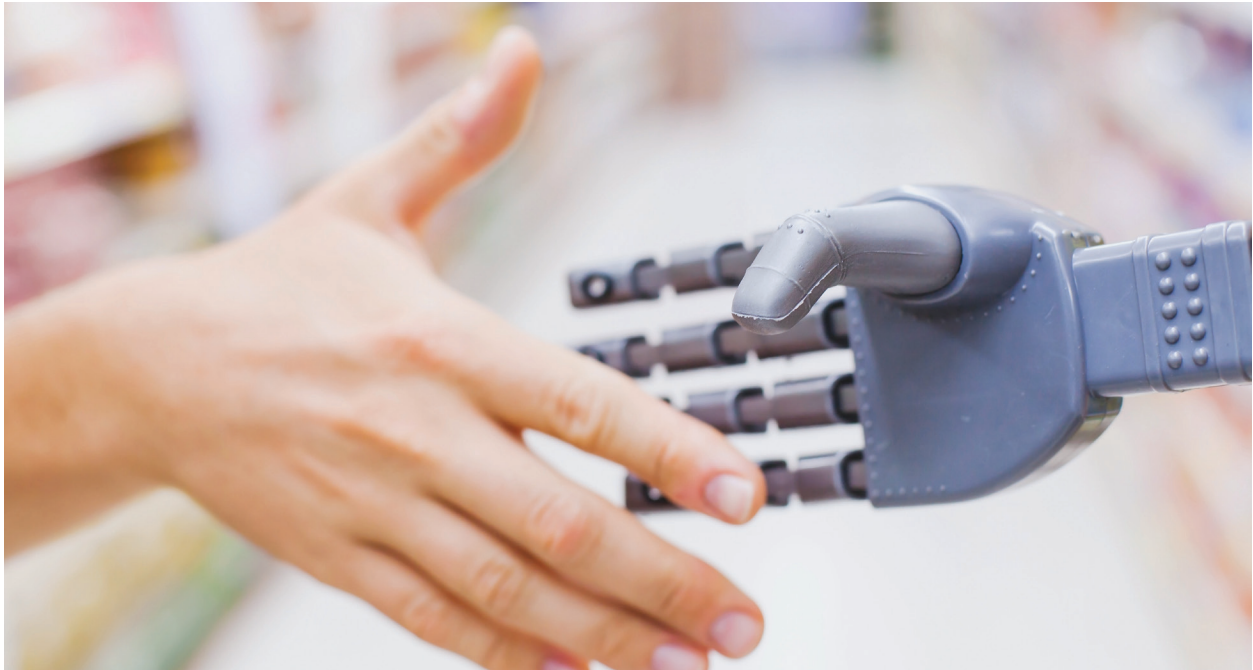


Operational Excellence Crossroads: Humans and Machines *What to do now as digital manufacturing disrupts industry*



The digital disruption in manufacturing creates a dynamic landscape where Operational Excellence (OE) strives for stability, quality and efficiency while continuing to service an increasingly demanding customer. With a unique, cross-industry perspective, Kepner-Tregoe consulting and training is at home in factories, shipyards, mines and also within global IT, media and telecommunications support operations. Some OE foundations for an increasingly digital operation are outlined below. They draw on our work in diverse, frontline operations worldwide.

Operational Excellence is a broad term for improvement programs—Lean, Six Sigma and myriad other initiatives—that are designed to fix problems, eliminate waste and create consistent and standardized processes. Strong Operations Excellence cultures also embrace innovation and directly engage and connect employees and customers.

Over time, OE will have a new name, the nature of work will change and operations will look very different; but there are critical steps every organization must take to support the OE journey to the digital future.

Improve workforce skills in using data to solve problems

Automation and advanced monitoring can bring new levels of stability to operations, eliminating the need for workers to run machines, make adjustments and resolve small issues. The past decades have seen this trend drive job losses. The news is not all bad however; workers who remain are now safer with less manual labor and repetitive tasks. They also have more time to study and learn on-the-job as they study the numerous sources of data now available to them. Increasingly operator capability development is a major area of investment.

The complication is that within this more digital environment, when problems do occur they are bigger, more complex and may never have been experienced before. Add to this a global supply chain that is difficult to control and demanding customers who just want it now.

In a world of big data and the tools to measure anything, a problem-solving approach that can quickly eliminate irrelevant data creates a solid groundwork for advanced problem solving and root cause analysis.

As the digital workspace evolves and becomes increasingly awash in data, problem solving and root cause analysis (RCA) capabilities that use data more efficiently provide lasting value.

