

Optimizing efficiency through digitalization in chemicals, petrochemicals and refining
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1. What does the subject of digital transformation and IoT mean to you?

Digital transformation and IoT are the next milestones in our technological evolution. As we have been embracing the integration of technology all these years, we must prepare to welcome these changes as well.

As a HR practitioner, this translates to making the organization and talent, adept in adapting to and adopting the changes that come our way. How equipped, enabled and empowered is the workforce? Are the leaders being developed to become change agents? What are the impediments to this change in terms of culture, work habits, skill sets, attitude? Is there a risk of workforce redundancy?

Digital transformation means converting an entire process stream's variables/parameters to be recorded, analysed, interpreted and acted upon using the data that is generated during the process. This can happen in any process – Refining, Manufacturing, Finance, HR, at any place where the process is clearly mapped.

This results in more discipline, more predictability, easier to trace root causes, proactively intervene and improve operational efficiency, safety and reliability.

2. What's the greatest impact IoT, data analytics and AI will have on the oil & gas industry? What lies ahead of operators and how will they adapt?

Like all changes, this new wave will necessitate the workforce to be prepared – technically and culturally. With more data points available for analyses, the operating efficiency, safety and reliability of the work place will improve. This change is akin to the transformation from fully manual to mechanical to semi-automatic to electronic to digital. Technical training and up-skilling will have to be complemented with counselling and inculcating empathy in employees. The organization should make the necessary investment in such activities.

In areas like inspection, to ensure integrity of the plant systems, the power of analysing large sets of data can be immense. Risk Based Inspection, RBI, can be done using AI which predict failures. Using Robotics, critical areas like the Fluid Catalytic Cracker, Fractional Distillation can be worked on to replace catalysts in inert atmospheres. Today, such jobs are very risky and expensive.

Similarly, pigging of the pipelines is also a time consuming and expensive job. With the help of technology, “intelligent” pigging can be done, where the pig is embedded with sensors and feeds data back to the main systems. These are essentially improved versions of SCADA. The data today can be stored and analysed in a holistic manner and newer patterns and relationships between the variables is possible.

3. How do you see the role of the Industrial Internet of Things in refining, petrochemicals & chemicals? What are the key benefits and opportunities of using IIoT solutions in downstream operations?

The petroleum industry has seen large investments in assets and the operations are complex to manage. With the workforce ageing, a lot of tacit knowledge will be lost to the industry. With ageing, even the assets will be more susceptible to breakdowns, wear and tear. The companies will need to invest in digital technologies to predict failures, prevent accidents and preserve the operations at high efficiency.

The new workforce will benefit a lot with the implementation of the IIoT. The wireless networks help in connecting and collecting more data points in a process stream. Operators training can be done with the help of the data that is recorded, by simulating scenarios. This will help the operation to be more efficient and safe.

Predictive and preventive maintenance will be required, which can be performed by analysing the vast amount of data recorded at multiple stage of the operations. A network of sensors, with fast computing abilities, cloud storage facilities and data analytics will give the companies a competitive advantage. Such advanced operations management with the help of information technology, will be more profitable in the long run, in addition to being safe.

4. How will this paradigm shift affect talent in manufacturing & downstream industry overall?

Just as how the work force evolved with improving processes and technology changes, the AI age is an inflexion point. Talent will have to be up-skilled. Organizations must introduce effective change management to enable the talent to embrace the IoT approach. With more process steps being automated, the value addition from the talent will need to be at a higher bar of contribution. Fluency with multiple technologies, equipment, interpretation of data, will be the

new skills that will be required. In the IoT world, the technical processes will all be networked with sensors, wireless connectors and other gadgets.

It would also demand that the people across process streams be connected in a closer manner. Working in teams will be an imperative, and therefore the challenge will be to create structures, processes and mechanisms that encourage team work, through rewards and career paths. Working in teams requires colleagues to be more empathic, more collaborative and more inclusive. Effective conflict resolution mechanisms and frameworks must be established to ensure proactive resolution. This will be required to prevent any mishaps and economic loss to the organization.

With the newer generations being more individualistic, coming with an “entitlement” mind set and less prone to sharing, it is going to be a challenge in organizations to undo the prevailing societal trends and instead encourage more pro-social behaviours.

5. What are the latest technology adoptions by downstream operators in Asia? Are there any success stories that other operators can learn from?

RBI or Risk Based Inspection in the Fluid Catalytic Crackers is a clear example. A risky and expensive procedure that is performed in an inert atmosphere of Nitrogen can be managed through the effective use of Robots. Using complex computer programs to analyse more than 2,000 variables operating under more than 400 constraints, the optimization of the process parameters ensures in procurement, utilization and conversion of resources at optimum levels. Similarly, fire alarms, relays, barometers are all interconnected to ensure failure in safe modes.

Some of the other advanced technologies that we have used include the –

- Development and implementation of smart pressure testing methods using wireless protocol. This minimises risk in addition to improvement in operational efficiency
- Use of drones for inspection of inaccessible positions such as flare tips, pipe racks and cable tray, emergency situation evaluation
- Implementation of new technologies in Rotary/ Inspection and corrosion monitoring:
 - Early event detection for rotary equipment
 - Developed and deployed thickness measurement and corrosion monitoring methods for static asset reliability
- Real-time control loop assessment and performance insights to improve process stability and minimise operating cost
- Machine learning based solution for prediction of equipment and process health to take corrective/ preventive actions for any future performance deterioration

6. Will Artificial Intelligence replace humans working in oil and gas?

The O&G industry deals with a lot of data. With the price of sensors at an affordable value, with a more robust labyrinth of networks and computing power, the data points that can be collected are multifold. The use of artificial intelligence is an imperative. This will result in analyzing complex sets of data and arriving at relationships between the variables, trends and patterns. Just as how mechanical, electrical, electronic and other engineering appliances entered the manufacturing spaces, AI is also becoming a potent tool.

