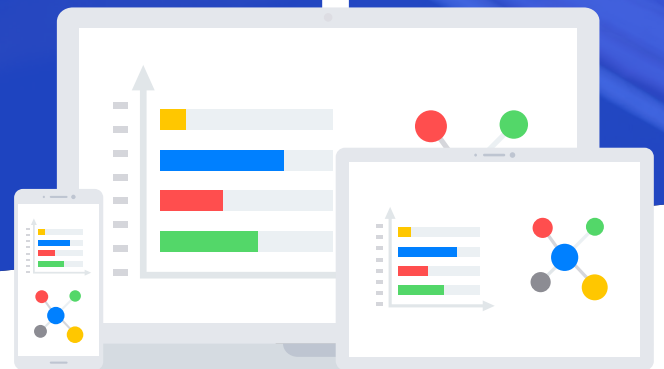




# MAXIML

Intelligent Field Automation



Refinery of the future: Transforming Turnaround Management

# Refinery of the future: Transforming Turnaround Management

For decades, managers have struggled to effectively coordinate the human and mechanical assets of turnarounds. This has led to delays, reworks, and cost overruns that leave stakeholders scratching their heads (and their purses). But not anymore. Digitalization is transforming Shutdowns & Turnarounds to bring the refinery of the future into the present. In this Whitepaper, we examine how digital technologies are helping oil and gas companies lead Turnarounds to profitability.

Every few years, downstream oil and gas companies are faced with the 'necessary evil' of performing turnarounds - a vital process for the optimal performance of the plant, continued safety of personnel, and compliance regulations.

In a typical turnaround, the entire refinery is put offline while highly skilled personnel, sometimes in their thousands, carry out overhaul work. The downtime can cost the company several millions of dollars in revenue. This is besides the cost of paying contractors, purchasing equipment, and additional logistic requirements.

The delicate and multifaceted nature of a turnaround necessitates several months and sometimes, years of planning. So much can go wrong in a complex process where multiple companies are sub-contracted different tasks.

A large turnaround can include up to 150,000 individual activities. With this level of complexity, approximately half of all shutdown turnarounds are delayed by more than 20% and 80% go over budget by more than 10%. Frequently, the work scope increases unexpectedly by up to 50%. – Digital Refining

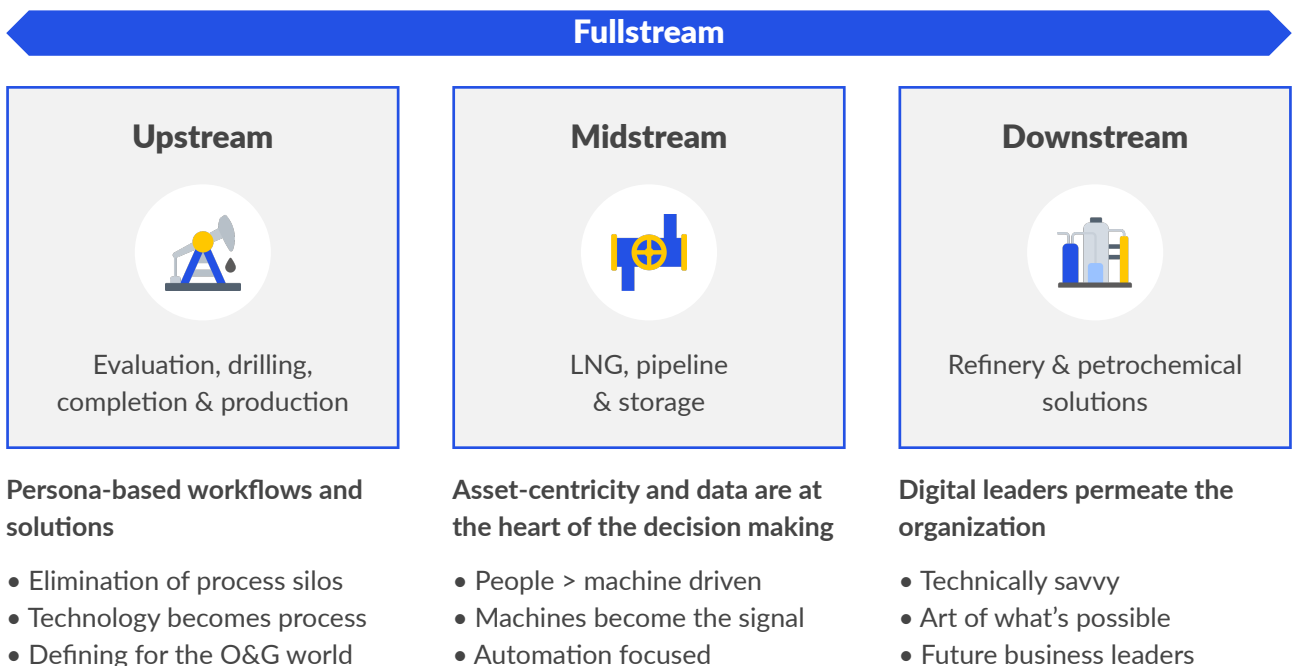
To reduce the risk of failure, managers have strived for a turnaround procedure where only a single version of 'truth' exists, where workers are given a platform to perform their best work, and where stakeholders can communicate in real-time. The advent of digital and automated technology has made this dream a reality.

