



BBMRI.at #3

PROJECT PROPOSAL

SUMMARY



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EXECUTIVE SUMMARY

In the first two funding periods (BBMRI.at #1 and #2, 2013-2023) the national node was established and a highly collaborative biobanking community was developed by engaging with all Medical Universities in Austria. BBMRI.at has become *“a visible, essential and driving part of the European research infrastructure environment”* (BMBWF, Evaluation Report BBMRI.at #2, 2023).

Key achievement of BBMRI.at was its pioneering role in Austria and BBMRI-ERIC in several fields. For example, BBMRI.at had a leading role in developing and implementing European and international biobanking-related standards (i.e. CEN and ISO standards on sample pre-analytics). They served as a common reference for BBMRI biobanks harmonization and for sample quality improvement. BBMRI.at was the first node to establish quality management cross-audits of its biobanks and successfully implemented virtual audits during the COVID-19 pandemic. As the first node, BBMRI.at established a ‘Central Access/Contact Point’ for requests (for e.g. samples/data and participation in call proposals). This served as a model for other BBMRI-ERIC Nodes. This resulted in numerous successful grant applications (national and EU calls) of BBMRI.at members. BBMRI.at is one of the nodes with the most advanced Key Performance Indicators (KPIs) system and monitoring process. BBMRI.at is recognized as a frontrunner in the field of ‘trusted and secure environment for patient data’. BBMRI.at developed a concept for data and metadata quality management for biobanks. Furthermore, BBMRI.at biobank partners successfully contributed to the COVID-19 research providing cohorts and involvement in collaborations projects of with academia and industry. BBMRI.at interacts with many (international programmes/initiatives and established the Austrian Cohort Initiative, with researchers, biobanks and industry participating.

In the third funding period (BBMRI.at #3, 2023-2028), the operation of Austrian biobanks will be further improved, their sustainability ensured and their position in the European biobanking community reinforced. Building on the achievements of BBMRI.at #1 and #2, #3 aims to ‘strengthen its strengths’, and to address emerging needs and further developments relevant for biobanking. Emphasis will be placed on user needs by engagement with different user communities from academia and industry. Related to this, BBMRI.at will continue driving the Austrian Cohort Initiative. BBMRI.at will further promote the importance of high-quality biosamples for reproducibility of research data. Therefore, efforts will be put on implementing biobanking-related CEN/ISO standards and performing BBMRI.at cross-audits. In addition to sample quality, data quality will be a prominent topic. Data quality concepts from BBMRI.at #2 serve as basis for further development and implementation of solutions to link biosamples with associated data. Overall, BBMRI.at #3 has a strong focus on data integration/harmonization/access, and data-related legal issues, two very current, dynamic and relevant topics. Existing data management solutions will be updated to meet latest demands. This includes novel tools or versions developed in BBMRI-ERIC, and new legal/regulatory frameworks which are about to be adopted at the European level (e.g. European Health Data Space Act, Data Governance Act). The activities of BBMRI.at aim to enable harmonized data integration and access to Austrian biobank data and will be closely aligned with activities of BBMRI-ERIC. Legal experts in BBMRI.at #3 will operate a national legal helpdesk, monitor legal and regulatory developments, and provide input to current legal discussions. This should help BBMRI.at and BBMRI-ERIC to establish their position in further legal frameworks.

As a part of global climate change awareness biobanks have to rethink their environmental impact (e.g. energy consumption, production of waste). Environment sustainability was therefore integrated as a new topic in BBMRI.at #3. The current environmental impact of biobanks will be analysed and a catalogue of measures how to increase environmental sustainability will be compiled. This may also help to reduce costs for the biobank operation. To improve the visibility of veterinary (clinical) biobanks a dedicated work package will be responsible for raising awareness on the potential of such biobanks and their samples/data, particularly with respect to the ‘One Health’ approach and comparative medicine (e.g. human – dog). In addition to outreach activities within the BBMRI-ERIC community, veterinary and human specialists (e.g. from cancer research) will be brought together to discuss strategies for research collaborations.

Finally, BBMRI.at #3 will finance the operation of the Austrian National Node and the required activities and will enable the efficient integration and participation of the Austrian biobanking community in BBMRI-ERIC.

