



WP4 STRATEGY WORKSHOP - MINUTES

Development and Implementation of the BioMediX eMetaverse Platform for Digital Education on Biomedical Applications

| | |
|---------------------|------------------------------|
| Prepared By: | Joaquín Roca-González (UPCT) |
| Reviewed By: | Marks Gorohovs (RTU) |
| Approved By: | Yuri Dekhtyar (RTU) |

1. Purpose of the workshop

The WP4 eMetaverse Strategic Workshop was convened to establish a common strategic basis for the design, implementation and validation of the BioMediX eMetaverse platform.

The workshop addressed:

- The role of WP4 within the BioMediX project.
- Links with WP3 and WP5 outputs.
- The educational purpose, target users and use scenarios of the eMetaverse.
- The required WP4 deliverables and their initial interpretation.
- The technical approach, including platform, whiteboard and videoconferencing integration.
- Data protection, sustainability, access management and evidence generation.
- The preliminary implementation roadmap, partner contributions and follow-up actions.

2. Participants and attendance

The workshop brought together representatives from all eight BioMediX consortium partners. A total of 15 participants attended in person in Cartagena, as recorded in the official attendance list. In addition, Magdalena Żukowska, Poznań University of Technology (PUT), participated online.

| No. | Participant | Institution | Attendance mode |
|-----|-------------------------|---|-----------------|
| 1 | Irena Jurjević | Juraj Dobrila University of Pula (UNIPU) | In person |
| 2 | Sven Maričić | Juraj Dobrila University of Pula (UNIPU) | In person |
| 3 | Paweł Buń | Poznań University of Technology (PUT) | In person |
| 4 | Jakub Gapsa | Poznań University of Technology (PUT) | In person |
| 5 | Magdalena Żukowska | Poznań University of Technology (PUT) | Online |
| 6 | Yuri Dekhtyar | Riga Technical University (RTU) | In person |
| 7 | Marks Gorohovs | Riga Technical University (RTU) | In person |
| 8 | Alexandru Ianoși | Technical University of Cluj-Napoca (TUCN) | In person |
| 9 | Răzvan Ioan Păcurar | Technical University of Cluj-Napoca (TUCN) | In person |
| 10 | Ancuța Carmen Păcurar | Technical University of Cluj-Napoca (TUCN) | In person |
| 11 | Alin Pleșa | Technical University of Cluj-Napoca (TUCN) | In person |
| 12 | Dolores Ojados González | Universidad Politécnica de Cartagena (UPCT) | In person |
| 13 | Joaquín Roca-González | Universidad Politécnica de Cartagena (UPCT) | In person |
| 14 | Nikola Vitković | University of Niš (NIS) | In person |
| 15 | Arsham Makaryan | Materialise | In person |
| 16 | Johanna Bruckhuber | ViscoTec | In person |





Attendance by organisation

| Partner | In-person participants | Online participants | Total |
|---|------------------------|---------------------|-----------|
| Juraj Dobrila University of Pula (UNIPU) | 2 | 0 | 2 |
| Poznań University of Technology (PUT) | 2 | 1 | 3 |
| Riga Technical University (RTU) | 2 | 0 | 2 |
| Technical University of Cluj-Napoca (TUCN) | 4 | 0 | 4 |
| Universidad Politécnica de Cartagena (UPCT) | 2 | 0 | 2 |
| University of Niš (NIS) | 1 | 0 | 1 |
| Materialise | 1 | 0 | 1 |
| ViscoTec | 1 | 0 | 1 |
| Total | 15 | 1 | 16 |

3. Strategic purpose and agreed concept

The consortium agreed that the BioMediX eMetaverse should be developed as a modular digital learning ecosystem, not as a single monolithic application. The platform should facilitate international collaboration between universities, students, researchers, technical staff, companies and relevant external stakeholders. Its purpose is to support biomedical engineering education through a shared digital environment integrating:

- Avatar-based collaboration.
- Biomedical 3D/CAD resources.
- VR, AR and other XR learning experiences.
- Collaborative whiteboard tools.
- Videoconferencing and mentoring.
- Learning resources, case studies and project outputs.
- Access to content related to additive manufacturing, bioprinting, medical imaging, data analysis, artificial intelligence, testing and digital transformation.

4. Agreed platform structure

The following functional spaces were agreed as the initial conceptual structure of the BioMediX eMetaverse:

| Area | Main purpose |
|--|---|
| Welcome and Orientation Area | Initial access point, user guidance, navigation support and information for first-time users. |
| Virtual Meeting Room and Mentoring Area | Avatar-based meetings, presentations, mentoring sessions and access to videoconferencing tools. |
| Biomedical CAD Gallery | Presentation and access to biomedical CAD models, anatomical models, medical devices and design concepts. |
| XR Simulation Area | A common access point for VR, AR and other XR experiences related to biomedical applications. |
| Collaborative Workspace | Co-design, brainstorming, workflow mapping, project planning, hackathon work and team collaboration. |
| Resource Library | Access to eToolkit materials, videos, case studies, manuals, eBooks, research resources and partner repositories. |





The meeting and mentoring functions should be treated as a single integrated area. Likewise, VR and AR content should be grouped under a common XR simulation area.



