Guidelines for VR environment – introduction to Toolkit of VR scenarios

November 2023

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Project Title: VR4SKILLS - Comprehensive training framework for leaders of internationalization enhanced by Virtual Reality (VR) in the post-pandemic era.

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creative commons BY ND

When is it a good idea to use VR?

The use of VR is most beneficial when:

- Need to train many people in a short period of time in knowledge, equipment/process principles, critical thinking, communication, psychosocial competence

- Operation of new weapons systems, etc.

- Need to interactively rehearse all operational options to select the best one and develop user confidence and understanding of the consequences of mistakes.

- Use from expensive equipment by those in charge

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When is it a good idea to use VR?

The use of VR is most beneficial when:

- Training is difficult or impossible to implement in the real world

- Response to nuclear reactor accident, response to terrorist attacks

- Training is dangerous, and any mistake can result in loss of health or life

- Medical / pilot / altitude training, etc.

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When is it a good idea to use VR?

The use of VR is most beneficial when:

- The process is limited by the availability of resources (time/infrastructure/experts/components).

- Training of pilots, vehicle operators, highly specialized specialists

- Need to motivate users to take action.

- Encouraging habit change, improving morale, building empathy, communicating emotion-based content, minimizing cultural differences

- Data-driven decision making

- Decision making, eye tracking, biometrics, voice analysis, head and hand positioning, action tracking

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Why you need it.

The advantages of VR in education and industry training

- No surprises - interactive, realistic scenarios - rapid skill acquisition
- Objectivity regardless of location and scale of training
- Ability to train skills and competencies
- Immersive learning experiences - greater learner engagement
- Improved retention - experiencing > remembering
- Affordability - minimal cost of training

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Why you need it.

The advantages of VR in education and industry training

- Collecting data on students' behavior/activities during training
- Training solo or together (both distance and in-person)
- Training alone or with an instructor
- Different applications - different levels of immersion
- Realistic - collaboration with manufacturers
- Reduced risk of cheating - no "click, click and go home" option

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Why you need it.

The advantages of VR in education and industry training

- Providing the best possible solution (both remotely and on-site)

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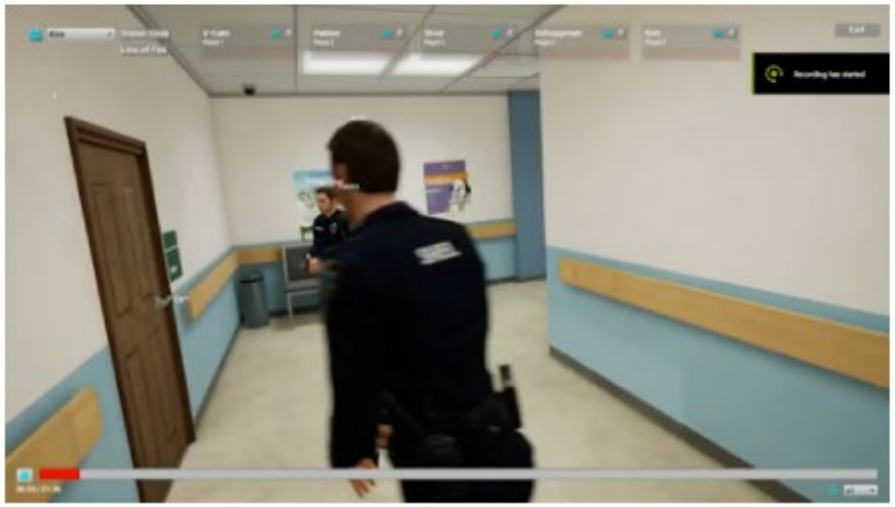
VR/XR/AR FOR EDUCATION & TRAINING

- Immersive technology which opens new possibilities to the military training -

- Leadership competences
- Personalized, continuous and cooperative interfaces
- Battlefield first aid & exposure therapy
- Development of cognitive skills
- Language, empathy and cultural knowledge
- Communicating with and recruitment of “digital natives”



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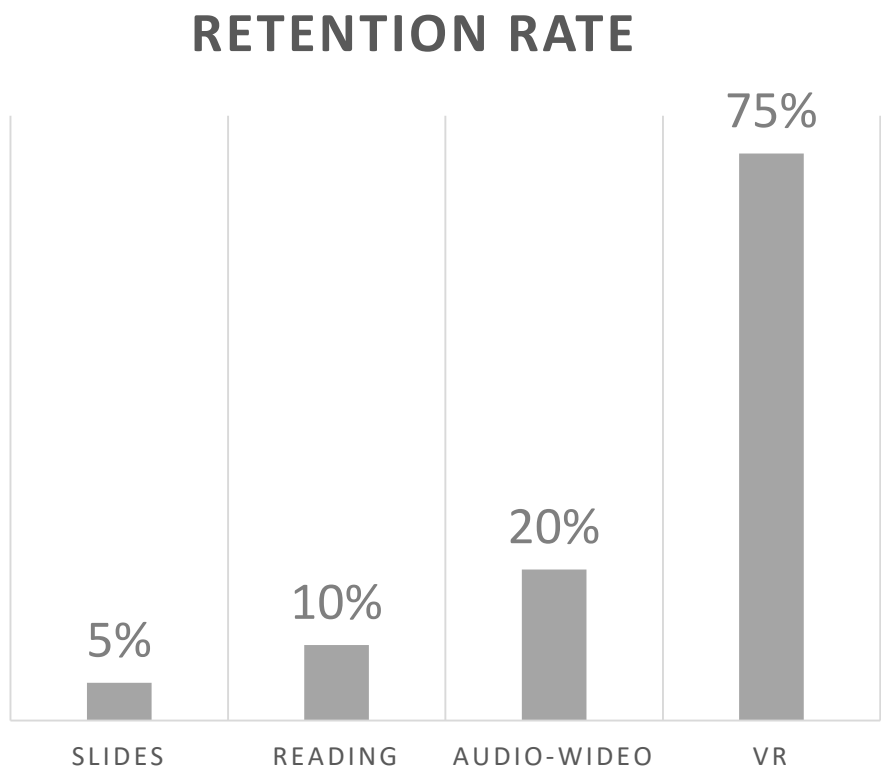
BENEFITS OF VR/XR/AR EDUCATION & TRAINING

- Lower training time – classroom 120 min / e-learning 45 min / **VR/XR/AR 29 min**
- Lower cost – **up to 40%** military training cost reduction
- Improvement in confidence – classroom 198% / e-learning 203% / **VR/XR/AR 275%**
- **Data based** education & training – quantitative & qualitative insight into the training process
- Increased efficiency – VR/XR/AR training results are **equivalent** to the results of traditional training



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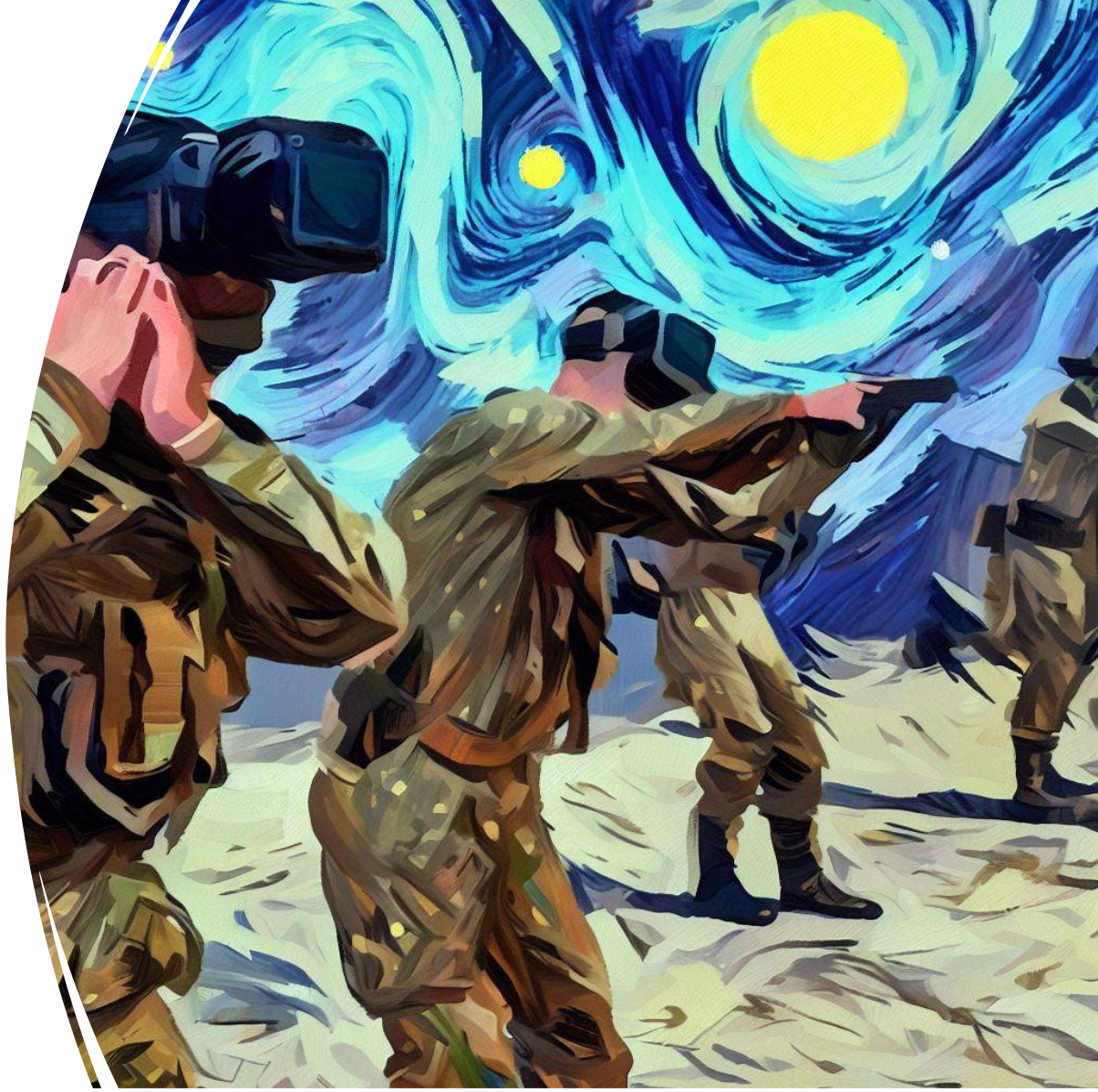
CHALLENGES

