An Executive Guide for AI in Service Operations

— PART 2 —

Putting what you have learned into practice

Co-created by

Emerj Artificial Intelligence and **PTC**

Introduction

Technology and innovation, and all the wonders and disruptions they bring, surround us. Service operations leaders navigate digital and physical worlds increasingly filled with the solutions that will help them plot their course into an AI future. Smart, connected products have the potential to provide significant market advantages, but new possibilities require new strategies from leadership.

However, as this disruption unfolds around industrial enterprises, how do they position themselves to thrive among and navigate new and unfamiliar challenges? How do they prepare for what comes next? How do they empower their people so that the investments needed to support these new technologies from idea to deployment reach AI ROI as soon as possible?

At Emerj, we aim to answer these questions through our interviews with Fortune 100 enterprise leaders and AI practitioners around the world.

In this service operations-focused white paper, we combine our insights and our range of primary research experience with expert perspectives.

Throughout the whitepaper, we will explore a roadmap approach that industry enterprises can adopt to bring about the transformation that has to happen within organizations in order to bring AI to life.

We will map the major stages of AI project deployment and discuss what it takes to progress from one to the next - from organizing enterprise data to deploying a successful AI solution. Along the way, we will review use-cases that can help guide organizations as they determine their own strategic journeys from the conception of an AI idea to the fruition of AI ROI.

AIoT Use Cases - A Look at Real-World Applications and Advice

The journey of AI adoption for services organizations begins with real AI projects. Now that we've covered the four steps of the AI adoption journey - we'll explore their application in practice through a handful of real world use cases.

We examine how to move into project execution by reviewing several use-cases that span both the manufacturing process itself as well as what happens to a smart product once it is out in the field. These initial use cases serve as a starting point to discuss trends and best practices that we see in our research work at Emerj.

USE-CASE 1

Injecting Human Business Intelligence into Machine Learning Models

When one of our Emerj interviewees started working with a Tier I Auto Supplier Client, the team began by framing the client's problem and align the organization's data and business strategies. This began by determining the most important goals and challenges that the manufacturing team was facing.

In the manufacturing process, it's common for key priority topics to include:

Improving efficiency in the manufacturing process.

Ensuring greater quality for the manufacturing process.

Preventing unplanned maintenance events.

According to the vendor interviewee, the Tier 1 Auto Supplier client was focused firmly on improving quality. With lives on the line in real automobiles, the firm's leadership wanted to do everything they could to raise the par on quality.

Over the years, the client had made the investment to generate and capture the data. They had invested in quality inspections.

The teams considered how to best use that data to drive the quality that the client sought.

Their research led them right past the complex machine learning model that they had built earlier, during the development phase. The team found their answers with the engineering and manufacturing SMEs on the shop floor. They showed the SMEs on the shop floor the patterns identified by the machine learning model, and asked questions like, **_"Does this make sense?" and "Why would this be happening?"_**.

The team sought narratives that could explain the patterns that they discovered in the data. They considered factors like:

→ Shift changes

→ Part change-overs

→ Weather conditions and temperature

→ Machine conditions

If our experience at Emerj has made anything clear, it's that data from physical machines and products always requires context from SMEs, and plenty of time for cleaning and refinement. Patterns in the data always include outliers that can't be understood without knowing the context outside of the data.

For example: When a shift change occurs, delays may show up in manufacturing data - not due to any malfunction in the machines, but due to the time requirement for new team members to man the posts. These changes require upfront scrutiny if the data is to be of any value at all.

The team probed if these factors were causing upticks in quality issues and brainstormed how they influenced trends in quality observations and by how much. The questions generated by those SME discussions then informed the machine learning engine that powered the team's research.

The interviewee mentions that the client and and vendor team worked together to ask increasingly more refined questions until they understood patterns in the data, and could discern which of those patterns could help with decision-making.

In the end, the Tier 1 auto supplier deployed statistical models that were well-tuned to measure variation at critical points in the manufacturing process.

The organization was able to drive the quality improvements they needed and get a deeper insight into statistical controls that supported their quality objectives.

