

Decision Support within Complex Subterranean Operations

NATO MODELLING & SIMULATION GROUP (NMSG)
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www.milak.at/nike





Challenges



OBH/Pezzi



Violent opponents and difficult environmental conditions



Extensive underground infrastructure



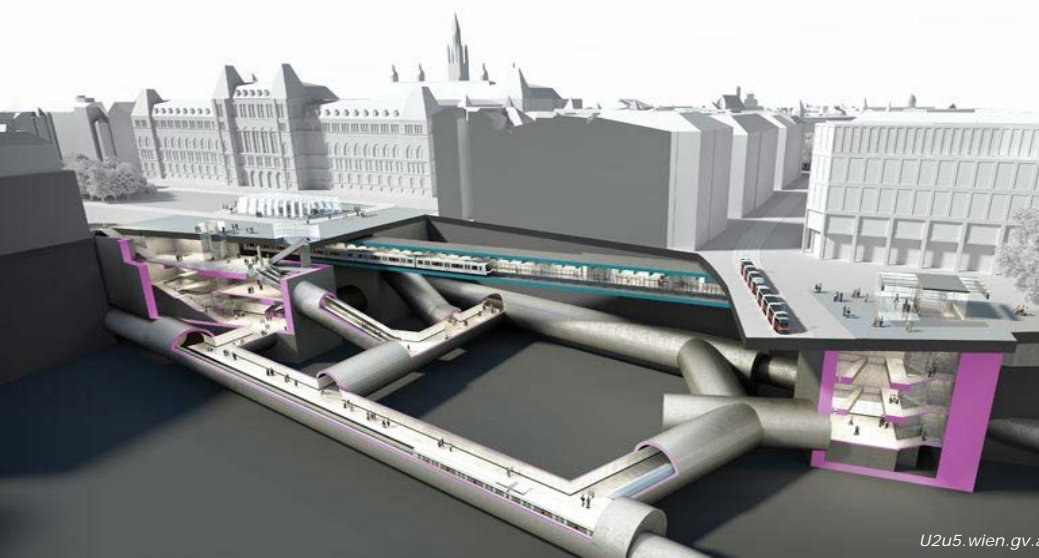
Completely hidden from view



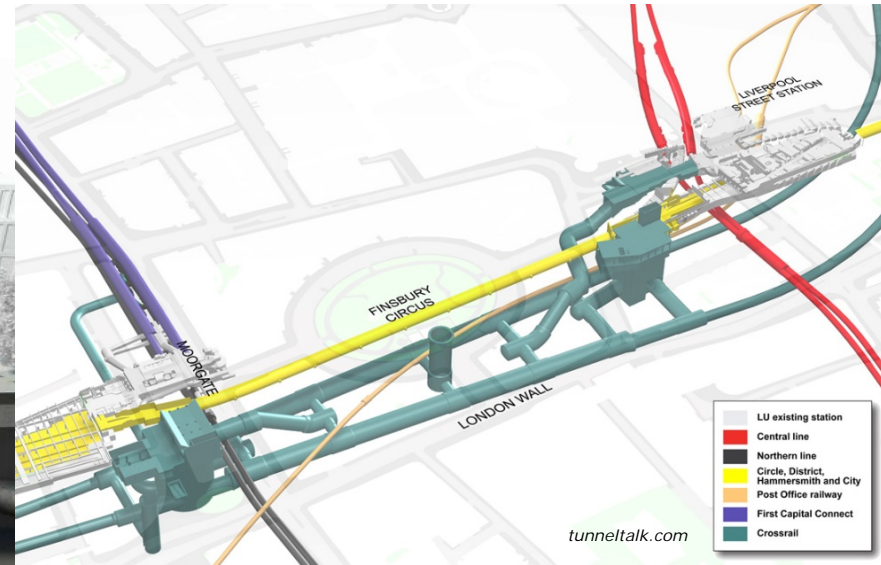
Comprehensible map material difficult to obtain



Complex Subterranean Operations



U2u5.wien.gv.at



A complex scenario is characterised by the simultaneous breakdown of essential functions (lighting, ventilation) and ubiquitous enemy threats thereby causing multiple cascading effects, extreme increases in mission duration and logistic demands. Mission accomplishment can be optimized using military techniques, tactics and procedures.



