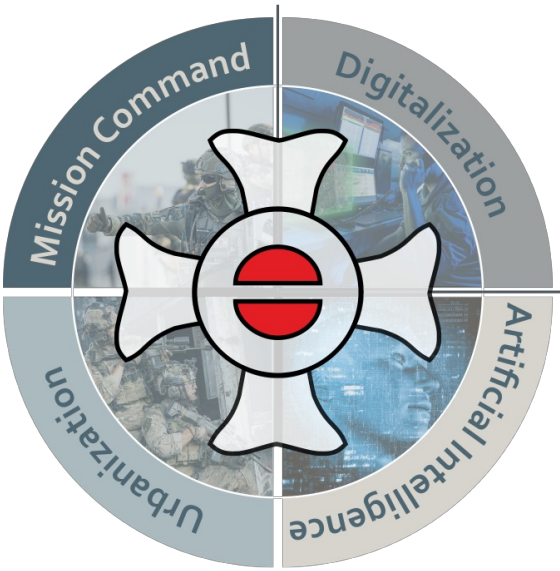
HEADQUARTERS PAPERS ONLINE - SPECIAL ISSUE



Theresian Military Academy
HEADQUARTERS PAPERS

Editors	Nina GEGENHUBER, Peter HOFER
Year and Place of Publication	2022, Wiener Neustadt
Publisher	Bundesministerium für Landesverteidigung
Conference Series	Urban Operations Expert Talks
Conference	Urban Operations Expert Talks 2022 19.07.2022 - 21.07.2022 Eisenerz
Peer Review	Double-blind

IMPROVING URBAN OPERATIONS BY INTEGRATION

THE NIKE RESEARCH AND DEVELOPMENT PROGRAM

THE NIKE RESEARCH AND DEVELOPMENT PROGRAM

Author:

Peter Hofer, Theresan Military Academy - Institute for Advanced Officer Training

Abstract:

Urban operations are without doubt amongst the most difficult military operations and there is a common understanding that the necessity to accomplish such missions will increase in the future. The NIKE program has integrated a great variety of research activities in developing the capabilities for subterranean operations. Being the most challenging part within the triple S (supersurface – surface – subsurface) urban environment, these capabilities are already an added value and currently enable shifting the focus on the needs of future urban operations.

read more

GENETICS: AN URBAN STABILITY FRAMEWORK

Authors:

Alexander Pytlar, United States Military Academy at West Point
Bryan Terrazas, United States Army

Abstract:

Global urbanization is occurring at an increasing rate, creating cities with unprecedented population density, size, and scale, stressing already vulnerable systems. Cities also serve as the site of new and increasingly critical factors for modern society across the social, political, and economic domains. At some point, these population centers will likely experience crises that demand external support, but there are few tools available to effectively evaluate a city's stability and resilience to these crises. It is critical that planners have a framework that can be applied when evaluating urban environments from which they may draw reasonable conclusions regarding decision-making. Existing US Department of Defense (US DoD) frameworks for analysing city environments are ill-suited to evaluate the upcoming urban stability issues cities will be facing in the twenty-first century and beyond. This study highlights important factors affecting the stability of future cities and emphasizes the growing importance of human dynamics and people's expectations regarding urban situations and contexts. Dense urban environments are the hubs of technological opportunities and complications, increasingly interconnected international relations, and other significant risks and opportunities that impact and threaten urban stability.

The study offers a process to evaluate a city's stability through three resilience dimensions - adaptive capacity, coping capacity, and expectancy benchmarks (or ACE) - and introduces an

overarching taxonomy to comprehensively assess the city as a system-of-systems known as GENETICS. The GENETICS stability factors - Governance, Economics, Natural Environment, Energy, Technology and Communication, Culture, and Security – assessed across the ACE resilience dimensions, provides planners and decision-makers the ability to make informed decisions regarding urban stability.

read more

MOBILE STOPPINGS IN COMPLEX SUBSURFACE OPERATIONS

Authors:

Peter Hofer, Theresian Military Academy - Institute for Advanced Officer Training
Michael Nöger, Montanuniversität Leoben - Chair for Mining Engineering
Manfred Eder, Laabmayr & Partner ZT GesmbH

Abstract:

Emergency situations in subsurface structures hold specific challenges, particularly in the case of highly dissected underground structures (several levels, winding, high penetration depths). Successful mission accomplishment is primarily linked to the existence of a functioning ventilation system, which must be understood and controlled by the emergency forces. This paper presents the development of a physical separation of the zone transitions to enable interventions in the air flow conditions by means of ventilation elements which can be quickly deployed and relocated. Besides the availability of specialized units capable of setting up the necessary ventilation sections, expert knowledge in the SubSurface Operations Cell (SSOC) and a suitable ventilation simulation is needed to define these sections. The interdisciplinary development of a customized mobile ventilation door is an essential building block for managing complex underground operations. The establishment of zone crossings even in large cross-? sections allows effective ventilation interventions in two-lane underground traffic structures with a large longitudinal extension.

