



CIVIS Alliance – Open Lab Project Impact Assessment Report

01 – PROJECT DESCRIPTION

- Title of the project** Experiencing and Engaging with Applications of Discrete Mathematics in Cybersecurity and Resilience
- Project coordinator** Bernhard Garn (University of Salzburg)
- Universities involved** University of Salzburg
University of Bucharest
Universidad Autónoma de Madrid
Salzburg University of Applied Sciences
- Hub theme** Digital and Technological Transformations
- Duration of activities** Feb - Sep 2026
- Place of the activities** Salzburg, Austria

02 – PARTNERS/TARGET AUDIENCE

Number of internal and external stakeholders involved in and impacted by the project

INTERNAL (All CIVIS universities)				EXTERNAL (All CIVIS cities/regions)	
Academics	Researchers	Students	Admin personnel	Citizens	Other - please specify
6	2	14	2	200+	High-school students 60+

Non-university associations and organisations that have been involved in the project

ASSOCIATIONS/ORGANISATIONS		
Name	Country	Description
JMP Statistical Discovery	USA	JMP is powerful statistical software, has strong engagement with its user base including non-technical users

03 – PROJECT IMPACT

Social dimension:

In this Open Lab project, the objective is to contribute to alleviating the disconnect between society and ubiquitous technology used nearly everywhere as a result of digitalization by creating outreach materials that provide for the experience and engagement with applications of discrete mathematics as a foundation of (applications of) computer science on a non-technical level targeting (high-) school children and the interested public, primarily focusing on cybersecurity and resilience against natural hazards. The goal of this CIVIS Open Lab project is to use the created outreach experience materials for informing and motivating the next generation to actively engage with and appreciate the underlying formal mathematical methods that are used to create, reason and execute cybersecurity in our daily interconnected online life as well as to model information technology risks with regard to societal resilience against natural hazards and their impact on the modern digital society of the 21st century.

This OL project has participated and contributed to different kinds of science outreach events, each of which had different target groups. While overall we are very pleased to report interest, engagement and active participation in the exchanges as part of outreach activities, it was noticeable that some audiences had an easier and more natural way to approach the topic of applications of mathematics than others. We can further say with certainty that every interaction and exchange provided benefit, this advancement of knowledge happened on different levels depending on the specific individual, as clearly school children and PhD students have substantially different understandings. Considering this, it is helpful that the designed outreach materials of this project can lead to civic engagements on different technical levels, making it possible to dynamically adjust the level of 'difficulty' as needed in a specific circumstance.

A highlight of this project so far has certainly been the participation with a booth at the 'Long Night of Research' (German original title: "Lange Nacht der Forschung") as part of the contribution of the University of Salzburg to this Austria-wide science promotion event. In this event, we counted more than 200 interactions with – primarily – school and high-school children, as well as with their parents and interested adults. We firmly believe that we were able to provide insights into a technical field that – implicitly and explicitly – dominates our daily lives in the 21st century.

Cultural dimension:

This OL project and some of its created outreach materials have contributed and been promoted at the 1. African-European CIVIS Forum in Casablanca, which enabled exchange with other Forum participants. The interactions and exchanges there were particularly impactful, given the broad attendees from CIVIS European and African Partner Universities, as well as the different areas of expertise and backgrounds from the participating academics, including PhD students.

This project also had a meeting and exchange with a representative from a company focusing on statistical software, which targets to provide access to sophisticated methods to several different industries, but making its software also easy-to-use for non-experts has always been a priority. While coming from different backgrounds as well as having different goals, the exchange about engaging a greater audience for technical matters provided valuable insights.

As of this writing, there is another conference contribution of this project upcoming in the form of a contributed poster about this project at a large scientific conference around the topics of geoinformation, including natural hazards and disasters. Here, the exchange with academics as well as industry representatives will be focused on.

To summarize, as of this writing, this project has participated and contributed to 7 events so far, with at least two more planned over the summer 2026.

