# Engineering Industries eXcellence

How to Leverage Simulation to gain insights on Manufacturing Process Performances

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ENGINEERING

# Speakers

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# Engineering Industries eXcellence

## Introduction

# At a Glance: a Global Company

**1.6 Bn€**
**REVENUE** FY2022*

**40+**
**YEARS OF GROWTH**

READ WHITE PAPER

**15,000~**
**EMPLOYEES**

**70+**
**OFFICES** AROUND THE WORLD

**30+**
**PROPRIETARY SOLUTIONS** FOR ALL MARKET SECTORS

**GLOBAL HQ**
ROME, ITALY


## ADVISORY

## TECHNOLOGY & IMPLEMENTATION

## PROPRIETARY SOLUTIONS

## MANAGED SERVICES

### RESEARCH & INNOVATION

**6** Development Labs
**130+** Live Research Projects
**€40m+** Investments / YR
**450+** Data Scientists and Researchers

### IT & MANAGEMENT ACADEMY "ENRICO DELLA VALLE"

**32,000** Man Days of Training / YR
**1,300+** Professional Certifications
**11,600+** Web Classroom Participants

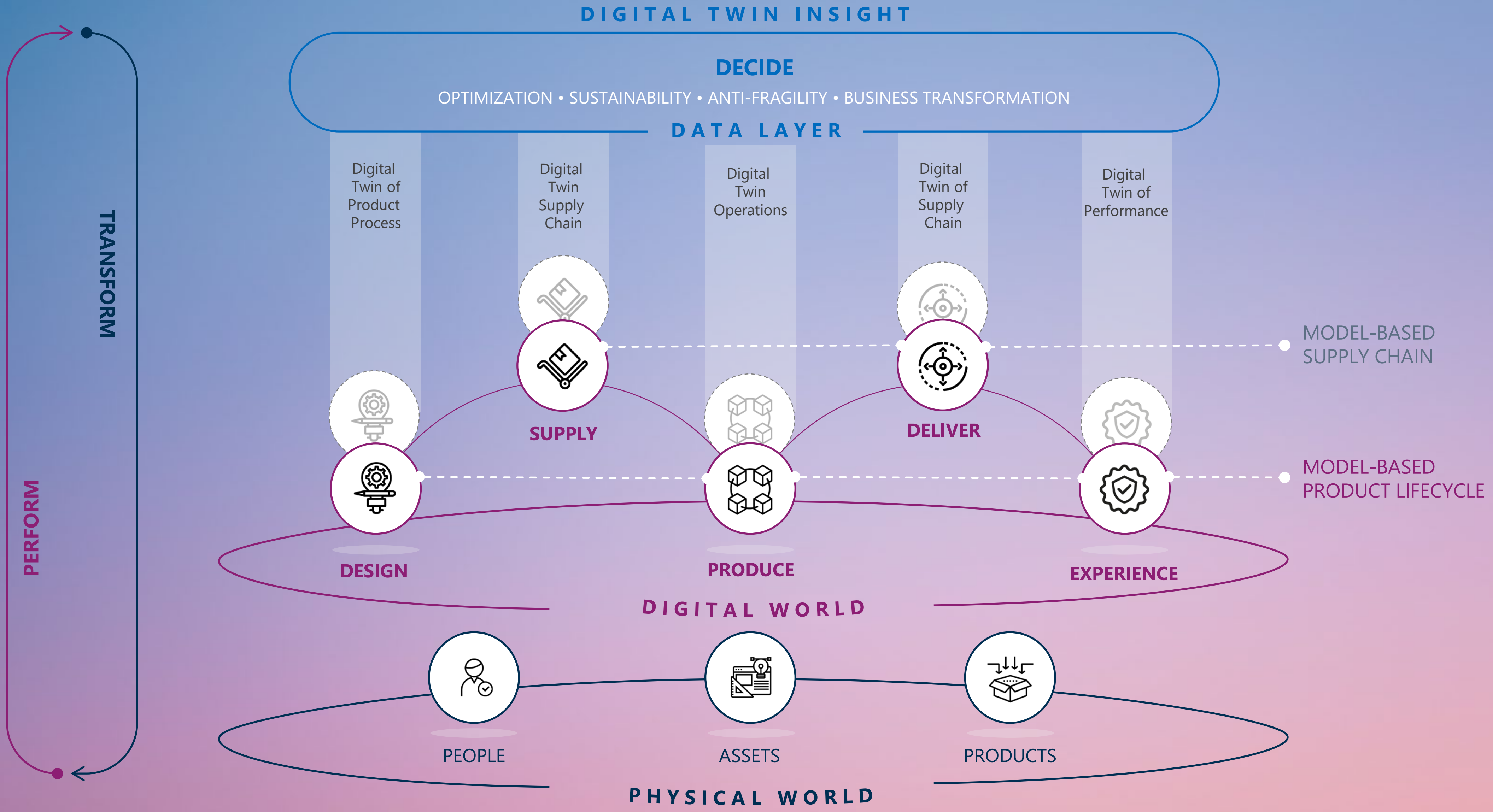
### ASSETS

**11** Portfolio Areas
**70+** Group Companies
**10+** Competence Center

**3** Data Center Tier IV
**22K** Managed Servers
**250K** Workplaces Managed

*PRO-FORMA

# Our Digital Thread for Industries eXcellence



# Project Overview

## Customer Background & Business Challenges

# Project Overview – Customer Background



- Manufacturer of **downhole power sections** used in drilling operations
- **Custom-made** power sections:
  - ➢ Requires unique tools and equipment to meet **quality standards**