- Lack of common terminology – bridging cultural & technology communicational gaps
- Addressing the skills gap – solving the problem of labor shortages in industrial and manual sectors
- Cost and time reduction – complex and expensive creation of VR/XR/AR creates the need for wise cooperation
- Lack of standards – need for grading and comparing VR/XR/AR training results
- Scattered R&D initiatives – need for a unified R&D collaboration and project networking



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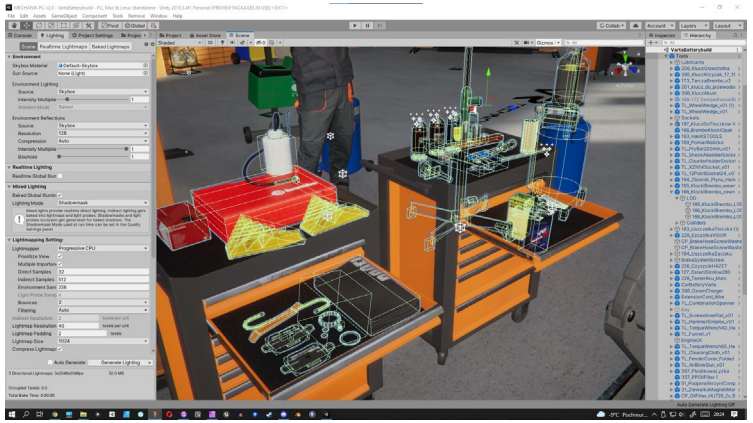
The main challenges? Why it is not here?

- Complex and costly to create - need for smart collaboration
- Need to evaluate and compare results - VR (vocational training) education and training standards
- Lack of common terminology, etc.
- Results of simulator exercises with different levels of immersion or detail are difficult or impossible to compare.



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„Let’s stop making education islands” - GETES Foundation

- Creation of common terminology
- Standards for vocational training (Competencies)
- Standards for grading
- Standards for comparing data
- Credentials (Certification)
- Embracing learning engineering & shared understanding
- Providing support

- Global network of cooperation
- Collaboration with specialist and institutions from +20 countries
- Forming scientific teams with aim of developing standards and technological solutions.
- Addresing the skills gap
- Maximizing human potential

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RECLAIMING SKILLS
AND COMPETENCES, TOGETHER

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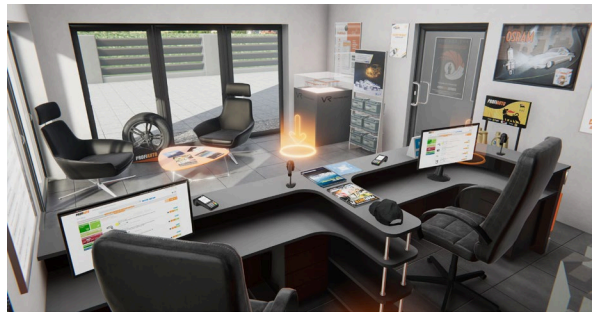
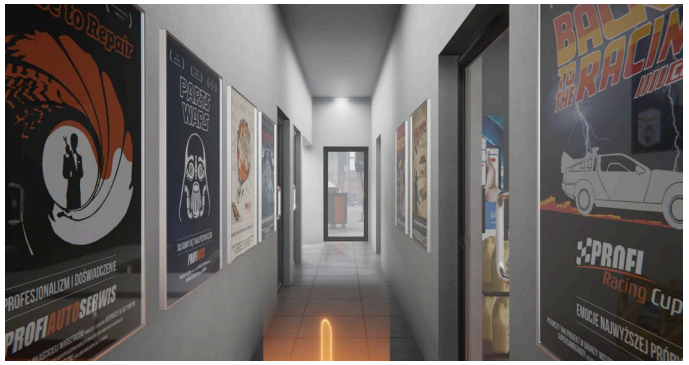
Main application of VR

- Simulators
- Interactive manuals
- Familiarization with the facility
- Games and multimedia
- Training
- Building empathy
- Trial work experience





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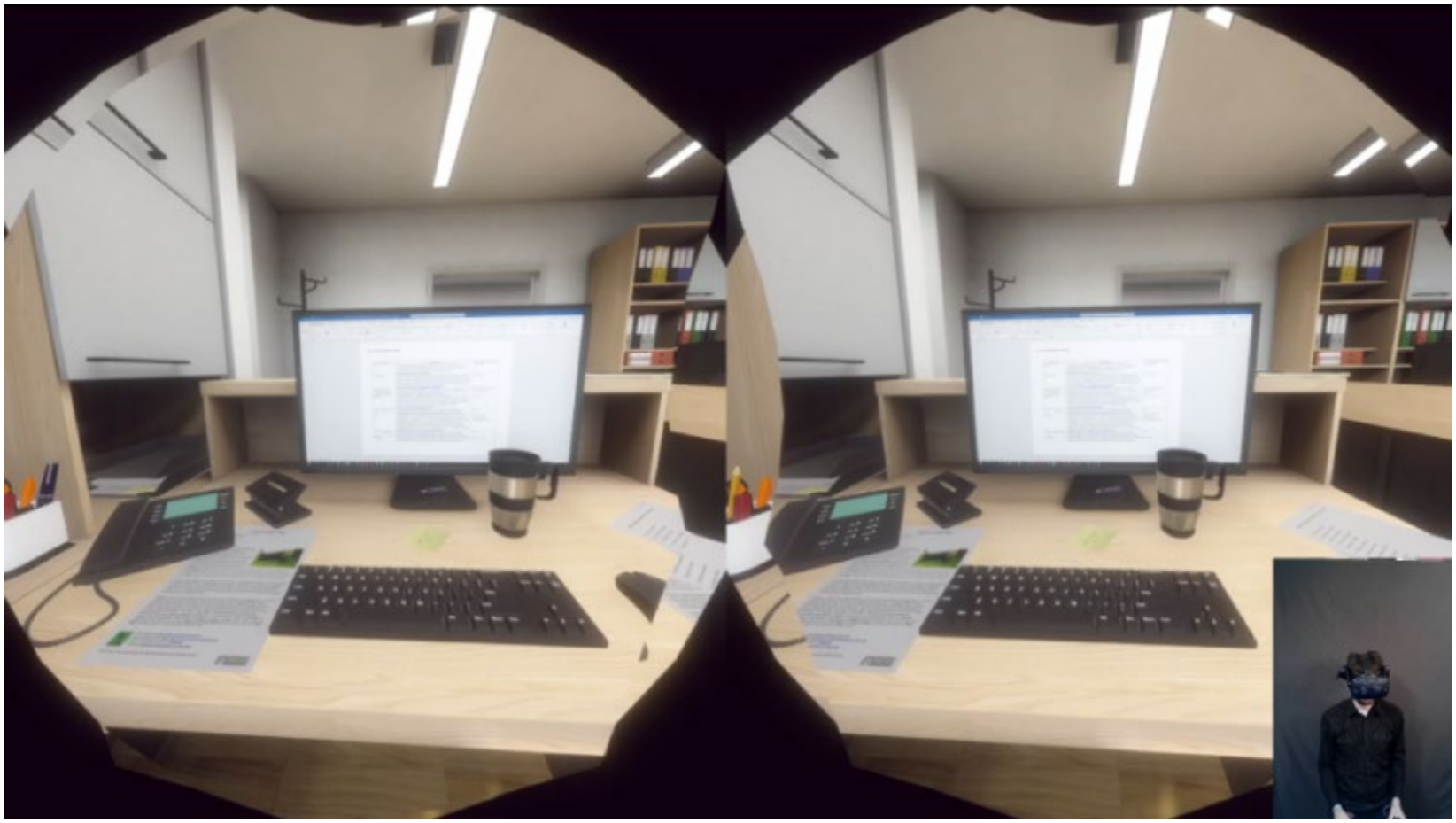
Example