Support new skills with coaches and workflows that provide prompts

Successful OE programs develop problem solving and root cause analysis skills that optimize the use of data to resolve problems efficiently and accurately. Organizations that develop problem solving and other critical thinking skills on the shop floor can eliminate wasted time and effort. Supporting workers with coaches and “ninjas” with advanced problem-solving skills is key to tackling complex issues never experienced before and helps to embed capabilities into sustainable, day-to-day operations. These people with advanced skills are often the Op Ex or Continuous Improvement leaders who are charged to roam the sites looking for improvements and working with operators to ensure that once root causes are found, solutions are practical and sustainable. In a future zero-defect world, these will be the skills to develop

Needle in a Haystack: Finding Root Cause Saves €2.8 Million

An occasional corrosion problem during production meant custom logic and memory chips had to be discarded. The problem resurfaced every few months yet the complexity of production and the elusiveness of the problem defied resolution.

This continued until a cross-functional team drawn from various departments tackled the problem again, this time using an RCA process to sort concerns, break issues into workable pieces, evaluate data and develop the most plausible hypothesis. After testing, they selected the best corrective action.

The corrective action was 100% effective, and the new process was adopted. Material costs fell, production delays disappeared, customer satisfaction improved, and €2.8 million in losses avoided.

and maintain, even if only through simulations and practice. Operator control rooms now look like aircraft cabins where operators spend much of their time attending to alarms and practicing for when something goes wrong. When something does go wrong, analytic thinking skills will be in high demand.

The complexity of modern manufacturing operations involves a lot of pieces interacting – a change in one place could impact the system as a whole. Here root cause analysis suggests where changes can be applied to achieve the results and impacts you desire. Understanding root cause may require untangling complex systems and their dependencies – often including the participation of multiple parties that must be coordinated. The impacts of both the original issue and any corrective activities can be widespread. The risk of ignoring or getting the root cause wrong and not understanding the consequences of resolution can be more hazardous than the original presenting issue.

One Step Forward, Two Steps Back: Plan to Sustain Change

Working in a highly regulated industry where a proven, problem-solving methodology is required, a manufacturer chose Kepner-Tregoe Problem Solving & Decision Making as its primary methodology, achieving immediate success in a pilot training program. But like many initiatives, use faded over time. To embed KT problem solving into the organization and eliminate roadblocks to using it, a revived program included not only training but also a middle management weekly review, coaching, and new roles and responsibilities around finding root cause.

The new approach proved successful and was swiftly deployed at a second site where problem solvers quickly doubled the average number of highly complex problems solved per year.



Avoid project overload and sustain improvements

OE relies on a workforce that is committed to pursuing continuous improvement. Lean and Six Sigma are givens for most manufacturing organizations today and manufacturing staff have at least a broad understanding of their concepts and terms. Key to achieving results from continuous improvement efforts is embedding changes into the daily disciplines of employees.

When organizations add a critical-thinking based approach for problem solving and root cause analysis to their Lean and Six Sigma toolbox, the biggest regret cited—in our experience – is not having done so earlier.

The contradiction is that manufacturing cultures thrive on routine and consistency, and this builds a “that’s the way we’ve always done things” mindset that is suspicious of change. Sometimes an external prompt is helpful to focus attention on the future. Front-line staff needs to be involved with improving outcomes *every day*.

The most powerful elements in the creation of an OE philosophy and culture are the focus and determination of a leadership team to execute the right things effectively. Leadership must communicate operational excellence aspirations and support a cultural change – with knowledge, process and behaviors all interplaying together in the context of the operating environment – by engaging the employees and creating a “High Performance Culture.” This culture is one where employees know what they are doing, why they are doing it, and are supported by goals and measures that drive improvement.

Of course, this is not a new concept: the much celebrated Lean cultures focus on empowering operators on a shop floor to “stop the line” when alarms light and ensure that issues are addressed immediately before impacting others. In the modern digital operation, machine learning and automated control of variables may well take immediate front-line control from operators. An excellent way to get operators back and engaged in the immediate control and improvement of their plant is to position them as short-term leaders of the Continuous Improvement projects being lead by Op Ex engineers. Operators can often become overwhelmed by the numerous machine-generated alarms they now must monitor. Through directly involving them in a focused improvement project which leverages this automation to troubleshoot and improve an issue, operators will gain greater confidence in how to interpret and respond to automatically generated prompts. The more advanced teams are able to program controls to automatically scan the horizon and the data for the clues that will signal the need to sound an alarm before the potential issue occurs.