Concept of Operations

Highly trained personnel – „CONTACT ZONE“

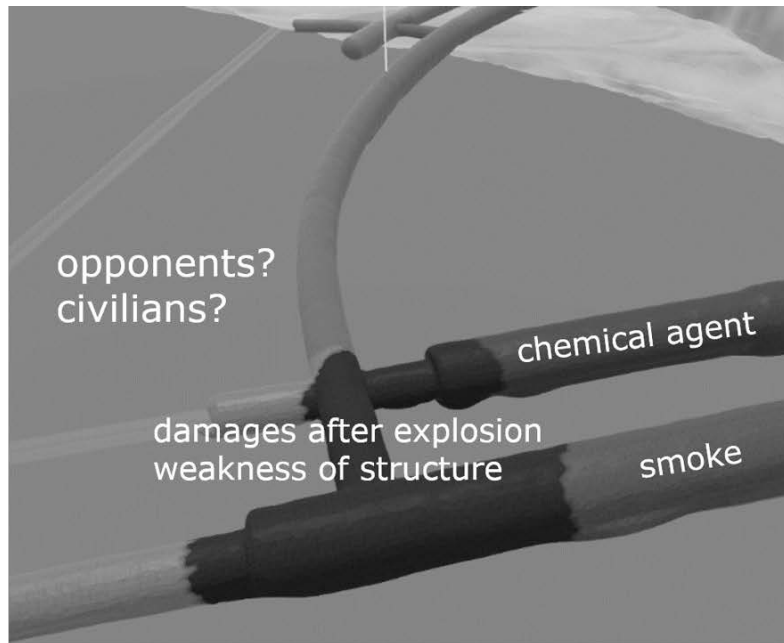
no power / no lighting / opponent
not respirable atmosphere (oxygen level <17%, toxic)
tunnel profile filled with smoke
specialised equipment and training necessary
Periodic relief of forces must be planned

Specialised personnel – „CONSOLIDATION ZONE“

establishment of ventilation, specialised logistic services
special equipment and training required

