

# Increased Operator Competency and Reduced Human Error, due to Enhanced Reality Technology.

Bas Janssen

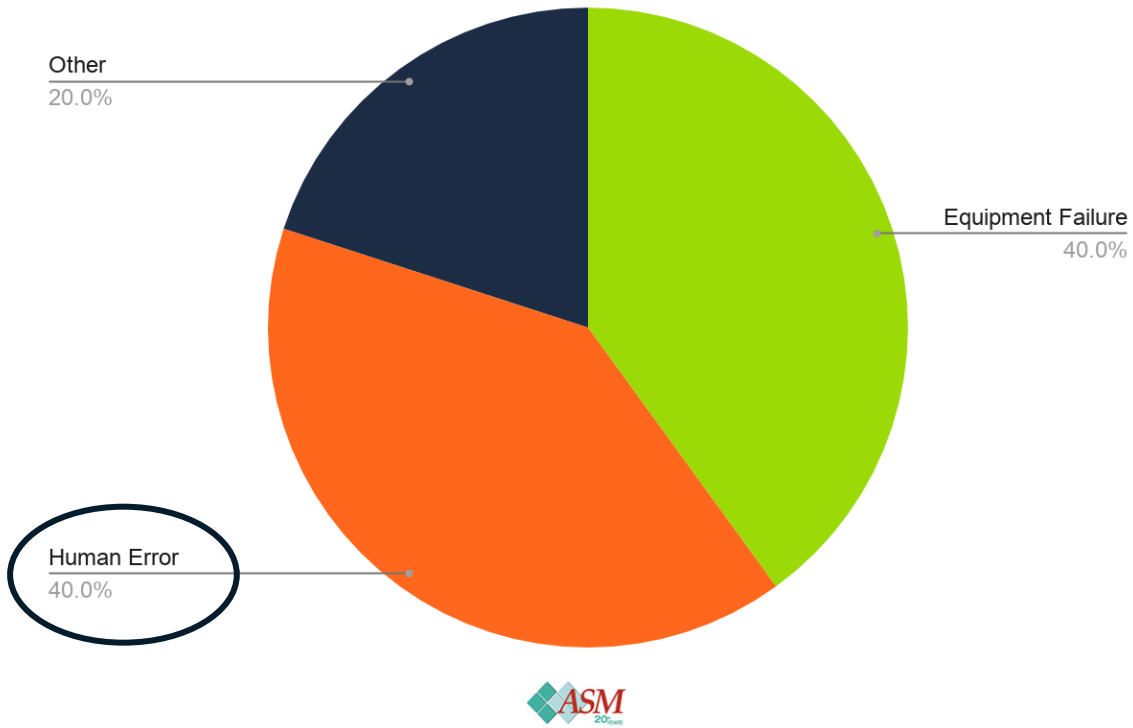
Voovio Technologies

Process Safety Congress, Dordrecht 14-05-2025

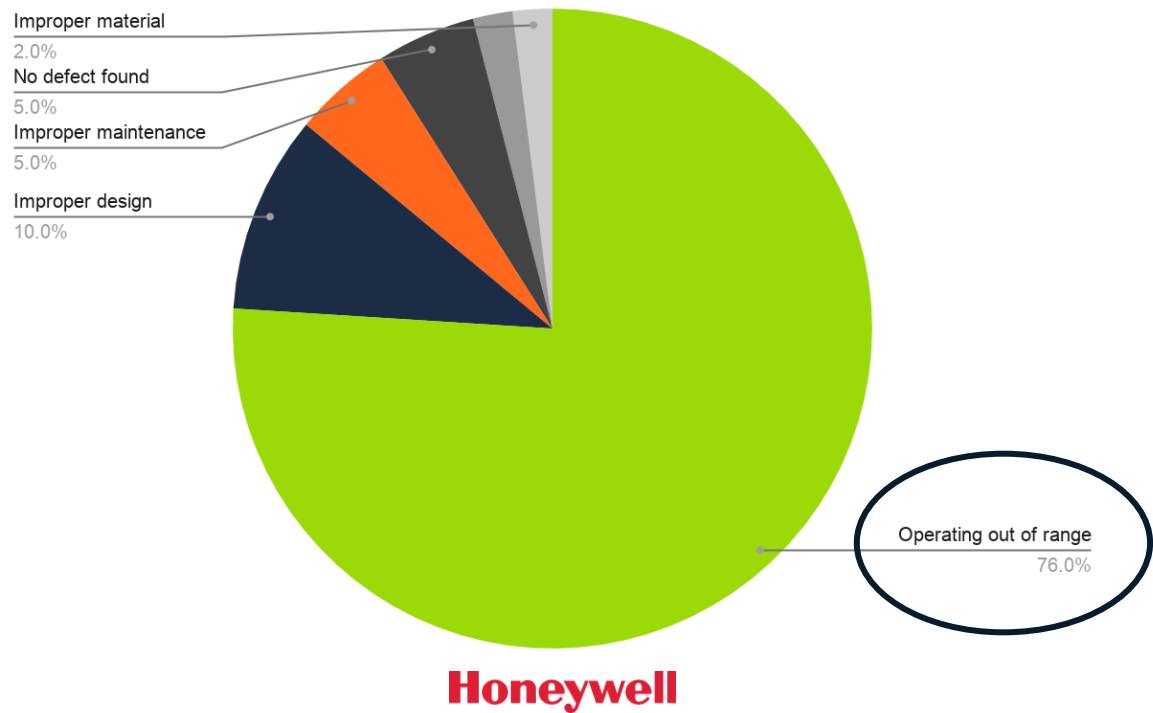


# Human Reliability & Procedure Quality are major contributors to process upsets & equipment failure.

Causes of Process Upsets



Causes of Equipment Failure



The background of the slide is a photograph of an industrial facility, likely an oil or gas processing plant. It features a complex network of white pipes, valves, and structural steel. A worker in a red protective suit is visible in the center, standing amidst the machinery. The entire image is overlaid with a semi-transparent dark blue filter.

**Technology & automation will  
not solve human reliability issues.**

**“40 - 60% of field operator tasks are not automatable.”**

McKinsey  
& Company

**It's not just about money...**

**Quotes from CSB's final report on the fatal acid release at LYB La Porte (2021)**

*"[...] The recurrence of these types of incidents points to the need to further re-design plug valves so that it is more difficult to remove pressure-retaining components while attempting to remove actuating equipment."*

*"The recommendations seek to address gaps in equipment design and labeling, procedures, communication of past incidents, and worker training."*

*"The CSB found that both the company and the contractor considered the removal of the actuator a simple task and did not provide the work crew with any sort of procedure or training."*

**Don't over-rely on inherent safety, people still matter!**

[https://www.csb.gov/csb-releases-final-report-into-2021-fatal-acid-release-at-lyondellbasell-la-porte-complex-in-la-porte-texas-/](https://www.csb.gov/csb-releases-final-report-into-2021-fatal-acid-release-at-lyondellbasell-la-porte-complex-in-la-porte-texas/)