These same issues apply not just in the manufacturing plant, but in field operations as well. Maintaining products in operation requires a similar degree of high-context collaboration.

USE-CASE 2

Understanding How Data Can Predict Operational Failure

Another case in practice is another industrial organization that builds large commercial fans that move air within industrial buildings. They looked to AI to help predict and prevent breakdowns in their equipment before they happened. They already knew that a solution that could detect and diagnose faulty equipment would present a strong case for ROI.

The most critical objective to start with was: ***Defining the KPIs and developing the reports and charting that the client needed to make informed decisions.***

The client already had sensor data to work with, but needed help in determining how to interpret that data to help them prevent breakdowns for their installed fans. Determining those failure patterns, and determining the metrics used to measure uptime, was an important first strategic step.

At Emerj we often see the most successful enterprise teams make these decisions in tandem:

A What data will be used to inform decisions.

B What are the metrics used to determine whether our improved decisions have actually impacted our customer's experience or our own bottom line.

Without a benchmark in place for the latter, it's nearly impossible for AI teams to make the ROI case to leadership, and to validate their efforts and spend.

This particular fan manufacturer's reputation for quality commanded higher margins in the marketplace - so they needed the high performance that would guarantee that their multiple-blower systems would continue to work together. In this regard, they were able to tie AI adoption to a critical strategic outcome for the company.

They looked to AI to predict and prevent problems before they happened - remote monitoring through connected devices seemed like a viable solution. Together with PTC, the firm crawled, defined, modeled, and aggregated the data so it would be easy for the end-user to check on those systems and make sure they're working well.

As a second step it was important to look at the diagnostics and searched for signals and patterns that indicated possible warning signs within the machines. With a slow performance degradation, the SMEs knew that there is an inflection point where performance started to change for the worse - and they set out to detect that inflection point through their data.

In this case it is most successful to use connected device data to determine if a flag should be applied to indicate when the machine's performance began to indicate a developing problem. The project team studied the tight relationships between variables that began to form within the data that included information about factors such as voltage, vibration, and airflow.

According to Chris Joynt, AIoT Co-Innovation Leader:

> *"We expect these elements to impact each other in a tight, well-known relationship. So that allows us to go under the hood and take a predictive approach with airflow. We can see that on this machine, right now, the reading should be X and compare that to the actual reading. When it's off, beyond a small margin of error, we can say that something is worth investigating."*

In our case above, the new process allows the client's workers to monitor their equipment worldwide and provided them with the ability to proactively reach out to their customers. *The customers could then repair the equipment before they experienced costly downtime events.*

The process began with an understanding of the data, and ended with an even deeper understanding of the data in use. Enterprise AI adoption tends to roll like a snowball. Initial projects yield ROI, and also yield a higher understanding of the data and it's potential. With more clean and well-understood data, new use case ideas naturally arise, and the cycle continues.

Firms who work closely with an aligned, cross-functional team can finish an AI project not only with the near-term ROI of an improved business outcome, but with the long-term ROI of higher AI fluency among their team members - leading to more fruitful projects into the future.

CONCLUSION

Key Takeaways for Service Leaders Adopting AI

AI project teams, and the executives and companies supporting them, confront frequent challenges when designing, developing, and deploying AI solutions within organizations. They must progress through the crawl-walk-run element of early-stage AI projects, which includes understanding the data and determining which of it is relevant. The decision-making becomes a true team sport.

Drawing upon on our research at Emerj, we've put together three important lessons for services leaders:

1. Assemble the Right Cross-Functional Team

Leaders consider many factors when they assemble their teams. However, beyond technical competence, project leaders must also consider how potential team members work with others and make decisions.

They will need to include the right people in discussions — because this plays an important part in the buy-in that team decisions will eventually need to succeed. We also need to consider many different experiences and perspectives when we assemble project teams.

An ideal cross-functional team includes:

→ **Subject matter experts**

Who bring experience about existing workflows and business processes.