- Manufacturing plant is  a **job shop**
  - ➢ Order volume = **Low**
  - ➢ Variability = **High**

# Project Overview – Business Drivers & Challenges

1

## Equipment Upgrade Evaluation

Newer and more accurate equipment is needed to provide higher-quality products to customers.

**Challenge**

- Evaluating the impact of introducing new equipment not only at work cell level but also on the whole manufacturing process (upstream/downstream impact).

2

## Production Scheduling Optimization

The processing time highly dependent on the product model being manufactured.

**Challenge**

- Currently, there is no effective method to optimize jobs scheduling or refine job completion date estimates.

# Solution Overview

## Objectives & System Architecture

# Solution Overview: Objectives

## Solution Objectives:

Provide a **robust decision support tool** to serve **heterogenous profiles** within customer organization to solve both **Strategic** and **Tactical** manufacturing challenges:

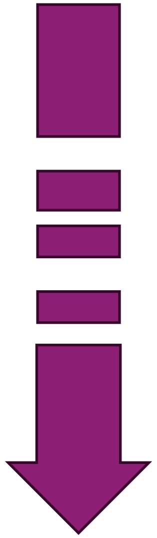
VP

Plant Manager
Industrial Engineers

Production Planner

- **Evaluate possible expansion plans to increase thruput and revenues**
- **Evaluate impact on entire manufacturing process of new equipment introduction**
- **Estimate job completion date based on current and future shopfloor conditions**
- **Optimize jobs sequencing on daily basis: run what-if analysis in response to disruptions**

**Strategic**



**Tactical**

# Solution Overview: System Architecture

## System Architecture Highlights: 3 Pillars

1 **User Interface**:

