

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

Bas Janssen

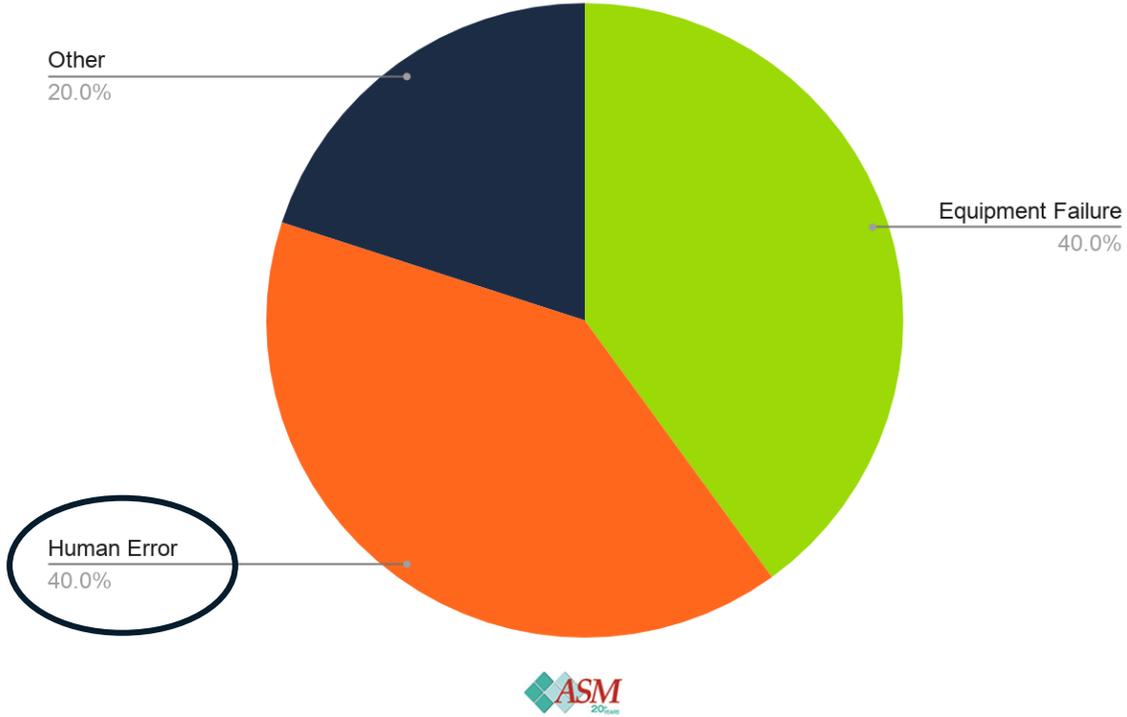
Voovio Technologies

Process Safety Congress, Dordrecht 14-05-2025