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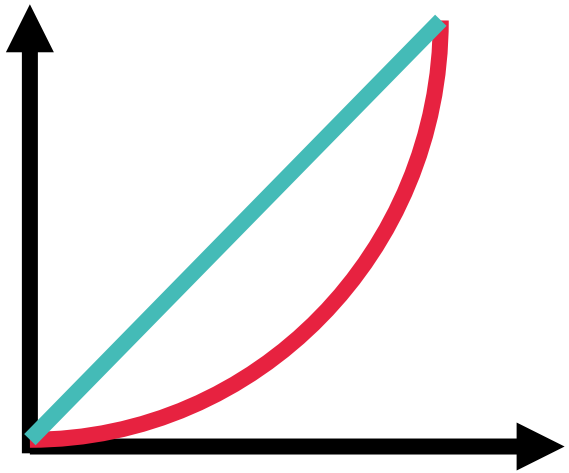
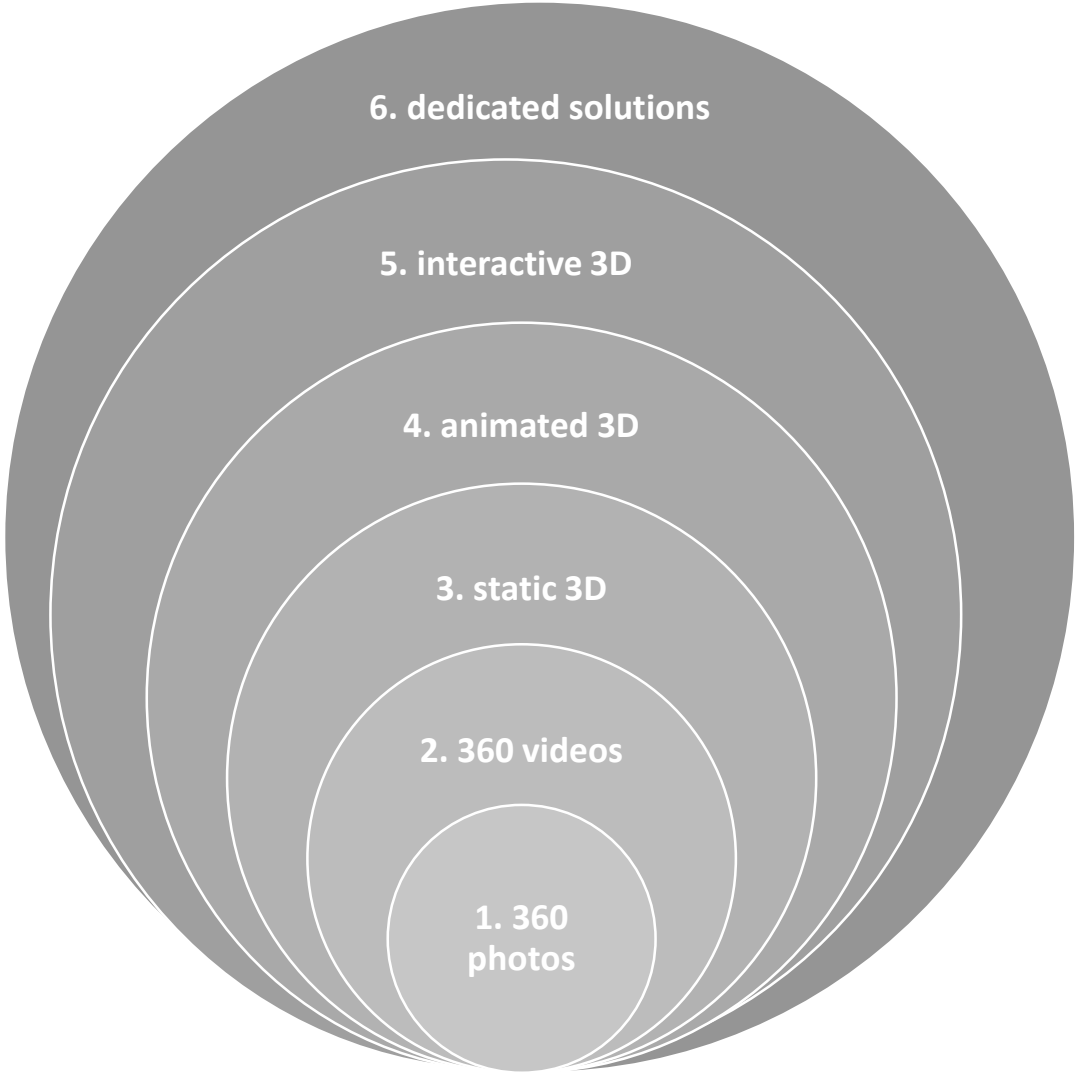
Functionality
Time and cost



VR immersion level



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Introduction to various forms of using VR

Imersion level 1 - VR glasses - 360 photos

- promotion of the institution / organization

*Raw 3D scan of WSB University Entrance

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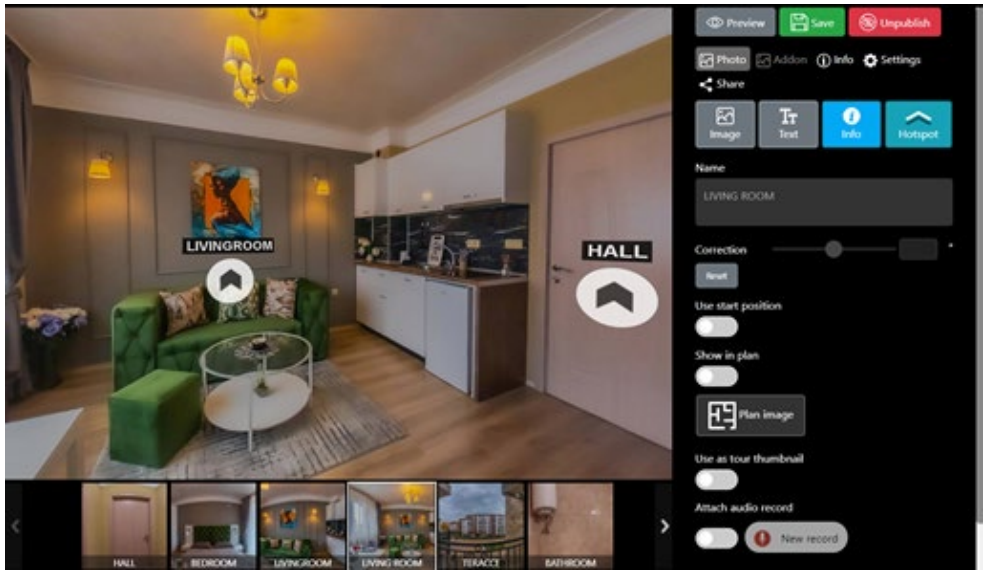
Introduction to various forms of using VR

Imersion level 1 - VR glasses - interactive 360 photos

- Acquaintance with the institution / organization



*Configured using widely available VR tour configurators

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Introduction to various forms of using VR

Imersion level 2 - VR glasses - 360 movies

- Acquaintance with the object
- Learning the basics of processes

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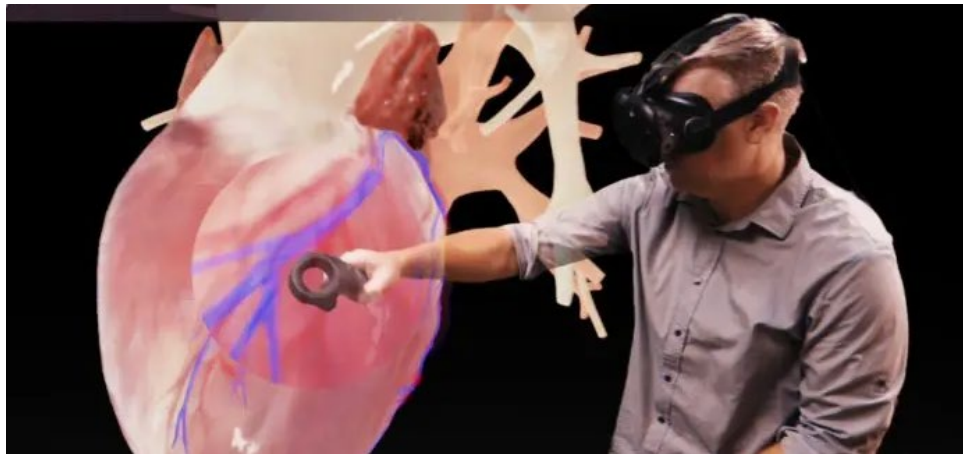
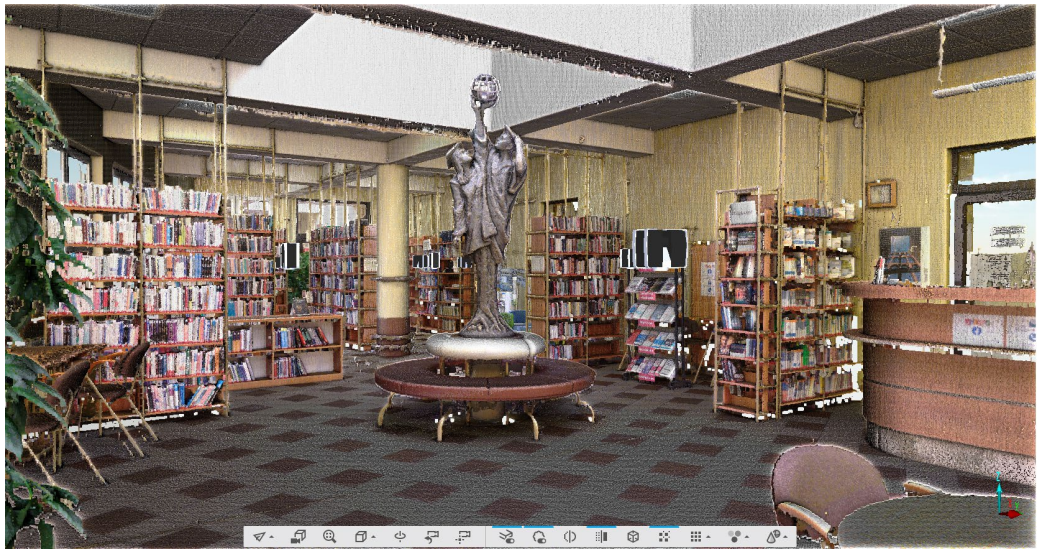
Introduction to various forms of using VR

Imersion level 3 - static 3D

- Acquiring spatial and visual knowledge
- Learning to build devices





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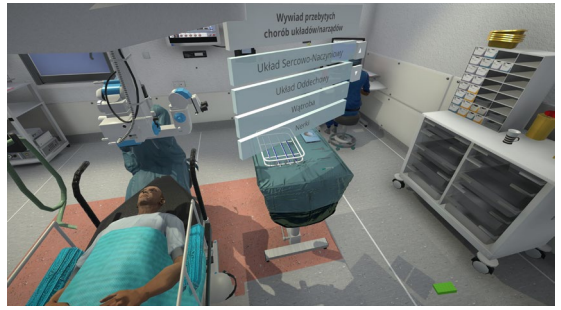
Introduction to various forms of using VR

Imersion level 4 - animated 3D

- Process learning
- Learning how devices work
- Development of cognitive skills, remembering and understanding information
- Development of observation skills and visual scanning



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Introduction to various forms of using VR

Imersion level 5 - interactive 3D

- Building a user experience
- Training in the use of real equipment
- Job training in a real place
- The highest level of knowledge acquisition
- Training of leadership competences
- Soft skills training
- Building the ability to control emotional responses to stressful or difficult situations
- Variant multiplayer (HLA, DIS)