The activities of BBMRI.at in its third funding period should ensure that the Austrian biobanks are well prepared to address current and upcoming user needs, and that both the biobanks and the Austrian node are positioned as valuable, competent and responsible partners within the research community.



PREVIOUS WORK OF BBMRI.AT #1 + #2 (2013-2023)

Within its first funding periods (BBMRI.at #1 and #2, 2013-2023), BBMRI.at established a successfully collaborating biobanking community by engaging all Medical Universities in Austria and creating a National Node (NN), which actively cooperates with the BBMRI-ERIC headquarters (HQ), its NN and other (inter)national programmes and initiatives. In the last **evaluation report** of BBMRI.at the **reviewers** outlined that *“the Austrian biobanking landscape has become a visible, essential and driving part of the European research infrastructure environment”* (BMBWF, Evaluation Report BBMRI.at #2, 2023).

BBMRI.at has been pioneering several key developments in the biobanking field at the national and European levels **and has strengths in several fields**. These includes for example the following:

Community/network building and engagement in BBMRI-ERIC:

BBMRI.at succeeded in building a biobanking community that engaged in a common process to establish and operate a national biobanking infrastructure which is a valuable and active part of BBMRI-ERIC. Stimuli derived from the joint work within BBMRI.at supported the BBMRI.at partners in the development and advancement of their biobanks. BBMRI.at includes - as the only BBMRI-ERIC N - a University of Veterinary Medicine with its biobank in its consortium. This inclusion of non-human biobanking in BBMRI.at is an added value and has the potential to serve as a best practice example for other institutions within the BBMRI-ERIC community.

Also other (inter)national initiatives and programmes outside the classical academic biobanking field established a close and fruitful collaboration with BBMRI.at. This includes among several others, the Human Biomonitoring Platform (HBM) of the Austria Environment Agency, and the national EIRENE hub Exposome Austria. The joint participation in the ‘Austrian Cohort Initiative’ provides evidence for this development. Also with the Austrian life science clusters, regulator bodies, standardization bodies and funders contacts were established (e.g. with LISA, LISAVienna; Austrian National Competent Authority (AGES), QMD Services; International Organization for Standardization (ISO), European Committee for Standardization (CEN), Austrian Standards Institute; Austria Wirtschaftsservice (AWS), Austrian Research Agency (FFG)).

BBMRI.at is a very committed and active partner in BBMRI-ERIC with numerous experts from BBMRI.at contributing in all BBMRI-ERIC task forces, working groups, and common services, and participating in the BBMRI-ERIC events and educational activities. Due to the strong engagement of BBMRI.at in BBMRI-ERIC and its pioneering role in several areas, many BBMRI.at achievements supported the development of the BBMRI-ERIC infrastructure.

Harmonization and standardization of procedures:

A central activity to enable collaboration and integration of biobanks and collections into a national research infrastructure is to harmonize and standardize procedures.

- BBMRI.at had a driving and pioneering role in developing and supporting the implementation of international (CEN and ISO) quality standards for sample pre-analytics. These standards help to generate samples of high and documented quality, which are key to improving data reproducibility and reliability. BBMRI.at representatives led the development of standards such as ISO 20166-3 (FFPE tissue - DNA), 20166-4 (FFPE tissue – in situ detection), and CEN/TC 17626 human specimens - microbiome DNA; Stumptner et al., 2022). Moreover, several BBMRI.at experts contributed in public consultations to standards under development.
- BBMRI.at was the first node to establish quality management cross-audits of biobanks within BBMRI.at. During the COVID-19 pandemic and the concomitant travel/meeting restrictions, the concept of on-site audits was successfully transformed into a virtual remote audit format. These cross-audits are a sign of mutual trust and gave rise to both further improvement of the biobank under review, as well as learning about existing approaches to common problems among the auditing partners (Haslacher et al., 2019).
- Over the past years, BBMRI.at has gained a prominent and pioneering role in the BBMRI-ERIC Negotiator and Directory use: As the first node, BBMRI.at established a ‘Central Access/Contact Point’ for requests (e.g. for sample/data/services, or participation in call proposals) including those coming in via BBMRI-ERIC (e.g.