# Unlocking value across the oil & gas supply chain

Already, digitalization is adding tremendous value to enterprises and revolutionizing the way companies conduct business in the oil and gas industry. From upstream to downstream, there are ample benefits to using digital technology.

“A Fullstream approach brings together equipment, services and digital solutions across the full value chain of oil and gas activities—from upstream to midstream to downstream.” - **Baker Hughes, GE.**

A Fullstream Digital approach to data and decision making can optimize operations and bridge the digital and industrial worlds



Source: Baker Hughes GE

## **| Upstream**

Exploration companies now have access to augmented/ virtual reality for 3D modeling and can use data analytic tools to evaluate the quantity of hydrocarbon reserves present in the field. Wells can be analyzed to determine the monetary value and proffer an accurate estimate of their lifespan.

Also, the drilling equipment is equipped with sensors and IoT devices to gather accurate real-time data and well information.

## **| Midstream**

Storage of crude oil products has never been easier with industry 4.0 automated devices that ensure that the stored products are maintained at an optimum temperature.

And during transportation, wireless technologies are used to pinpoint the exact location of transportation trucks. Furthermore, sensors are attached to pipelines to send 'leak alarms' by monitoring the noise levels or the change in pressure, flow rates, and temperature.

## **| Downstream**

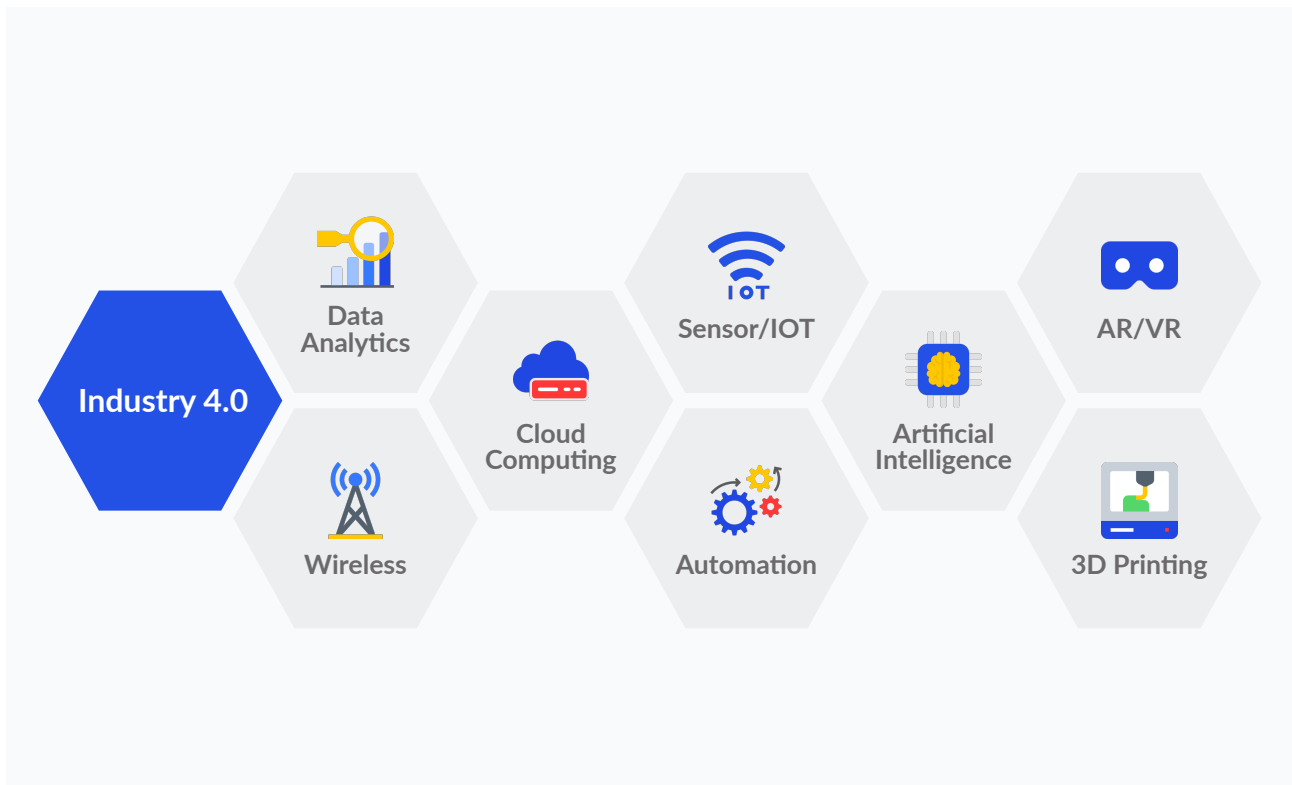
In the refinery process, sensors are used to monitor the safety and performance of the vessels and to pre-empt turnarounds. Managers also use artificial intelligence technology to make data-based projections on product demand for profit maximization strategies.