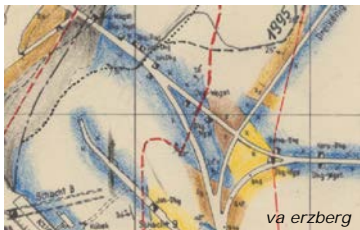
Trained personnel – „SATURATION ZONE“

standardised purpose equipment
saturation of space with trained forces

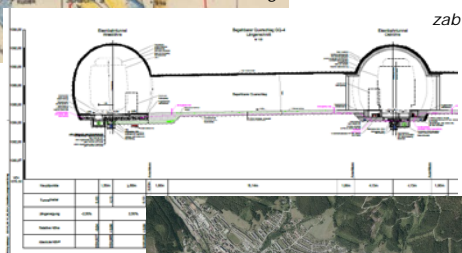




Rapid Creation of a Common Operational Picture



va erzberg



zab



data.gv.at

RApid
Data
Integration &
Visualization

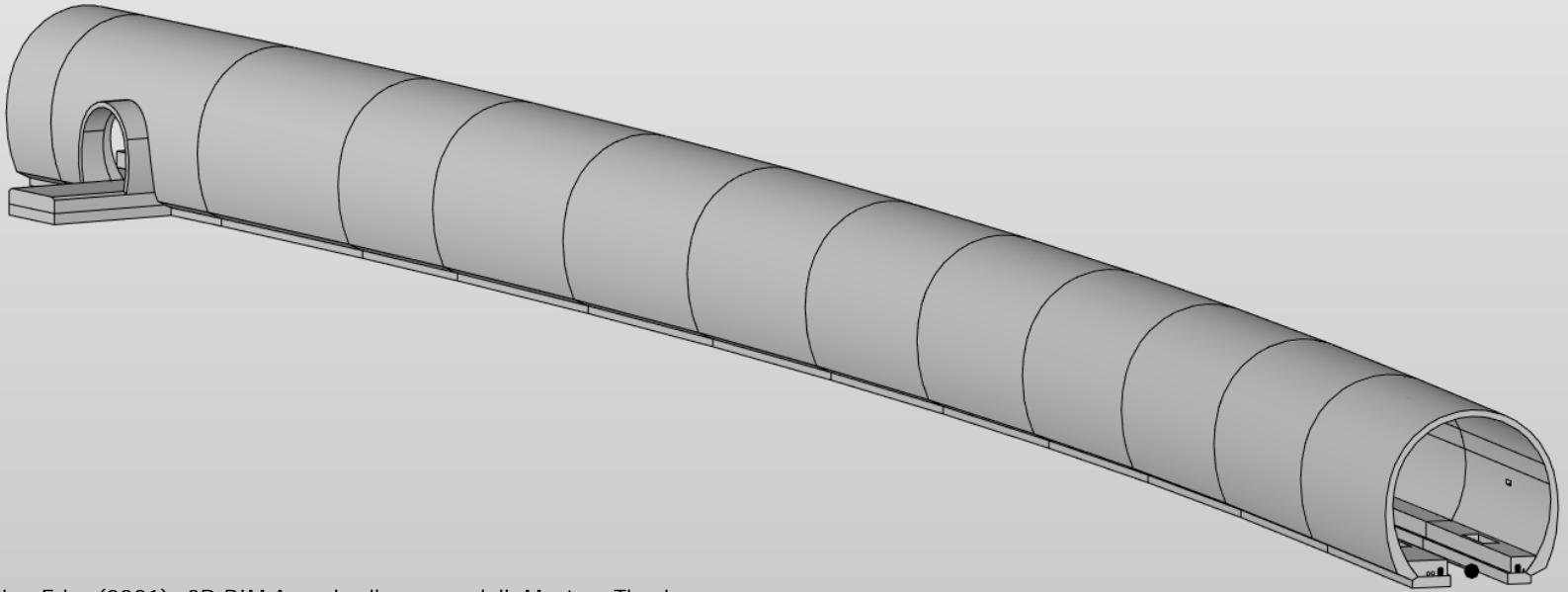
truly comprehensive (tc) COP



Speed is more important
than precision



Tunnel Information Modelling (TIM)



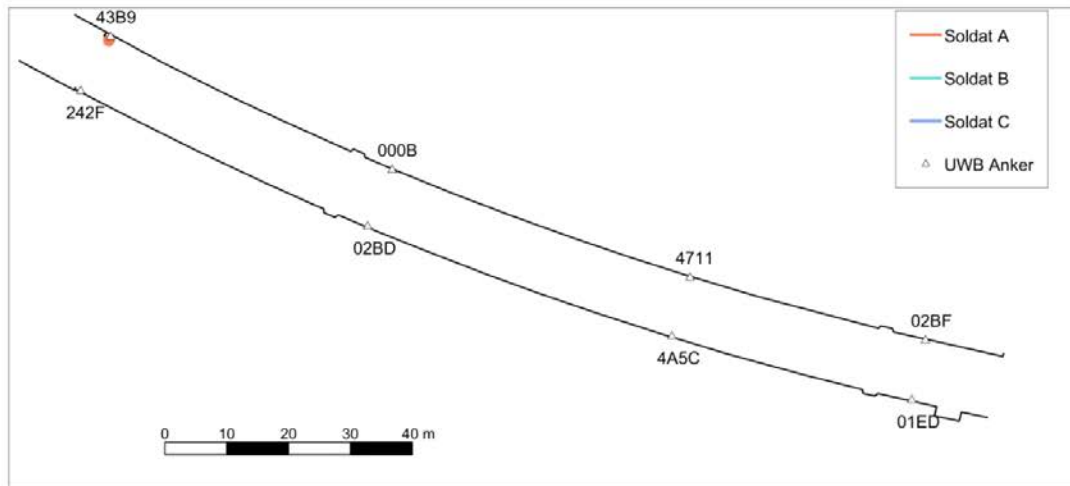
Nina Eder (2021): 3D BIM Ausschreibungsmodell, Masters Thesis