# Procedure clarity: very common and very open-ended...

1 step



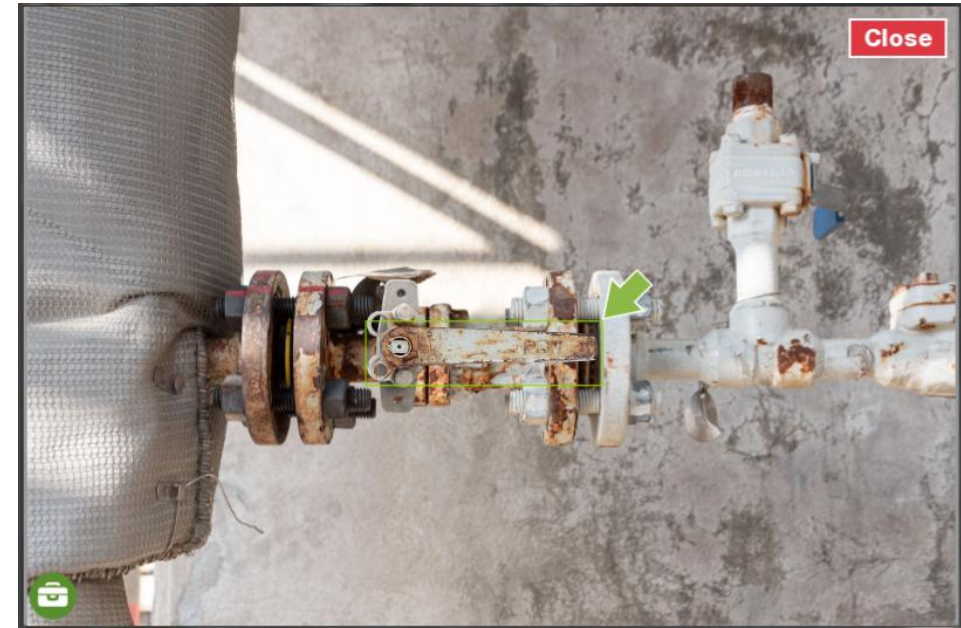
53 actions

Actuating 15 different valves

**MANUALLY FLUSH** all CTO's, top/bottom flushes, bypasses around flush flow meters, and any other isolation flush valves

## CAUTION

Failure to properly flush all CTOs may result in a reactor poisoning event



# Operation Errors: Procedure Clarity or Operator Execution?

## Procedure Clarity

- Ambiguities and generalizations
- Assumption that operator already knows how to do it
- Procedure does not reflect practices
- Mismatch between assumed and actual qualification level of the operator

## Operator Execution

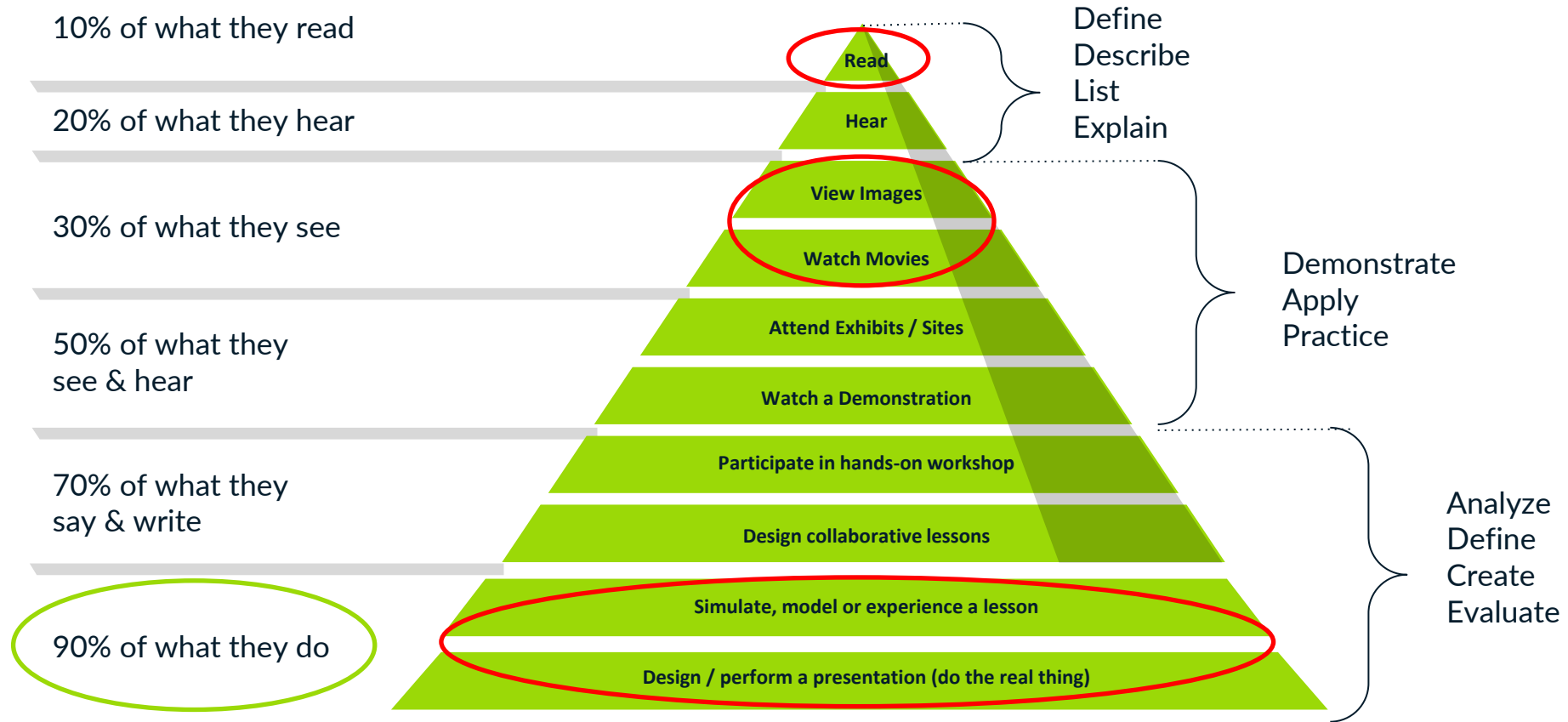
- Didacticts – SOPs hard to digest
- Execution not standardized across shifts
- Mass retirements, high turnover – SME's overwhelmed by training needs



