WHITE PAPER

HUMAN-CENTRIC APPROACH TO AUTOMATION AND AI IN LOGISTICS

Minimize accidents, improve employee safety, optimize, and leverage data for efficient operations

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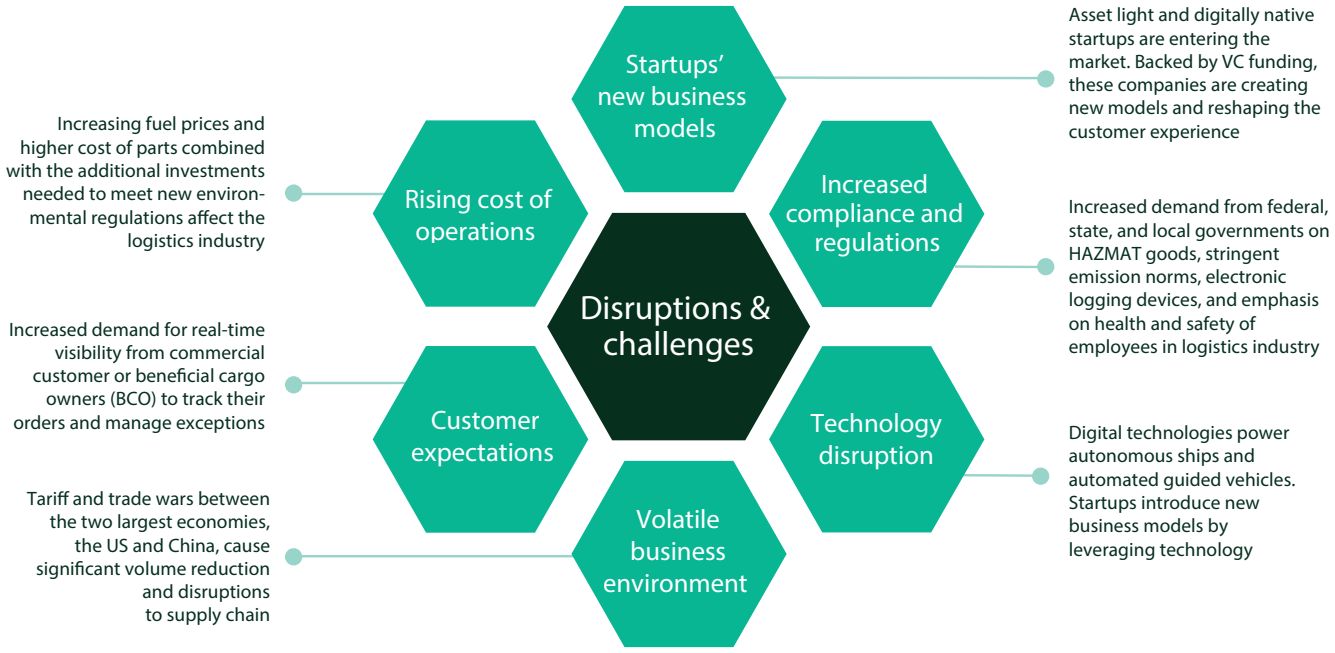
- Only 10% of logistics companies rate their analytics capabilities as advanced (NextGen Survey - 2018)
- In a recent survey by Forbes Insights, 65% of executives in logistics, supply chain, and transportation acknowledge the need to revamp existing operations and transform
- The logistics industry is behind the digital curve

It is a time of disruption for the logistics and transportation industry. It also has to overcome challenges to meet the expectations of customers. For instance, they demand real-time visibility of their shipments, including track-and-trace options, as well as compliance with regulations to ease cross-border commerce. Moreover, technology startups backed by venture capital (VC) funding have digital-first business models that are more agile and responsive to customer needs.

The competition is intense, but the logistics and transportation industry has been slow to adopt digitization. The reasons: lack of clear vision for digital transformation, lack of leadership support for a transformation, insufficient talent, unclear ROI and economic benefits of digital investments, concerns around data security and privacy, and organization culture that does not lend itself to digital transformation at scale.

However, progressive companies understand the need to keep up with technology, and CXOs see that useful lessons can be learnt from disruption. These companies seize the opportunity to pivot and create new business models, improve services, enhance employee safety by reducing accidents, and ultimately increase profitability.

