Siemens Digitalization – Script.

Slide 3: About Siemens

* + **Siemens** is a global technology powerhouse that operates across multiple sectors. Company was found in 1847 by Werner Von Siemens. Siemens operates across various sectors, including Digital Industries, Smart Infrastructure, Mobility and automation, health and financial services.
  + [With a presence in **more than 200 countries** and employing over **300,000 people**, Siemens continues to be a global force in innovation and engineering excellence](https://www.siemens.com/global/en/company/about/history.html) and has a revenue of 77.8 Billions Euros in 2023.

Slide 4: Opportunities and Challenges

* Being a global power-house of technology and innovation, Siemens is a behemoth with a Global presence. This sheer scale in terms of production facilities, markets serviced, technologies used and diversity of people being employed presents its own challenges as well as opportunities. Some of the key challenges, therefore stem from the enormous diversity, complex operating model, Data and Cybersecurity concerns and Workforce up-skilling. Within enormous diversity we see:
  + Diverse product portfolio
  + Varying order sizes – from one to one million
  + Different manufacturing technologies as well as multiple markets served.

From an operating model complexity perspective, we see:

* + More than 1000 IT solution implemented
  + Many and complex processes and digitalization use cases
  + Interdependence between factories, supply chains and regional circumstances.

Apart from these two major challenges, there are usual impediments in terms of cyber security and people.

In the midst of these challenges are opportunities that have the potential to catapult the company to the next level and lead the world into the new technology and Industry 4.0. some of these opportunities comes from company’s unique position to lead, develop and catalyze the technologies of Industry 4.0 which include Digital twins, end to end digitalization including supply chains and logistics.

Slide 5:

We are presenting here a high-level standard digitalization model or framework for use at Siemens. This is proposed to be used for the end to end factory digitalization at a pilot in one company and then replicate it across the factory location with the respective project teams.

The standard digitalization framework starts with understanding the factory digital landscape by interaction with users, subject matter specialists (both internal and external), exploring and identification of solutions and finally drawing out the implementation road map along with milestones, value expected, project teams and timelines.

When it comes to exploring solution framework, the key features to look at will be target architecture, solution platform and of course the cyber security.

For scaling we find huge opportunities with Supply chain Tower and RPA, Intralogistics (this is also the subject of the specific use case to be discussed later in the presentation), Digital twin simulation and production with its use in simulation of inventory availability and requirements, performance monitoring etc., Edge and IOT infrastructure and other Industry 4.0 technologies (to be discussed later in the presentation.

The framework will not be complete without focusing on People agenda – upskilling, training, retention and hiring.

Slide 6: Digitalization detailed steps: general guidelines

When we look at a stylized, detailed roadmap for digitalization we have to keep in mind following key steps and digitalization pillars:

Managing digitalization in a technology company involves strategic planning, execution, and continuous adaptation. Some of the key approaches include :

* **Digital Transformation Roadmap**:
  + To draw a clear roadmap with clear milestones and optimum resource allocation This roadmap should align with the organization’s overall strategy and business goals.
* **Then we look at Five Key Phases of Transformation**:
  + **Ambition**: where we define the vision and Set ambitious goals.
  + **Design**: Create a detailed plan. Identify processes, technologies, and organizational changes needed.
  + **Deliver**: Execute the plan. Implement digital solutions, train employees, and monitor progress.
  + **Scale**: Expand successful initiatives across the organization. Ensure scalability and sustainability.
  + [**Refine**: Continuously assess and refine digital processes based on feedback and changing needs](https://www.gartner.com/en/information-technology/topics/digital-transformation).
* **Other key factors or elements to put a special focus on include :**
  + **Digitizing Operations**:
  + **Data-Driven Decision-Making**:
  + **Agile Mindset and Experimentation**:
  + **Change Management and Employee Engagement**:
  + **Collaboration and Ecosystem Partnerships**:
  + **Cybersecurity and Risk Management**:
  + **Continuous Learning and Adaptation**:

The key is to approach digitalization holistically and with a strategic thought and intent.

