution of action plans, tasks, alerts, and CAPA.



Summary

Today's modern manufacturing plants are investing heavily in the Internet of Things - and for good reason. IoT reduces costs and increases production while generating troves of data to enable smarter decisions. All too often, however, companies that invest in IoT neglect to consider the human element of manufacturing.

As a result, many QA and QC inspections and audits are still being performed using a combination of paper and spreadsheets. This makes it difficult to integrate collected data into existing systems while opening the door for human error.

With mobile software, however, manufacturers can capture, aggregate, and integrate information gathered from QA and QC walkthroughs. This allows for better and faster data collection while providing leadership with a comprehensive look at how each plant is performing, and how the company is performing as a whole.

I. *http://www.verizonenterprise.com/verizon-insights-lab/state-of-the-market-internet-of-things/2016/*

Got questions? We can help!

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