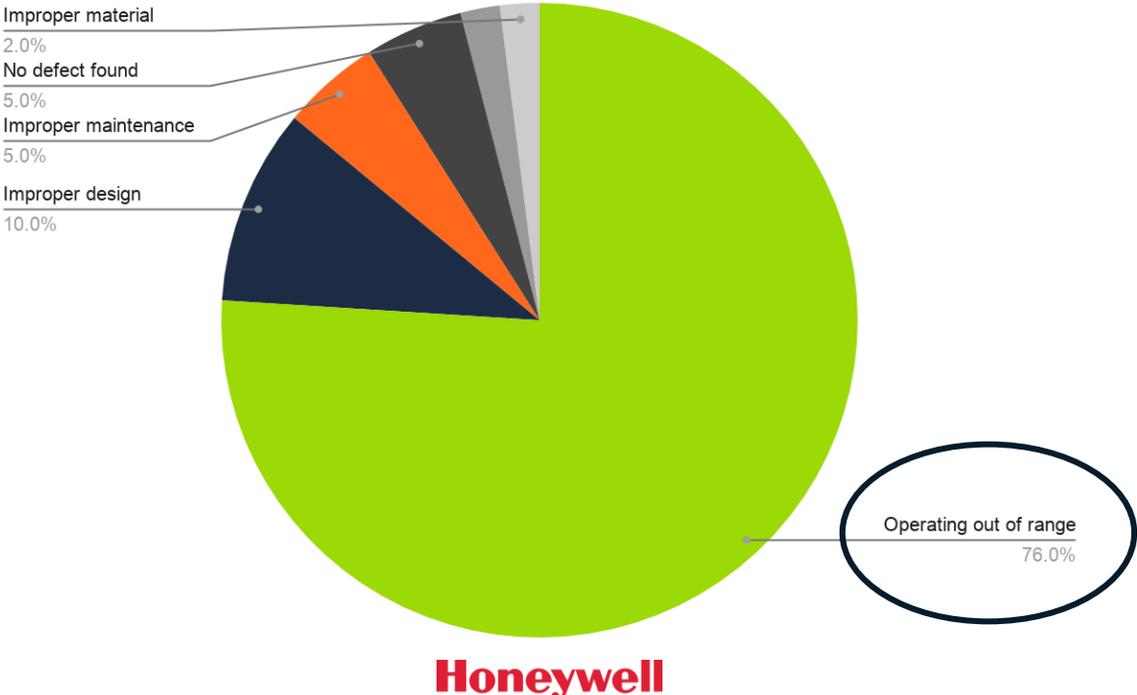


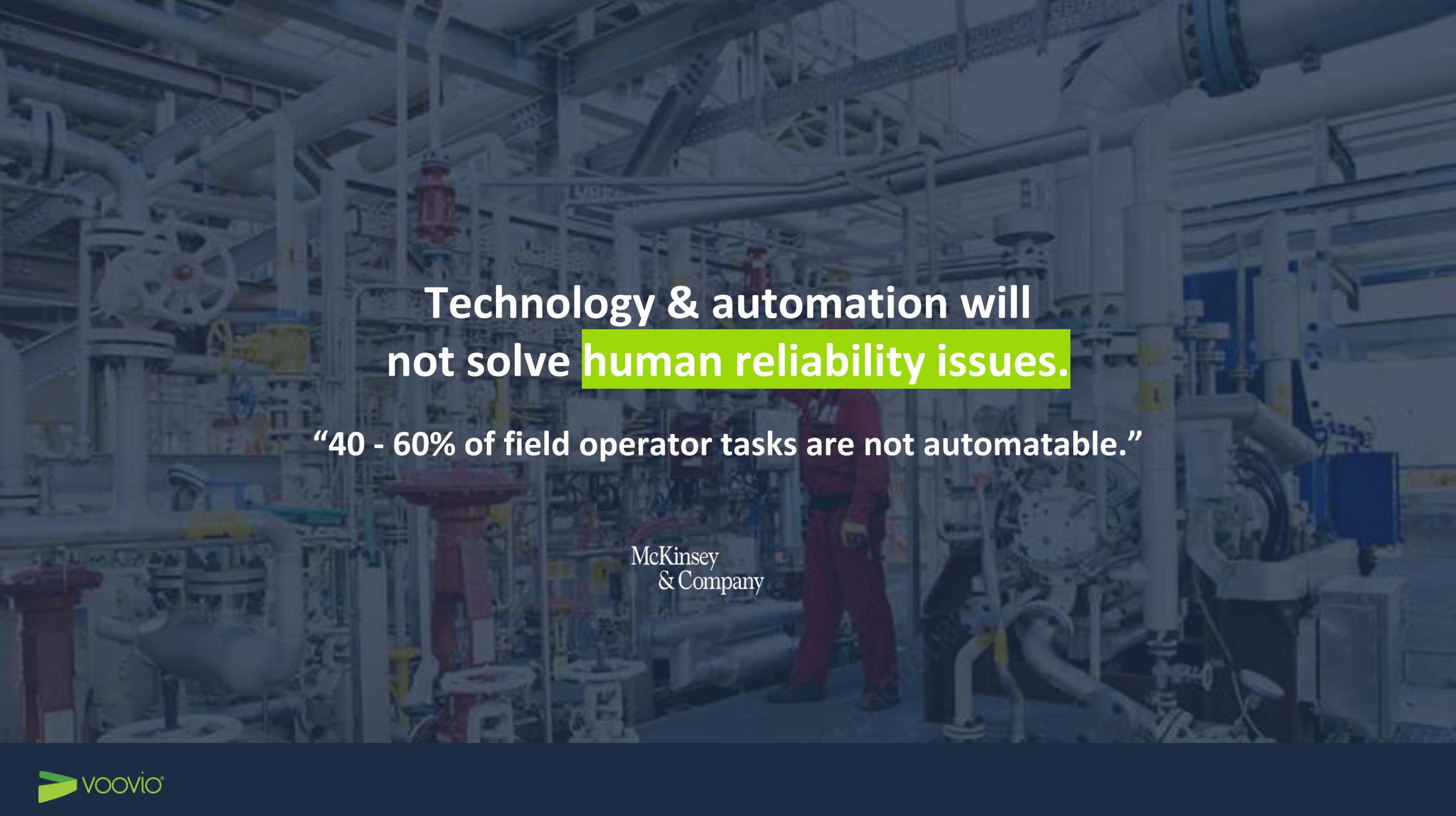
Human Reliability & Procedure Quality are major contributors to process upsets & equipment failure.