# The promise of Industry 4.0 for turnarounds

The skilled workers required to carry out turnarounds often have different approaches to work and may also be unfamiliar with the plant. For managers, the goal is to unify and effectively bed in these workers so that the turnaround can be safely completed within the time frame and specified budget.

Digitalization and Industry 4.0 technologies enable this - here's how they can help turnaround managers achieve this goal while complementing the human and mechanical assets.

Better management of shutdowns and turnarounds can yield schedule and cost improvements of up to 30 percent.  
 - Mckinsey.



**These factors among others have led organizations to demand more from their EHS systems and solutions:**



**Data Analytics**

There is so much to keep track of before, during, and after a turnaround. Without data centralization and analytics, this can quickly become overwhelming. Dashboards can help managers successfully manage data and garner rich insights from turnaround data.



**Wireless technologies**

Wireless data transmission can propel the swift exchange of information and work schedule from managers through sub-contractors to workers. Also, stakeholders can use 4G LTE signal tracking for better asset management with real-time performance monitoring and tracking.



**Cloud Computing**

With real-time mobile dashboards and web-based interfaces, turnaround managers can monitor the performance (and safety) of workers, view logged-in hours, and observe general compliance with EHS protocols.



**Sensors/IoT**

Sensors and IoT devices guarantee greater asset security through improved monitoring of individual equipment and the overall refinery plant.



**Automation**

For specific tasks where the safety of workers cannot be guaranteed, automated devices (robots, beacons, drones, etc.) have gained entrance and can be used to help or replace the human workforce.



**Artificial Intelligence**

AI and ML can be used to evaluate data in all phases of the turnaround to highlight insights and predict outcomes that may have proven elusive to human analysts.



