

SAVE

ANIE
AUTOMAZIONE



Digital Twin – Risks reduction for the plant

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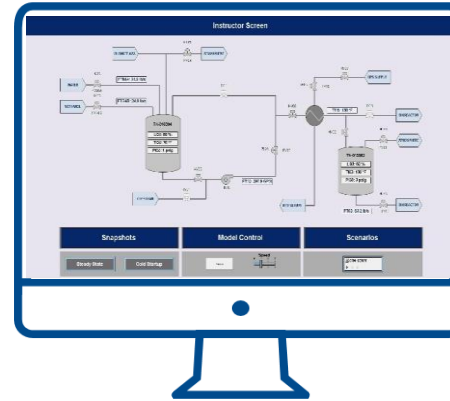
EMERSON™

What is the Virtual Plant?

Real World



Virtual Plant



- P&ID's
- Data Sheets
- H&MB & Process Data
- Reactor Correlations

**Control System
Hardware**



**Operator
Console**



Process Simulation

Digital Twin Process Modeling

 High Fidelity

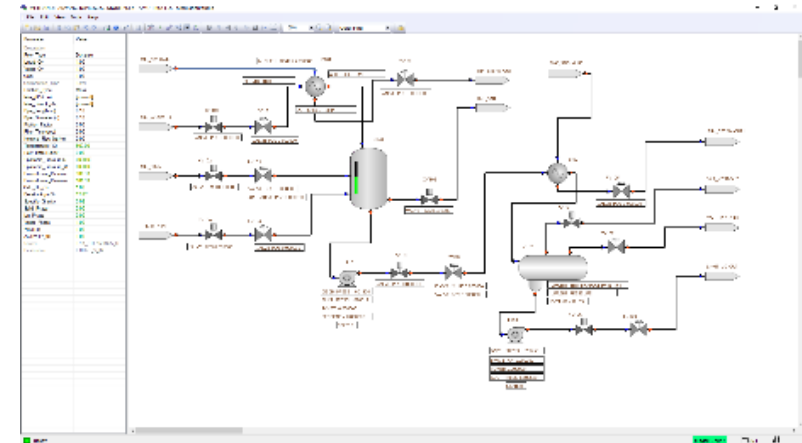
 Medium Fidelity

 Low Fidelity

Process Simulator

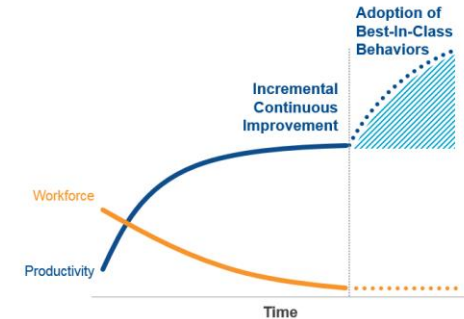
- + Unit Operation Library
- + Realistic Dynamics

- Kinetics, Thermodynamics, Hydraulics
- Equipment Models, Mass Heat Balance
- Instruments, Valves, Motors, Drives



What is the Digital Twin?

- The ongoing Digital transformation has changed the way we can do business.
- Improved accuracy of decision making and actions - right information in the hands of the right expert.....independent of their location.
- The Digital Twin is a software based representation of a physical asset, evolution of the virtual plant
- It allows the process to be simulated before being built, supporting engineering design & testing well before construction has begun. This allows the process and design to be optimized early in the project lifecycle.
- Once the process is constructed, real time data from the field can be used to further enhance the digital twin, supporting the ongoing optimization of the process.



