# VIGO

Comprehensive platform
for VR learning, training and guidance

# Contents

# 1. Abstract

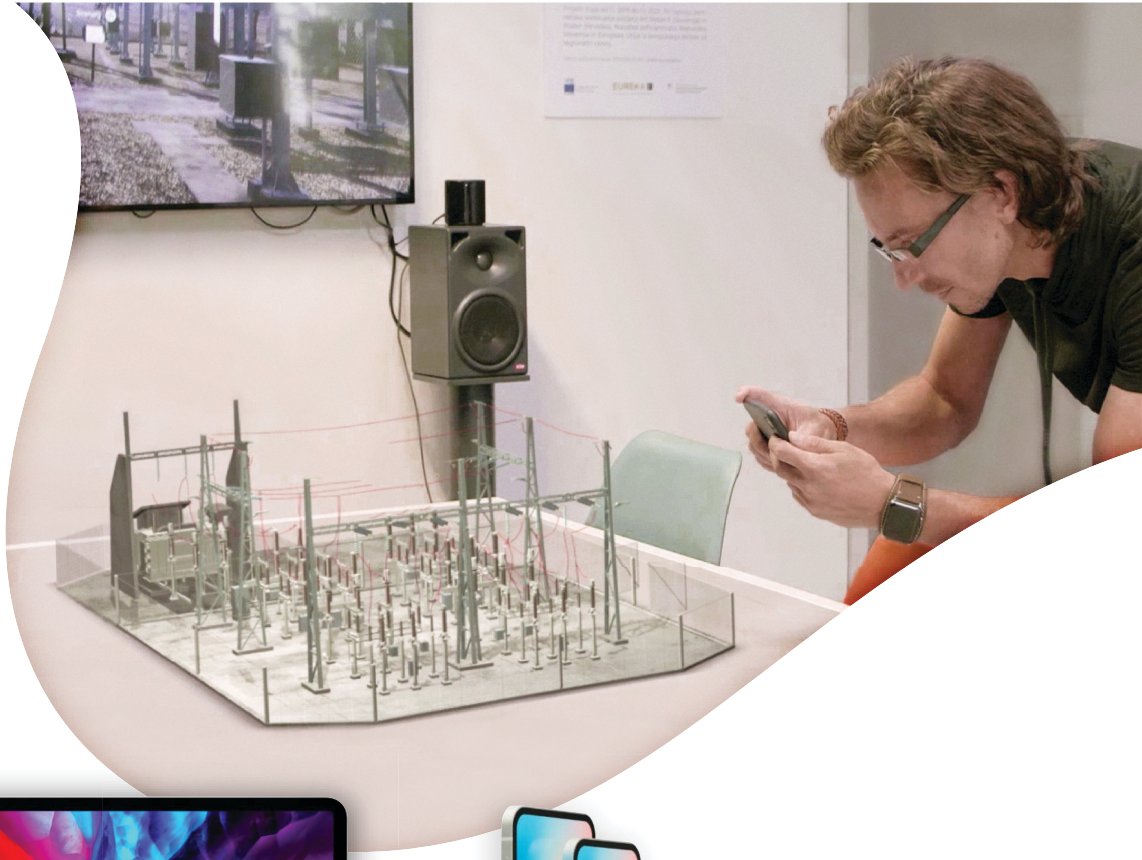
1.

This whitepaper will outline the »how and why« of enterprise training with VR. It will explain the problems that companies are currently facing within the training segment, the environments and tasks where VR training can provide support, as well as the concise benefits of the technology itself. It will also provide current use cases and the citation of studies that will lay an empirical foundation for its implementation. Finally, it will present our own software solution, VIGO; which can be safely utilized to incorporate VR training into business scenarios at low cost with high impact.

# 2. The technology

2.

***Virtual Reality (VR)*** can change the way the world is perceived since it immerses users into an computer-generated environment, which can be either imagined or a digital copy of the physical world. They are separated from the real world and transported to a virtual one, where they are able to interact with objects and places perceived with their senses.





