Project Number	621668-EPP-1-2020-1-ES-EPPKA2-KA
Project Title	Mixed Reality in medical Education based on Interactive Applications (MIREIA)

D8.5. PROMOTIONAL MATERIAL

Dissemination Level	Public
Delivery Date	December 31, 2023
Responsible	MEDIS
Authors	All MIREIA partners

Co-funded by the Erasmus+ Programme of the European Union

Version control

Version	Date	Comment
01	31/12/2023	First version of the report (MEDIS)
02	05/04/2024	Second version of the report (MEDIS)

Summary

The purpose of the dissemination is to raise awareness of the MIREIA project and its outcomes. The dissemination of the results from the MIREIA project had two main thrusts with more detail and information needed at each level:

- The first was the dissemination of information about the project and the achievements towards a larger public, ensuring the awareness of results and the use of EC funding in this key research area.
- The second was towards the scientific community towards the disseminations of the best practices developed in the project, making available the tools and methodologies allowing other researchers access to these for other domains.

To reach the awareness level intended, dissemination was supported by communication materials, such as a website, flyers, roller-ups, and posters.

Table of contents

1. Introduction

Target audiences for the external communication: All the results, both research, state of the art and market analysis were disseminated first among the partners of the consortium and then to the scientific community through specialised media, as selected scientific journals, magazines, conferences, courses and seminars, fairs, web sites, etc. This contributed to making known the competences of the consortium and the results of the project through the medical society, including clinicians and patients, through the medical companies and technologists.

The target audiences for internal communication were partners, executives, and the members of the consortium.

2. Promotional materials

The following promotional materials have been created during the course of the project:

- Project Logo
- Consortium template presentation (PowerPoint)
- Roll-up
- Brochure

2.1. MIREIA Logo

2.2. Consortium template presentation (PowerPoint)

This template for the project presentation was designed to be used by all consortium partners for all dissemination activities during the project.

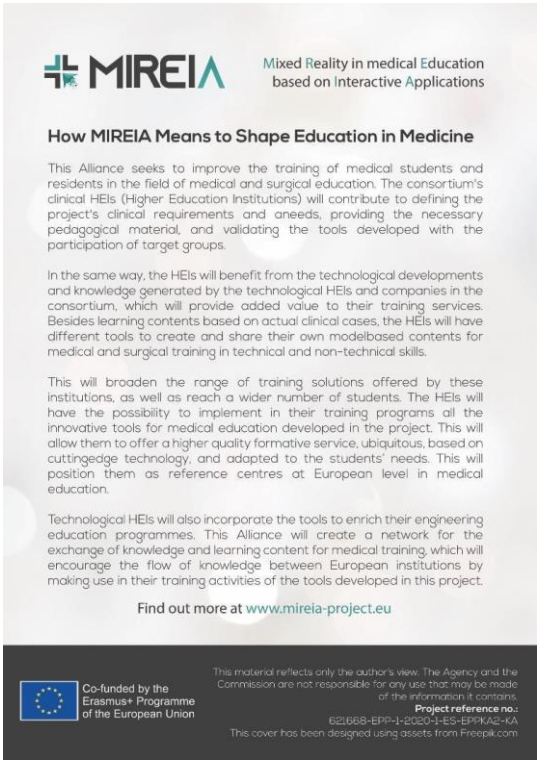
2.3. Roll-Up

The Roll-up has been designed for use in project dissemination events in order to give more visibility to the project. Its size and layout allow it to be used in presentations and next to stands at dissemination events.

2.4. Brochure

Brochure with general information of the MIREIA Project:

- Brief description and aims.
- Funding information.
- Website.
- Contact information.



3. Dissemination activities

The dissemination materials described above have been used by all consortium partners at various national, European and international events aimed at the project's target audience.

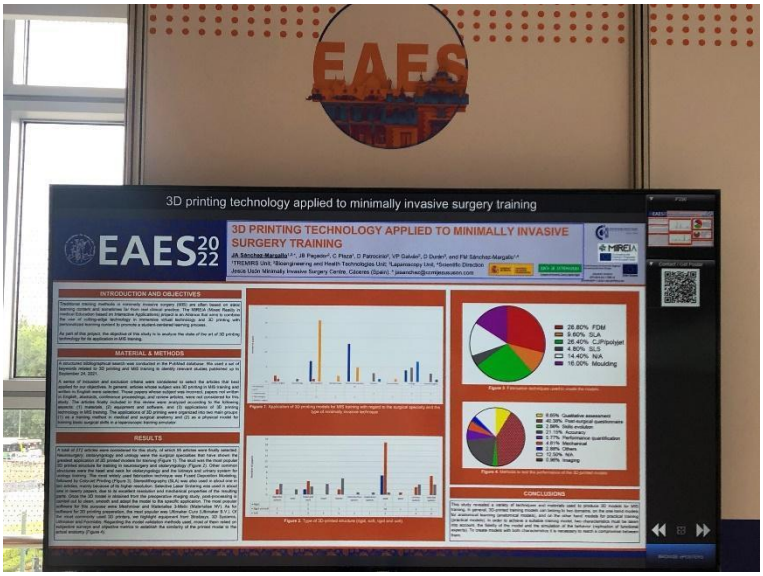
3.1. DIESE Conference (Thessaloniki, Greece; September 2021)

The Department of Informatics and Electronic Systems Engineering in collaboration with the Vice-Mayor of Education & Lifelong Learning of the Municipality of Thessaloniki, the Liaison Office and the ESPA Office of the Alexandria Campus of the International University of Greece organised a conference that held online via the zoom platform on Monday, September 20 at 12:00. Avaca Technologies was invited to demonstrate the Technical aspects of the eLearning platforms especially related to 3D gaming and similar technologies. Avaca presented the past experience of 3D based gaming and eLearning projects and also the MIREIA project which was at its first stages as a cutting-edge project for such purposes emphasising both on the actual deliverables of the project and the underlying technological foundation of the various aspects since the audience was both technical and non-technical.

