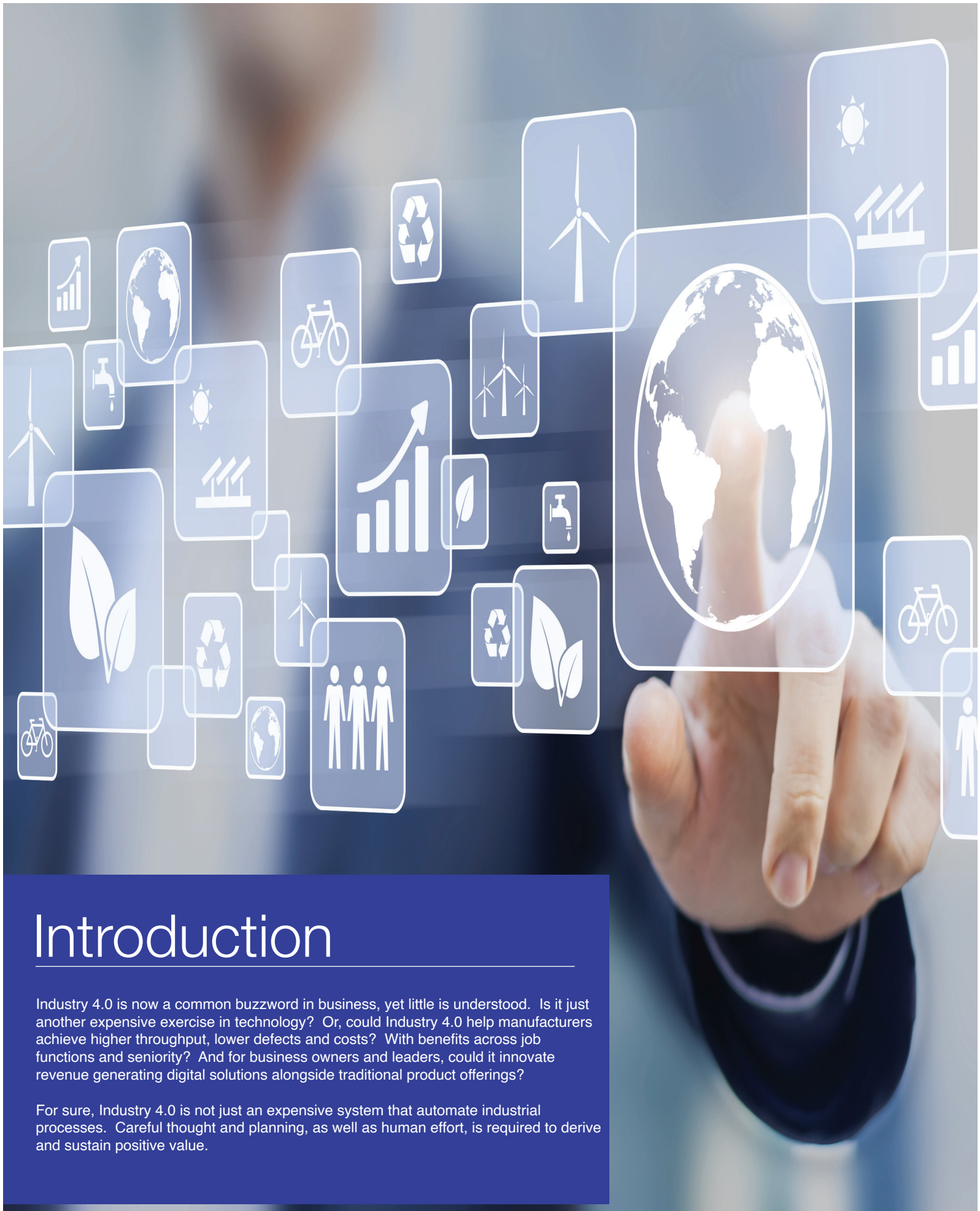
How to start and sustain Industry 4.0 initiatives

A whitepaper

Making our world safer

TÜV NORD
Singapore



Introduction

Industry 4.0 is now a common buzzword in business, yet little is understood. Is it just another expensive exercise in technology? Or, could Industry 4.0 help manufacturers achieve higher throughput, lower defects and costs? With benefits across job functions and seniority? And for business owners and leaders, could it innovate revenue generating digital solutions alongside traditional product offerings?

For sure, Industry 4.0 is not just an expensive system that automate industrial processes. Careful thought and planning, as well as human effort, is required to derive and sustain positive value.

What approach should I take?

Industry 4.0 is driven by data and connectivity. So for those seeking to embark on the journey, the DELTA framework[1] [2], is the most appropriate roadmap. DELTA is a model to help practitioners drive data value throughout project lifecycle. With five stages of maturity, from impairment to data being source of strategic advantages, DELTA help companies determine where they are, set desired outcomes, and means of achieving it along 5 dimensions of analytics:

Data

Data might be the new oil, but extraction, filtering and processing is needed to generate useful insights. So anyone interested in Industry 4.0 must ask these questions – What data do you have? Where does it come from? What could it tell you? Regardless of your intentions with Industry 4.0, DELTA prescribes a journey to improve consistency, quality and organization of data. This would drive better manufacturing outcomes.

Enterprise

Data is only valuable if there's technology for extraction and transformation. This enables human analysis to decipher meaning and trends. So the ability to centralise data, technology and analysts will be critical success factor for Industry 4.0. However, interlinking of networks and databases create vulnerabilities. TUViT, the cybersecurity subsidiary of TUV Nord Group, provide information security services for industrial plants and critical infrastructures. These include penetration testing and conformity assessment on IEC 62443 – which apply to IoT systems; and IEC 61508 for functional safety in process instruments.