Slide 7: Industry 4.0

Industry 4.0 technologies provide a unique stack of cutting edge and innovative tools and solutions to be used while executing digitalization projects. These are particularly critical for factory and supply chain digitalization and provide a bulwark for the re-engineering and optimization of key inputs. Industry 4.0 has the potential to create smart factories where we find a seamless blending of cutting-edge technology, data-driven decision-making, and human-machine collaboration. If we look at key elements of Industry 4.0 we have for example:

* **Intelligent Components**:
  + Like robotic arms, conveyor belts, and sensor-laden workstations with each robotic arm possessing its own digital brain—an amalgamation of AI algorithms and machine learning models. These arms can adapt, learn, and optimize their movements based on real-time data.
* **Predictive Maintenance** :
  + Where embedded sensors monitor the health of machinery.
  + Maintenance bots—small, nimble, and tireless—swiftly replace worn-out parts before they disrupt production.
* **Collaborative Robots (Cobots)**:
  + Cobots dance alongside human workers, their movements choreographed by algorithms.
  + When assembling intricate components, a human and a cobot work in tandem. The cobot’s precision complements the human’s creativity.
* **Digital Twins**:
  + Each workstation has its digital twin—an exact virtual replica. These twins simulate real-world scenarios, allowing engineers to optimize processes.
  + If a bottleneck emerges, the digital twin suggests adjustments: alter the conveyor speed, tweak the assembly sequence, or recalibrate the robotic arms.
* **Real-Time Analytics**:
  + A massive data lake collects information from every corner of the factory: production rates, energy consumption, worker fatigue levels, and even the ambient temperature.
* **Customization on Demand**:
  + The factory adapts to market demands swiftly. When an order for personalized smartphones arrives, the assembly line reconfigures itself.
  + Cobots switch toolheads, conveyor belts reroute, and the digital twins adjust their simulations—all orchestrated seamlessly.
* **Quality Assurance**:
  + AI vision systems scrutinize each product. Imperfections trigger alarms, halting the line.
  + A human inspector verifies the AI’s findings, ensuring that only flawless goods proceed.
* **Supply Chain Integration**:
  + The factory communicates with suppliers, adjusting material orders based on real-time inventory levels.
  + Blockchain ensures transparency, tracing raw materials from source to finished product.

Slide : Measurement of Impact:

Any digitalization initiative needs to be monitored and its impact measured viz a viz set targets and goals. Some of the measures that we can track in real time for our specific use case are :

Through-put or flow rate, Inventory Turnover rate and error reduction. Similarlily other measures could also be tracked and provide an effective validation of the success of digitalization project.

Slide 8: Defense in depth Cyber security Architecture

With the smart factories and use of smart tools and networked components including IOT, the exposure to cybersecurity attacks and failures increases manifold and could pose a strategic risk to the survival of the company. We propose a comprehensive defense in depth cyber security framework inspired from the MITRE 3 framework. The framework relies on layers of security technology stack and to proactively execute a cyber security kill chain.

However, it must be noted that even having this kind of concentric layers of protection, we could still be exposed to Zero Day and Man in the Middle attacks. Zero Day attacks could be only mitigated through threat intelligence platforms using AI assisted tools and Man in the middle attacks need a continuous and high level of user awareness and trainings.

Slide 9:

Perhaps the most critical KSF for any digitalization initiative is the People. People who have to ultimately use the digital assets in their day to day functioning. It is imperative that they are fully engaged, on-boarded and involved in the digital projects and that they have the required skillsets and attitude to successfully realize the benefits of digitalization. The slide presents some of the standard tools and processes employed to augment and re-calibrate the work-force management plans within a digitalized environment. These include

* Drawing a workforce plan
* Identifying challenges and opportunities
* Upskilling and Reskilling
* Workforce engagement and
* Talent Management

We have also provided the expected outcome or benefit realization approximation for each of these initiatives.