read more

SUBSURFACE MOVEMENT CONTROL

Authors:

Roland Perko, Joanneum Research

Alexander Almer, Joanneum Research
Hannes Fassold, Joanneum Research
Anna Maly, Joanneum Research
Robert Wenighofer, Montanuniversität Leoben
Julian Eder, Laabmayr und Partner ZT GesmbH
Peter Hofer, Theresan Military Academy – Institure for Advanced Officer Training

Abstract:

Human lives are particularly at risk in critical security situations in subsurface infrastructures. Thus, this work presents concepts and initial results of the KIRAS project NIKE-?SubMoveCon, which focuses on subsurface movement control. All critical information is extracted from cameras (optical and thermal) and from microphone arrays. The results are transferred into a 3D virtual reality common operational picture, which assists the subsurface operators and allows efficient movement control.

read more

SMALL-SCALE MODELS AND TESTS AT THE “ZENTRUM AM BERG?

Authors:

Jacqueline Schmidbauer, Montanuniversität Leoben
Paul Heilinger, Montanuniversität Leoben
Christof Hofmann, Montanuniversität Leoben
Valentin Speckmoser, Montanuniversität Leoben

Abstract:

During the master’s program "Geotechnics and Tunneling" at the University of Leoben, several models of the Zentrum am Berg (ZaB) have been developed for the realization of small-?scale tests. Using physical models of the ZaB, non-?destructive small-?scale tests will be carried out in the future. These experiments could be radiation and gas dispersion tests as well as blasting tests, which are performed on a small scale, while their effects can be proportionally converted to real cross-?section dimensions.

read more

TASK FORCES IN SUBSURFACE OPERATIONS

A PSYCHOLOGICAL ANALYSIS OF SPECIFIC FACTORS

Authors:

Janika Saretzky, ERC Experience Research & Consulting
Jürgen Pretsch, ERC Experience Research & Consulting
Aljoscha Neubauer, Karl-Franzens-Universität Graz

Abstract:

Operations in subsurface areas are increasingly relevant challenges in national crisis management. This study recorded task forces' risk perception and the perceived competence regarding amok and terrorist scenarios. The results based on data of 324 task forces show that general risk perception and the subjective experience of competence are lower in subsurface than above-?ground operational scenarios.

read more

RASPOS: SUBSURFACE PEOPLE DETECTION AND LOCALIZATION USING WI-FI PROBE REQUESTS

Authors:

Alexandros Evangelatos, Montanuniversität Leoben
Robert Wenighofer, Montanuniversität Leoben

Abstract:

Operations in subsurface areas are increasingly relevant challenges in national crisis management. This study recorded task forces' risk perception and the perceived competence regarding amok and terrorist scenarios. The results based on data of 324 task forces show that general risk perception and the subjective experience of competence are lower in subsurface than above-?ground operational scenarios.

read more

NIKE BLUETRACK

BLUE FORCE TRACKING IN UNDERGROUND STRUCTURES

Authors:

Markus Watzko, Technische Universität Graz - Working Group Navigation - Institute of Geodesy
Karin Mascher, Technische Universität Graz - Working Group Navigation - Institute of Geodesy
Axel Koppert, OHB Digital Solutions GmbH,

Abstract:

In this article we present a blue force tracking system for operators in underground structures. By fusing inertial data sensed by an Inertial Measurement Unit (IMU) with distance information from Ultra-?Wideband (UWB) and map information from a 3D model, a robust tracking system is introduced. Since the needed infrastructure and map model cannot be assumed available, tools are developed to provide the necessary information in near real-time. Our tests in a tunnel at Zentrum am Berg (ZaB) showed that the developed system provides robust localization information.

read more

THE DIGITAL HEADQUARTERS

Authors:

Julian Eder, Ingenieurbüro Laabmayr und Partner ZT

Thomas Halwax, Syncpoint GmbH

Mario Voithofer (Realsim)

Abstract:

Urban military operations pose enormous challenges for operators. Complex spatial situations and a flood of data, provide challenges for the planning process of such operations, especially when trying to understand them with traditional planning tools. The project NIKE within the Austrian Armed Forces aims to tackle these challenges with modern digital tools and Rapid Data Integration and Visualization. We describe different techniques for visualizing various types of data and compare them for their possible applications in a decision-making process.

read more