**It's not either or, it's both!**

# The Power of Simulation.

People generally remember...



The Learning Pyramid

Let's see a demo.



YouTube video links:

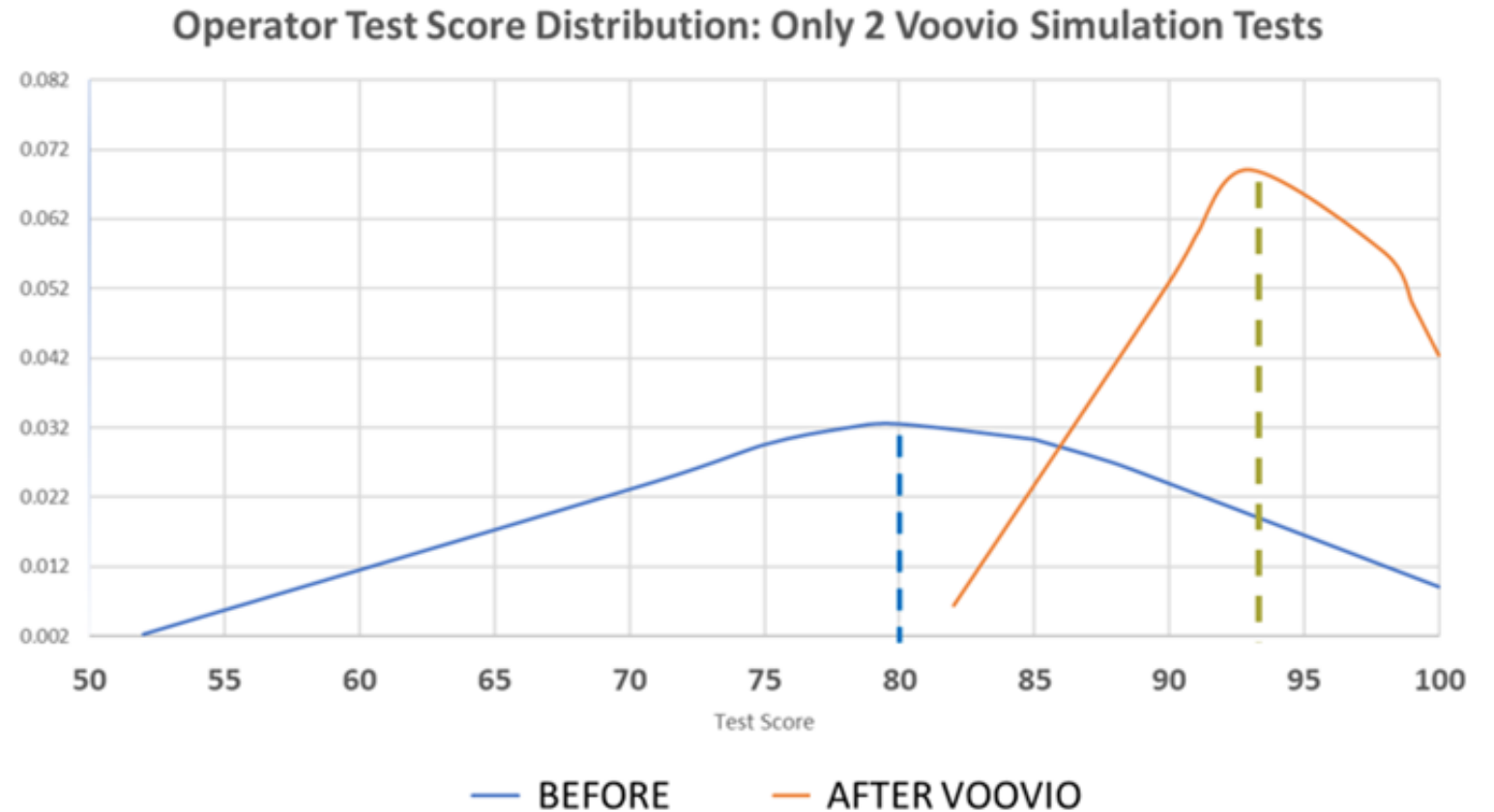
[Voovio | Solving Manufacturing's Biggest Challenges](#)