Causes of Process Upsets



Causes of Equipment Failure



A background image of an industrial facility, possibly an oil or gas processing plant, with a complex network of pipes, valves, and machinery. A person in a red uniform is visible in the center, working on the equipment. The image is dimmed to allow text to be overlaid.

**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/>

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

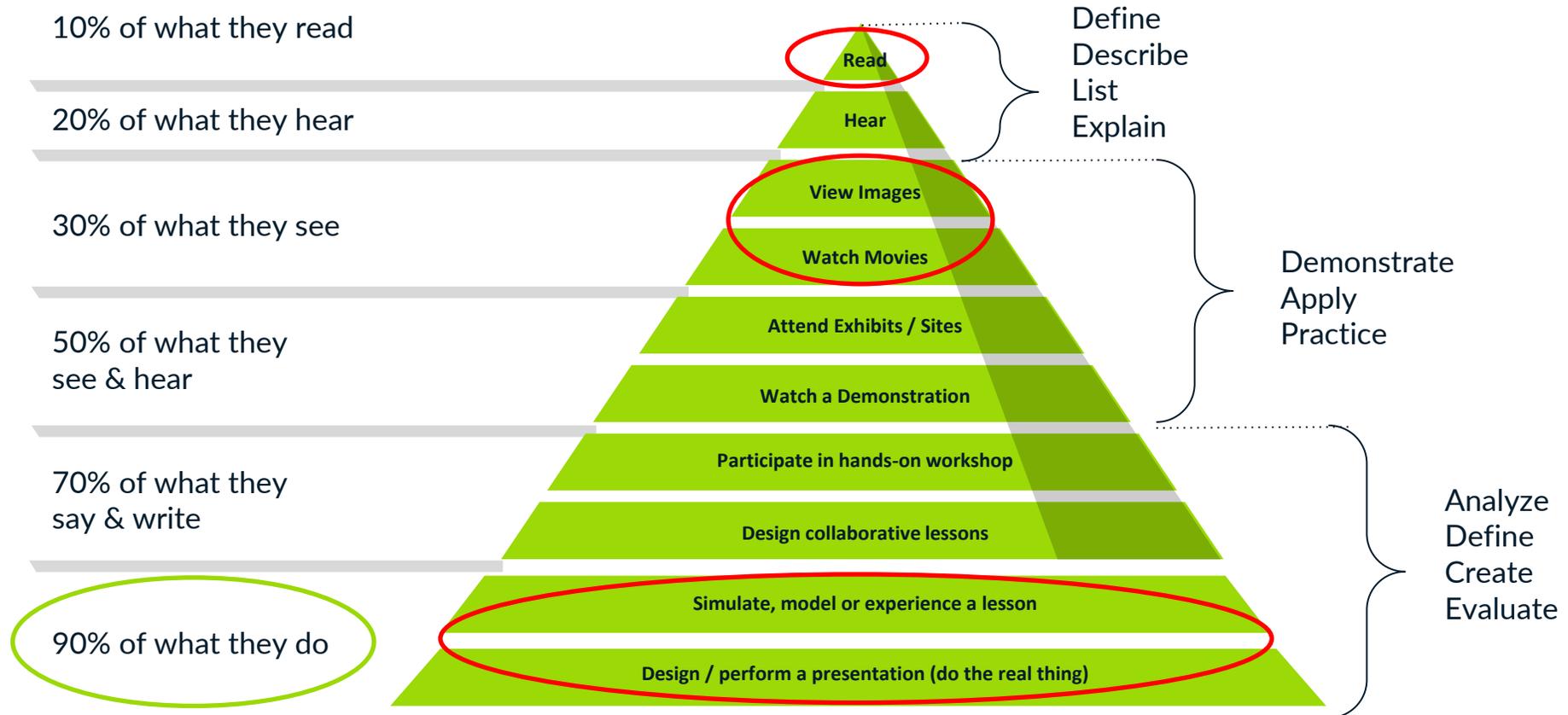
- Didactics – SOPs hard to digest
- Execution not standardized across shifts
- Mass retirements, high turnover – SME's overwhelmed by training needs