# 2.

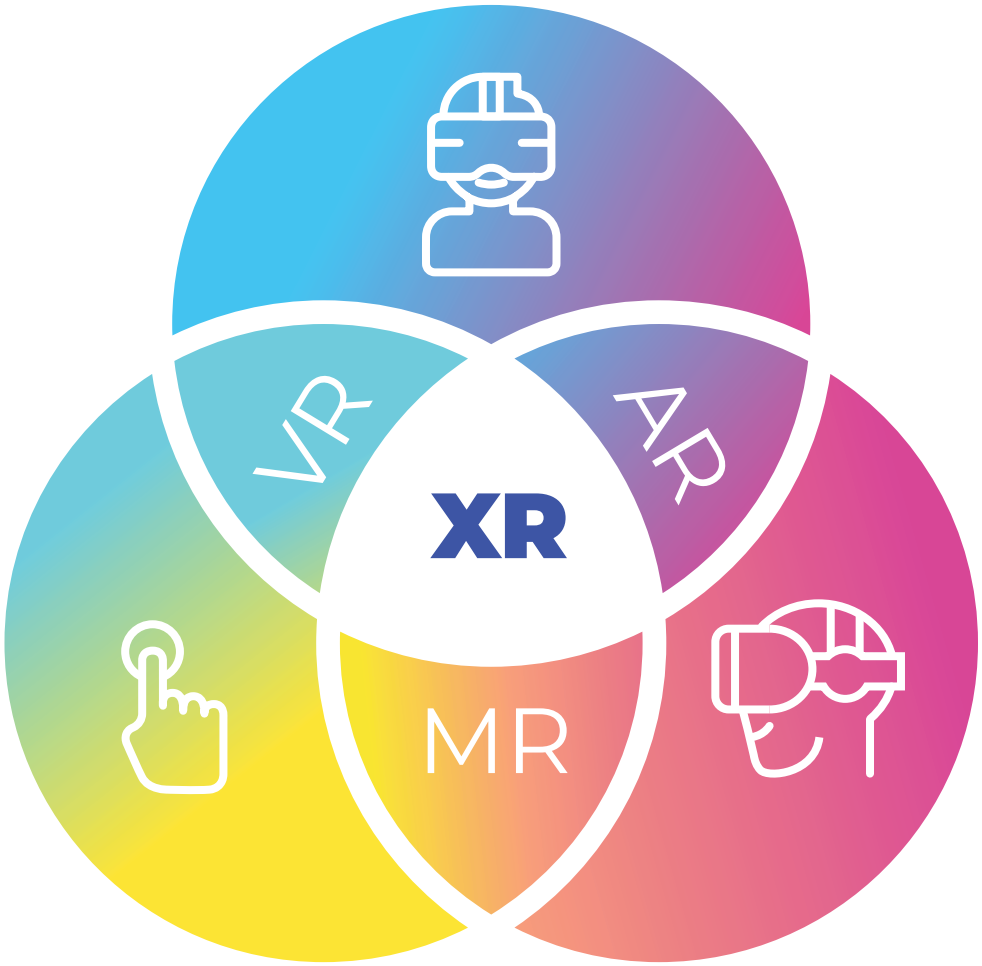
***Augmented Reality (AR)*** is where the digital meets the physical world. AR can be thought as an expansion of the user's environment, which is enriched in real time with superimposed digital models and information, such as texts, graphics and multimedia content. The aim of such technology is indeed to "augment" or, in other words, to enhance the user's physical world with contextual, significant and relevant information

*HoloLens 2*

***Mixed Reality (MR)*** integrates digital models into the physical world. Unlike AR, it enables users to interact with the artificial models displayed within their field of vision, thus making them aware of the environment around them.

2.

