

POV

# Smarter Turnarounds, Safer Operations for Oil & Gas Companies

The AI Toolkit for TAR (Turnaround) Managers

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## Introduction

**Here's a number that still makes people stop and think: \$10 million.<sup>1</sup> That's the average cost of just one day of unplanned downtime at a large oil and gas facility. It's not just a statistic; it's a real, tangible hit to the bottom line. And for the teams on the ground, it means real pressure, real urgency, and real consequences.**

Let's face it, no one wants to shut down operations. However, in industries such as oil and gas, **planned shutdowns**, also known as **turnarounds (TARs)**, are a necessary part of maintaining safe and efficient operations. These are the moments when production pauses to allow for critical maintenance, inspections, and upgrades to take place.

The stakes? They're high. Every extra day offline can cost millions of dollars. And for the Turnaround Manager, that means managing thousands of moving parts – tasks, teams, timelines, and risks – all while trying to make the best decisions with limited information and zero room for error.

This is where **Artificial Intelligence (AI)** is starting to change the game.

AI helps cut through the noise. It turns massive volumes of operational data into clear, actionable insights. It helps leaders see risks before they become problems, streamline complex schedules, and get production back online—faster, safer, and smarter.

And now, with the rise of **Generative AI (Gen AI)**, we're seeing even more possibilities. Gen AI can analyse historical and real-time data, automate documentation, and generate insights that help optimize every phase of a turnaround—from planning to execution to post-event analysis.







Leading a turnaround is no small feat. For any TAR Manager, it's a high-stakes balancing act—delivering a complex project on time, within budget, and without compromising safety. But as anyone who's been in the trenches knows, the reality is rarely that simple.

## The Business Case

### Why AI Matters to TAR Managers

Let's bring it to life with a few real-world examples:

- **Scope creep** is a silent disruptor. At one refinery, a well-scoped plan of 1,200 tasks grew to over 1,800 as teams added “just-in-case” jobs. The result? A 3-day delay and a multi-million-dollar hit to the bottom line.
- **Contractor availability** can shift overnight. A TAR Manager at a petrochemical plant found out—just days before execution—that a key contractor had overbooked their crew. The scramble to find replacements caused critical delays and budget overruns.
- **Visibility gaps** can be costly. In another case, a heat exchanger replacement fell behind schedule, but the delay wasn't flagged until the next day's review. By then, the ripple effect had already disrupted downstream work.
- **Shift handovers** are often a blind spot. In one turnaround, the TAR Manager had to sift through stacks of handwritten shift logs and emails every morning to piece together what happened overnight. In one instance, a missed note about a faulty valve led to duplicated work and a half-day delay. The lack of a

centralized, real-time handover system meant critical updates were buried in fragmented documents.

- And other **data**—often scattered across spreadsheets, emails, and legacy systems. When decisions need to be made fast, this fragmentation becomes a major liability.

### THIS IS WHERE AI STEPS IN AS A STRATEGIC ENABLER.

#### AI helps TAR Managers:

- **Validate scope** using historical data to avoid unnecessary work
- **Forecast resource needs** with greater precision
- **Spot risks early**, before they escalate
- **Streamline shift handovers** by capturing and surfacing key updates in real time
- **Eliminate the need for manual log reviews**, freeing up time for strategic decision-making
- **Make confident decisions**, grounded in real-time insights

In essence, AI gives TAR Managers what they've always needed: **clarity, control, and confidence**—especially when the pressure is on and the margin for error is razor-thin.