Focus improvements relative to key metrics

One constant in OE is the theme of performance measurement. Digitization of operations and the encroaching IoT will continue to change the way work is done and success is measured. Measures enable an organization to keep score and monitor the effectiveness of strategies and plans.

A precise and collaborative approach to addressing the most pressing needs, while maximizing existing assets, can take full advantage of an organization’s desire to optimize those metrics that enhance their competitive advantage.

NS Bluescope Malaysia Improves OEE By Improving Key Metrics

When international steel producer Bluescope sought to improve operations in Malaysia, KT coached technicians to choose which troubleshooting tools to use, gather data more effectively, define problems specifically, take a fact-driven approach to finding cause, and track the effectiveness of corrective actions. Technicians who previously observed the problems were now involved in solving them.

Year-on-year results include: Downtime/line-stops reduced 46.4% per shift; Speed loss fell from 5.3% to 0.6%, an 88.68% improvement; already at a high line yield of 97.41%, an 0.46% improvement meant annualized savings of \$1.4 million. Improvements increased availability, which, in turn, resulted in a line overall equipment efficiency performance increasing from 77.66% to 90.17%, a 16.1% positive change.

This approach selects the Six Sigma, Lean or other programs that produce improvements that can be sustained. With leadership involvement in identifying goals and helping to facilitate and embed change, project success builds employee and customer commitment. When significant improvements are realized and sustained, a more dynamic culture evolves and additional improvements are viewed as realistic and within reach

Accept that each OE journey is unique

Operational Excellence programs tend to be non-linear and fail to follow a maturity model, as tempting as it might be. Each organization needs to focus on building a program that supports their competitive advantage within the opportunities and constraints of a range of factors.

In evaluating or re-evaluating your OE efforts, it is important to reflect on your organization's unique characteristics, opportunities and risks to help guide these efforts.

- What is your industry, where is it moving, who are your competitors?
- How much technical capability is in place and where does your historical knowledge lie?
- Where have previous investments been made in OE programs?
- What is your relationship to customers?
- What is holding you back and what is your competitive advantage?
- What do you want your operators to be doing in ten years?
- What failures could you avoid if you had predictive powers?

As IoT presents new opportunities, even companies coming to OE late in the game will benefit. Just like many African and Asian nations that jumped the expensive and resource intensive “poles and wires” stage of telecom, now factories can skip expensive ERP data capture and move into wireless monitoring interfaces.

Today's digital advances only underscore an ongoing asset in the OE journey: humans with critical thinking skills. The value of advanced capabilities in solving problems and making decisions using logic and data remains constant, defying the disruptions of changing products, platforms, customers and technologies.

A Focus on Quality

Fokker Aerostructures, part of GKN AEROSPACE, is in an industry with extremely high expectations for quality. This provides the focus for Fokker's OE efforts. Working with Kepner-Tregoe to address “first time right” in manufacturing, Fokker achieved tremendous cost savings and quality improvements and then additionally focused efforts on sustaining improvements. Fokker is moving from reactive to preventive efforts and improving integration on a global scale, striving for zero defects by 2022.



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Belinda leads KT teams in assisting manufacturing organizations to use Operational Excellence/Lean Six Sigma methods to achieve organizational goals. She has developed successful applications that combine Op Ex principles and KT's renowned problem solving skills in projects that typically deliver ROI of 5:1 or more and millions of dollars in benefit.

About Kepner-Tregoe

Kepner-Tregoe is the leader in problem-solving. For over six decades, Kepner-Tregoe has helped thousands of organizations world-wide, solve millions of problems through more effective root cause analysis and decision making skills. Kepner-Tregoe partners with organizations to significantly reduce cost and improve operational performance through problem solving training, technology and consulting services.

Additional reading:

How to Implement Lean Manufacturing by Lonnie Wilson, "Cultural Change Leading Indication #3: Problem Solving," pp 93-107, McGraw-Hill Education; 2 edition (March 17, 2015).

[36 Operational Excellence Stats Every Manufacturing Leader Must See](#), LNS Research, Jan 2014.

[The 10 skills you need to thrive in the Fourth Industrial Revolution](#); The Future of Jobs Report, World Economic Forum, Davos, Jan 2016.

The Path to Operational Excellence

The characteristics of Operational Excellence (OE)—improved quality, capability, shorter lead times, increased service levels and lower cost—are best achieved when organizations consider five key execution drivers.

Manufacturing as a Competitive Advantage

Continuous Improvement programs are evolutionary but manufacturers need more to stay competitive. This article discusses how a temporary influx of effort, focused on high-priority improvement opportunities, can create step-change improvements.