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

The Power of Simulation.

People generally remember...



The Learning Pyramid

Let's see a demo.



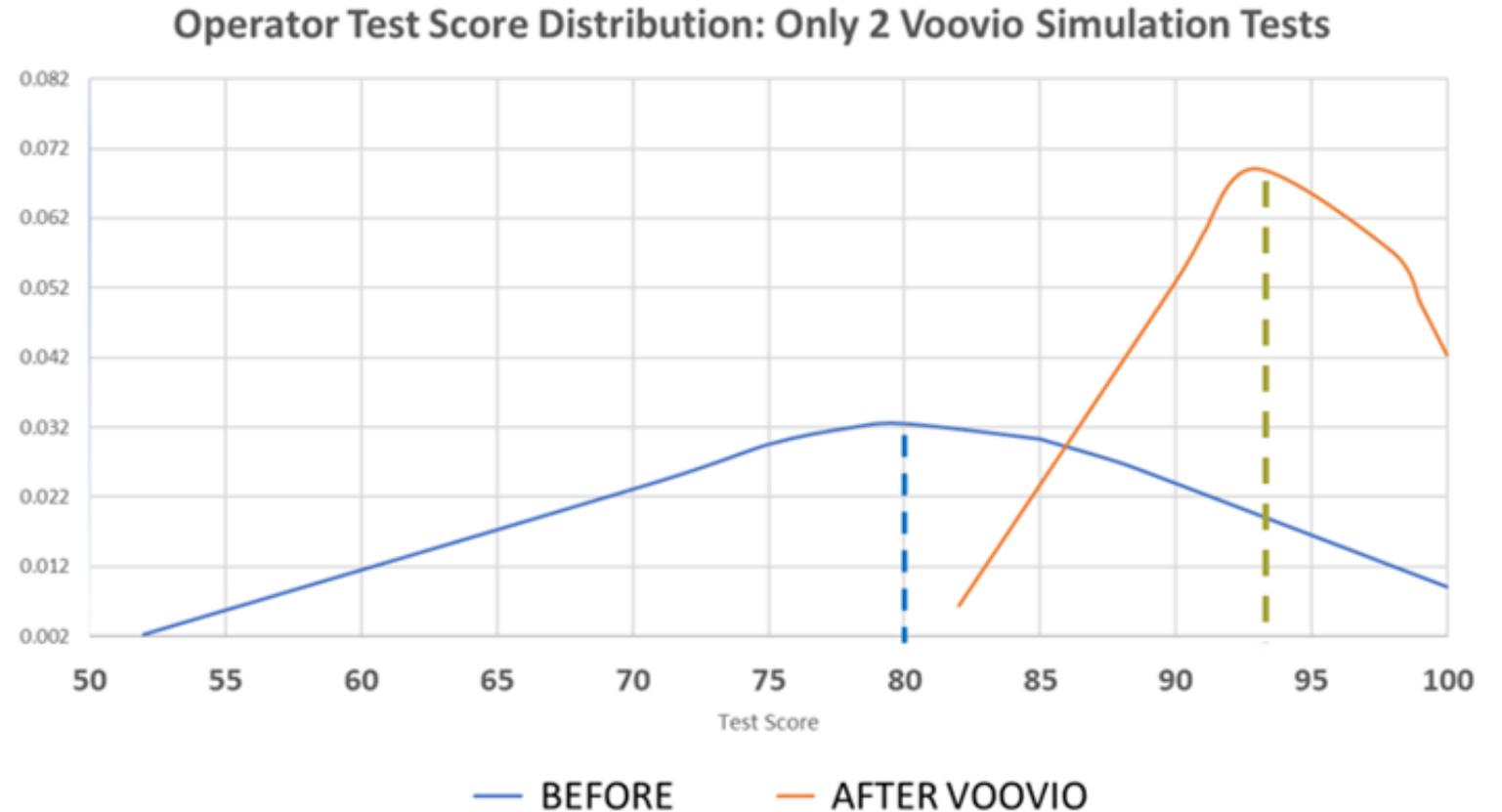
YouTube video links:

[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!

Logos and Company Names:

- SUNCOR ENERGY
- CALUMET SPECIALTY PRODUCTS PARTNERS L.P.
- Formosa Plastics
- TESLA
- Linde
- lyondellbasell
- covestro
- DOW
- PHILLIPS 66
- HALLIBURTON
- kuraray
- LBC TANK TERMINALS
- Westlake
- SHINTECH
- BASF
- وولام Celanese
- CRODA
- EASTMAN
- FIBER INDUSTRIES
- OWENS CORNING
- ERGON
- سابك sabic
- Chevron
- Renewable Energy Group
- LION ELASTOMERS
- Climax Molybdenum
- BASF
- Westlake Vinnolit
- بوروج Borouge
- HALLIBURTON

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 3rd 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:

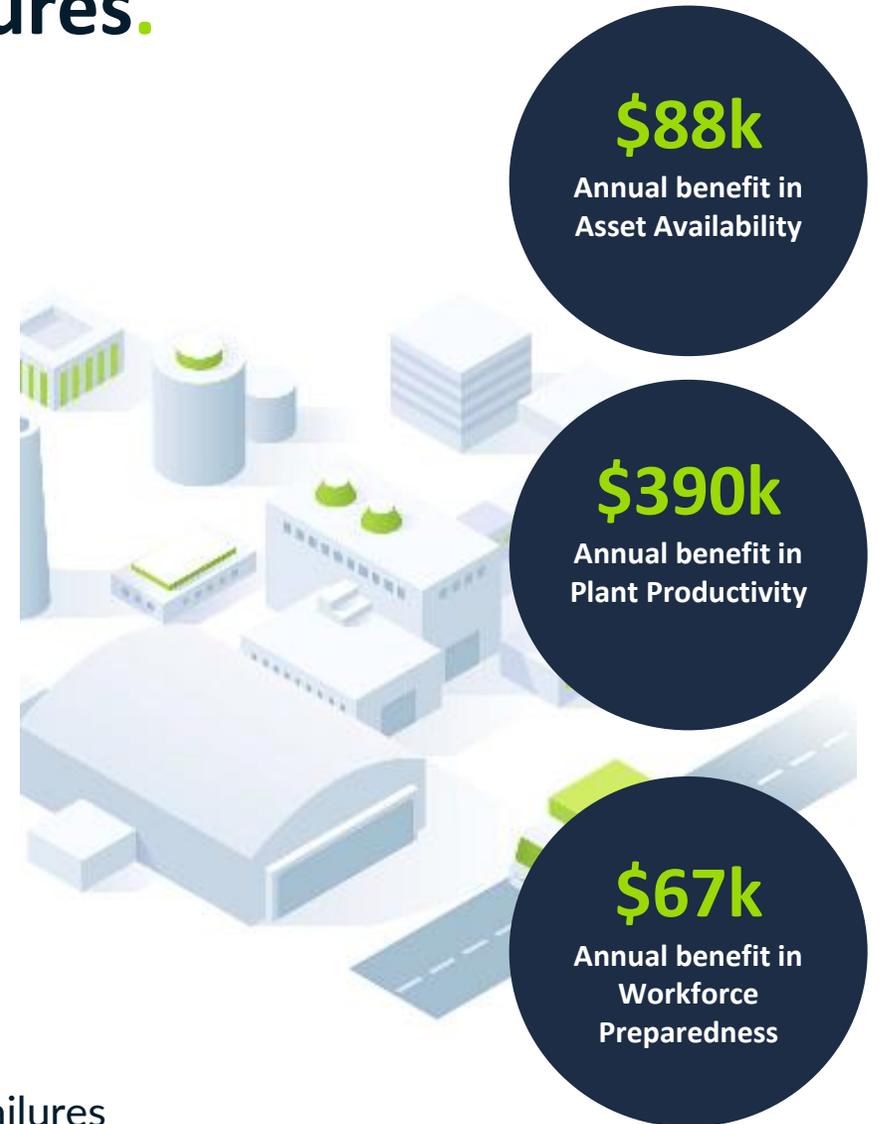
- High attrition: Improve operator onboarding efficiency and reduce costs. Impossible to expose operators to all SOPs.
- Unplanned downtime related to boiler feedwater (BFW) pump failures related to mis-operation

