



**Virtual Reality Project at
Montanuniversität Leoben**

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➤ Raw Materials VR Database

- Aims of the project
 - Creation of a database with VR data on European mining, processing and metallurgical activities
 - 3D-visualisation of raw materials related information for education and public awareness creation purposes
- Project outcomes
 - Library/ database of 3D-visualised raw materials related information: around 100 sets of information
 - Tour through European and Australian raw materials sites

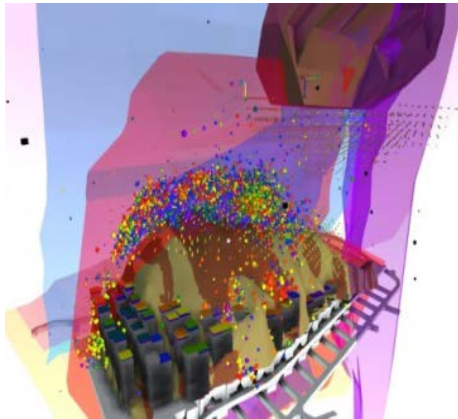
➤ Raw Materials VR Database

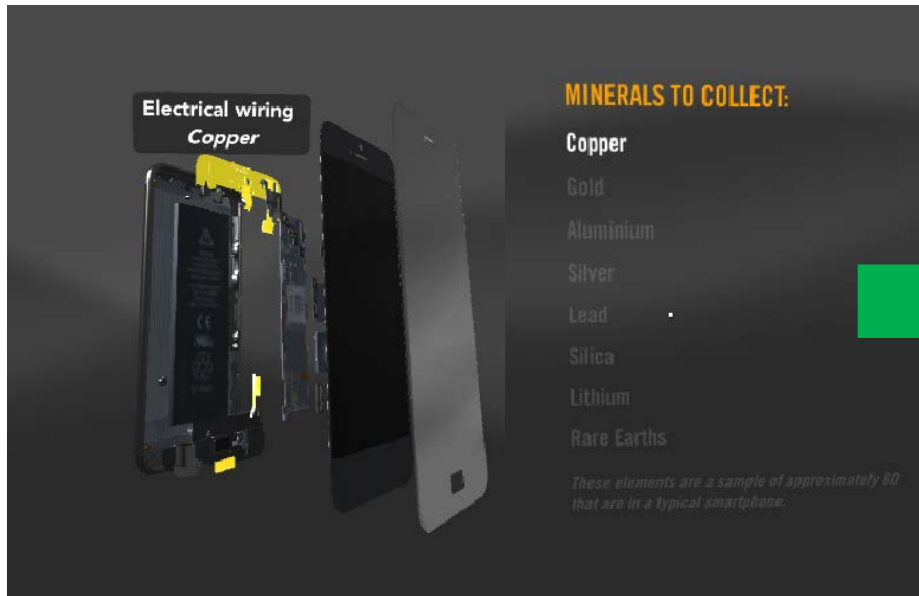
- Target groups for project outcomes:
 - Students in higher education
 - Society
- Project partners
 - Universities and research organisation active in the field of raw materials (around 50 partners from EITRaw Materials Consortium)
 - Mining and raw materials related companies
 - University of New South Wales, Sydney, Australia

- System overview: “Smartphone Raw Materials”
 - Oculus Gear VR
 - Samsung Galaxy S7



- UNSW has been a world leader in VR technologies for mining over the last 15 years
- From flat screen, to curved screen, to AVIE and VR headsets





Existing system content at UNSW

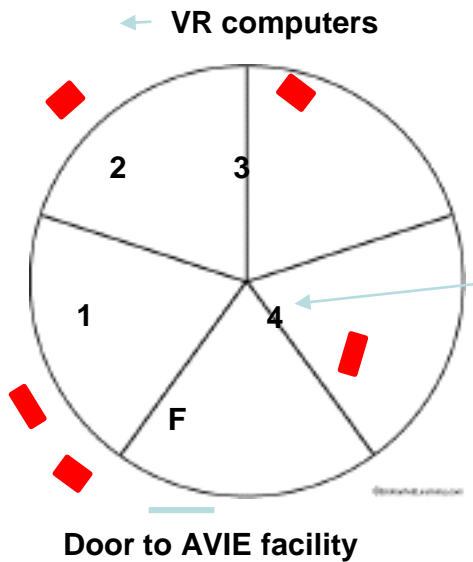
- Six mine sites; open-pit, underground, greenfield
 - Copper, gold, aluminium, silver, lead, silica, lithium, rare earths
- Every mine site explained by
 - Introduction video
 - 360° as well as conventional videos and photos
- → Visualization of:
 - Mining process and applied mining systems
 - Mineral and metallurgical processing
 - Reclamation
 - ...