→ **Data scientists**

Who bring expertise on the quality of the data, and what's possible.

→ **Executive leadership**

Who may not be involved consistently in the project, but understand the financial and business outcomes.

→ **IT managers**

Who will be required to help with security and help to integrate AI systems into existing IT infrastructure.

These groups often speak completely different languages - there is no one brain at the company who understands them all. Pooling this expertise is the only way to select the right projects, select the right KPIs, and see an AI project through to deployment.

Companies who succeed in building cross-functional teams are those who select for team members who are excited about leading change, and interested in AI. Enthusiasm seems to be the strongest predictor of alignment, especially when AI is new to an enterprise.

2. Frame Data as an Asset

To succeed, AI projects need clean historical data, and quality real-time data. AI can find those hints much earlier than a human would perceive them. Detecting minute patterns in time-series (or other) data is where AI excels, but only when data is groomed, clean, and representative of the real business environment.

Historical data can show machine learning models the KPI movements that preceded breakdown events. The project team still brings domain expertise and the ability to tinker with the rigidity of the algorithms and their results, but it is AI that notices discrepancies and trendline changes before humans perceive anything is different.

Good data also means having the right data. *"In the smart, connected products world, we have a lot of data about assets that are similar. And we have connected equipment that has been thoughtfully designed, which is a double-edged sword," says Joynt. "You can have so many targets that it's like, 'Where do we start?', 'What do we focus on?'"*.

Achieving predictive insights starts by treating the data as an asset. Peter Tu, Chief Scientist of AI at GE Global Research puts it this way:

> *"One of the biggest advantages [of AI] we've been able to achieve is statistical inference … When it comes to industry, we see a large number of use cases for that basic problem. This can come from the perspective of … 'How do I predict when something has gone wrong with the process?,' 'How do I know what will happen with that process?' And then, based on those future predictions, what should I do best in order to plan for how to accommodate those possible outcomes?'"*

Teams must do a lot of work and strategic thinking to determine the right starting point, which data matters, and decide how to structure a project so that it evolves towards something that will ultimately help the end customer. From there, they need to consider what an AI solution will look like and how smart connected products will further the goals and objectives of their industrial processes.

👤 3. Begin with the End User in Mind

An AI solution adds value when it is actually put to use. It's important to consider end-user buy-in across two important strata:

→ **Product feedback**

End-users know how they want to work. They know what kind of interfaces would be useful, and which would be hindrances. They know what measures of success are valuable, and which are useless. Fielding their feedback early in product ideation is important in order to build a useful product.

→ **Buy-in and ownership**

End-users, like any team member, want to feel that their voice is heard. Even if a product could be build to serve their goals - if it were handed down from higher-ups - would fail from a lack of buy-in.

Both elements are critical - and AI project leaders who succeed in seeing projects to deployment are careful to garner both kinds of support and feedback.

One of the most reliable ways to garner this kind of support is to find an end-user champion who (a) is committed to change and improving their processes, and (b) who holds sway and respect among other end-users, and can help to align other end-users in providing feedback and testing or using the new solution.

About PTC:

PTC helps clients to achieve industrial innovation with solutions that enable companies to differentiate their products and services, improve operational excellence, and increase workforce productivity. With PTC, and its partner ecosystem, manufacturers can capitalize on the promise of today's new technology to drive digital transformation.

PTC's portfolio of CAD, PLM, IoT, and AR technologies work together to enables data continuity for their enterprise clients in various industries, including: Industrial equipment, high-tech, automotive, aerospace and defense, life sciences.

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About Emerj Artificial Intelligence Research:

Emerj Artificial Intelligence Research is a market research and advisory company focused exclusively on the business impact of AI.

Companies that thrive in AI disruption run on more than just ideas. They leverage data and research on the AI applications delivering return in their industry today and the AI capabilities that unlock true competitive advantage into the future - and that's the focus of Emerj's research services.

Leaders in finance, government, and global industries trust Emerj to cut through the artificial intelligence hype, leverage proven best-practices, and make data-backed decisions about mission-critical priorities.

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