Significant disruptions and challenges in the logistics industry



With this shift in mindset, logistics companies are beginning to experiment with various disruptions, specifically technology disruptions, which have the potential to amplify outcomes. A Statista survey in 2018 listed the top disruptive technologies that are impacting the logistics industry in a significant way - cloud, Internet of Things (IoT), virtual and augmented reality, analytics and insights, blockchain, automation, artificial intelligence (AI), robotics, and drones.

While use cases for automation and AI opportunities across the logistics chain gather momentum, in this white paper, we focus on how these technologies can be leveraged to improve the safety of employees and passengers and minimize accidents across various logistics sub-verticals (including railroads, ocean liners, domestic freight, and last mile). We will also cover key considerations and discuss the organization construct and operating model to achieve stated objectives.

Value chain assessment and opportunity identification

Looking at the value chain for the international logistics industry (from first mile to last mile), we have selected three broad areas - railroad, ocean freight, inland road freight - to discuss how safety can be improved and how accidents can be minimized by leveraging technologies such as automation and AI.

1. Improving safety of railroad operations

Digital technologies - a blend of AI, automation, telemetry, and mobility - boosts productivity as well as enhances safety of field personnel and railroad operations. It can be done in many ways.

Improve safety and productivity in inspections: The current inspection process is manual and slow, with field personnel on the tracks. A safer method: leverage AI-powered optical inspection of railroad network infrastructure through high-resolution and high-speed cameras attached to engineering or inspection trains. These images and related sensor data can be stored in the cloud and compared against AI / ML image and pattern recognition algorithms that can easily identify and classify potential problems such as cracks, rusting, excess vibrations, and highlight them in a dashboard for the maintenance team to take action. This solution can potentially reduce inspection times and errors, improving productivity, and also reduce health and safety hazards for field personnel.

Improve safety of field personnel: While optical inspection can reduce the number of field personnel on the tracks and rail infrastructure, some will still be required. To complement optical inspection and to ensure better safety and productivity, maintenance and field personnel can be provided with wearables or handheld mobile devices to inspect rails or ties and mark them as defective or needing replacement. Such inspection reports can be fed to central systems in real time and help create a subsequent plan for raw material procurement, leading to process busting. If such tools are combined with location based services for contextual alerts and actions, it can improve the overall safety as well.

Improve safety of rolling stock: AI-powered integrated hardware can substantially improve asset monitoring capabilities of railcars and other rolling stock. Sensors mounted on railcars can provide real-time notifications about the condition of key components and their wear and tear. It helps predict high-risk breakdown scenarios in advance and enable scheduling of preventive maintenance for railcars based on health information. Maintenance can be scheduled in advance at a shop in a major yard which the car is passing through, reducing the need to pull the car out of service, and more importantly, avoid accidents due to faulty machines or parts.

Federal mandates to improve safety: While technology helps improve overall safety for railroads, federal mandates like the US Government's Positive Train Control (PTC) have also helped improve operational safety and prevent accidents. PTC is an advanced automated train safety system made possible by a **combination of real-time data visibility** *(locomotive, its location, speed, train consist, train schedules, work zones on rail infrastructure and signals)* and **underlying technology infrastructure** (back office servers, communication links, PTC-compliant locomotives and wayside interface units) with the objective of improving railroad safety. Imagine a train approaching a speed restriction section or a segment of track that has another train or workers - in such cases, PTC issues a warning (based on warning distance and stopping distance) to the train engineer to take action, failing which PTC takes auto control to enforce a reduction in speed or bring the locomotive to a halt.

While these possibilities improve overall safety, they also have the potential to be a force multiplier and realize benefits such as increased productivity, increased asset availability, increased asset reliability, leading to reduced dwell times , higher network velocity, and increased capacity.

2. Minimizing shipping accidents

According to Allianz Global Corporate & Specialty SE, in 2018, 2,698 shipping incidents were reported. Human error and oversight topped the list of causes. Technologies such as IoT and AI can address this problem.

Intelligent navigation systems: Think about a mix of high resolution machine vision, GPS, and radar that relays real-time data *(on nearby vessels, hazards)* to a control tower powered by AI (for early detection) which in turn triggers alerts in real time and recommends a course of action to avoid collision. Orca AI puts intelligent navigation to use.