The expectation of humans working with AI will be to interpret the data, take informed decisions and ensure the leverage of the data. AI will not replace human beings, but it will be a forcing function in ensuring the skill sets of the work force are upgraded to more sophisticated levels. Tasks that can be automated will be, resulting in the need for the workforce to enhance their skill sets to a higher level. As a process of industrial evolution, this will be Industrial Revolution 4.0.

7. What are your near term plans to manage change and improve technical expertise in your organization?

We adopt immersive training techniques. We have kiosks which provide 3-Dimensional effects. Augmented Reality is also deployed for certain operations to make the training more 'sticky' and quick. A digitally simulated environment is created with a Digital Control Panel. The operators learn to work on the live system only after intense training that include class room sessions, digital simulations, guided On The Job assignments and validation by experts.

8. Do you have any formal training programs for teaching new skills to the operational staff?

We have dedicated learning academies for the technical and functional employees across the organization. A culture of continuous learning has been fostered. The Field Technical Executives and Panel Officers undergo a rigorous program before being given independent charge to work on live systems.

The Operator Training Simulator (OTS) at Reliance has enabled all greenfield and most brownfield plants to train engineers on smooth start-up, shutdown and handling of abnormal situation. RIL has also piloted Virtual Reality (VR)-based technology for training.

9. Are you concerned about cybersecurity in your organization? (for operators)

Not really. The systems are not linked to external networks.

10. What are the key technologies which your company would like to implement in the next 5 years? (For refiners, petrochemical & chemicals companies only)

A platform based architecture is the agenda for the enterprise. All efforts are on towards making that a reality. This will ensure inter-connectedness across businesses and functions thereby allowing for the leverage of the vast amounts of data residing in the organization. Towards this objective, multiple open sourced technologies are being considered along with data lakes and other frameworks which will ensure an architecture that is long lasting.

Smart manufacturing integrates data from various systems with process expertise enabling proactive and intelligent manufacturing decisions in dynamic environments. Smart manufacturing technology also aids the Company to improve its performance in terms of integrity, reliability and effectiveness of business and manufacturing operations.

11. What impact does Big Data have on operational efficiency and how is Big Data changing the industry?

Big Data initiatives are currently underway in our company, focusing on business and operational dimensions.

Business:

- Data analytics on feedstock and product trading and hence maximizing profit opportunities
- Use cases in areas like procurement, exports, risk management, shipping, planning and optimization
- Retail outlets have upgraded their payment ecosystem

Operational:

- Within manufacturing operations, we have begun the journey of creating a digital manufacturing platform with the objective of providing real-time business insights to end-users so that they can take fast and effective decisions through a common and intuitive user interface.
- Analytics to assess characteristics of assets, feedstock, and output to define optimal plant settings
- Focus on improving reliability of units for financial and safe operations
- Reducing maintenance/ downtime of assets
- Utilizing robotics and AI in product handling, ware-housing and inventory management
- Optimize operations by re-configuring process units as per demand

12. What are your views on Asia's downstream industries rate of digitalisation as compared to counterparts in other regions i.e. America, Europe and the Middle East markets?

Downstream industry in India is still evolving w.r.t. usage of digitization and technologies like IoT, AI.

While, the O&G industry is relatively younger in Asia vis-à-vis the Americas, Europe of Middle East, the technologies that were deployed as well as the quality of the assets need upgrading. There is ample scope for using analytics and digitization to improve reliability and uptime and increase energy efficiency. With the improvements in data eco-system, the approach of business decision making based on limited parameters is getting challenged. Digitization can help amalgamate expertise and speed up decision making. Investments in digital technology, when deployed at scale, can generate operational savings far exceeding the investment costs.

13. What will the future workforce look like in the digital age? How well equipped is your organization to handle the challenges?

There have been a lot of papers written on this subject. So, I am not going repeat that here. Reliance invests heavily in the latest technologies to ensure safety, operational efficiency and to have a strategic advantage in the market.

14. Any tips on "Managing Talent in the Digital age"?

Some of the key initiatives taken in the people space (particular focus on manufacturing):

- Competency Assurance System (CAS) helps building critical domains of technical and functional skills by addressing current and future business challenges, effectively through competent workforce
- Use of analytics, in areas like workforce architecture, enhances the overall organisational effectiveness
- Business heads are equipped with real-time dashboards that track all relevant KPIs across the hire-to-retain cycle

15. What will be the highlight of your presentation at Asian Downstream Summit?

At the core of a safe and efficient operation, is the workforce that is trained, motivated and committed. This workforce requires to "feel" to be a part of the organization and therefore this requires 3 effective actions on the organization' part.

1. Managers who inspire
2. Goals that motivate

3. Recognition that is satisfying
4. Communication that is relevant.

The potent combination of these elements will serve the organization in ensuring a smooth, safe and successful organization.