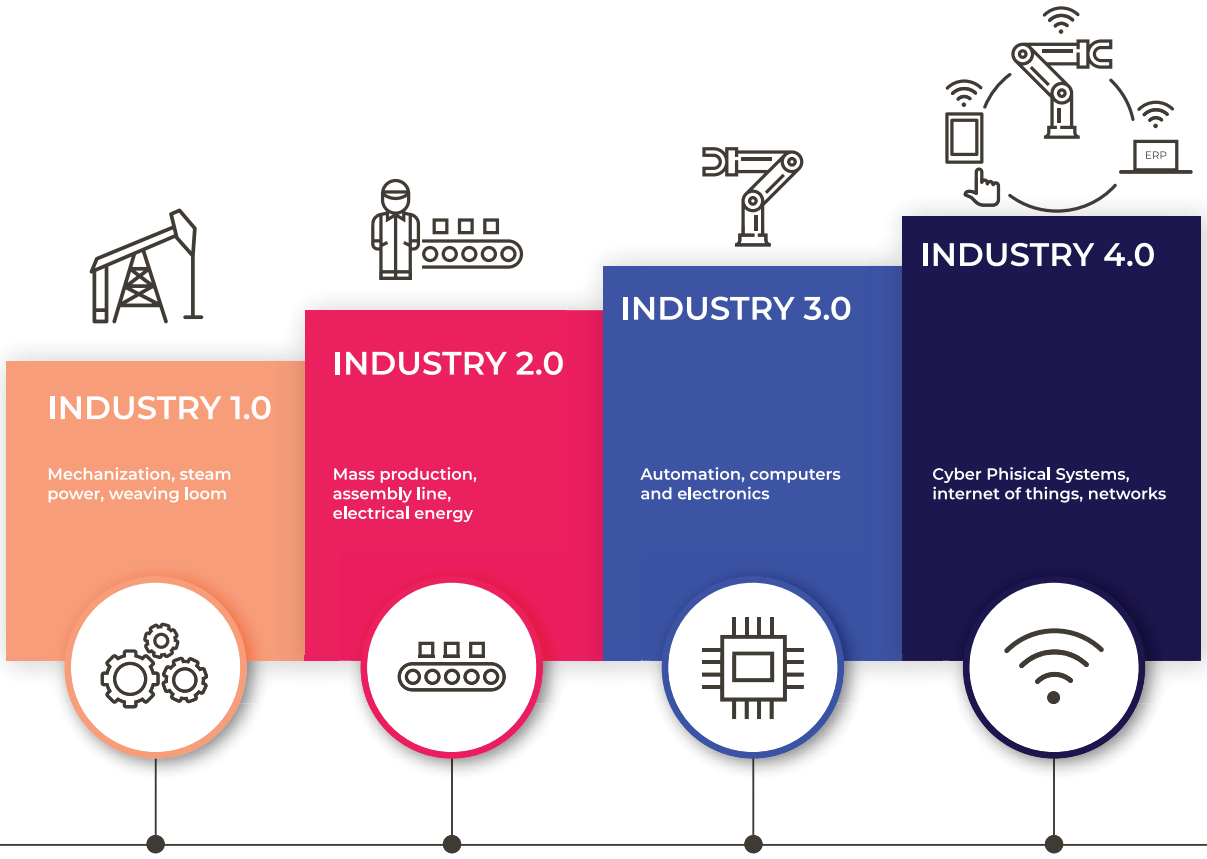
***Extended Reality (XR)*** is a union consisting of all the above mentioned realties together. It is not a specific technology but rather an umbrella of all technologies listed above.




# 2.

# 2.

***The Fourth Industrial Revolution (or Industry 4.0)*** is the ongoing transformation of traditional manufacturing and industrial practices combined with the latest smart technology (extended reality, artificial intelligence, advanced robotics, cloud computing, etc.). This primarily focuses on the use of large-scale machine to machine communication (M2M) and Internet of Things (IoT) deployments to provide increased automation, improved communication and self-monitoring, as well as smart machines that can analyze and diagnose issues without the need for human intervention through the use of predictive maintainance. At present, these technologies are already capable of effectively bringing value to the businesses adopting them.



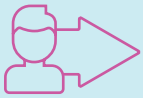
3.

# 3. Problem statement

From the manufacturing floor to the sales floor, it is essential to have knowledgeable, well-trained workers. This is becoming more challenging in the industrial sector, which is dealing with a serious skills gap that could leave millions of manufacturing jobs unfilled, a rapidly retiring workforce, and a need to support increasing automation.[1] Additionally, traditional manual-based or instructor-led training can be not only extremely time-consuming and stressful, but expensive when personnel and travel costs, language translation, and machinery downtime is factored in.