**Virtual Reality and Augmented Reality**

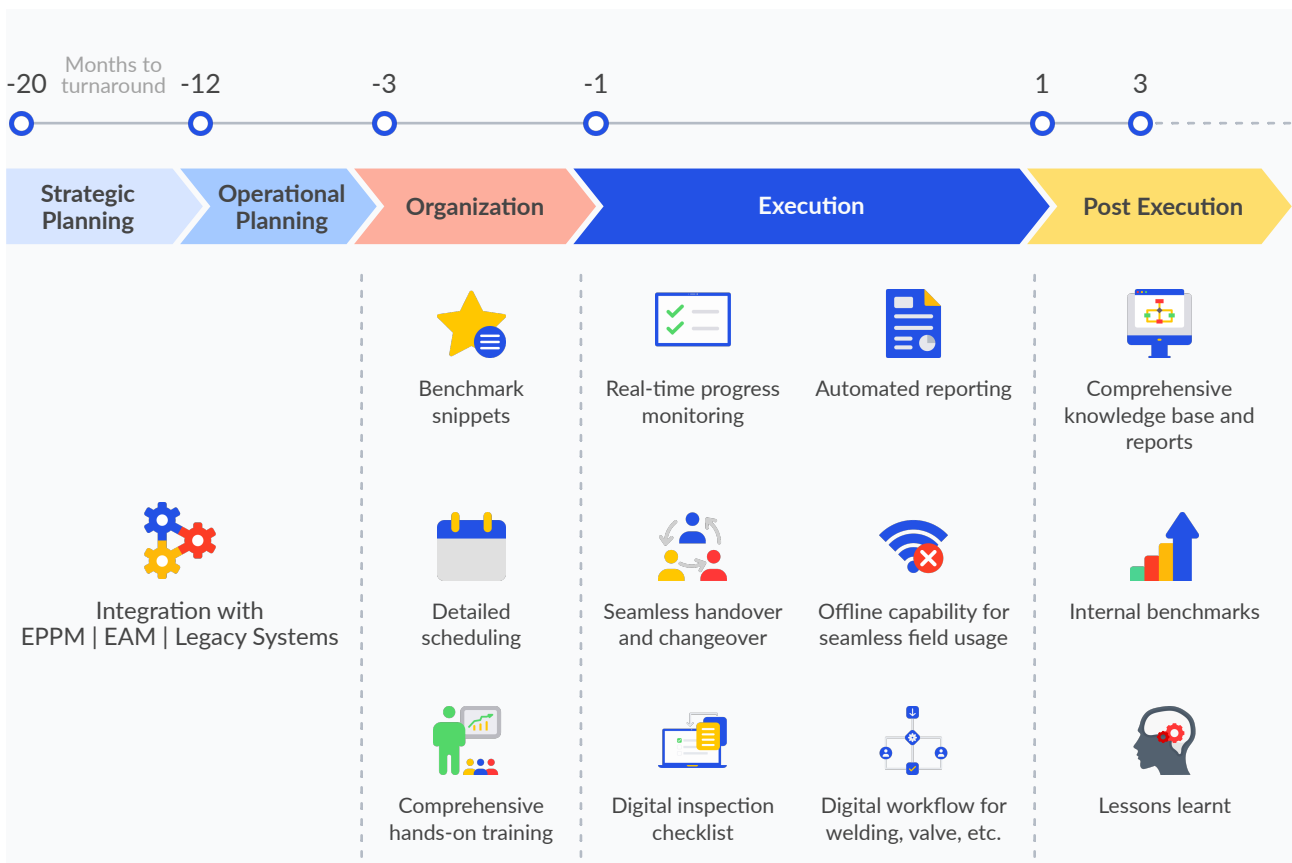
Virtual walkthroughs can be conducted to prepare workers for the more complicated tasks. These walkthroughs will replicate the manual task and allow workers to absorb complex information in a visually engaging way. Also, with VR and AR experts can provide real-time 'over-the-shoulder' guidance via video streams to on-field workers.

# Digitizing turnaround management

While the stages in turnaround management can vary from organization to organization, they typically consist of five major phases:

- Strategic Planning
- Operational Planning
- Organization
- Execution
- Post Execution/Close-out

Let's look at how digitalization adds value across each of these phases.