Negotiator, email). This approach proved successful as it a) served as a best practice example for other BBMRI-ERIC nodes for the fast and reliable handling of requests, and b) approx. 60% of all BBMRI-ERIC Negotiator requests were sent to BBMRI.at partners and partner biobanks.

- Many of these requests led to accepted projects in which BBMRI.at consortium partners with their associated biobanks and researchers contribute. Examples of such projects are: ISIDORE (infectious diseases), canSERV (cancer), Instand-NGS4P (next generation sequencing), MICROBE (microbiome biobanking), DIOPTRA (colon cancer screening), HEAP (exposome), BIGPICTURE (digital pathology), CyBioank (biobanking infrastructure), and SCIBIOEU (scientific outreach on biobanking) (<https://bbmri.at/projects>).
- BBMRI.at is one of the few nodes with an advanced Key Performance Indicators (KPI) system and monitoring process.
- As sample/data traceability is an increasingly important issue. BBMRI.at has been using and testing different types of methods to track the contribution of biobanks and is at the forefront of this development within BBMRI-ERIC.

Data management:

Data management is becoming an increasingly important issue in the context of biobanking and biosample-associated data are gaining enormous relevance particularly for artificial intelligence (AI)-based analyses. BBMRI.at #2 responded to this in several ways:

- In addition to the strong presence of BBMRI.at partner biobanks in the BBMRI-ERIC Directory and Negotiator, BBMRI.at contributed in the federated search platform piloting phase.
- Moreover, data quality categories and criteria for data and metadata quality in biobanks were defined and a concept for data and metadata quality management for biobanks was developed by BBMRI.at.
- With its work on “trusted and secure environment for patient data”, a new model for accessing and analysing patient and health data locally in a secure environment was tested. Here, BBMRI.at is recognized as a frontrunner. This model has been further developed and brought to a European level, where it is now discussed within BBMRI-ERIC and the United Nations.
- Some BBMRI.at partners established digital pathology and whole slide image scanning facilities and services, and have become experts in building and operating digital scanning infrastructure.

Examples of further successes of BBMRI.at:

- During the years of the COVID-19 pandemic, several biobank partners successfully contributed to the COVID-19 field, built up COVID-19 cohorts together with clinical partners and/or conducted research in collaboration with local and/or industry partners. This included for example over 20 research projects performed at Austria's highest biosecurity laboratory and autopsy area (BSL-3) at the Med Uni Graz, as well as several SARS-CoV-2 research projects at Med Uni Vienna with strong MedUni Wien Biobank involvement. This led to multiple scientific publications on the topic of SARS-CoV-2 including a joint research collaboration and publication of Med Uni Vienna/MedUni Wien Biobank and Med Uni Graz/Biobank Graz in a high-ranked journal.
- These activities also attracted the interest of various media, which resulted in numerous TV reports and articles in newspapers and magazines.
- In interviews and discussion rounds with different types of stakeholders including biobank users and citizens/patients we gained valuable insight into stakeholders' opinions, requirements, and concerns, which are of importance for adjusting our services, processes and communication.



MAJOR GOALS OF BBMRI.AT #3 (2023-2028)

Building on the achievements of BBMRI.at #1 and #2, the focus of BBMRI.at #3 is on further ‘strengthening the strengths’. We will continue our strong commitment to engagement in BBMRI-ERIC, emphasizing our pioneering role, while keeping a focus on improving the operation of BBMRI.at biobanks and promoting their role at the national and European levels. In order to achieve these goals the planned activities during BBMRI.at #3 will include an extension and further development of successful work in certain areas such as harmonization and standardization, and quality management. However, this will also include a stronger focus on certain topics and the integration of new topics that are of increasing relevance for biobanking. These are the focus on data from both a technical/IT and a legal/regulatory perspective, environmental sustainability in biobanking, comparative medicine/‘One Health’, and cancer mission (the latter being an integral topic in several WPs).