## BOX FACTS:

**40%** 40% of employees who receive poor job training leave their positions within the first year.[2]



**68%** In 2016: 68% of workers say training and development is the most important workplace policy.[3]

[1] Industry Week - How Manufacturers Will Tackle the Talent Shortage in 2019: https://www.industryweek.com/talent/article/22027389/how-manufacturers-are-tackling-the-skills-gap

[2] Employee Training is Worth the Investment, go2 Tourism HR Society, 2017 (last check: September 26, 2017): https://www.go2hr.ca/articles/employee-training-worth-investment

[3] Brandon Carter - 2016 Employee Engagement & Loyalty Statistics, Access Perks, December 31, 2016 (last check: September 26, 2017): http://blog.accessperks.com/2016-employee-engagement-loyalty-statistics

# 4. Background


## The present

Huge sums of money are being invested in trainings across the globe, yet in many cases the training procedures are not only outdated, but do not clearly outline the complexity of the technical tasks they propose to teach. Longer training times, employees under-performing and safety risks have a huge knock-on effect to the industrial employer.

Each day companies are faced with the challenge of upgrading existing employee skills to increase production performance and to train new hirees to be 'production ready' with the basic technical, safety and quality skills. More than 80% of managers believe that effective training is critical to project success (skill levels linked to business value and can lead to a 10% increase in productivity when teams are well trained)v.

It is not uncommon for companies such as BMW to invest around 352 million Euro a year on employee trainingvi. In fact, US Manufacturers alone invest $3000 in training for each new hirevii. That is $4.6 million annually. To keep those same employees up to scratch throughout their career, manufacturers invest a further $1500 per employee each year - $2.3 million annually.



4.

# The future

4.

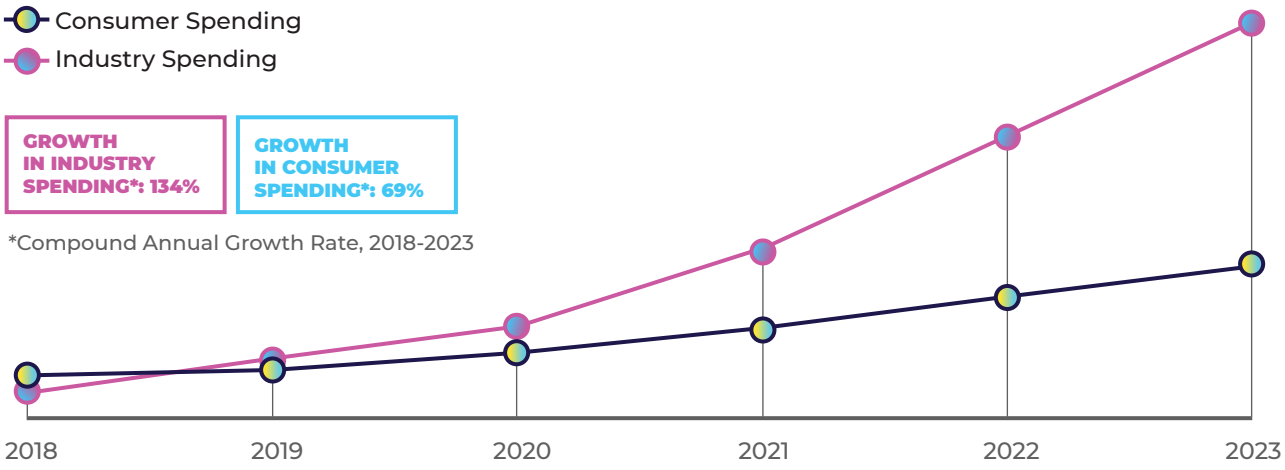
**XR** technologies will become key components in the Digital Transformation strategies in industry. According to Gartner by 2020, 30% of large enterprises will adopt AR applications on mobile devices as part of their Digital Transformation strategy while 25% of large businesses in mature markets will pilot and deploy mixed reality (MR) solutions, up from 1% in 2017. These assumptions highlight the magnitude and impact that AR, MR and VR in the near future. Moreover, it can be noticed that these technologies can and will be applied in many industries, supporting and reshaping many different activities.