# Where AI Makes a Difference

Across the TAR Lifecycle

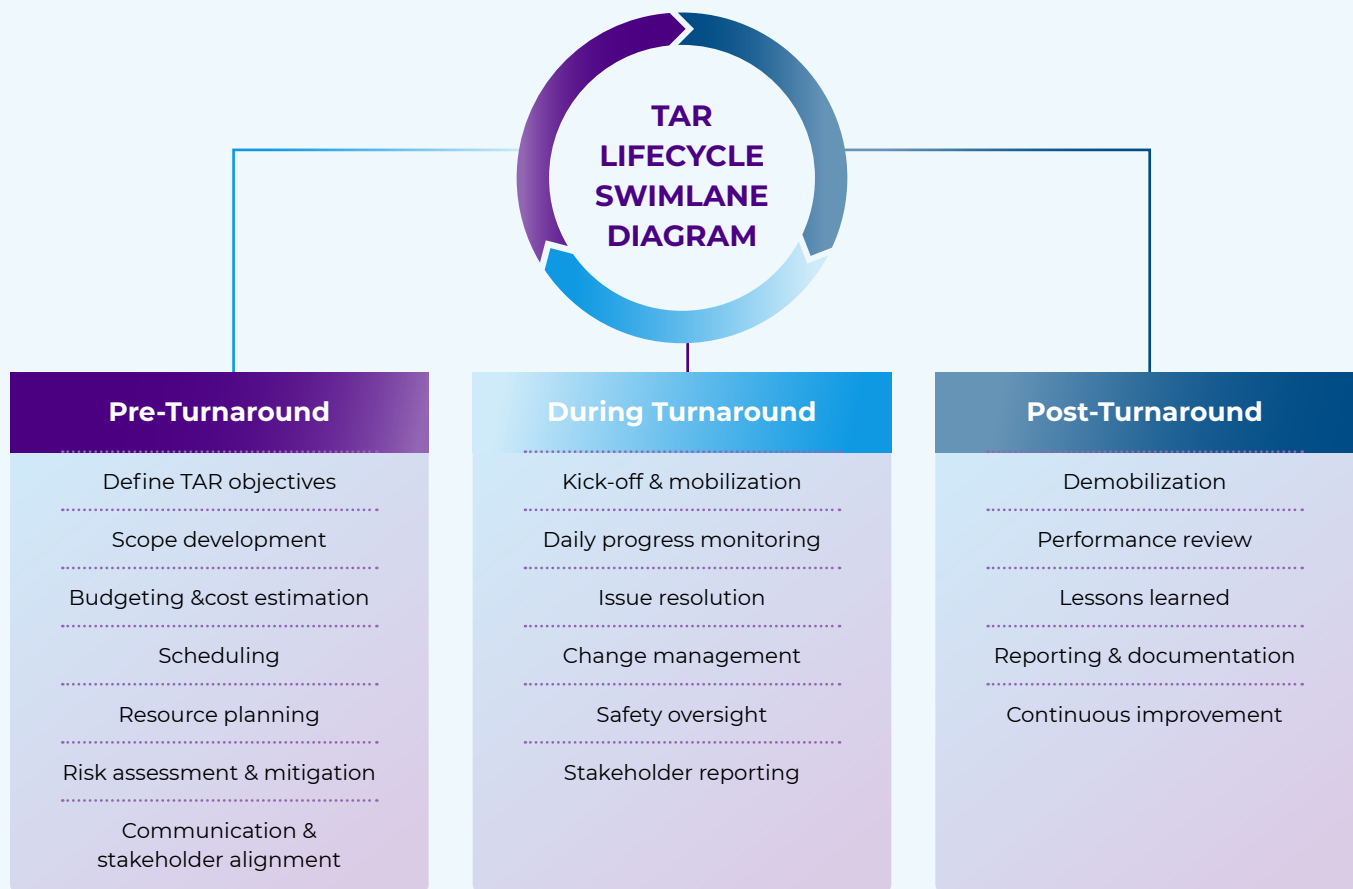


Figure 1: TAR Lifecycle Swimlane Diagram

**Imagine yourself** as a Turnaround (TAR) Manager at a large downstream oil and gas facility. You have been through more than a dozen shutdowns—each one a high-wire act of planning, coordination, and firefighting. But this time, you're not doing it alone. You are backed by AI.