5 ESSENTIAL COMPETENCIES OF DIGITAL TRANSFORMATION

Automated Workflow

Decision Support

Workforce Upskilling

Mobility

Change Management

Digital Transformation



IMPROVE
Plant Performance

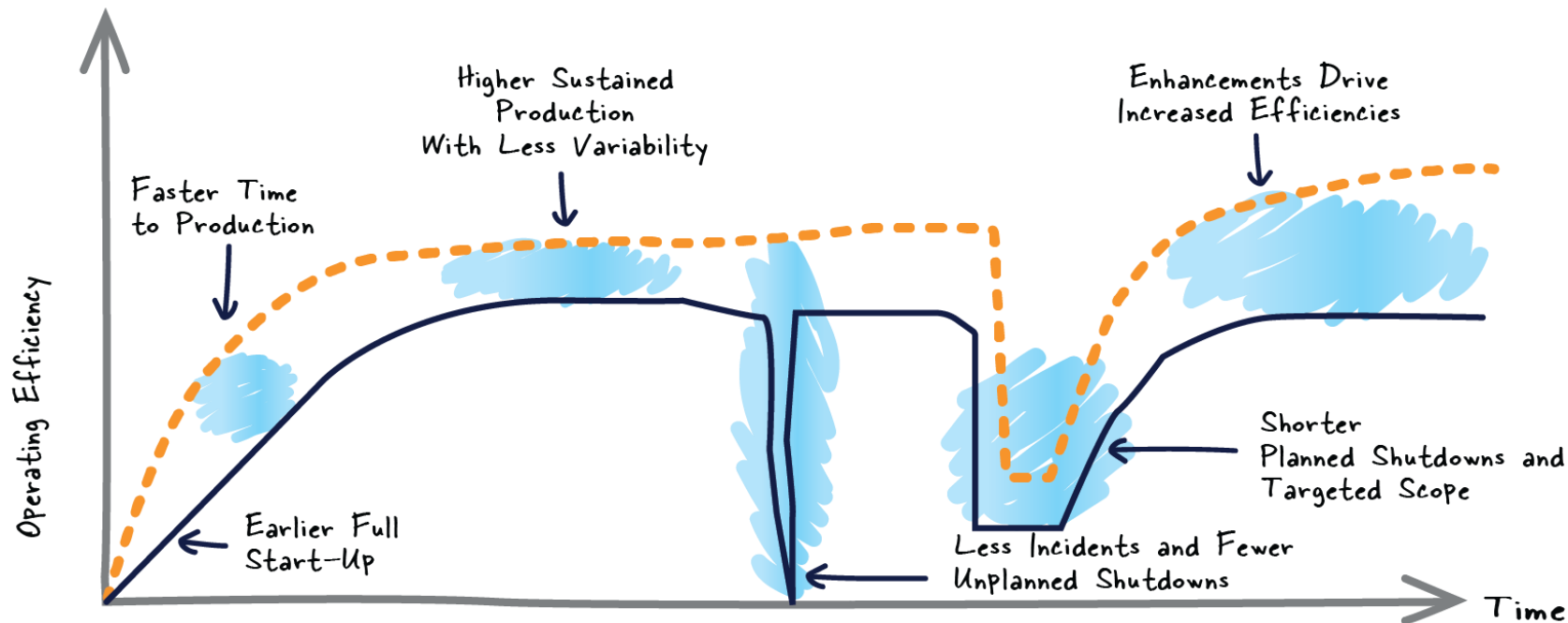


REDUCE
Downtime



MITIGATE
Safety Risk

The power of Digital Twin



Digital Twin



Maximize Safety, environmental compliance and profits

Digital Twin for Process Industries



Chemical



Food &
Beverage



Life
Sciences



Mining



Pulp &
Paper



Upstream
Oil & Gas



Refining &
Petrochem



Industrial
Energy
& Onsite Utilities



Power
Generation



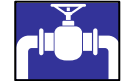
Water &
Wastewater



Reservoir
Management



Pipeline
Management

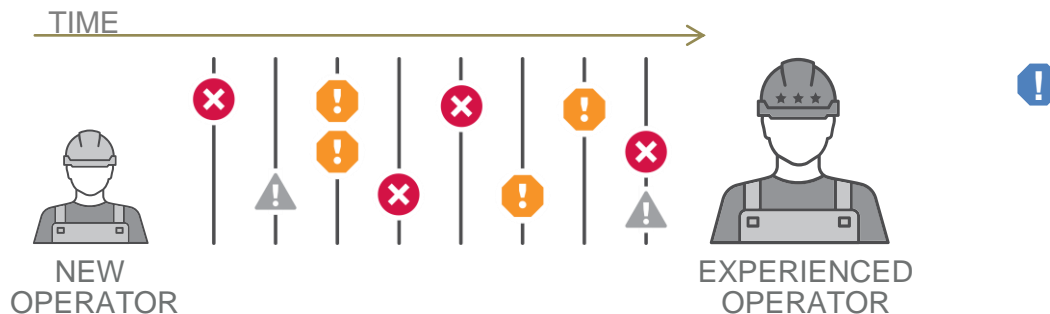


6^{TO}7
YEARS

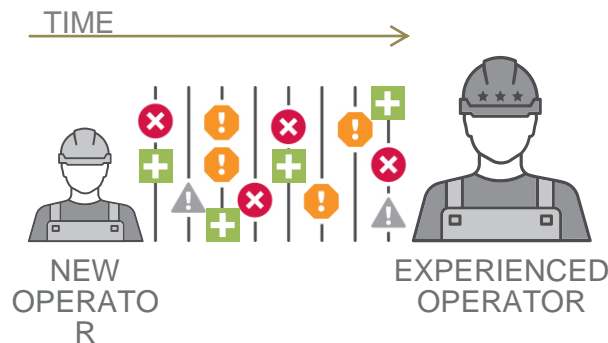
It takes an average of six to seven years to develop new employees into autonomous petrotechnical professionals who can make non-standard, original decisions.

2010 SBC Oil & Gas HR Benchmark, Schlumberger Business Consulting Energy Institute, March 2011

Digital Twin is Critical to Workforce Upskilling and Operational Performance



New Way



A more complete model can **simulate more** abnormal situations faster.



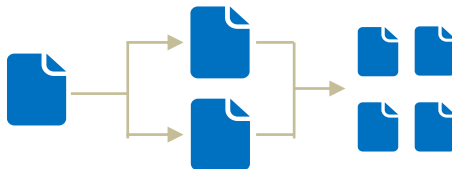
ACCIDENTS
DURING TRANSIENT TIME

A typical refining facility will spend less than 10% of its time in transient operations. However, 50% of all process safety incidents occur during this time.

"Tame Your Transient Operations," Chemical Processing. June 2010.

Digital Twin is Critical to Safe Operations

Without a complete picture of the operation, a plant is brought back online with manual processes.



MANY MANUAL
PROCESSES



MANY OPERATIONS
PERSONNEL

New Way



AUTOMATE
D
PROCESSE
S



HIGHLY TRAINED
OPERATOR

A more complete
and up-to-date model
**enables digital
workflows.**

Combined execution tasks



Augmented reality for maintenance



Maximize the Digital Investment Value

Engineering Environment

control systems connected with experts, regardless of location

Process Control Design

design, build, and test control strategies

Operator Training Simulator (OTS)

virtual training to prepare operators for abnormal situations

Process Optimization

develop and test process improvements off-line

Operating Models *Process Dynamics*

Data Structures *Physical and Operating Parameters, Configuration Data*



A DIGITAL TWIN...



Represents assets in the physical world with a digital model



Looks and feels like the real environment



Simulates that model forward with varying degrees of fidelity



Is NOT just a data model. It must include relational interaction



Connects with relevant time data to ensure the model mirrors reality



Thanks