Blue Force Tracking in GNSS-denied environments

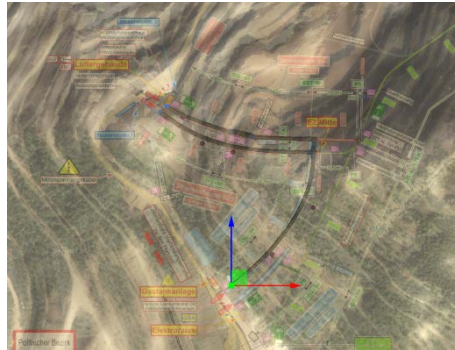
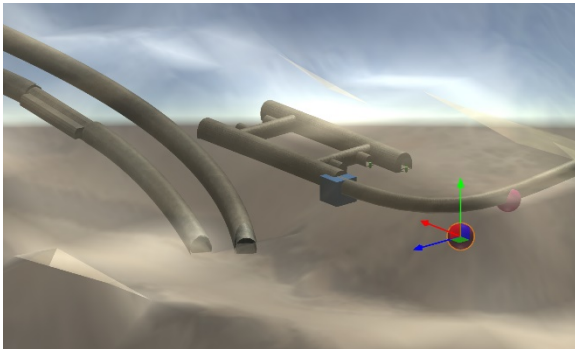
OHB Digital Solutions: visualisation within NIKE BLUETRACK





Fast Tunnel Modelling Tool

- **Data aquisition** of 2D plans
- **Fast Creation** of 3D tunnel models
- **Visualisation** in 3D und XR C2IS
- Better **Comprehension** of the subT Area of Operation