## BEFORE THE TURNAROUND: FROM GUT FEEL TO DATA-DRIVEN PLANNING

In the past, your planning phase was a whirlwind of spreadsheets, tribal knowledge, and scope debates. This time, AI tools helped you to analyse five years of TAR history. The system flagged over 150 tasks that had been repeatedly added but rarely executed or had minimal impact on asset reliability.

With this insight, you confidently trimmed the scope by 12%, saving weeks of prep work and millions in potential overrun.

Meanwhile, Gen AI helped your planners clean up and standardize hundreds of job plans—some of which were still in scanned PDFs or handwritten formats. What used to take weeks was done in hours.

AI also forecasted labour demand and flagged a potential shortfall in certified welders during the peak execution window. You acted promptly, securing additional resources before the situation escalated into a crisis.

## DURING EXECUTION: STAYING AHEAD OF THE CURVE

As the turnaround kicked off, you no longer relied on fragmented updates or late-night calls. Your AI-powered dashboard gave you a real-time view of progress, risks, and resource utilization.

Midway through the event, a critical exchanger replacement began to slip. AI detected the delay before it reached the critical path and recommended resequencing of tasks. You approved the change, which avoided a 48-hour delay and kept the project on track.

## BUT THE REAL BREAKTHROUGH CAME WITH SHIFT HANDOVERS.

Previously, you would start each morning sifting through handwritten logbooks, WhatsApp messages, and emails to understand what happened overnight. It was time-consuming and error-prone. On more than one occasion, missed notes led to duplicated inspections or delayed decisions.

Now, AI compiles a concise, real-time shift summary that highlights key updates, unresolved issues, and flagged risks. You walk into the morning meeting fully briefed, ready to lead with clarity.

## AFTER THE TURNAROUND: TURNING DATA INTO INSIGHT

Once the TAR wrapped up, your team didn't have to spend weeks compiling reports. Gen AI had already been working in the background—pulling insights from logs, emails, and field notes to generate a comprehensive closeout report.

AI also benchmarked this TAR's performance against previous events and industry peers. It highlighted that while safety performance had improved, equipment idle time remained a concern, providing a clear focus area for the next cycle.

And because every TAR is now a data point, the system continuously learns and improves. You know that the next shutdown will start smarter than the last.

## The AI Toolkit for TAR Managers

Here's what's in your digital toolbox when AI is in the picture:

### TAR Event Manager Copilot

Your always-on, Gen AI-powered assistant. This isn't just another dashboard—it's a conversational partner that understands your world.

Ask questions like:

- “What caused delays in Unit 3 yesterday?”
- “Which tasks are trending late compared to the P50 baseline?”
- “What risks are emerging from shift handover notes?”

The Copilot draws from real-time data, historical trends, and even shift logs to provide you with clear, actionable answers—instantly.

### Predictive Analytics Engine with S-Curve Tracking

Think of this as your early warning radar. The engine continuously monitors progress, cost, and resource data to forecast:

- **Schedule delays**
- **Cost overruns**
- **Resource bottlenecks**

Using **S-curve tracking**, it compares your planned progress against actual and forecasted performance. If your actual progress starts to lag the plan, the system flags it early—before it becomes a crisis. It even simulates recovery options, helping you make informed decisions to stay on track.

**Example:** Midway through a TAR, the S-curve showed a widening gap between planned and actual progress. The engine identified a scaffolding delay and recommended task resequencing. The TAR Manager acted quickly, recovering in two days and avoiding a USD 5 million overrun.