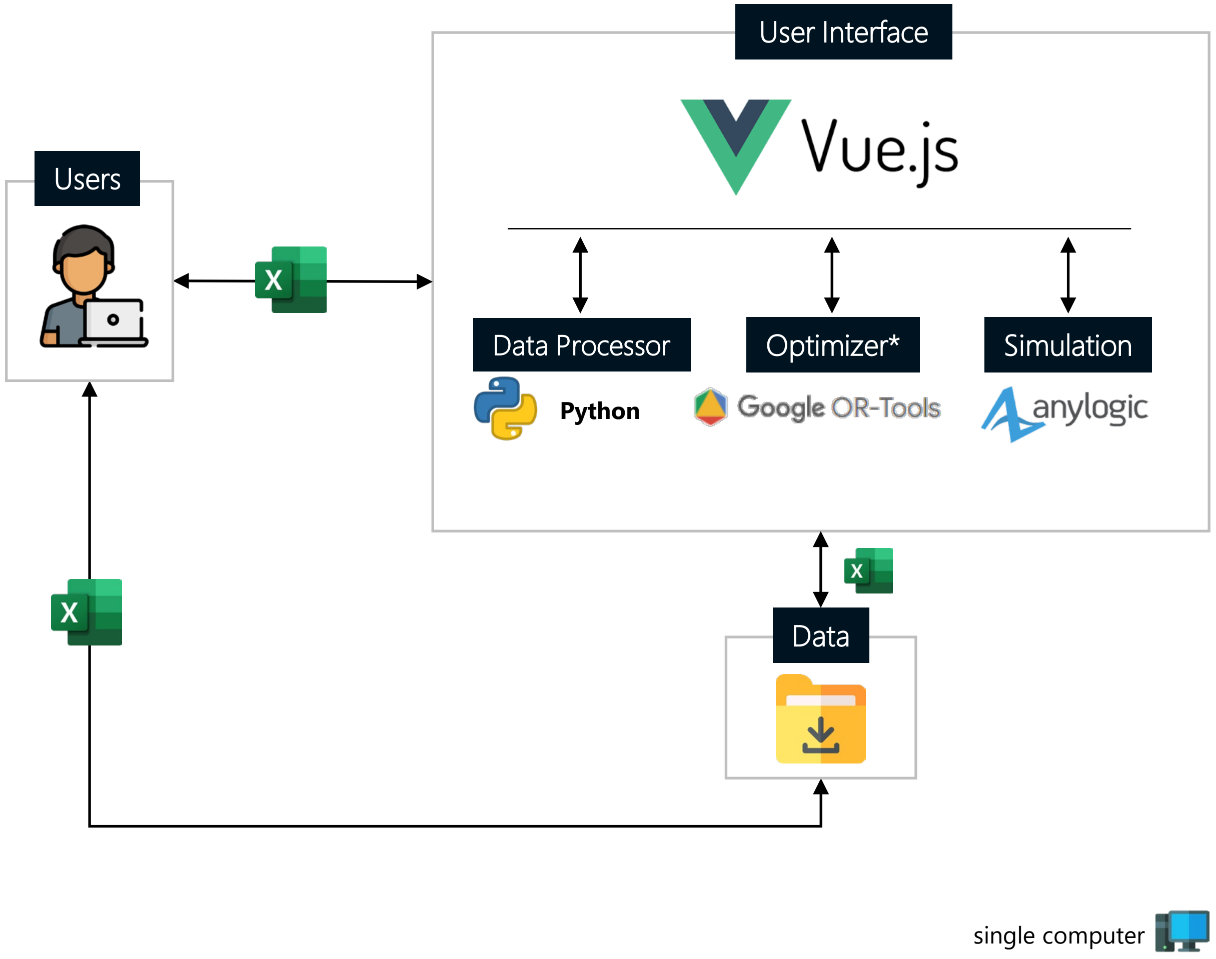
- **User experience is driven by visual management:** most user interactions with the solution are handled  with in web-based interface
  - Scenarios Configuration
  - Lunch Experiment Runs
  - Uploading Data Input & Visualizing Outputs

2 **Back –End (Data Base):**

- **Data processing is automated:** managed by user interface and automated with built-in data - processor and post - processor for data ingestion and results visualization.
- **Data Storage:** file will be saved locally to a computer

3 **Simulation Model:**

- **Capture Plant layout  and Manufacturing Process Logic:** live simulation runs are still visible to user for navigation within the model
- **Scenarios Runs execution:** optimization and non-optimization experiments
- **Generates output data and KPIs:** scenario result data curate by post processor to visualize relevant outputs




***External optimizer selected for discrete optimization**

# Solution Overview: System Architecture – Benefits

1. **Usability:**
   - UI provides enhanced user experience for non – simulation engineers. It hides the complexity of the backend and allow easy interactions with data and the simulation model.

2. **Data Management:**
   - Better process to manage data ingestion and visualization
   - Better performances

3. **Scalability:**
   - Possibility to easily scale up the solution to manage multiple scenarios and different data sets.