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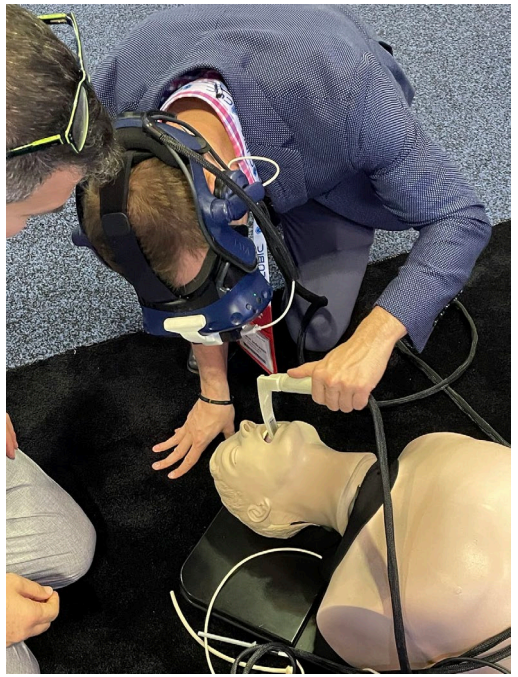
Introduction to various forms of using VR

Imersion level 6 - integrated simulators

- The highest level of realism
- Dedicated implementation



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Interesting examples

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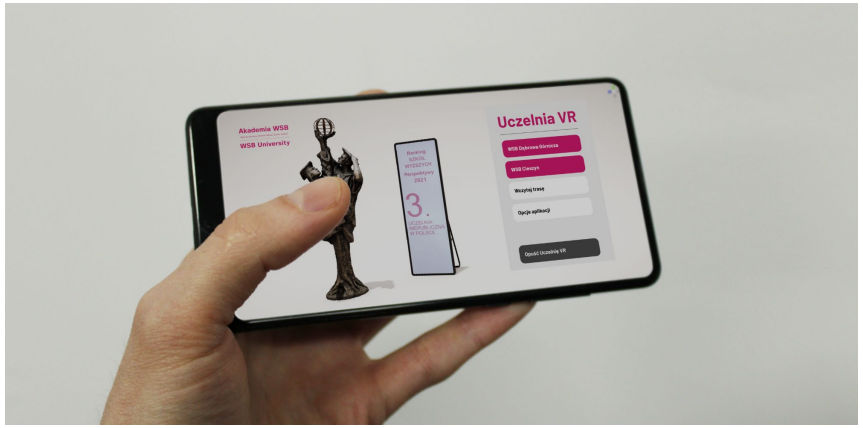

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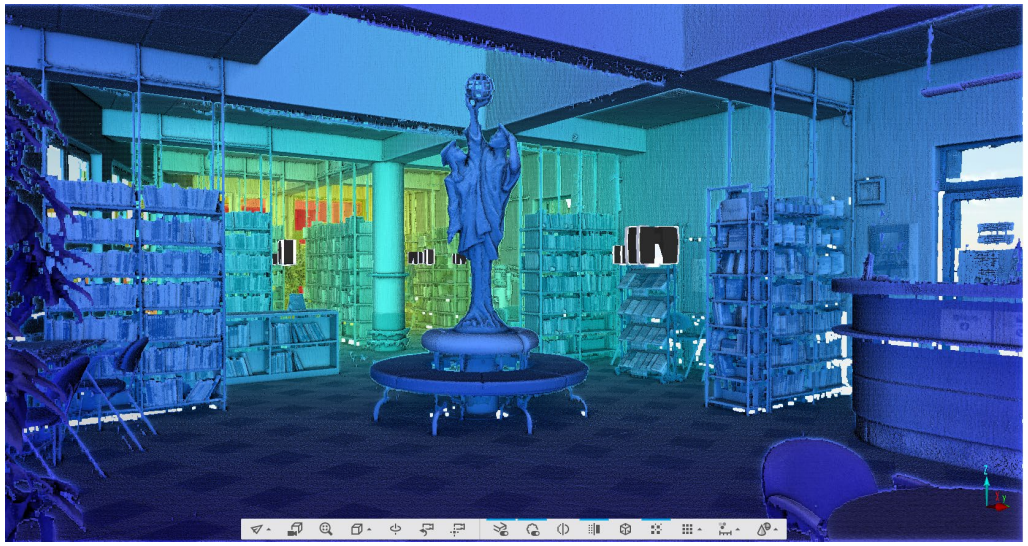
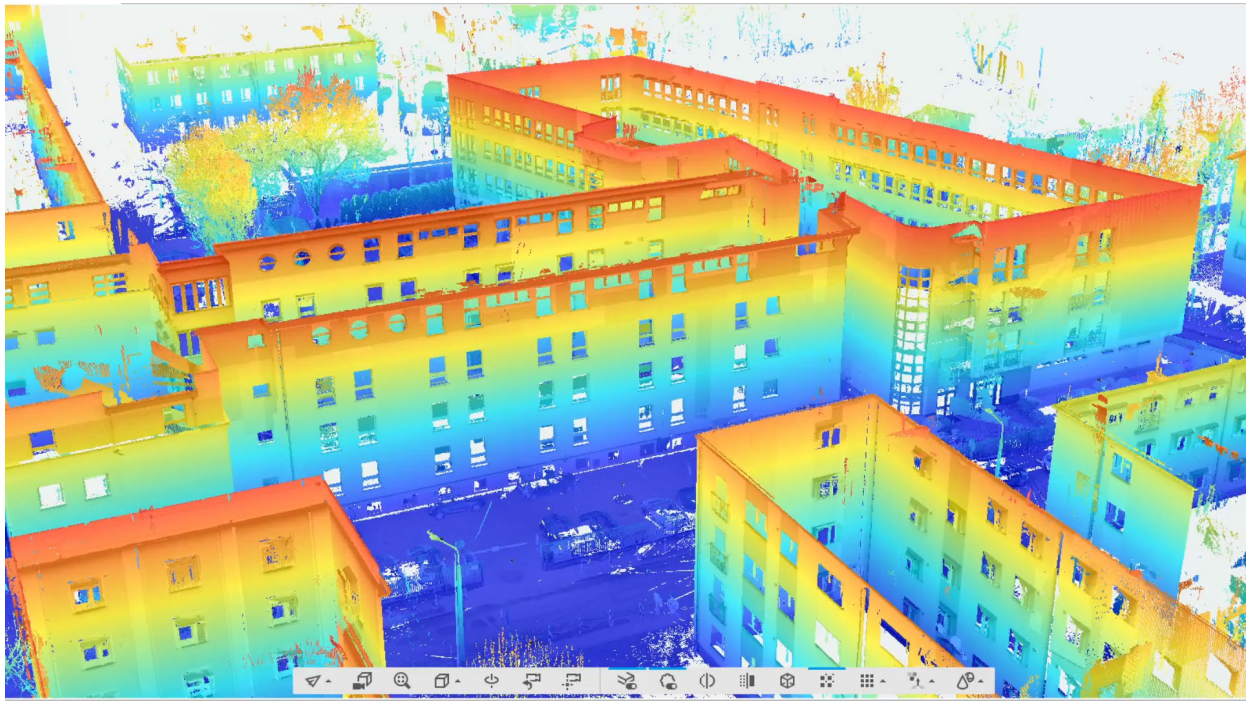
The process of mapping a building





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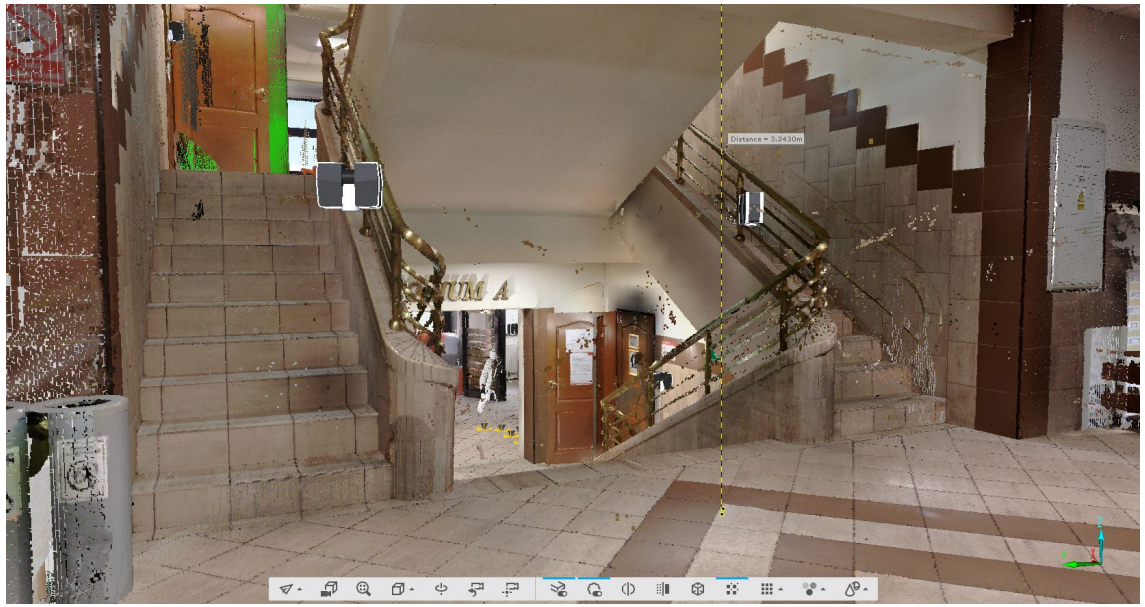