- VR modules incorporated into education
 - Mine method education
 - Socially responsible mine planning and design
 - Mine feasibility study analysis in 3D
 - 3D animated mineral processing flowsheet
 - Mining Big Data analysis
 - Student research projects developing VR
- Reach of VR enhanced courses spans 4 collaborating Mining universities in Australia, US, Japan and South Africa



- Development of a collaborative 'Cloud Classroom' using VR headsets
- 5 stations – Facilitator and 4 students, but potential to link to others online/remote



VR Project at MUL

System design

➤ Mineral Map of Europe

- Metals
- Industrial minerals
- Construction materials
- Mineral Fuels (Coal)

➤ Commodity map

- Iron
- Copper
- Precious metals

- Raw Materials VR Database
 - allows to demonstrate in detail even complicated processes and machines
 - allows students to watch mining & metallurgical processes in virtual reality closer than in real reality
 - enables to combine imaging with technical information
 - is considered to be sexy by young people and would attract them to our business

➤ Raw Materials VR Database

- In overall helps students to get a better understanding of the mining-processing and metallurgical processes
- Field trips with students to industrial sites become more and more difficult and so many students have difficulties in experiencing real operation throughout their studies.
- Creation of public awareness and therefore reduction of criticism against mining activities

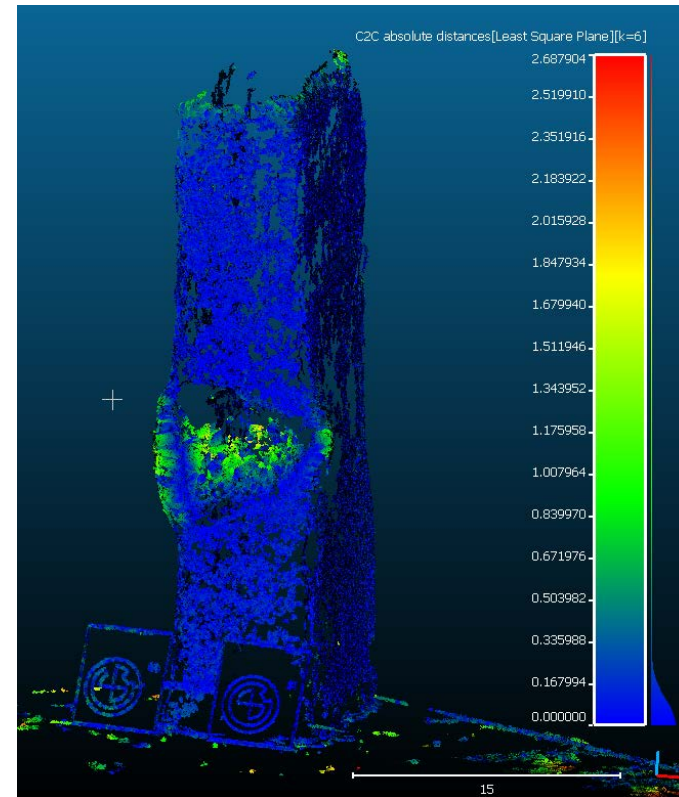
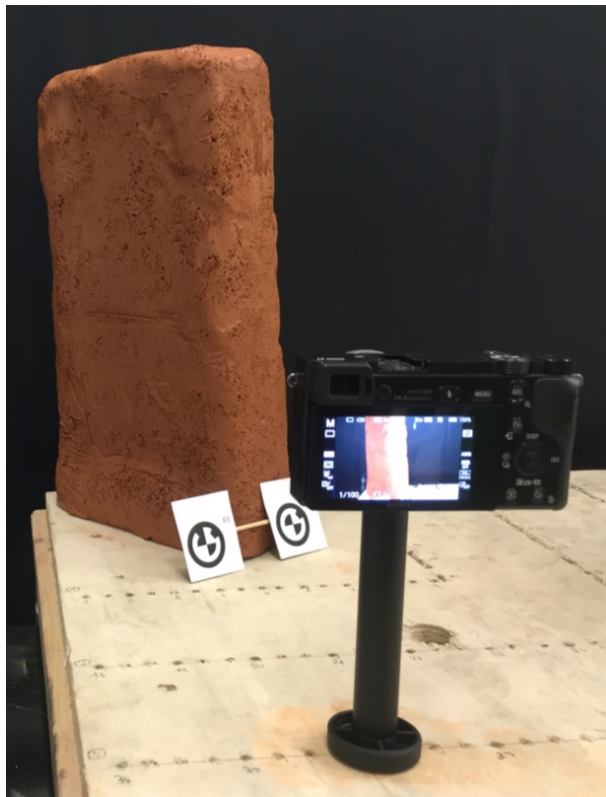
➤ Resources needed

- 30 VR gears and mobile phone per site
- 2-3 360° cameras and filming hardware
- 2-3 professional filming and cutting teams
- 2-3 professional IT teams (for virtual reality design)
- Project of 2-3 years
- Financial volume
 - 30.000 € for site specific visualisation hardware
 - 2-3 million € for whole set up during 2-3 years

- Combination with other technologies
 - UAV - based Mine Surveying: Areal and Ortho Images
 - Photographic documentation and inspection
 - Data basis for mine planning
 - visualization



- Combination with other technologies
 - Change detection in 3D object geometry: pillar deformation and stability control in underground mining



- Combination with other technologies
 - Deposit Modelling: Surpac, Datamine, AutoCad, numerical modelling
 - “Easy” use of deposit models; Good visualization of data (“google street view”)
 - Implementation of data into VR/AR (augmented reality) models:
 - Structural geology, Rock mass properties
 - Images of Stresses, displacements,...
 - Production data (drilling time, bore holes ...)