[What Voovio customers say about the Skills Gap](#)



# 1st Workforce Performance Data

- Data from 14 customers
- 1 critical SOP was assigned to each **qualified** operator.
- 1 month of autonomous practice.



# Visit our booth 5!



# Impact.

# Onboard faster & ease pressure on SMEs.

Impact on	Benefit	Time Required	
		Voovio	Traditional
Procedure Competency	65% faster	3.30 hours	9.75 hours
SME / Trainer Time	>73% reduction	2.25 hours	8.25 hours

- Controlled experiment at major Texas Petrochem facility with input from Rice university, Houston TX – June 2021.
- 24 operators, split into 2 groups, learned 2 SOPs in 2 days. No experience in that production unit prior to exercise.
- Traditional method: classroom, review P&IDs/SOP, field walkthrough
- Voovio method: Voovio Guided/ Learn, field walkthrough

# Standardize Training & Best Practices.

Challenge	Impact
Standardization in Procedure Execution	Locks in best practices across shifts
Unplanned downtime due to procedure execution	Fewer unplanned events with est. savings \$50k to >\$500k per procedure per year
Not enough SME time for training	50% reduction – free SME up for important knowledge transfer
Qualification time too short to learn everything	Reduced time to qualify by 30% while increasing competency
Overtime on training	50% reduction

\*Presented by BASF at AFPM Reliability and Maintenance Conference 2019 – confidential – do not share without permission





# loading racks have fewer issues with 3<sup>rd</sup> Party Drivers.

150 trucking companies, >900 drivers

## Before Voovio:

- Shadowing time and frequent incidents

## After Voovio:

- Drivers:
  - are better prepared
  - are more familiar with equipment/site
  - recognize issues early
  - give better feedback on issues

Time savings for operators:

**75-80%**



Calumet Operations Manager: *"This is now an area we worry less about. Life is a little easier!"*

# Refinery – fewer environmental releases.

## Site:

- Refinery

## Challenge:

- Eliminate loss of containment of process materials resulting in reportable incidents and regulatory fines
- Procedure generalizations
- Lack of exposure to entire startup procedure and lack of competency

## Use of Enhanced Reality/improved clarity:

- Line Walk process to create action checklist clearly defining all release sources
- Practice procedure simulators prior to procedure execution
- Field execution tool