Voyage optimization and re-routing: By combining data from voyage execution with external factors such as weather, port conditions, and route congestion, and using advanced analytics and AI to predict delays and recommend outcomes, the voyage monitoring team and the captain can make on-the-fly decisions (voyage re-routing, speed, adjusted arrival time at port) to optimize the voyage and avoid accidents due to congestion.

Predictive maintenance: Just as the manufacturing sector has adopted Industry 4.0 features such as predictive maintenance, optimal safety stock, insights-driven quality control, automated maintenance schedule, the shipping industry can be transformed. Key machinery components on a ship can be repaired or replaced based on a pre-determined schedule as opposed to standard practice of repairs irrespective of their condition, or replacement only when they break down causing unnecessary operational downtime. A more productive and safer method: attach sensors on key machinery components and engines. Operational data from these sensors can be relayed in near real time (through satellite communications) to centralized cloud-based systems powered by AI. Such a system can analyze the feed and match it with historical data to detect anomalies and determine the optimal time for part replacement, which could be at the next port of call. By making optimal decisions on maintenance schedules, shipping companies can lower costs (associated with early part replacement or avoid opportunity cost related to breakdowns) while improving voyage times (that can be impacted due to unscheduled downtimes). However, the primary benefit of predictive maintenance is the opportunity to minimize worker-related accidents as workers do not face situations with broken parts or machinery that needs urgent fixing.

Improving worker safety on ships: If a breakdown does occur despite predictive maintenance, workers can be provided with safety apparatus equipped with sensors, cameras, and augmented reality equipment. A suite of technologies connected to a central control tower (to capture telemetry data such as ambient pressure, temperature, and noxious gases, monitor against threshold and recommend next best actions) lends itself to alert the worker in real time on any imminent hazard.

3. Improving driver safety in the trucking industry

AI and digital technologies can be leveraged to improve safety for personnel in the domestic freight trucking industry.

Driver fatigue detection: High-resolution cameras can be used to monitor the driver's behavior. Sensors on the truck can sense and relay sudden events (abrupt lane switches, incorrect gear usage, RPM calculation, cornering, over speeding, hot braking) and their frequency. This data can be used by an AI-powered cloud platform to identify patterns and detect and report anomalous driver behavior which could be due to fatigue, distraction due to phone usage, texting, or eating. Fleet managers can take the driver's performance into account while planning, intervene if a safety risk is flagged in real time, or assess the performance of a team of drivers.

Vehicle health monitoring and alerts: While it is important to monitor driver behavior, it is equally important to monitor the health of the vehicle. Powered by sensors *(which helps capture real-time vehicle data such as engine temperature, battery, fuel level, coolant level, engine oil and brake fluid level, CO2 emissions, air filter health)* and based on threshold definitions set for various health parameters, it becomes possible to monitor the health of vehicles in near real time through a central telematics control tower. Real-time interventions and alerts can be provided to the driver, or automatic interventions can be enabled *(for instance, an autonomous driving control feature can kick in to drive the truck to the nearest lay-by).* Such a system should be equipped with predictive analytics capabilities to undertake a cause-symptom analysis based on historical performance of the vehicle on the above parameters and support preventive maintenance, increase uptime and accelerate rectification of health issues with the vehicle based on system-prompted problem parts or areas. This system could also double as an accident management platform. Imagine a truck driver having an SOS button to alert the company in the event of accidents. As soon as the SOS option is triggered by the driver, the latest GPS location is sent to the disaster operations team immediately, to speed up accident management and ensure safety.

Key considerations - a well-thought-out framework for automation and AI

In the logistics industry, automation and AI can improve safety and minimize accidents, but there are challenges to implement these technologies. A company needs to have a framework that covers the entire journey from vision to realization. Without an end-to-end plan, such initiatives remain silo projects and fizzle out over time due to challenges like:

- Negative impact of disruptive technologies on workforce
- Digitization undertaken as a set of standalone projects without an overarching strategy or management
- Organizational structure is an obstacle to make decisions and implement technology for digital initiatives
- Slow pace of cultural change, with employees resisting change
- No economies of scale on big ticket investments (as business units and departments have divergent views on digitization, thereby making siloed sub-optimal investments) resulting in lack of ROI