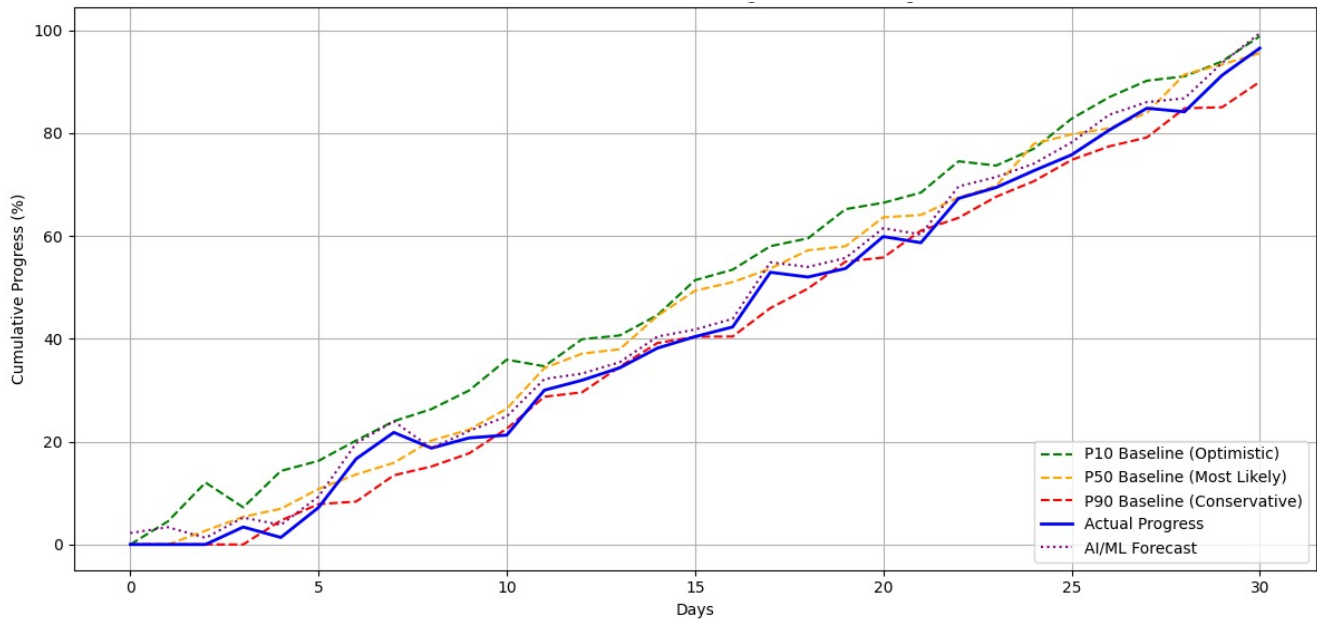


Figure 2: AI-Enhanced S-curve Modelling for TAR Planning

### NLP WORK ANALYZER

Job plans come in all shapes and formats—PDFs, spreadsheets, even handwritten notes. This tool uses natural language processing to clean, structure, and standardize them into clear, consistent work packages.

### Result

What used to take planners weeks of manual effort now takes hours, freeing up time for higher-value planning and coordination.

### SHIFT HANDOVER INTELLIGENCE

Shift changes are a critical moment in any TAR—and often where things fall through the cracks. This tool compiles updates from logbooks, emails, and voice notes into a single, prioritized summary.

### Result

The TAR Manager starts each shift with a clear, AI-generated briefing—no more chasing updates or missing key details. It's like having a personal assistant who never sleeps.

# Architecture Overview

## 1) DATA SOURCES

Most large organizations already deploy integrated systems for turnaround planning and execution, including:

- Planning and Scheduling Systems
- Inspection Test Reports (ITRs)
- Quality Completion Systems
- Timesheet Management Tools
- Shift Handover Documentation, etc.

## 2) AI LAYER

- Models are trained to detect patterns, predict outcomes, and recommend actions.

## 3) USER INTERFACE

- You get dashboards and copilots tailored to your role.