With supporting technology spreading fast and the cost of the devices falling – as was already the case for handheld devices – AR, MR and VR are expected to become »can't-live-without tech«.

Customer Insights & Analysis, Giulia Carosella, research analyst, European Industry Solutions: *»XR technologies will continue to expand as cost of entry declines and benefits from full deployment become more tangible. Focus is shifting from talking about technology benefits to showing real and measurable business outcomes, including productivity and efficiency gains, knowledge transfer, employee's safety, and more engaging customer experiences,«*

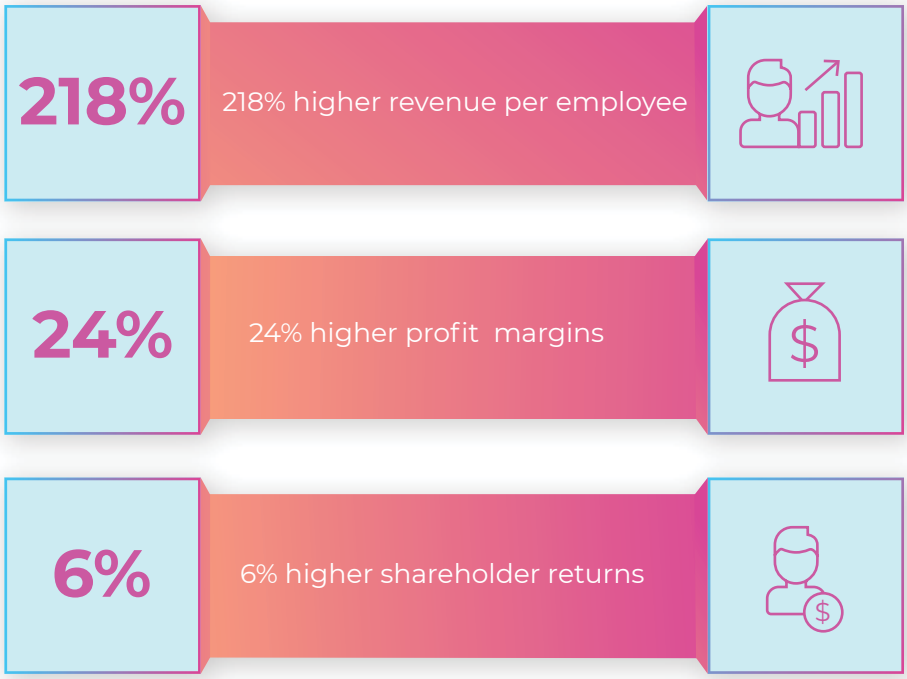
## INDUSTRY SPENDING ON AR/VR IS OUTSTRIPPING CONUMER SPENDING

**AR AND VR SPENDING FORECASTS (GLOBAL, US$ BN)**



# 4.

## COMPREHENSIVE TRAINING PROGRAMS YIELD[4] :




As the beneficial business impact of XR technologies comes into clearer view, adoption in the industrial sector will follow suit. ARtillery Intelligence projects a tipping point to hit by mid-2020 for enterprise XR, followed by rapid acceleration and expansion thereafter.[5]