## **| Strategic Planning**

In the strategic phase, the manager devises a mental framework of the turnaround operation. Discussions may be held among stakeholders to establish the scope of the turnaround, spell out the goals, and determine the best route to accomplish these goals. This process will involve several back-and-forth communications.

Word-of-mouth will not suffice as stakeholders may be in different locations and would need to exchange information in different formats. With digital tools, managers can build and share turnaround scope with all stakeholders that integrate with enterprise resource planning. And unlike 'normal' conversations, this information can be stored and archived for future reference.

## **| Operational Planning**

Managers can use digitalization to hash out the details of the strategic planning phase and settle on more specific turnaround themes. With digital auto-updates, scope changes and their impact on turnaround variables can be communicated in a timely manner to all stakeholders.

## **| Organization**

A turnaround is an extremely fluid operation that requires total synchronization of the human assets. Digitalization eliminates the communication gap and makes it easier to achieve a seamless organization.

Updated job tasks can be instantly communicated to affected workers and all workers will have a digital platform to flag issues in real-time. Besides, stakeholders can track job progress and partners can view how the money is being spent with real-time updates on task execution.

The end result is that everyone is on the same page and totally coordinated for the singular goal of success.

## **| Execution**

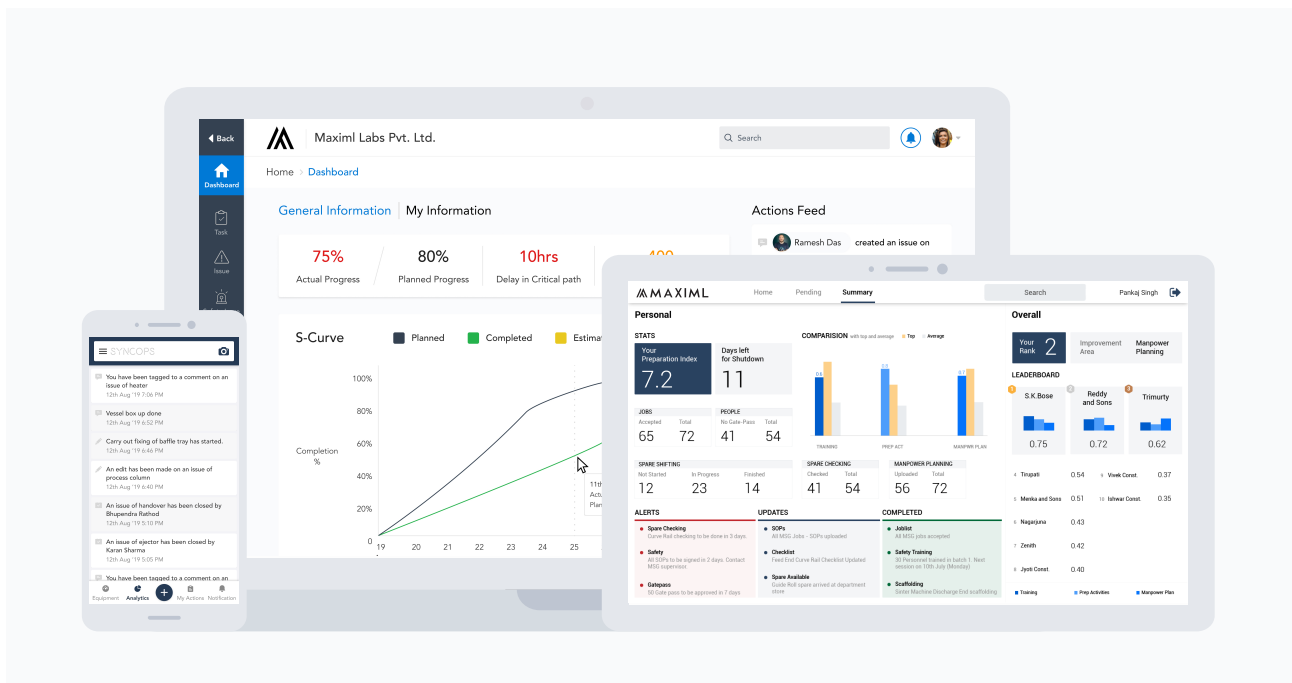
Using real-time digital insights, turnaround managers can make better decisions to optimize the critical path for turnaround success. They can reposition teams, departments, and individual workers based on real-time data analysis and monitor performance with regards to budget and schedule. Also, when critical problems arise - as they most likely will - workers will enjoy the benefit of remote expertise for quick resolution.