## Main ROI contributor:

- Elimination of environmental releases



# Technical Gases Plant – fewer pump failures.

## Site:

- Plant / Support process for refinery

## Challenge:

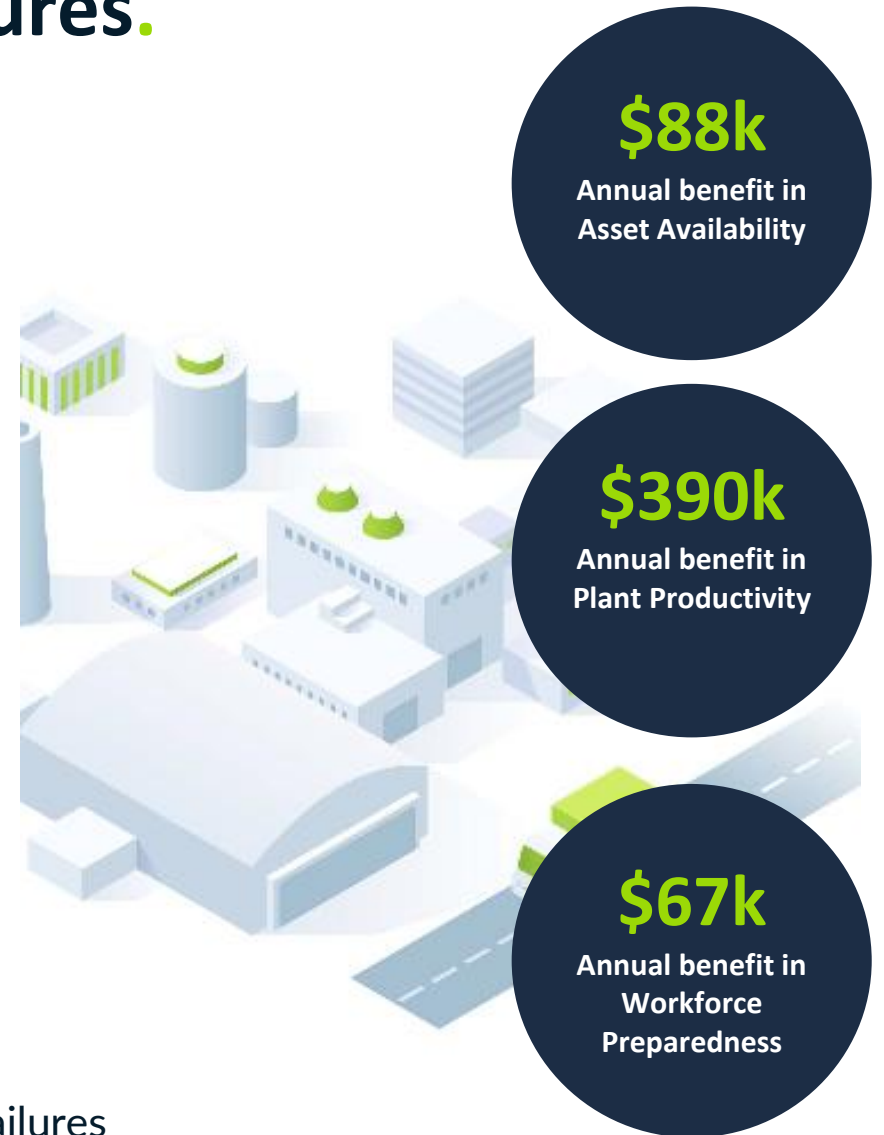
- High attrition: Improve operator onboarding efficiency and reduce costs. Impossible to expose operators to all SOPs.
- Unplanned downtime related to boiler feedwater (BFW) pump failures related to mis-operation