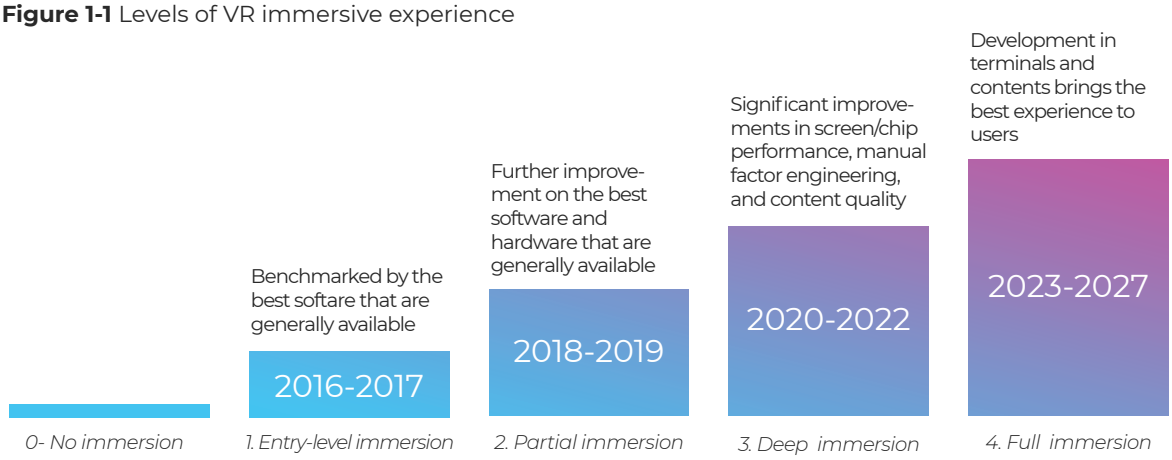
Mike Boland, Artillery Intelligence: »XR delivers a greater ROI proposition for enterprises in terms of reducing the level of errors in an industrial setting, or increasing speed of completion of a given task. When done at scale, those gains can really add up.«

[4] Why Employee Training for Plastics Manufacturers is Critically Important, Paulson Training Program Inc. (last check: September 26, 2017): https://www.paulsontraining.com/employee-training-plastics-manufacturers-critically-important/

[5] ARtillery Intelligence: Behind the Numbers: Enterprise AR's Road to $29 Billion

# Challenges

**Figure 1-1** Levels of VR immersive experience




The implementation of new technologies and processes rarely comes without challenges. Some of these are; cultural obstacles within enterprises that are doubtful about emerging technologies, fragmented IT ecosystems with outdated networks and infrastructure, unskilled professionals with lack of experience in a new field, outdated processes and last but not least, security issues.
For this reason it is imperative to find a basic use case which can provide a clear and measurable proof of concept. By doing so, many obstacles such as overcomplication and hardware locking, can be avoided. Finding an XR enthusiast within the company can be extremely helpful to the process.

4.

# The benefits of VR training

As VR technology and hardware continue to evolve and become more accessible, enterprises are expanding the range of use cases across their organizations. What used to be seen as merely a marketing device has evolved to now measurably impact the entire product lifecycle and customer experience.

VR is addressing many of the problems listed above across multiple maintenance and training scenarios, producing time and cost savings, reducing the likelihood of errors, relieving training-related stress, making it easy to capture institutional knowledge from long-tenured experts, and helping workers retain a greater amount of content through immersive learning.

The immersive and experiential learning style that VR technology offers can not only close the gap between outdated training methods, but also increase worker production, efficiency and overall task performance rates, as well as reduce the errors made by employees in the long run – when compared to training with traditional methods.

When applied to business, these technologies allow to reshape entire industry processes, reduce costs, enhance both customer experience and satisfaction and improve overall efficiency by increasing the perception of the surrounding environment. A focused and accurate value assessment is the best way to ensure that you get the most value out of these revolutionary tools—both in the immediate results and long-term scalability.



5.