transform tools
s g r s

lock transform
 x y z

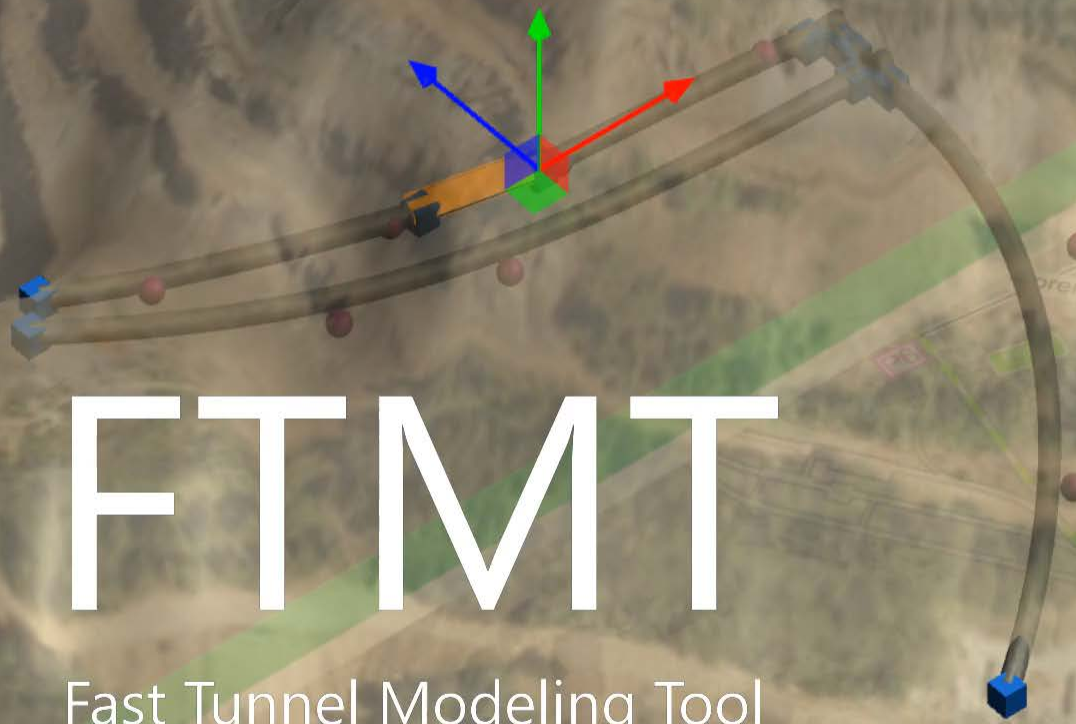
 Delete

 Import Plan
Map: 100%
Plan: 42%

 Add Tunnel

 Add Block

 Export Model



FTMT

Fast Tunnel Modeling Tool



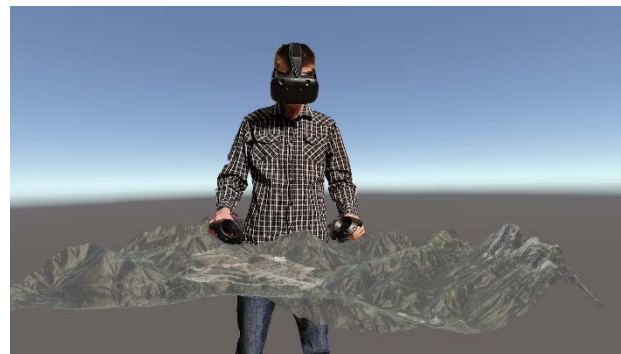
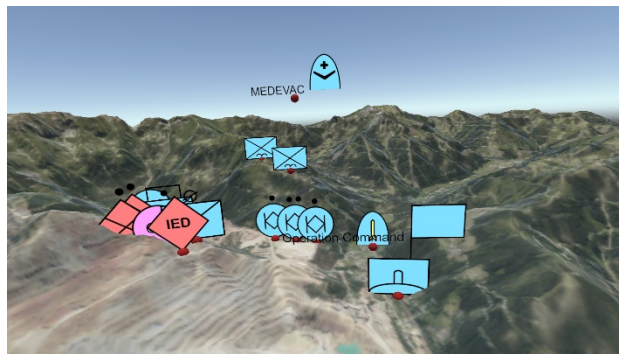
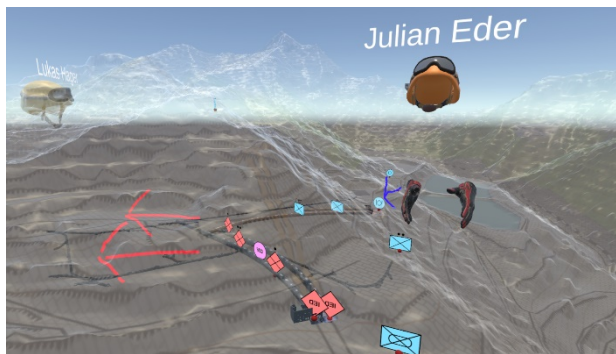






Subsurface Operation Mission Tool

- Better **comprehension** of complex, multidimensional Areas of Operation
- Creation of **plans of operations** (tactical symbols, drawings, ...)
- **Integration** of on-premises cyber-physical systems and sensors







Chief SSOC

Civil Engineering Expertise

Mining Expert

Geology Expert

Subsurface Engineering
Expert

Tunnel Safety Expert

Data Integration and Visualization

GeoInformation Systems
Expert

Visualization Expert

Cyber Physical Systems
Expert

Information and
Communications Expert

Military Expertise

Tactical Expert

CBRN Expert

Engineer Expert

Logistic Expert



Conclusion and Outlook

- RADIV offers insight in infrastructure normally out of sight
- Establishing RADIV as a command and control assisting process allows to make more precise actions
- Digitalization of Headquarters
- Improving Decision Support for Urban Operations