One topic that becomes increasingly relevant for biobanking and the medical research field in general is data and particularly digital medical/health data. Medical/health data are globally growing, are very diverse, complex, and highly sensitive, which poses specific challenges with respect to their use. For BBMRI-ERIC, its NNs and their associated biobanks it is important to ensure findability of sample and data and to facilitate access for research purposes in a legally and ethically compliant manner. On a European level the data space and related legal and regulatory issues are very dynamic and several developments that are relevant to BBMRI.at (as well as to BBMRI-ERIC and the biobanking community) have recently started and will move forward in the near future. Examples include the General Data Protection Regulation (GDPR), Data Governance Act, Data Act, European Health Data Space Act, AI Act, and the AI Liability Directive.

In BBMRI.at #3, we therefore have a strong focus on **data integration/harmonization/access, and data-related legal/regulatory issues**. This will be addressed in two WPs (i.e. *WP1 – ‘IT Architecture and Data Integration of Austrian Biobanks’* and *WP2 – ‘Legal and Regulatory Challenges and Opportunities (LARGE)’*).

Similarly to other countries, the IT landscape in Austria’s biobanks differs strongly in terms of IT architectures, data and metadata models. For integration of Austrian biobanks into the BBMRI-ERIC IT platforms it is highly relevant to **harmonize data integration and access to Austrian biobank data** by using well accepted international standards (like the healthcare data formats Observational Medical Outcomes Partnership (OMOP) or Fast Healthcare Interoperability Resources (FHIR)). This will be aimed at in **WP1** and strongly aligned with ongoing activities of BBMRI-ERIC. Legal and local governance issues will be addressed in cooperation with WP2 (legal and regulatory issues) and in the context of data quality, experiences from BBMRI.at #2 and expertise of WP3 will be considered.

With this new relevance of **legal and regulatory issues** for BBMRI.at, the focus of the CP UNIVIE within BBMRI.at #3 shifts. It moves from the societal dimension of ELSI (WP led by Ulrike Felt in BBMRI.at #2) to legal and regulatory ELSI issues (WP now led by Nikolaus Forgo). In **WP2** legal experts from the University of Vienna will observe and inform BBMRI.at and BBMRI-ERIC about relevant European (and national) legal and regulatory developments, and provide input to current legal discussion. This will help BBMRI.at and BBMRI-ERIC to establish their position in further legal frameworks. Moreover, it will establish BBMRI.at as a NN with profound legal expertise. A newly established ‘BBMRI.at Legal Helpdesk’ will support partners in legal and regulatory questions in the field of research with biodata.

The need of users for access to human biological samples and data that meet international standards for verification of performance of in-vitro diagnostics has increased with the European Union In-Vitro Diagnostics Regulation (Regulation (EU) 2017/746)¹. Industry (but also laboratories) need samples of high and documented quality for the validation and/or the verification of in-vitro diagnostics performance. To address these user needs, BBMRI.at #3 will continue to place much emphasis on implementing CEN² or ISO³ quality standards for sample pre-analytics and contributing to the development of new standards in emerging fields such as digital pathology & AI or microbiome.

¹ <https://eur-lex.europa.eu/eli/reg/2017/746/oj>

² European Committee for Standardization, www.cencenelec.eu

³ International Organization for Standardization, www.iso.org



With **WP3**, BBMRI.at will support the partners to implement standards and improve their **quality management (QM)**, with greater consideration of biobank standards (e.g. ISO 20387⁴). Medical research (be it in cancer or other research areas) requires not only high quality samples but also data of trustworthy quality for delivering reproducible results. The amount of data and their relevance in medicine, research and also biobanking is constantly rising. Therefore, BBMRI.at expands the notion of 'quality' from sample quality to data quality and addresses data quality control in the WP3 activities. With its quality-related work, BBMRI.at #3 will make an important contribution to improving reproducibility of research data, which was shown to lead to high expenses and wasted money in research (Freedman et al., 2015).

Environmental sustainability has become a common phrase in discussions about climate crisis. Climate change spurs the demand for minimizing the environmental footprint in all areas of life. Research institutions and biobanks as energy-intensive research infrastructures have to rethink their environmental impact. For this reason, BBMRI.at #3 has foreseen to address this issue for biobanks, where it is only beginning to be a topic of consideration. In a new work package (**WP4**), BBMRI.at #3 will identify current environmental impact of the biobank partners and work out potential measures to increase **environmental sustainability** and lower energy consumption, usage of toxic chemicals and production of waste. By this, BBMRI.at aims to find measures that contribute to Austria's efforts to reach carbon neutrality until 2040 (Oesterreich.gv.at, 2023) and at the same time reduce costs for the operation of biobanks.