## Use of Enhanced Reality/improved clarity:

- BFW training/refresher prior to execution
- Visual, action checklist provides clarity for inexperienced operators
- Onboarding curriculum for new operators

## Main ROI contributor:

- Increased organizational productivity and reduction of unplanned failures



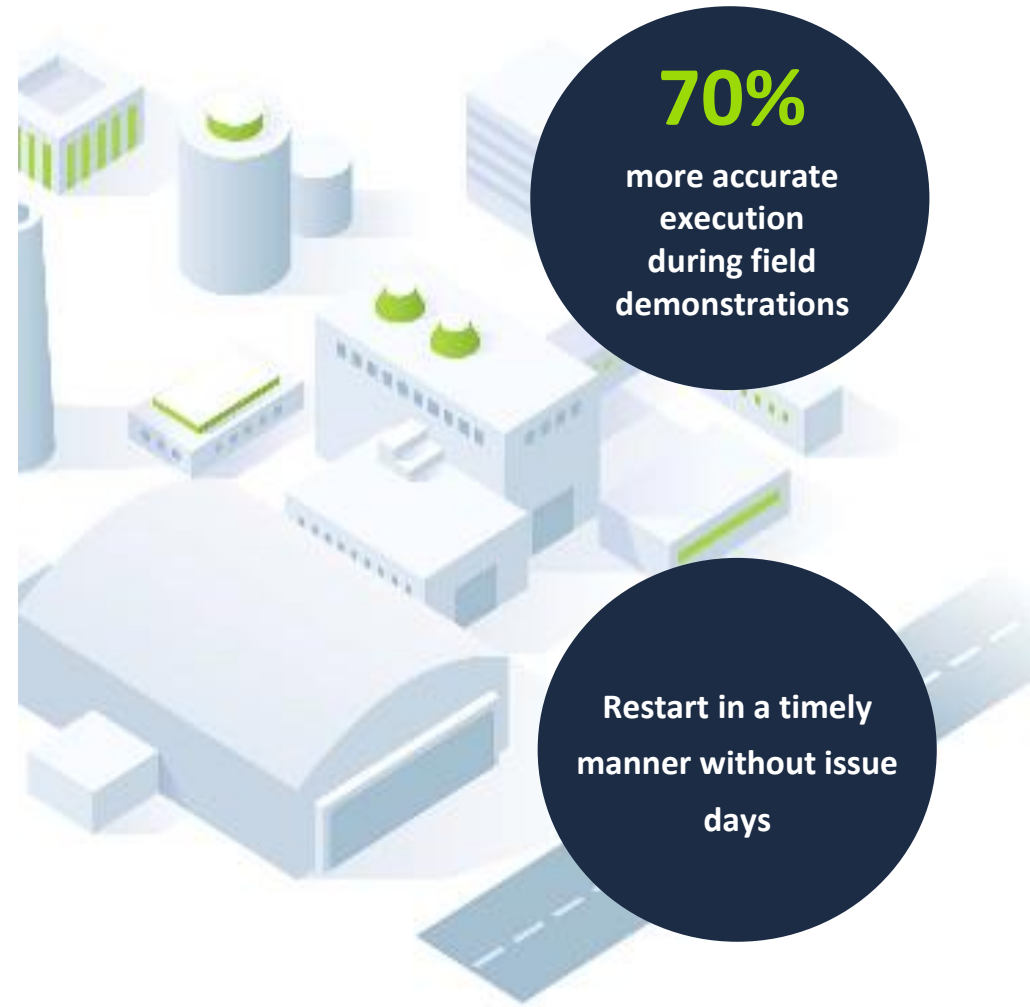
# More familiar with equipment and actions.