Economic dimension

This CIVIS Open Lab project provided not only an official mechanism to work together across CIVIS Universities, but also provided financial resources that enabled the creation of a dedicated project team. Furthermore, the financial support enables to create outreach materials as well as to organize project meetings with participating academics.

Added value for the beneficiaries

This OL project enabled the project team to combine different areas of expertise and backgrounds, from both technical- as well as social sciences, to form an interdisciplinary project team to work together for engaging and promoting applied mathematics in the context of cybersecurity and resilience to the general public, with a clear focus on the next generation. The insights, lessons learned and co-designing of outreach materials as well as activities provides added value to the project team. The activities that have been carried out within this Open Lab project would not have been possible from a single university, enabling greater scope, depth and impact together.

Relevance to the context

We are currently experiencing the progressing digitalization of our lives and environment at an unprecedented, accelerating pace with the most recent push being heavily driven by the capabilities of large language models and (generative) artificial intelligence in general. The increasing technological capabilities that surround us, directly in the form of 'smart personal things' (including smart phones, health trackers, etc.) or indirectly via a 'smart environment' (including Internet of Things and AI-agent driven refrigerators), stand in sharp contrast to a disconnect- or even rejection- of parts of the broader society to science combined with a lack of understanding of fundamentals of modern information technology, including the role of geoinformatics. With exclusive social media usage, fake news consumption and a fading interest in Science, Technology, Engineering and Mathematics (STEM) as well as science in general, a disconnect manifests itself towards and in parts of society significantly disadvantaging them and also hinders them in self-informed participation in aspects of modern life, rendering them even more vulnerable to malicious targeted influences. This is clearly a problem that transcends local and national boundaries and threatens directly the modern way of life and further digitalization.

Universities, in fulfilling of their third mission, are addressing emerging social challenges and work together within CIVIS to leverage the resulting synergies from the CIVIS University Alliance. A disconnect and lack of understanding to technological foundations, including applied mathematics, cannot be solved only on a local level, but needs coordinated and substantial actions to address on a high-level. However, such activities can start on a local level, which is precisely what this Open Lab project has contributed to.

Explain how the project has fulfilled the goals and objectives of the European project CIVIS2 (Erasmus+, 2022 - 2026)

Conducting this project as a CIVIS Open Lab project adds significant value, because it enables to draw from the strengths of the CIVIS university alliance. The project team members as academics from different European universities work together under the umbrella provided by CIVIS, establishing a multinational project team uniting different perspectives. Furthermore, the creation of approachable and intelligible science outreach materials requires both technical- as well as educational expertise. The project team of this project consists of academics from three different CIVIS universities (University of Salzburg, UoB and UAM) with different backgrounds, forming together a balance between technical and educational expertise. The project team will be further supported by local experts in cybersecurity from the Salzburg University of Applied Sciences, which connects this project to the local (cybersecurity) stakeholders in the broader area of Salzburg in Austria.

The goal of this project aligns and contributes to the strengthening of the civic identity of CIVIS by creating rich interactions for the dissemination of knowledge. As such, this project aims to bridge scientific and technical concepts, targeting a broad local audience in the wider area of Salzburg in Austria near the two participating universities from this region. It also aims to lower the barrier to engage with applications of discrete mathematics in computer science by offering approachable participatory interactions via

physical games that visualize and illustrate abstract concepts in an intelligible way. Furthermore, additional visualization and explanatory materials such as created posters provide background information and the guidance from project team members at events has helped the audience to realize technical connections and an overview on a high level how discrete mathematics are used in cybersecurity and resilience for modern internet-based technologies. The contributions and participations in science outreach events pay particular attention to civic engagements events targeting the younger generation, including high-school children and prospective new students at the University of Salzburg – explicitly not only those already interested in computer science or STEM-related studies. These civic engagements also contribute to the connection of CIVIS with local communities and strengthen the Open Labs initiative of CIVIS via participatory, inclusive and open interactions.

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Université

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