The SARS-CoV-2 pandemic demonstrated the close connection between humans, animals, and their shared environment. This has stimulated and renewed the interest in the 'One Health' approach (One Health High-Level Expert Panel et al., 2022; One Health High-Level Expert Panel, 2023). One aspect of '**One Health**' addresses the fact that humans share many features with animal species, and that humans and certain animal species have several health aspects in common. This phenomenon is referred to as '**comparative medicine**' (Lerner H and Berg Ch, 2015). With both human and veterinary medical universities and biobanks, BBMRI.at has potent partners to touch on this topic (in **WP5**). Veterinary biobanks are currently underrepresented in BBMRI-ERIC. With its activities BBMRI.at #3 will draw attention to the potential of veterinary sample collections (of Austria and other BBMRI-ERIC NN) for comparative medicine and 'One Health' research approaches. Since humans and animals also develop some similar types of cancer, this could fit into the EU cancer mission. It is therefore important to identify and bring together the respective specialists from the veterinary and human field (e.g. osteosarcoma research), to discuss possible strategies for research collaborations. With its activities, BBMRI.at supports the goal of BBMRI-ERIC to form a closer relationship with ESBB as stated in their Memorandum of Understanding (BBMRI-ERIC and ESBB, 2022).

In addition to organizing and harmonizing the Austrian biobanking community, BBMRI.at has to operate NN for Austria's participation in BBMRI-ERIC. Georg Göbel (MUI) takes over the function of the National Node Director. He will participate in the BBMRI-ERIC Management Committee (MC) and contribute to the development of the annual work programme. Furthermore, **WP6 Coordination & NN Operation** will link the Austrian biobanking community with the activities of BBMRI-ERIC to ensure efficient and broad participation of Austria at the European level. In BBMRI.at #3, interaction and collaboration with other national and international initiatives/programmes and BBMRI.at will remain a major activity. Because biobanking-related issues are similar, an enhanced collaboration would increase capacities and improve interoperability. BBMRI.at will be a platform for such interactions. With respect to stakeholder engagement, BBMRI.at #3 will focus on strengthening the networks with clinicians and researchers, and will continue to engage citizens and patients via public activities (e.g. events such as Long Night of Research, Children University Courses, and guided biobank tours).

Another important goal of BBMRI.at #3 is to **support the sustainable operation of Austrian biobanks**. The most important factor for sustainable operation of biobanks is that resources (samples and data) and services provided by biobanks are readily used. In addition to income from access and biobank service fees, return on investment can also come from participation in externally funded projects, either of the biobanks themselves and/or of researchers of partner universities. The latter would lead to a return on investment outside of the biobank, but is of value for the biobank operating organization (university). BBMRI.at #3 aims to support sustainability through activities in

⁴ www.iso.org/standard/67888.html



several WPs e.g. WP1 – by supporting access to samples/data, WP 5 –by identifying measures to reduce operational costs by energy saving and waste/chemical reduction, WP6 – by continuing the well appreciated Central Access/Contact Point for requests (for samples/data/services, collaborations, and participation in call proposals), and by supporting and encouraging BBMRI.at partners to participate in funded projects.

With this proposed work programme, BBMRI.at aims at helping Austrian biobanks to take a leading role in the international biobanking field and to be well prepared to address upcoming needs, such as providing efficient access to biosamples and data in terms of composition and quality. This is highly relevant for modern biomedical research. Thereby, BBMRI.at contributes to increasing the excellence and competitiveness of Austrian academic and industrial research. Furthermore, BBMRI.at - together with BBMRI-ERIC - addresses several of the European science policy goals such as the EU mission on cancer, on climate, and data-related goals (e.g. FAIR data, open science, data protection). The proposed activities for public engagement contribute to increasing the public understanding of biobanks and provide guidance for biobanks to increase their impact on society.