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Virtual avatars

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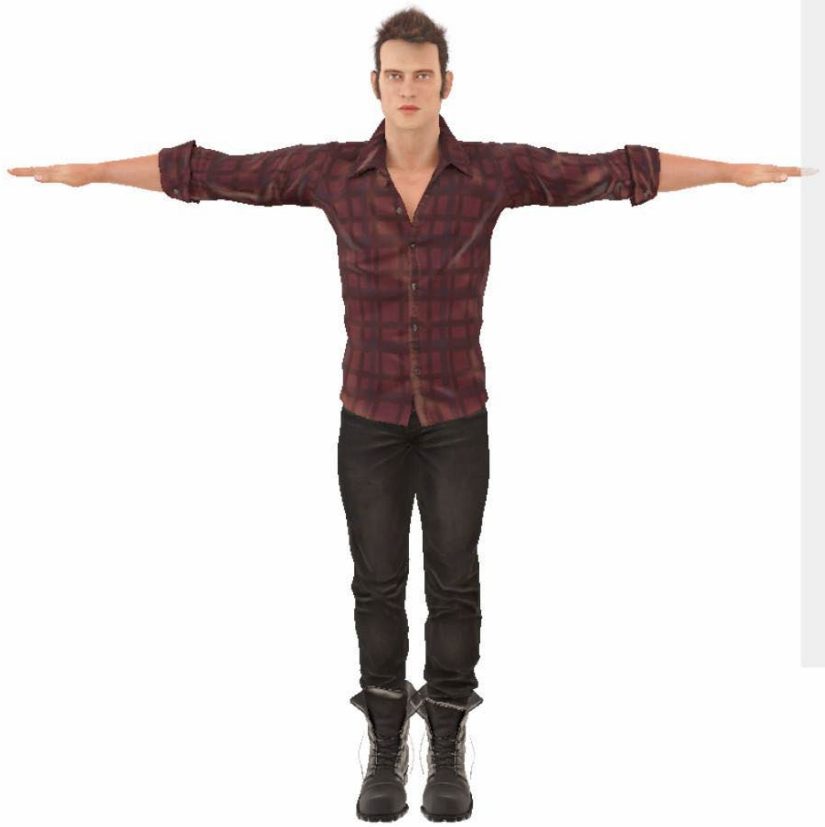
Dąbrowa Górnicza, Cieszyn, Olkusz, Żywiec, Kraków
WSB University



Konfigurator Awatara
Avatar configurator

Fryzura / Hairstyle

Oczy / Eyes

Usta / Mouth

Nos / Nose

Odcień skóry / Skin tone

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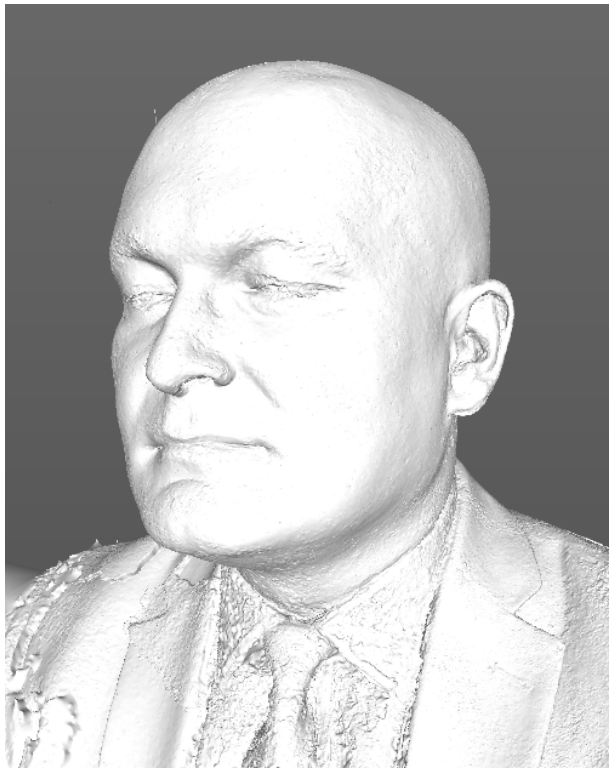
The process of creating virtual avatars



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Personification

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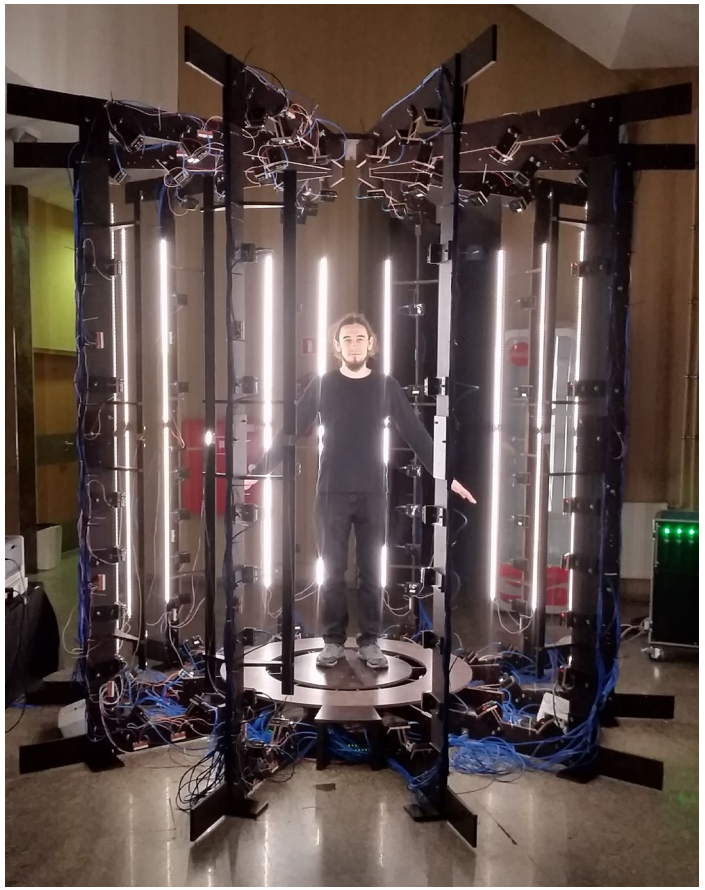
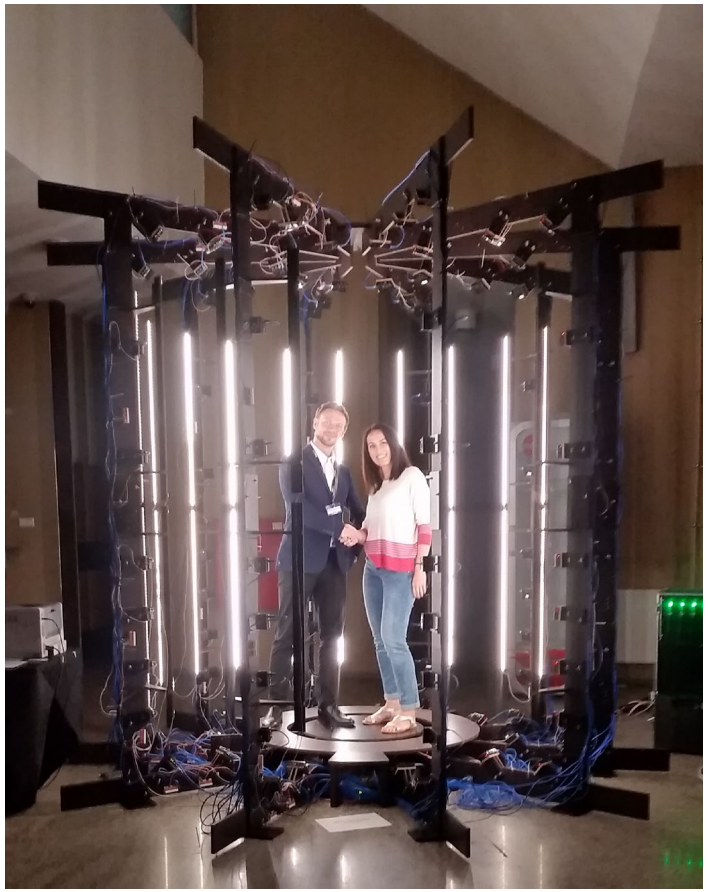
Techniques for reflecting people in a simulation environment





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Modifying the appearance, clothing and behavior of Virtual Avatars

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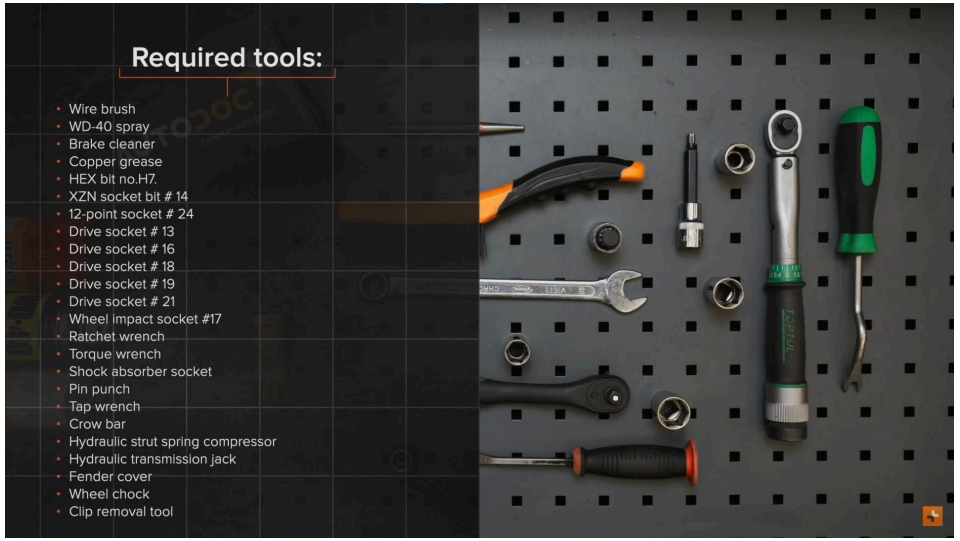
VR creation process

- Definition of the goal
- Choice of form
- Process modelling
- Potential for errors
- Evaluation criteria
- 3D modeling
- Logic implementation;
- Testing

- Analyst
- Screenwriter
- Industry expert
- Product owner



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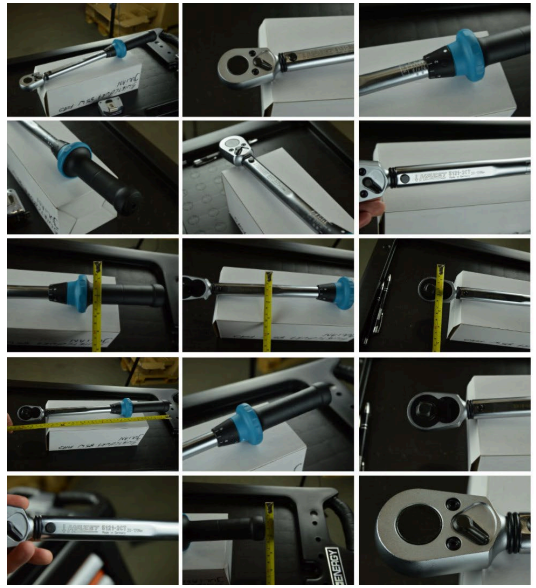