From our experience, we have devised a comprehensive framework consisting of six key dimensions. Our framework breaks down the complex puzzle into manageable chunks. Our strategy and road map define the automation journey and identify the right candidates or use cases for automation based on business case and clear business value. While strategy, road map, and technology choices are important, we need to prioritize several aspects:

1. **Governance and decision making:** It establishes policies, processes, and controls to enable a working model, define the right level of controls across business units and functions, and ensure the launch of initiatives to improve safety.
2. **Operating model for automation and AI initiatives:** It involves the selection of partners, development methodologies and templates, and establishing a center of excellence to manage initiatives at scale.
3. **Change management and people enablement:** It manages change more effectively across the organization through communication and interventions *(such as reskilling and redeployment of people affected by automation)*

Infosys framework for finding value and building the foundation

AI & A STRATEGY

Why implement AI & Automation?

- Vision, charter, road map, and measures of success for AI & Automation
- Identify right AI & A initiatives, digital business models, shared digital services
- Prioritize and justify AI & A investments with compelling business case
- AI enabled process automation, hyper automation opportunities

GOVERNANCE

How do we govern decision making?

- What types of governance bodies are required?
- Who has decision rights, and what are these rights?
- What policies, processes, and controls to put in place?

PEOPLE ENABLEMENT

How do we address the impact on people?

- What should be the change management strategy?
- What are the new roles and responsibilities?
- How should we manage the people impact of automation, and how should we reskill people for new ways of work?
- Doing more with less - elevate role of employees and having them focus on problem solving and exception management

TECHNOLOGY SOLUTION

What are the right tools & technical architecture?

- AI & Automation capabilities, AI first process, data governance, AI & machine intelligence, digital experiences
- Hosting options, autonomic platforms, platform innovation with next gen tech
- The right automation partner for the long term – flexible, agile, sustainable
- Ensure data foundation

OPERATING MODEL

How do we operationalize the AI&A-COE?

- Right org design – combination of data engineering, data science and data visualization
- Define right prioritization framework and measurement metrics
- What type of development partners, methodology, and templates to use?
- What will be the acceptance criteria for deliverables?
- How do we manage and monitor the new Digital environment?

AGILE REALIZATIONS

How do we integrate AI & RPA into our Business & IT ecosystem?

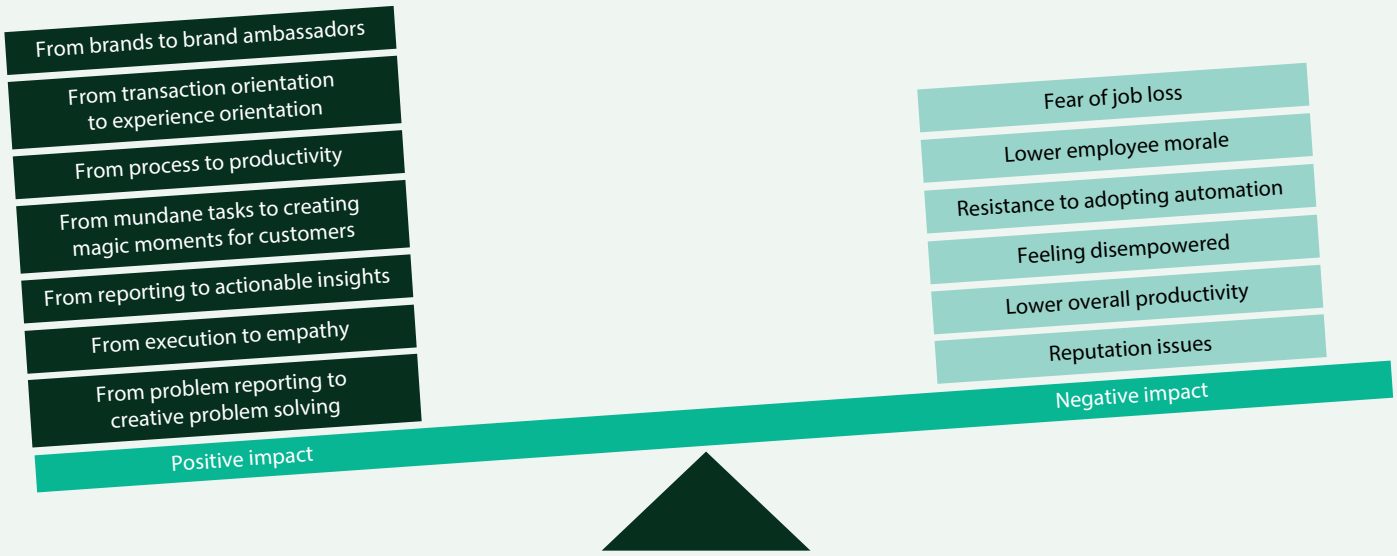
- Prioritizing use case based on impact
- How do we develop reusability?
- Scaled Agile, real-time dev ops
- Rapid realizations and deployment - CI/CD
- How do we monitor and support robots and outcomes on an ongoing basis?