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



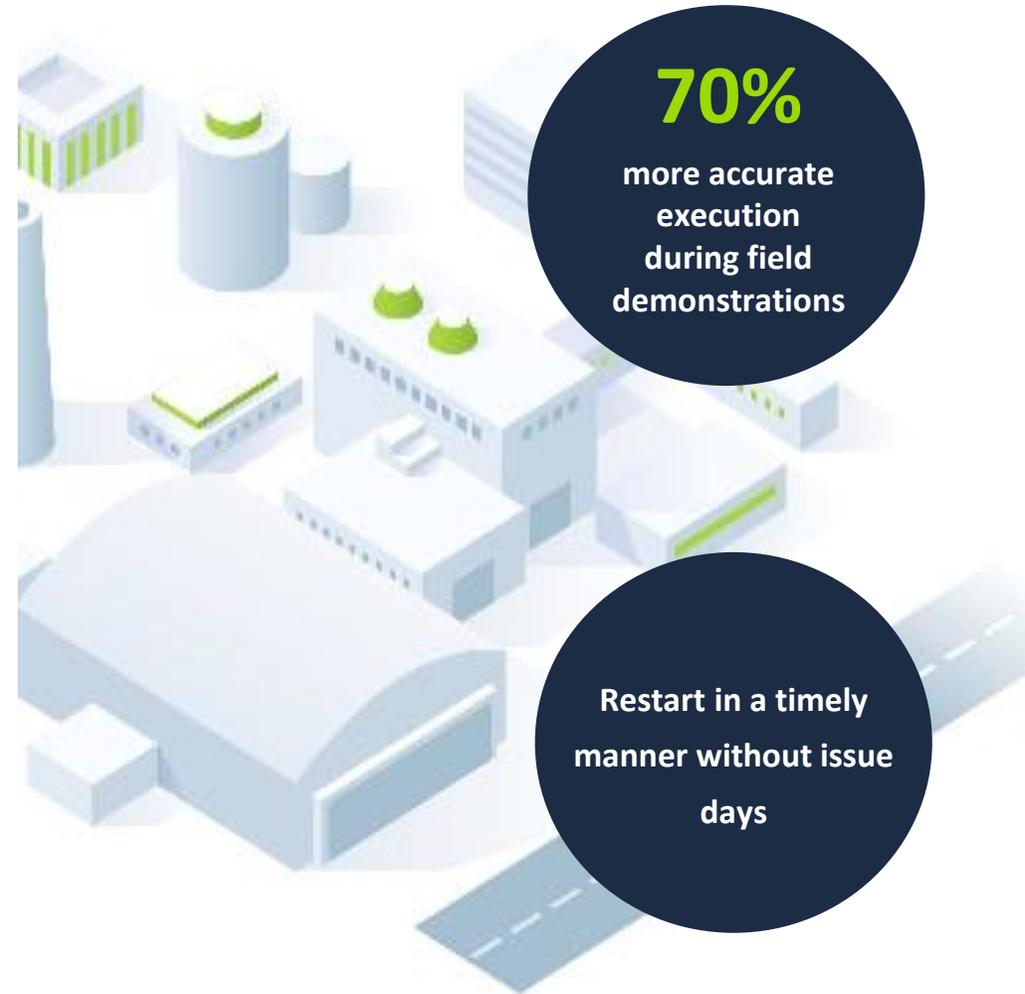
More familiar with equipment and actions.

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."



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"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."