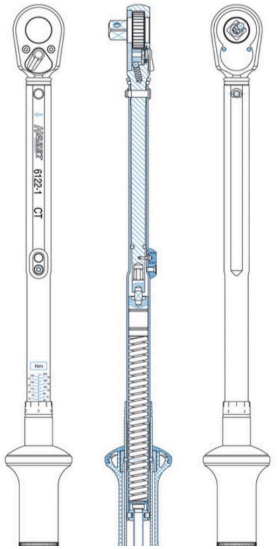

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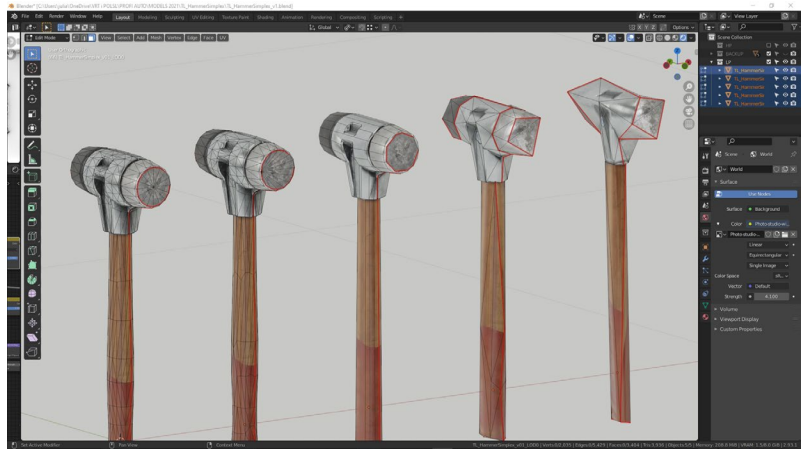
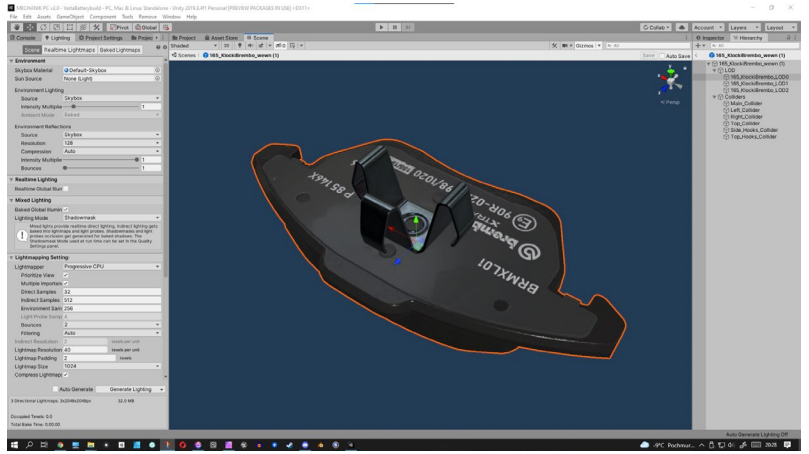
- Analyst
- Screenwriter
- Industry expert
- Product owner
- Programmer of simulation systems
- 3D graphic artist
- Sound engineer





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VR creation process

- Definition of the goal
- Choice of form
- Process modelling
- Potential for errors
- Evaluation criteria
- 3D modeling
- Logic implementation;
- Testing

- Analyst
- Screenwriter
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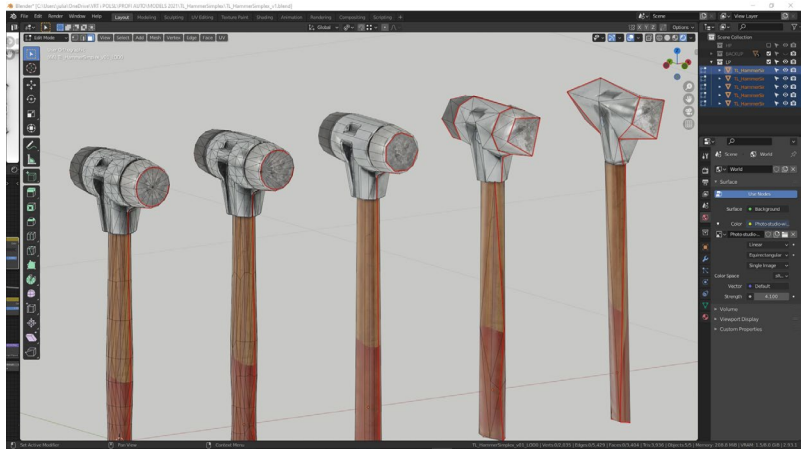

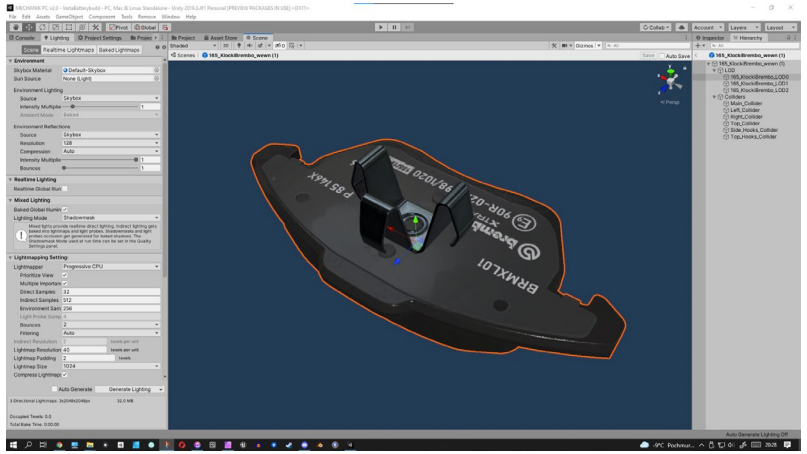

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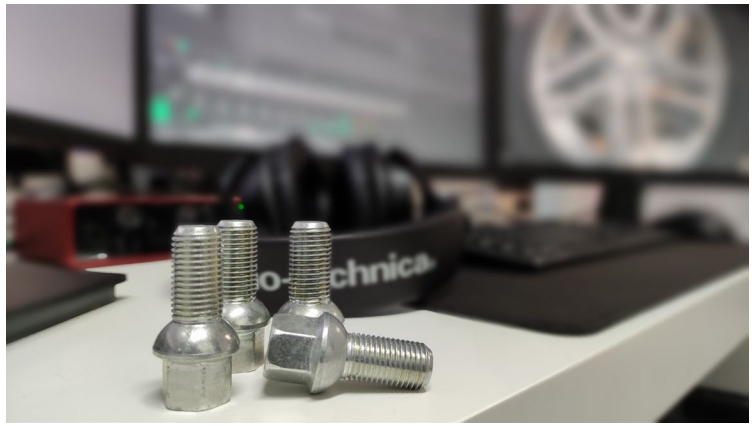

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VR creation process

Akademia WSB
Dąbrowa Górnicza, Cieszyn, Olkusz, Żywiec, Kraków
WSB University

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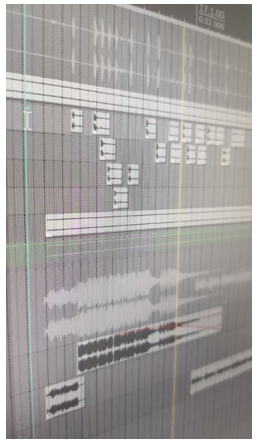

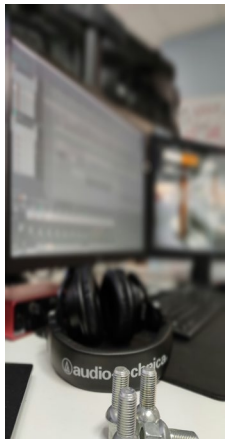

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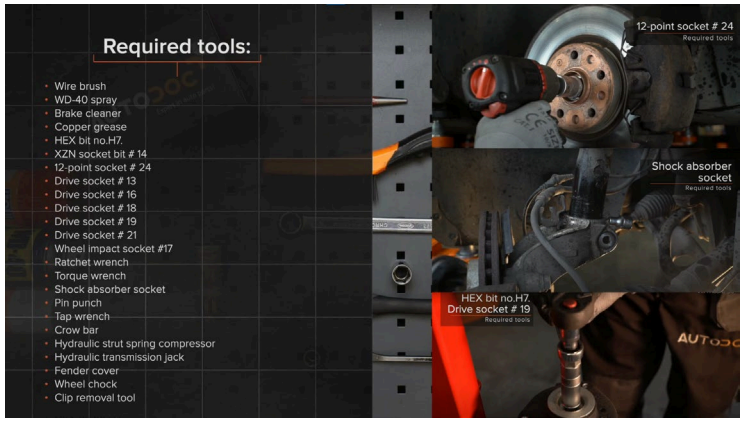