| INDUSTRY TRAINING CHALLENGES | VR AS AN INDUSTRY TRAINING SOLUTION | VR BENEFITS |
|---|---|---|
| DEMOTIVATED LEARNING<br>Classroom training and paper-based group learning methods often fail to motivate trainees to their full potential | MOTIVATE LEARNERS AND ENHANCE THE LEARNING EXPERIENCE<br>New technology such as VR is fascinating and makes trainings more attractive | MAXIMUM YIELD<br>Motivated trainees become motivated employees with increased productivity for maximum yield rates |
| TRAINING SAFETY<br>In many cases, paper or online trainings are the only option as it is not possible to train on real devices due to safety requirements | CREATE A SAFE ENVIRONMENT<br>VR makes it possible to explore and train troubleshooting scenarios without any risks | INCREASED SAFETY<br>VR enables employees or customers to safely perform interactive, hands on training In environments and scenarios where safety was previously a concern |
| DAMAGE AND DESTRUCTION DURING TRAINING<br>Disassembling or destroying products for training purposes | ELIMINATE DAMAGE AND DESTRUCTION FOR TRAINING PURPOSES<br>X-ray views and 3D visualizations let workers see inside and target key point in training scenarios to avoid unneeded damage or destruction of products | SAVE ON TRAINING MATERIAL COSTS<br>Reduced damage or destruction of products and materials during training |
| DEMAND FOR EXPERT TRAINERS<br>Training new employees and customers usually requires either external experts or time taken from experienced colleagues | SELF GUIDED TRAINING<br>VR empowers employees and customers with self-guided training and enables ubiquitous, collaborative and situated learning | REDUCED EXPERT TRAINING COSTS<br>VR offers self-guided training, similar to online e-learning |
| LACK OF INTERACTIVE LEARNING<br>Employees want to be trained by doing, but this means that huge budgets need to be spent to offer this to each employee | INTERACTIVE LEARNING<br>VR trains employees by guiding them through real tasks in real scenarios with visual step-by-step instructions | INCREASED KNOWLEDGE RETENTION<br>Interactive and hands on training increases training efficiency and knowledge retention allowing employees to outperform when commencing work |
| THE TRAINING DATA JUNGLE<br>Huge handbooks lost information, outdated versions or simpty information too difficult to find and apply to training scenarios. Not to mention wasted costs on printing, materials and waste | ORGANIZED DATA WHERE IT NEEDS TO BE<br>Training data appears exactly where It needs to be on real objects without having to search | SAVE TIME BY 50%<br>Training data appears exactly where it needs to be on real objects without having to search and training scenarios can be picked up and used immediately at any time to refresh memory in the field |
| OUTDATED 2D DIAGRAMS<br>For complex training scenarios, 2D diagrams are unable to effectively display core learnings and be practically applied | 3D INSTRUCTIONS<br>3D VR visualizations on real world objects allow employees and customers to understand training processes by being able to see the information as we see it in the real world... in 3D | REDUCE ERRORS BY 90%<br>Precise visualizations of 3D data exactly in the correct position on real objects as well as training In any language ensures that employees and customers always understand their tasks |



5.

# 6. VIGO

VIGO is our VR software solution for enterprise training that is supplemented by AR & MR modules - together they constitute a comprehensive platform which can be utilized to incorporate VR training into business scenarios at low cost with high impact.

6.

## Main functions and features:

- **Interactive VR workspace**
  VIGO's fully immersive and interactive VR workspace allows for unparalelled realism that only just falls short of the real thing.

- **Integrated scenario editor**
  VIGO's integrated scenario editor allows for quick additions and modifications, giving it a flexibility that mimics the landscape of contemporary industrial processes.

- **Process simulation**
  VIGO's behaviour-changing process simulation enables repeatable scenarios that constitute the core module of the platform's learning and training function.

- **360° viewer application**
  VIGO's 360° viewer application enables users to learn about the immersive environment's modules, and allows for third-party remote guidance of the trainee.

- **HoloLens MR application and mobile AR application**
  VIGO connects the virtual environment to the real world with its HoloLens Mixed Reality and mobile Augmented Reality modules.

- **Cross platform collaboration**
  VIGO's cross platform collaboration module enables cooperation between users on different platforms.

- **Interconnectivity with SCADA systems**
  VIGO has an interconnectivity option that links onto and reads from existing SCADA systems.

- **Data collection for analytics**
  VIGO collects real time data of the trainee's virtual actions that can be used to analyse a trainee's progress.

- **Other**
  VIGO also offers a fully customizable GUI, full scalability, an intuitive workflow and easy deployment.

# Best practices for VR training content adoption

## Trainee

- Do short VR training sessions, no more than 15 minutes
- Make it an opt-in and offer alternatives
- Check health condition
- Enable communication
- Clear scenarios

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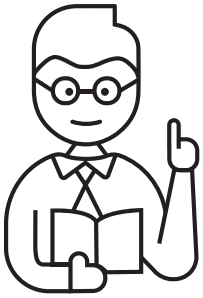

## Trainer

- Work with trainers to develop content
- Which are the 20% who are eager to apply VR?
- Include worker council early on
- Enable communication

# 7. Get in touch.

## Our offices

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