5. Strategic design principles

The workshop agreed the following principles for WP4 implementation:

- 1. Education before technology**
Each platform component must have a clear educational purpose and contribute to defined learning outcomes.
- 2. Low-barrier access**
The core platform should be accessible through a conventional web browser, without requiring advanced hardware.
- 3. Optional immersive access**
VR or AR equipment may be required for specific XR applications, but not for general access to the platform.
- 4. Modular architecture**
The eMetaverse should integrate specialised external tools and resources rather than attempting to recreate all functions internally.
- 5. Reuse of existing resources**
Materials from WP3, WP5 and partner-developed resources should be reused wherever possible.



6. Controlled access and moderation

Access should initially be managed through user registration and credentials, rather than being fully open to the public.

7. Data-protection-by-design

The platform should minimise the processing and storage of personal data and avoid the inclusion of patient-identifiable content.

8. Sustainability and portability

Platform selection should consider future support, costs, maintenance, exportability and the avoidance of vendor lock-in.

9. Evidence generation

The system should enable the collection of access data, participation records, screenshots, exports, feedback and other evidence required for Erasmus+ reporting.

6. Minimum viable platform approach

The consortium agreed to prioritise a **minimum viable platform** during the first implementation phase.

The first prototype should include:

- Browser-based entry to a shared 3D environment.
- Avatar-based navigation and basic multi-user interaction.
- Controlled registration and access management.
- A welcome and orientation area.
- A virtual meeting room with mentoring and videoconferencing access.
- A biomedical CAD gallery.
- An XR simulation area.
- A collaborative workspace with whiteboard access.
- A resource library.
- Basic usage tracking and reporting.
- Documentation and user guidance.

Advanced functions, such as detailed gamification, complex learning analytics, extensive avatar customisation, certificates, badges, LMS integration or AI-assisted functions, may be considered later but are not mandatory for the initial prototype.

7. Technical implementation approach

The preferred implementation approach is based on a hybrid architecture.

The eMetaverse should act as a common navigation, collaboration and access layer, while specialised services may remain external.



These may include:

| Component | Proposed approach |
|----------------------------------|--|
| Avatar-based virtual environment | Browser-accessible virtual-world or WebXR-compatible platform. |
| CAD and 3D resources | External repository or platform-linked visual gallery. |
| VR and AR applications | Independently hosted XR applications linked from the XR simulation area. |
| Online whiteboard | Existing collaborative service integrated through links or embedded elements. |
| Videoconferencing | Existing institutional or commercial service, such as Microsoft Teams or equivalent. |
| Resource library | Structured collection of links and materials from WP3, WP5 and partner repositories. |
| Evidence layer | Registration data, analytics, screenshots, feedback forms, exports and activity records. |

The workshop concluded that developing all functions from scratch would create excessive technical complexity, data-protection responsibilities, cost and maintenance risk.

8. Users, access, data protection and moderation

The consortium agreed that the BioMediX eMetaverse will serve a broad stakeholder community. Its core users will include biomedical engineering students, teachers, trainers and technical staff, while additional users may include researchers, industry representatives, healthcare professionals, hackathon and summer-school participants, and other relevant external stakeholders. The platform will use controlled registration and role-based access to support secure, moderated and GDPR-manageable participation.

The consortium agreed that the platform should not initially be fully open to unrestricted public use.

A controlled registration process should be established to provide users with access credentials and to support:

- Basic user authentication.
- User roles and permissions.
- Moderation and removal of inappropriate content.
- Restriction of unauthorised access.
- Collection of usage evidence.
- Data-protection management.

The system should minimise personal-data collection. Biomedical resources must not include patient-identifiable data, patient codes or confidential clinical information.

9. Integration of WP3 and WP5 resources

WP4 will reuse and integrate resources developed through other project work packages, whenever technically and educationally appropriate.





Relevant resources may include:

- eToolkit materials.
- Case studies.
- Process videos.
- Educational presentations.
- Biomedical workflows.
- CAD and 3D models.
- Medical imaging and segmentation resources.
- Additive manufacturing and bioprinting examples.
- Artificial intelligence and data-analysis materials.
- Industry-related innovation resources.