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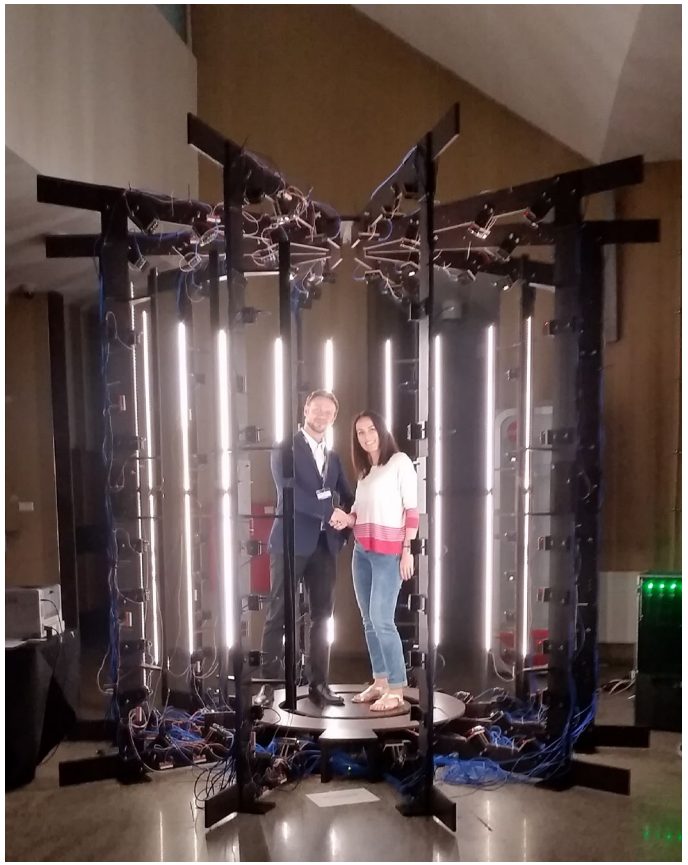
VR creation equipment

- Efficient computer stations
- 3D scanners of people
- Object 3D scanners
- Motion capture acquisition systems
- Face acquisition system
- Gesture acquisition systems
- Voice acquisition system
- Equipment for testing / use



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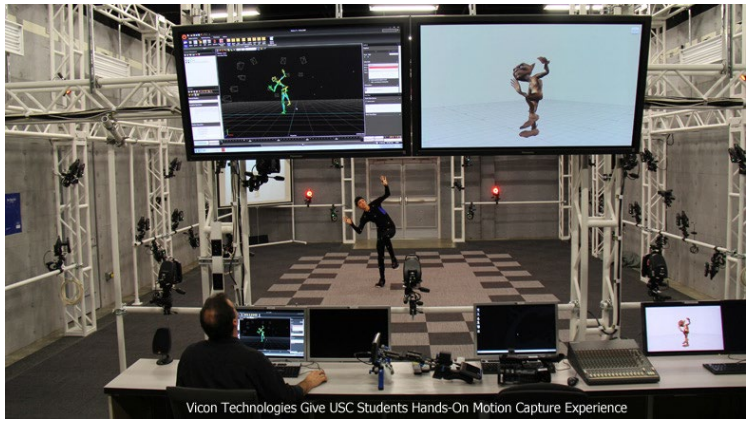
Vicon Technologies Give USC Students Hands-On Motion Capture Experience

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Summary of the advantages of using VR

- Standardization of procedures
- Improving procedures
- Pre-employment verification
- Improving security
  - Planning
  - Study of the level of consciousness
- Process and cost optimization
- After Action Review- generating reports

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Choice of form - case study 1

- Objective - to create a training that allows users to acquire experience in the field of cybersecurity basics of typical computer workstation software.

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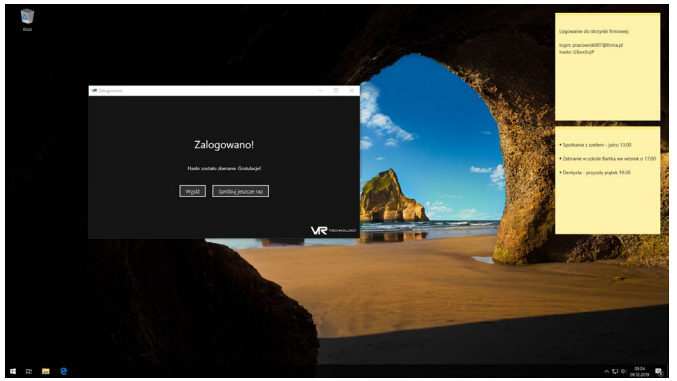
Choice of form - case study 1

- Objective - to create a training that allows users to acquire experience in the field of cybersecurity basics of typical computer workstation software.
- Recommended form - simulation with the use of desktop applications
- There is no sense in mapping the operation of programs, mouse, keyboard via controllers
- There is no point in using VR to simulate reading content from a flat screen



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Choice of form - case study 2

- Objective - to create a training that allows users to acquire experience in the field of behavior in a new environment / stressful situation.
- Empathy building
- Experience of cultural differences

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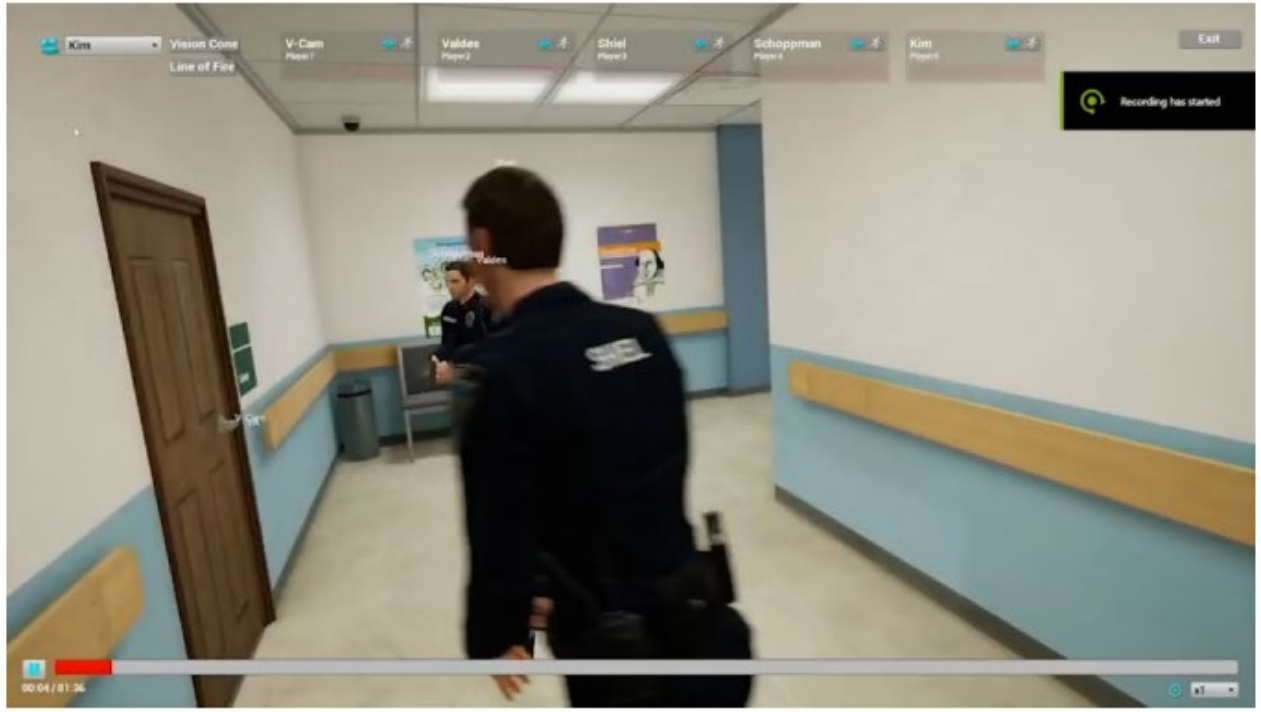
Choice of form - case study 2

- Objective - to create
  a training that allows users to acquire experience in the field of behavior in a new environment / stressful situation.
- Empathy building
- Experience of cultural differences
- Recommended form - interactive VR application



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VR Hardware Comparison

	Meta Quest 2	Best for Standalone VR	$300.00
	Sony PlayStation VR2	Best for PlayStation 5 Gamers	$600
	Valve Index VR Kit	Best Controllers	$1415
	Meta Quest Pro	Best for Pros and High-End Enthusiasts	$967

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VR Education Examples

- Class VR
  - 360 photos and videos
  - A variety of content
  - Upload your own content

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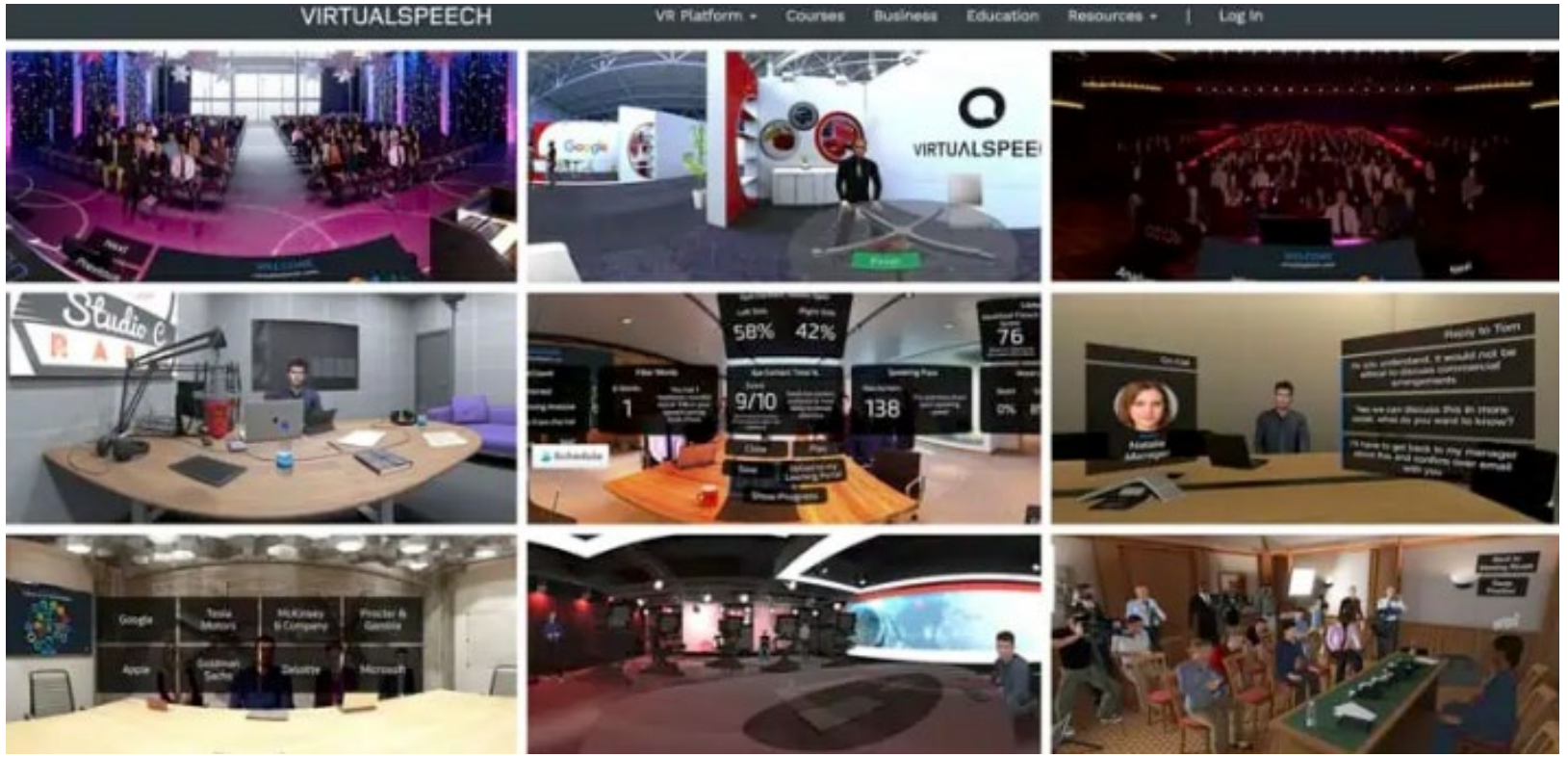
VR Education Examples

