

## Marie Skłodowska-Curie PostDoc Positions in Germany

### “Expression of Interest” for hosting Fellows

This template should be used by institutions interested in hosting postdoctoral fellows within the Marie Skłodowska-Curie Individual Fellowship programme. Host institutions should be located in Germany.

#### 1. Valid for the following MSCA-IF Calls<sup>1</sup>:

x 2019	x 2020
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#### 2. Interested host institution:

TU Bergakademie Freiberg  
Akademiestr. 6  
09599 Freiberg  
Germany

#### 3. Institute/Department:

Faculty of Geotechnology, Geosciences and Mining  
Department of Mine Surveying and Geodesy  
Reiche Zeche Mine  
Fuchsmühlenweg 9B  
09599 Freiberg, Germany  
<http://tu-freiberg.de/fakult3/mage>

#### 4. Contact person (name and e-mail address):

Univ. Prof. Dr.-Ing. Jörg Benndorf, MPhil  
Tel: +49 (0) 3731 39-2612 E-Mail: [Joerg.Benndorf@mabb.tu-freiberg.de](mailto:Joerg.Benndorf@mabb.tu-freiberg.de)

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<sup>1</sup> MSCA Individual Fellowships are selected on the basis of annual calls for proposals. Forthcoming and open calls for proposals can be found on the [Funding & tender opportunities Portal](#) of the European Commission.

## 5. Project idea/position (scientific requirements, topic, discipline):

### ***Underground Space Information Modelling***

The underground space offers an enormous potential for sustainable future development in energy storage, underground infrastructure, resource supply and others. The prerequisite of utilizing the underground space in a most efficient manner is knowledge about the spatial distribution of material characteristics and also existing infrastructure. A typical example is an underground mine.

In the light of newly available monitoring-, geo-data management-, modelling-, visualization- (Virtual Reality VR) and decision supporting technology (Augmented Reality AR), spatially and timely very dense data and information for both, geometrical and geochemical, mineralogical, attributes of the underground space and its interaction with the surface can be effectively used. Examples include but are not limited to satellite sensors (e.g. Copernicus Sentinel 1 and 2), airborne and terrestrial LIDAR-data for areal information, geochemical point sensor data including FTIR and SWIR, classical surveying data or self-sufficient deformation sensors for local information. The development of these methods and its demonstration has been and is still focus of several interdisciplinary European research projects, such as [I2MON, Real-Time Mining, STINGS, CopServ-MineWater].

Therefore, for an improved and scientifically sound underground space planning the following questions should be addressed:

- How can modern and newly available multi-scale and multi-sensor monitoring technology be best utilized, to characterize geometrical, geo-mechanical and geochemical characteristics underground at an appropriate spatial and timely resolution? (Underground Space Monitoring)
- How can these monitoring data be translated into a better understanding, to model and predict time related processes (e.g. hydrology) on a suitable spatial and timely scale? (Data Driven Predictive Modelling)

Considering the long time frame and the highly inter-disciplinary planning process across all stake-holder groups, in addition to the above mentioned technical questions, further aspects should be also considered:

- How can relevant data, information and models/knowledge available today and being created over the complete time horizon be conserved and made available to all stakeholders?
- How can relevant data, information and knowledge be communicated and visualized for all stake holders in an efficient way allowing for a transparent and open integrated planning approach to permit assessment and analysis of all options?

In the construction industry, the BIM concept is an emerging technology that provides a systematic methodology to manage the essential building design and project data in digital format throughout the building's life cycle. It essentially is an information system as "digital twin" of the construction object that comprises all data, predictions and planning scenarios from different stake-holders and presents it in an effective visual way. It is argued to be a catalyst for change to reduce barriers between stakeholders, improve effectiveness in communication and planning and lower costs of inadequate interoperability. It promotes understanding, dissemination and effective implementation by presenting data in arguments in manageable sections. This also includes a complete integration of process monitoring information, integrated process models and exploration of possibilities. Modern mining companies have developed comprehensive geo-data base and GIS solutions that are currently used as Geoportal in partially mobile solutions in an underground space. Extending these with the components of prediction models, interactive planning scenario

evaluation, directly linked to costs and other KIPs will offer also an improved interactive transparent and efficient communication tool, in particular during the underground space usage planning. The communication to non-technical stakeholders, which may only limited be able to interpret to typically used 2D technical maps, a VA or interactive AR environment is advisable.

Building on the aforementioned modern multi-scale and multi-sensor monitoring techniques, the Marie Currie fellow would develop a framework to make best use of these data and develop, similar to state-of-the-art Building Information Modelling (BIM) systems, an innovative integrated information and modelling system for a sustainable underground space utilization.

It is expected that candidates publish their work in international peer review journal papers and independently connect to global research centers focusing on related subjects as part of their professional network development.

Applicants should have demonstrated their ability of scientific work in a related field and an effective communication of results as part of their previous work.

Please tick:

- Life Sciences
- Natural Sciences
- Engineering Sciences
- Social Sciences and Humanities

#### **6. Deadline<sup>2</sup> for considering interests by postdoctoral applicants:**

Interested applicants should contact no later than September 10th, 2019. However, we ask applicants to contact us as early as possible in order to plan and support the project in the best possible way.

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<sup>2</sup> Please consider that the preparation of a Marie Skłodowska-Curie proposal requires some time and that the fellow and supervisor have to agree on a project and training opportunities for the fellow.