**AnyLogic** has been identified as the best simulation software to be used thanks to its:

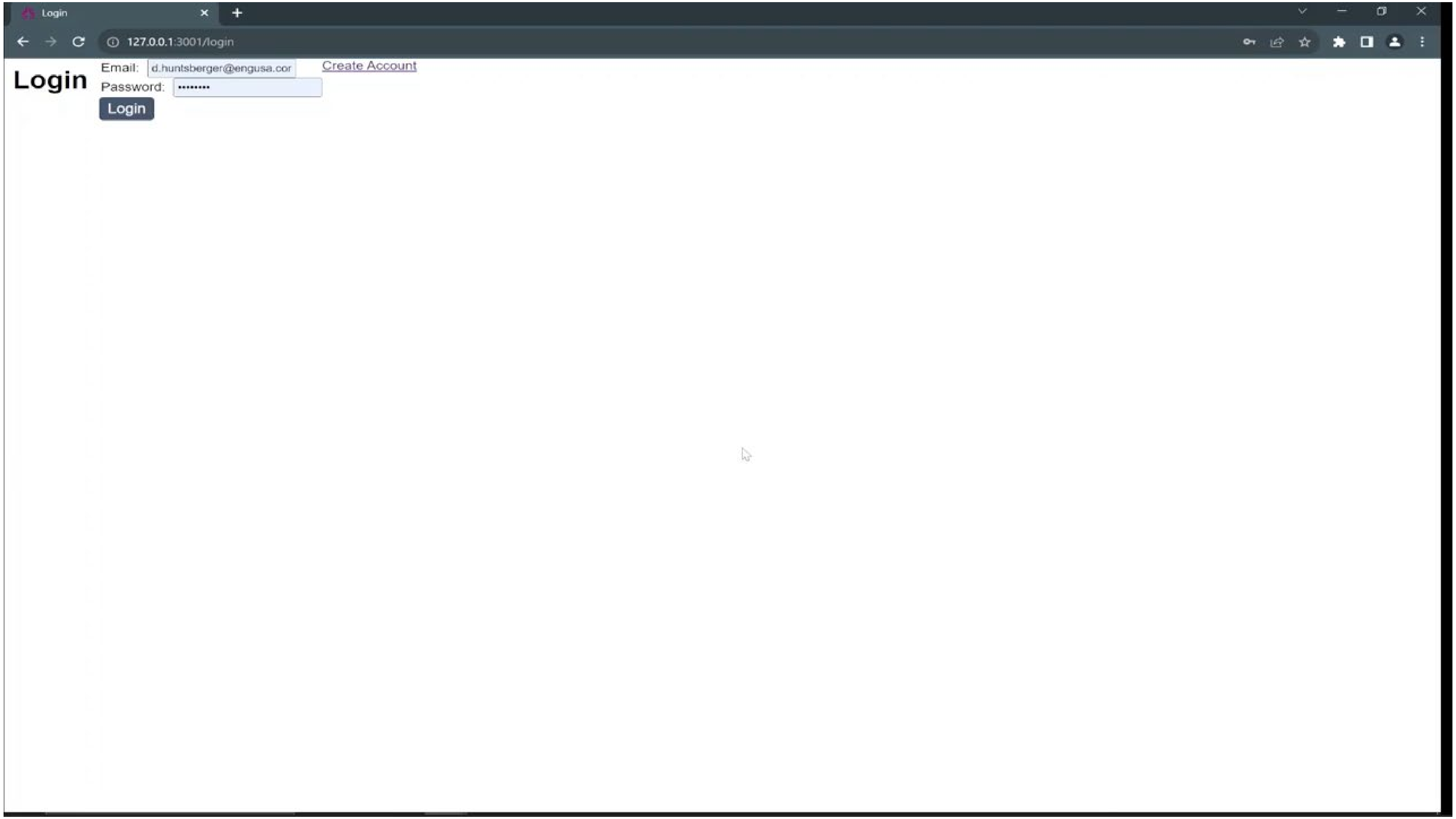
- **Flexibility:**
  - Allow to effectively model customer specific manufacturing processes
  - Support Objective Oriented Programming principles (Data Driven Model creation)