Leadership

How Industry 4.0 would benefit companies depend on vision laid down by management. Will it be for reduction of costs? Improve governance and performance? Or, innovate a completely new market proposition? Jet engine maker Rolls Royce had launched their "IntelligentEngine" vision[3], where their engines would "talk" to operation centres on running condition, and assess impact of atmospheric conditions on engine performance. So leadership is key in harmonizing Industry 4.0 with their organisation's context and strategic direction.

Targets

Industry 4.0 projects must address specific needs and outcomes. Is it to automate a process? Find and eliminate bottlenecks? Innovate a digital business model? And if programme driven, it will create a unified strategy from many disconnected initiatives.

Analysts

Whatever the insights, data need to solve business problems. So people are needed to cleanse, explore and model data towards a business objective. Data analysts use statistical methods and modelling to derive quantitative or qualitative insights. Which in turn, would shape business decisions.

1. "Five Stages of Analytics Maturity", from the book "Competing on Analytics: The New Science of Winning", Tom Davenport, Jeanne Harris, 2007
2. "Analytics at Work: Smarter Decisions, Better Results", Tom Davenport, Jeanne Harris and Bob Morison, 2010
3. "Rolls-Royce launches IntelligentEngine", 5th February 2018, https://www.rolls-royce.com/media/press-releases/2018/05-02-2018-rr-launches-intelligentengine.aspx, extracted on 28th June 2019

DELTA and Analytical Maturity

Success Factor	Stage 1 Analytically Impaired	Moving to: Stage 2 Localized Analytics	Stage 3 Analytical Aspirations	Stage 4 Analytical Companies	Stage 5 Analytical Competitors
Data	Inconsistent, poor quality, poorly organized	Data useable, but in functional or process silos	Organization beginning to create centralized data repository	Integrated, accurate, common data in central warehouse	Relentless search for new data and metrics
Enterprise	n/a	Islands of data, technology, and expertise	Early stages of an enterprise-wide approach	Key data, technology and analysts are central-ized or networked	All key analytical resources centrally managed
Leadership	No awareness or interest	Only at the function or process level	Leaders beginning to recognize importance of analytics	Leadership support for analytical competence	Strong leadership passion for analytical competition
Targets	n/a	Multiple disconnected targets that may not be strategically important	Analytical efforts coalescing behind a small set of targets	Analytical activity centered on a few key domains	Analytics support the firm's distinctive capability and strategy
Analysts	Few skills, and these attached to specific functions	Isolated pockets of analysts with no communication	Influx of analysts in key target areas	Highly capable analysts in central or networked organization	World-class professional analysts and attention to analytical amateurs

Source: "Analytics at Work: Better Decisions, Better Results", Davenport, Harris, Morrison. Harvard Business School Press 2010. Reproduced with permission.

Sustaining Industry 4.0 initiatives

Plan-**D**o-**S**ee-**A**ct framework

The Plan-Do-See-Act (PDSA) framework, typically applied in quality assurance circles, can drive control and continuous improvement across Industry 4.0 processes.

PDSA has four stages: a well-defined business case (Plan); collecting, transforming and integrating data elements (Do); analyzing data to visualise "what happened and what is happening" (See); harnessing data insights to drive improvements (Act).

The outcome: Data swamp of lake?

Regardless of application, Industry 4.0 would generate huge quantities of data. Would it hinder operations (data swamp) or facilitate greater effectiveness (data lake)? Rather than treating data as a final outcome, the DELTA and PDSA frameworks manages it as a tool – for better decision making at strategic and operational levels.

TÜV NORD Group

About TÜV NORD Group

TÜV NORD Group is an internationally-recognised and reliable partner for inspection and certification services. Our experts have extensive knowledge based on experience. This guarantees independence and neutrality and also means that we can offer continuity in supporting our clients. The benefit to you is clear: our experts accompany and support the development of your company and provide you with objective feedback.

Your path to Industry 4.0 readiness

We recommend initiating a Security4Safety risk assessment with your components or products before expanding this to cover your production processes. Once you have completed this with positive results certification according to IEC 62443 is available to you for your entire organisation. Together with certification to ISO 27001, this allows you to demonstrate the Industry 4.0 readiness of your organization. This level of maturity requires that you observe the state of the art in the field of safety and security and satisfy the necessary duty of care for the bringing into circulation of safety and security-related products.

Contents of a Security4Safety risk assessment

The S4S risk assessment can be conducted in two different modules.

In the first module our experts conduct a status analysis with you, during the course of which the directives and standards to be applied for your purposes are defined, followed by a risk analysis pursuant to these standards, such as IEC 62443-3-2, IEC 61509 and others. The threat analysis may be conducted at the level of your components and products or at the level of your manufacturing processes. You receive the results in the form of a detailed technical report of this status analysis and can subsequently identify the safety and security gaps in your products or processes. On this basis you are able to identify and implement the measures suitable for eliminating the risks in your organisation.

In a second module we offer you an S4S risk assessment for evaluating your implementation in products or processes. The result is a technical assessment of your S4S implementation.

The benefits for you

- Identification and elimination of digital weak points in the development, manufacturing and service process
- Securing the quality and safety/security of products
- Reducing the risk of recalls and damage to image as well as subsequent claims for compensation
- Increasing customer trust due to the qualified assessment of TUV Nord Singapore and TÜV NORD CERT

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