- VirtualSpeech
  - Public speaking in VR



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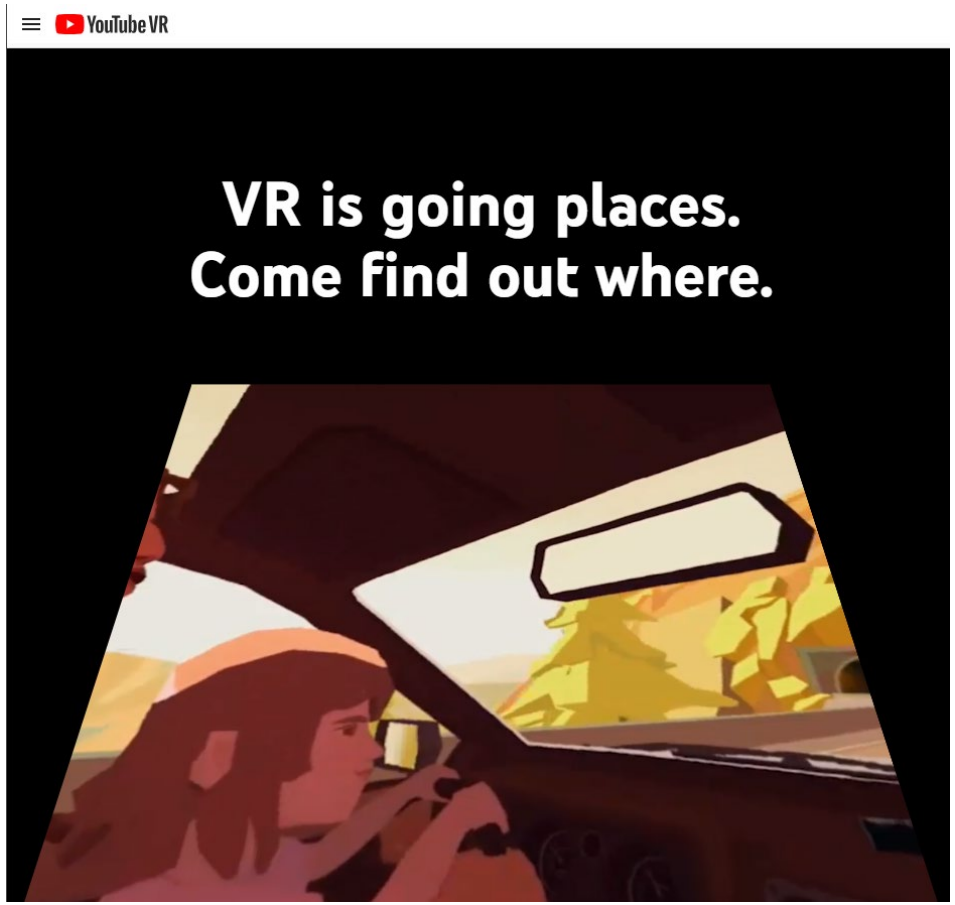
VR Education Examples

- YouTube VR
  - Lots of 360 videos



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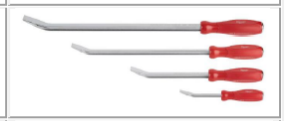
Sample VR scenario

- Determination of the activity to be mapped in the simulation:
  - Mandatory
  - Optional
- Identification of relevant 3D models of objects (interactive)
- Identification of 3D background objects
- Defining the levels of difficulty
- Determining the scoring
- Customer discussion and approval

Example scenario

	Activity	Easy level	Medium level	Included in the simulator (proposal)
0.	Loosen the wheel - always marked			
1.	Put a wedge under the front wheel (model 24 from the 3D model list)	Put a wedge under the wheel	Prepare your car for a shock absorber replacement	Yes
2.	Opening the bonnet (the bonnet lifting functionality is ready in the current version of the mechanic)	Open the mask		Yes
3.	Removing the plastic shock-absorber cover			Not
4.	Cleaning the upper shock absorber mount.	Cleaning the upper shock mount with a brush and rust remover	Preparing and unscrewing the upper shock-absorber mount	Yes
5.	Loosen shock absorber mount bolts (3 pcs.) - Ratchet spanner with 13mm socket.	Loosen the screws of the upper mount		Yes
6.	Loosen the wheel hub bolt (model 19 ratchet with 12-point 24mm socket number 7 on the list). Loosen by making several turns of about 90 degrees each.			Not
7.	Loosen the wheel bolts. Use the same ratchet spanner as in the previous point, but with a 17 mm wheel socket (no. 14 in the tool list).			Not
8.	Lifting the car on a hoist.	Lift the car on the jack	Preparatory operations for removing the lower shock-absorber mount	Yes
9.	Unscrewing the wheel	Unscrew and remove the previously loosened wheel		Yes
10.	Unscrewing the stabiliser link mount	Clean the stabiliser link bolts with a brush and rust remover		Yes
11.	Removal of the transverse stabiliser bar	Disconnecting and extracting the stabiliser link		Yes
12.	Disconnecting the brake lines from the shock-absorber bracket			Not
13.	Unscrewing the lower shock-absorber mount and steering knuckle	Clean the screws of the lower shock mount with a brush and rust remover	Disconnect the lower shock-absorber mount	Yes

19	Tap spanner or simply a long ratchet spanner	< no photo >
twenty	Undermining tool (Crowbar)	
21	Fitting machine for shock absorbers	
22	Hydraulic support	
23	Wheel arch cover	< no photo >

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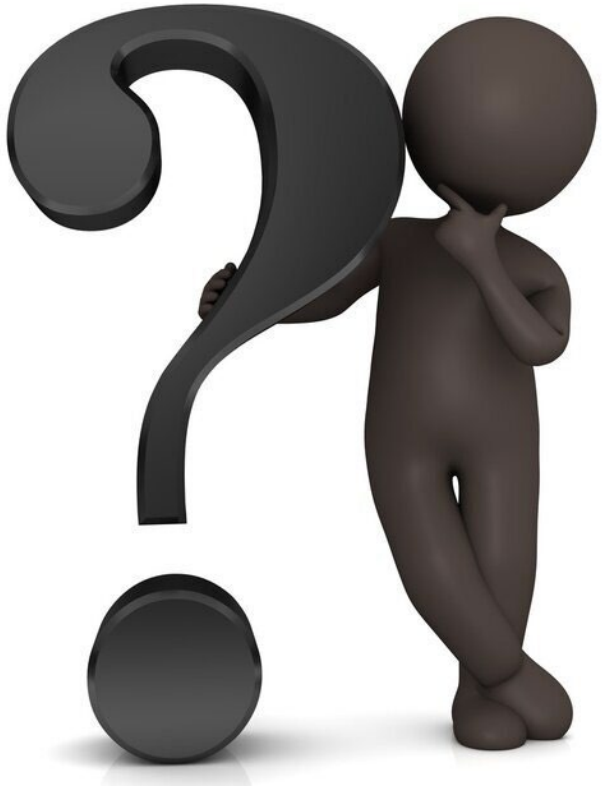
How much does VR cost?



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	360 photos	360 videos	Static 3D	Animated 3D	Interactive 3D	
Time	<1 month	<1 month	<3 months	3 to 6 months	6 to 12/18 months	
Persons	• Industry expert • 3D graphic designer	• Analyst • Industry expert • 3D graphics designer	• Analyst • Writer • Industry expert • Simulation systems programmer • 3D graphics • Level designer • Programmer • Tester • Product Owner	• Analyst • Writer • Industry expert • Simulation systems programmer • 3D graphics • Level designer • Programmer • Tester • Product Owner • Sound engineer • 2D Graphic Designer • Translator • PR / Marketing Officer	• Analyst • Writer • Industry expert • Simulation systems programmer • 3D graphics • Level designer • Programmer • Tester • Product Owner	• Sound engineer • 2D Graphic Designer • Translator • PR / Marketing Officer • Motion Capture specialist
Crafting Equipment	• 360 camera • Computer station	• 360 camera • Computer station	• Object 3D scanner • Computer station	• Object 3D scanner • Microphone • Computer station	• Object 3D scanner • Character 3D scanner • System for traffic acquisition • System for the acquisition of facial expressions	• Gesture acquisition system • Microphone • Computer station
Equipment to be used	Standalone VR goggles, e.g. Oculus Quest 2	Standalone VR goggles, e.g. Oculus Quest 2	Standalone VR goggles, e.g. Oculus Quest 2	VR goggles, e.g. Oculus Quest 2 in conjunction with an efficient PC stand	VR goggles, e.g. Oculus Quest 2 in conjunction with an efficient PC	VR goggles, e.g. Oculus Quest 2 in conjunction with an efficient PC

VR4 Skills

Akademia WSB
WSB University

DOBA

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