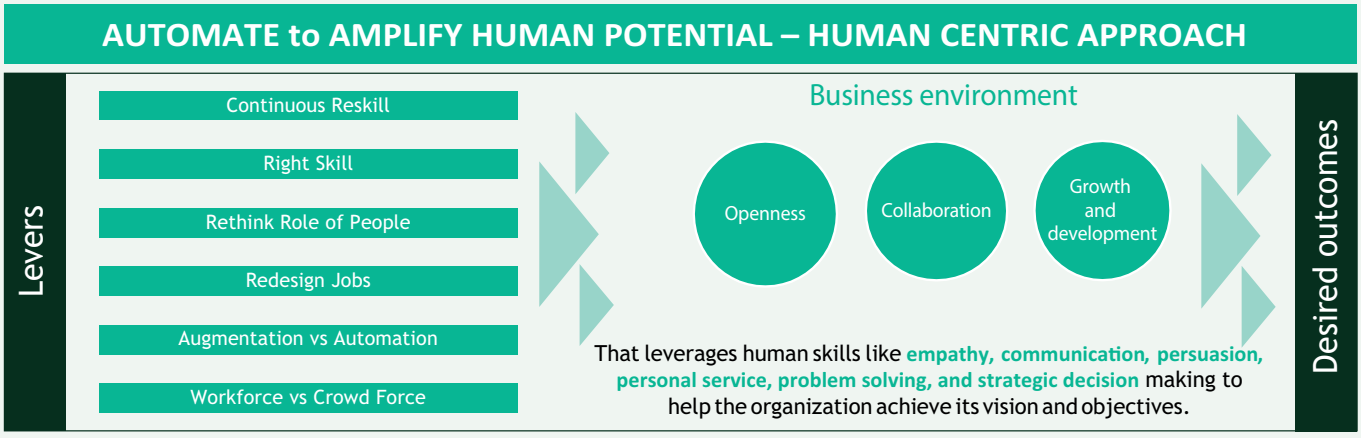
Automate to amplify the human potential – a human-centric approach to digitization

Applying automation, AI, and allied digital technologies can reduce accidents and improve the safety of workers, field employees, and crew. However, it also means fewer crew members on board a liner or freight train or lead to displacement of employees, leading to necessary reskilling and redeployments in other business functions. Such a transition impacts the livelihood of people. If unattended, it could get out of control as employees fear job losses, feel disempowered and demotivated, which in turn affects the morale of employees and lowers productivity. How can organizations 'navigate their next' and keep their human capital motivated? The answer is in designing an approach toward automation and AI – one that is 'human-centric' and where skills like empathy, communication, problem solving, and strategic decision making are valued and leveraged in creating an environment of trust, openness and collaboration that eventually leads to growth and development. It provides the right balance between implementing a change (driven by technology) and ensuring that people aspects such as empathy enablement and inclusivity are taken care of. This approach ensures that changes are designed with humans at the center and it requires the leaders and change agents to think through critical aspects:

- Rethink roles of people
- Redesign jobs
- Reskilling and right skilling
- Create a culture of a flexible workforce and incentivize inter-function movements
- Augmentation vs automation

We call this the 'human-centric approach to automate and amplify human potential.





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Sathya has more than 18 years of advisory experience. He leads the digital, logistics and product functions for CRL (consumer, retail and logistics) consulting. He has worked with several global brands to develop business, IT and omnichannel strategies and managed large transformation programs. In his career spanning close to two decades, Sathya has worked across a diverse set of roles, including functional lead, product manager, business architect, and program manager.

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