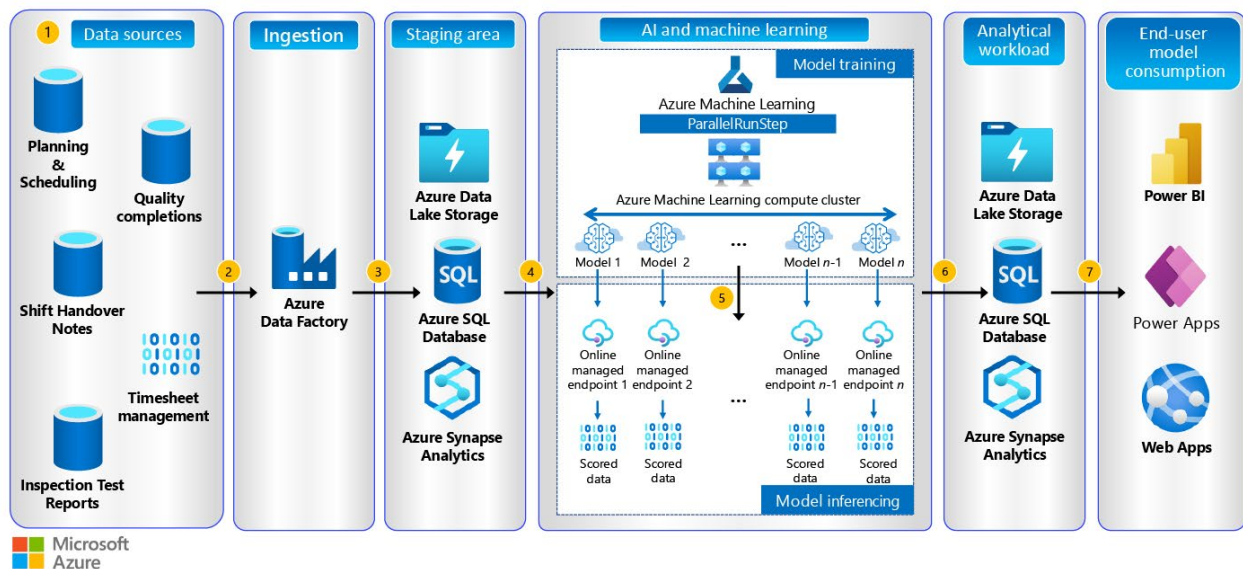


Figure 3: High-level architecture diagram

## Conclusion

Turnarounds in oil and gas will always be high-stakes, but they don't have to be high-stress. With AI, TAR Managers are no longer just reacting to problems—they're anticipating them. Decisions are no longer based on instinct alone but guided by real-time insights and predictive intelligence. This isn't just about adopting smarter tools—it's about empowering smarter leadership.

Looking ahead, the industry is on the cusp of a digital shift that will redefine how turnarounds are planned and executed. Predictive analytics will help foresee equipment failures before they happen. Digital twins will simulate entire plant operations, enabling better scenario planning and risk mitigation. IoT and edge computing will bring real-time visibility to the field, while generative AI will streamline scheduling, reporting, and decision-making.

These technologies won't replace the expertise of TAR Managers—they'll amplify it. The future of turnaround management is not just about operational excellence; it's about strategic foresight, enhanced safety, and sustainable performance. With AI as a co-pilot, TAR Managers won't just manage turnarounds—they'll master them.

## Ready to transform your next turnaround?

Connect with us at [eugene.comms@ltimindtree.com](mailto:eugene.comms@ltimindtree.com) to see how the TAR Event Manager Copilot and predictive analytics can help you master complexity, minimize downtime, and drive operational excellence.



## Authors



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Srinath Subramanyan is an IT professional with over 20 years of experience in IT Service Operations and program execution across the energy value chain. He brings deep expertise in leading large-scale digital transformation and modernization initiatives for major oil and gas clients. His portfolio includes successful delivery of software implementations, ERP transformations, modernization programs, and data & analytics solutions that drive operational excellence and business value.



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Kannan Selvarajan brings deep expertise in Microsoft Power Platform technologies and emerging AI paradigms, including Gen-AI and Agentic AI. With a strong foundation in low-code development and enterprise automation, Kannan has led transformative initiatives across Power Apps, Power Automate, and Power BI.

## References

1. *How much cost unplanned downtime each year, hint-global:* <https://www.hint-global.com/blog/cost-of-unplanned-downtime/>

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