## **| Close-out**

After the turnaround, stakeholders can archive digitalized documentation like instructions, drawings, and photos for future reference. Moreover, key data like cost drivers and ratios can be computed and analyzed to learn from the turnaround and make accurate forecasts for future turnarounds.

# Maximl for Turnaround Management

Maximl offers the first full-stack collaboration platform for deskless workers powered by Intelligent Field Automation. Our Project Management solution transforms Turnarounds by digitizing everything from scope management to last-mile processes. We empower turnaround managers with all the data they need to efficiently manage budgets and stay on schedule.



## Trusted by Leaders

Maximl's Smart Project Management solution is used by the largest refineries to manage their Shutdowns and Turnarounds.



## **| Smart Project Management for Turnarounds**

Our solution digitizes workflows and streamlines communication between different stakeholders. It harnesses real-time actionable data directly from the field, thereby improving productivity, and facilitating better decision making throughout the turnaround lifecycle.

- **Manage Turnaround Scope & Schedule**
  - Build & share digital STO scope with all stakeholders
  - Auto-update all components in case of scope change
  - Drag and drop modules to prepare turnaround schedules
  - Integrate with ERP to include routine work in STO scope
- **Automate Common Workflows**
  - Start task-based discussion threads and send notifications
  - Keep a digital record for all documentation
  - Deliver remote expertise on critical problems
  - Get real-time status on tool and rented equipment
  - Perform remote and virtual inspections & operator rounds
- **Monitor Progress in Real-time**
  - Ensure turnaround is on track with live images and video updates
  - Analyze impact of scope change on quality, costs, safety, and schedule
  - Monitor compliance and set up alerts for delays & spend
- **Track & Benchmark KPIs**
  - Use historical data to easily prepare organizational benchmark
  - Automate all major reports and KPI dashboards
  - Get comprehensive turnaround readiness status

## Case Study: Maximl enabled faster plant start-up by implementing digital box-up and de-blinding at a Fortune 1000 Oil & Gas Major

### Problem

The company performed maintenance and inspection through checklists which are used by multiple departments. These checklists were paper-based forms accessed individually by owner engineers. An owner engineer spent 6-8 hrs to find the right stakeholders from different departments to get the checklists certified. Evidently, this was a time-consuming process involving a lot of manual work.

These checklists played a crucial role in managing turnarounds efficiently and safely. Sequence checkpoints and evidence verification of safety hold points are critical to safety - a lot of these points require adherence to approvals only at the asset location.

**Total number of checklists: 100+ used by 250+ users from 5+ departments**

### Solution

Maximl's Smart Project Management solution rapidly digitized the box up checklists and implemented automated organizational workflows. We also enabled collaboration features that allowed multiple users to access checklists and work on them in real-time. The offline capability of our solutions enabled seamless operations even in low connectivity areas of the plant.

## **I Value generated:**

### **Productivity Gains:**

- ~80% improvement in efficiency for maintenance, operation, and inspection personnel performing the checks on-field.

### **Hours Saved:**

- ~4 hours gained on critical path on account of 60% reduction in time for box-up and de-blinding clearances.

### **Adherence to safety hold points:**

- Stakeholders received real-time notifications to begin evidence attachment or sign-offs from asset location.

Maximl's digital solution for turnaround management ensures stakeholders are seamlessly engaged in the operations while allowing turnaround managers to analyze the success of the turnaround and gain valuable insights for future turnarounds.

[Learn more about Maximl's solution for Turnaround Management here.](#)





www.maximl.com

## Reach out to us

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