## Major Refinery

- **Procedure:** Emergency Procedure- Feed Diversion to Hot Standby
- **Comparison:** Operators practiced Voovio simulators vs operators participating in monthly Tabletop exercises.
  - Voovio group demonstrated **70%** more accurate execution during field demonstrations.

## Large Petrochemical Facility

- **Procedure:** Startup following weather event
- **Site Issue:** Sister units with similar assets were down due to the 2021 Freeze, 'Storm Uri'.
  - The unit that employed Voovio simulators restarted in a timely manner without issue days ahead of the sister unit.



# Feedback.



# Operator Trainee Feedback:

*"I think I could go out into the field right now and startup the Extruder. I feel now very familiar with the area and procedure."*



*"This is engaging. Reading a procedure is not engaging. This is the most engaging and effective training I have ever done."*

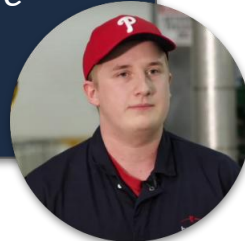


*"We went through the SOP in about 10 min in the field because we already were familiar with the area and the SOP. The trainer couldn't believe it."*

*"When we were out in the field, we knew where everything was and felt familiar with the area. I like the way you learn the detail and sequence of a procedure, so when you're in the field training you learn new things faster and retain the info better because you're more familiar."*



*"When we were out in the field, we knew where everything was and felt familiar with the area. I like the way you learn the detail and sequence of a procedure, so when you're in the field training you learn new things faster and retain the info better because you're more familiar."*



*"I feel better armed and have more confidence because I was able to practice in Voovio first."*



# Trainer Feedback:

*"Trainees can see and operate the equipment virtually, having direct report back to how they are performing. Instead of me walking a student through a process 40 min individually, I can now have 16 students do the same task at once. It's a timesaver! It could shorten our training from 6h to 40 min."*



*"I was fairly impressed with the thought process of how Voovio trains a new operator. It is a really unique approach. My opinion has only changed by getting stronger because after learning how to operate Voovio, I've really seen how it can do a lot of great things."*



*"Voovio gives the opportunity for seasoned operators to ask questions, check things etc. whereas without Voovio you might not be willing to ask questions".*



*"It absolutely works. It is a legitimate tool and has a defined place."*



*"Well done. It was truly a noticeable difference" (between those who had used Voovio & those who hadn't)*



*"I think Voovio helped a lot for the trainees. There is a time factor when looking through procedures & trying to relate the real world to the procedures. Using Voovio provides clarity on what exactly needs to be done & helps create muscle memory."*