- **Scalability:**
  - Support different deployment configurations: from Single Computer to Cloud Installation (Model Manager)
  - Ease of integration with external relational Database

# Solutions

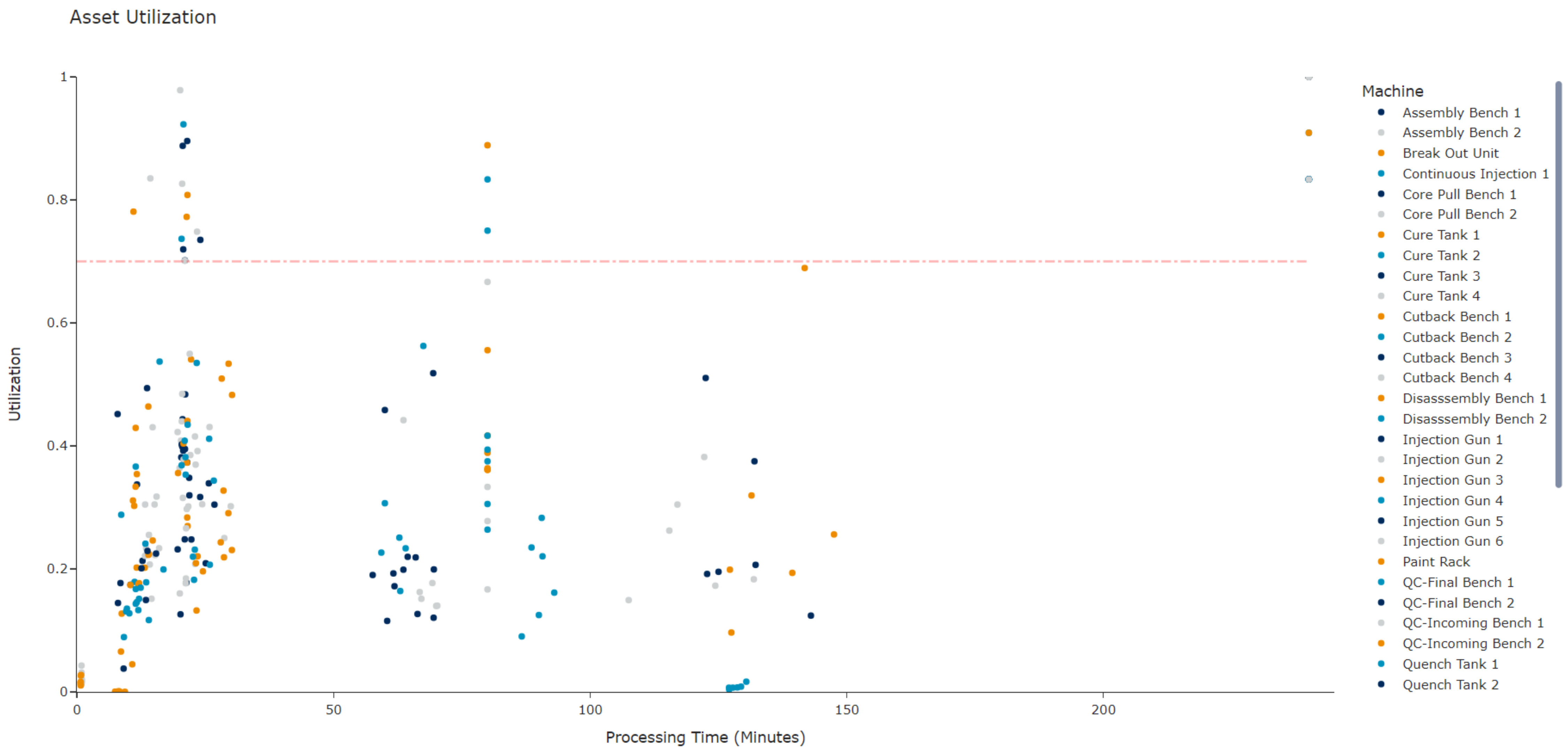
Mockups & Videos

# Solution Mockups & Videos



# Solution Mockups & Videos





# Key Takeaways

## Business Benefits & Next Steps

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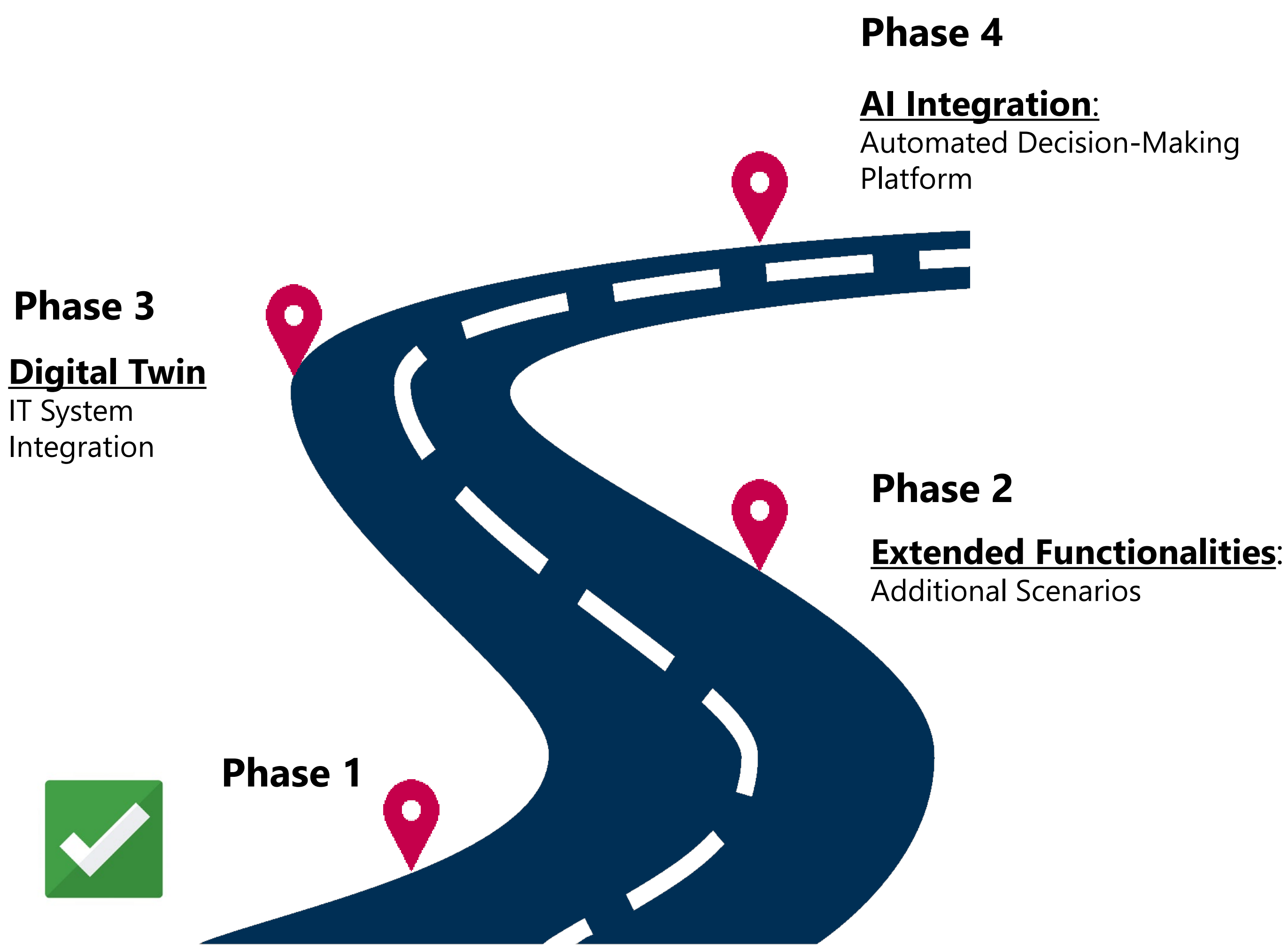
## Business Benefits

- Increase Production Performance and Efficiency
- Reduce Scheduling Time
- Improve Customer Service

## Next Steps: Digital Twin Roadmap



# Q&A

**Any Questions?**

# Thank you.

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