Each resource should be described through a common metadata structure, including:

- Resource title.
- Educational purpose.
- Learning outcomes.
- Source and responsible partner.
- File format or access method.
- Licence and access conditions.
- Hardware or software requirements.
- Integration link.
- Validation status.

10. WP3 case studies and dissemination

The workshop reviewed the progress of selected WP3 case studies. One case study related to SLA printing of a support structure had been fully filmed and required consolidation of video materials and preparation of the accompanying documentation. Additional cases related to mould printing, casting and PEEK printing were planned for development during July 2026.

The consortium agreed that case-study documentation and associated video materials should be completed, where possible, by the end of September 2026, in preparation for the multiplier event planned for 9 October 2026. Case studies will be presented during the summer school through short contributions from the partners or teams directly involved in each activity.

11. Summer school, student engagement and international collaboration

The summer school was identified as a major opportunity to:

- Introduce BioMediX case studies and project challenges.
- Engage students in practical work related to CAD, additive manufacturing, bioprinting, testing and biomedical design.
- Validate selected eMetaverse components with students and teachers.
- Collect structured feedback on usability and educational value.
- Promote future international thesis, internship and project opportunities.
- Encourage international and interdisciplinary student teams.





The consortium also discussed the creation of a shared repository of potential Bachelor’s, Master’s and internship topics. This repository should support student recruitment, mobility, co-supervision and collaboration among partners.

12. Future sustainability and collaboration opportunities

The participants discussed possible continuation pathways beyond BioMediX, including:

- Joint or co-supervised Bachelor’s and Master’s projects.
- International internships.
- Joint diplomas and double-degree opportunities.
- Erasmus Mundus Design Measures.
- Erasmus Mundus Joint Master programmes.
- Future Erasmus+ cooperation projects.
- Horizon Europe and other research proposals.
- A possible European educational programme related to biomedical digital manufacturing, medical-device development, XR and digital health technologies.

The consortium recognised that the resources generated in BioMediX could provide a strong foundation for future academic and research cooperation.

13. Preliminary event planning

| Activity | Preliminary timing / decision |
|---|---|
| BioMediX Summer School, Riga | 20-30 July 2026 |
| Multiplier Event, Riga | 9 October 2026 |
| Student training in Belgium | Proposed for 26–27 November 2026, subject to confirmation |
| Staff training / VR-related activity | Expected in February 2027; final date subject to consultation |
| Student Hackathon | Expected during spring 2027 |
| Student presentation / training activity in Germany | Preliminary proposal for May 2027 |
| Final coordination and reporting meeting | Expected in Croatia around June 2027 |
| BioMediX Multiplier Event, Cartagena | Planned for June 2027 |
| BioMediX Summer School, Cartagena | Planned for the last weeks of July 2027 |

The consortium agreed that the exact dates, responsibilities and dependencies should be validated through an online consultation process.

14. Main action points

| Action | Responsible | Target date |
|--|--------------|--------------|
| Prepare the WP4 functional concept document | UPCT | 13 July 2026 |
| Prepare and circulate a WP4 requirements survey | UPCT | 22 June 2026 |
| Prepare the tools and resources inventory template | UPCT | 29 June 2026 |
| Complete the tools and resources inventory | All partners | 13 July 2026 |
| Prepare comparison matrices for platform, whiteboard and videoconferencing options | UPCT | 20 July 2026 |
| Define platform, whiteboard and videoconferencing requirements | All partners | 20 July 2026 |
| Prepare metadata templates for CAD, VR and AR resources | UPCT | 20 July 2026 |



| | | |
|---|--------------|-------------------|
| Identify reusable WP3 and WP5 resources | All partners | 20 July 2026 |
| Propose candidate CAD models, VR resources and AR applications | All partners | 20 July 2026 |
| Prepare the WP4 action plan, responsibility matrix and milestone schedule | UPCT | 30 July 2026 |
| Review and approve the WP4 action plan | All partners | 30 July 2026 |
| Establish a shared repository of international student project topics | All partners | 14 September 2026 |
| Complete case-study documentation and video materials where possible | All partners | 30 September 2026 |
| Prepare material for the TUCN multiplier event | All partners | 30 September 2026 |

15. Closing statement

The workshop established a shared strategic direction for WP4.

The BioMediX eMetaverse will be developed as a browser-accessible, modular and collaborative educational environment. The first phase will focus on a realistic and sustainable minimum viable implementation, integrating existing technologies and available project resources. The immediate priority is to formalise the workshop outcomes into:

1. A WP4 functional requirements document.
2. A detailed action plan and milestone schedule.
3. A partner responsibility matrix.
4. A tools and resources inventory.
5. A platform comparison and selection process.
6. Common metadata templates for CAD, XR and learning resources.

These documents should be reviewed and approved before the summer school, enabling the technical development phase to begin from September 2026.