3.2. EAES Congress (Barcelona, Spain; November 2021)

The 29th International Congress of the European Association for Endoscopic Surgery (EAES) took place in Barcelona, Spain, from 24th to 27th November 2021. During this event, experts and professionals in the field of endoscopic surgery gathered to share their knowledge, research

findings, and advancements. The congress also featured various sessions, discussions, and networking opportunities for attendees.



3.3. iSMIT Congress (Oslo, Norway; March 2022)

The 33rd Annual SMIT Congress, organized by the International Society for Medical Innovation and Technology (iSMIT), took place in Oslo, Norway in March 2022. This conference brought together medical specialists, industry professionals, biomedical engineers, and researchers from around the world to discuss the synergies between healthcare and technology. The event aimed to foster collaboration and innovation in the field of medical technology and its impact on patient care.

3.4. EAES Congress (Krakow, Poland; June 2022)

The 30th International Congress of the European Association for Endoscopic Surgery (EAES) took place from 5-8 July 2022 in Kraków, Poland. The theme of the congress was "How to avoid undesired events in MIS". Medical professionals came together to discuss advancements and best practices in minimally invasive surgery.

3.5. Romanian Association for Endoscopic Surgery Congress (Timisoara, Romania; September-October 2022)

The Romanian Association for Endoscopic Surgery (R.A.E.S.) organised its XIth National Congress in Timisoara from 28th September to 1st October 2022. The congress was a significant event that brought together experts in the field of minimally invasive surgery and provided an excellent platform for networking, learning, and advancing the field of endoscopic surgery. It was organised in combination with:

- The XIth National Congress of the Romanian Association for Endoscopic Surgery

- The XIIIth Romanian National Symposium of Bariatric and Metabolic Surgery
- The IIIrd Romanian National Symposium of Robotic Surgery

3.6. EAES Wintermeeting (Malta; January 2023)

The EAES Wintermeeting 2023 took place in Malta from January 26th to 28th, 2023. Here are some highlights from the event: Hands-on Cadaver Course in Foregut Surgery, Live Surgery Sessions and State-of-the-Art Technology in the OR.

3.1. Romanian National Conference of Surgery (Eforie Nord, Romania; May 2023)

Conference of the Romanian Society of Surgery, May 23-25., Eforie Nord. Oral presentation: 3D molds and HoloLens applications in colon surgery training. Silicon Colon Model and VR application presented in a dedicated stand in the Medical Exhibition.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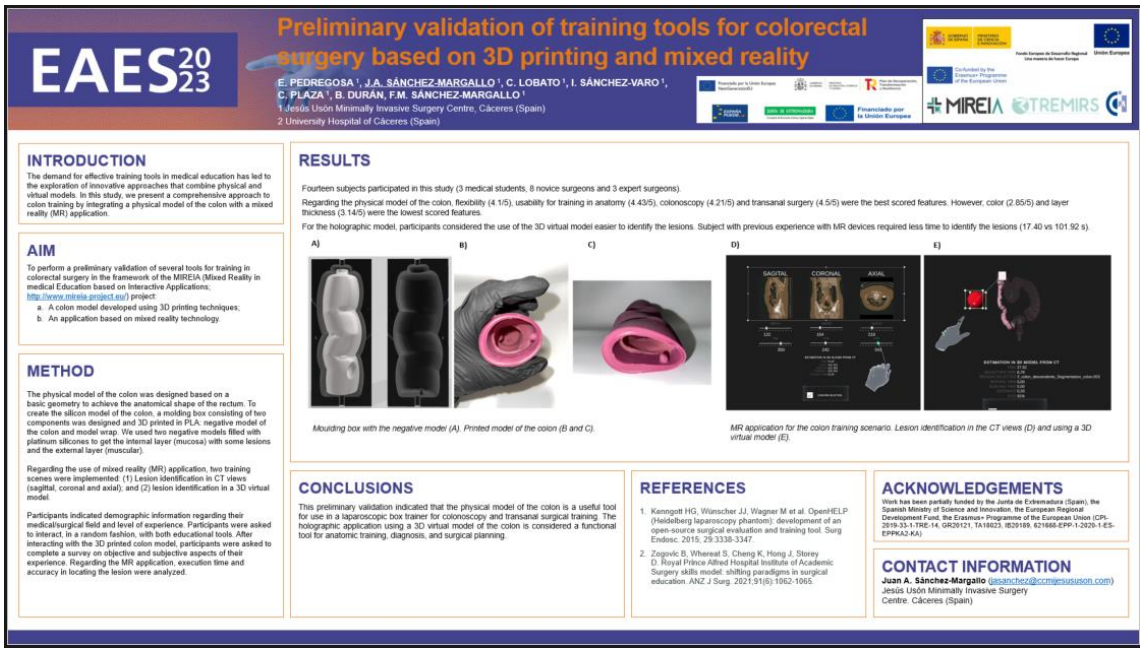
3.2. EAES Congress (Rome, Italy; June 2023)

The 31st International Congress of the European Association for Endoscopic Surgery (EAES) was held in Roma, Italy from June 20th to June 23rd, 2023. This congress brought together experts in endoscopic surgery to discuss advancements, share knowledge, and explore innovative practices.



EAES 2023

Preliminary validation of training tools for colorectal surgery based on 3D printing and mixed reality

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INTRODUCTION

The demand for effective training tools in medical education has led to the exploration of innovative approaches that combine physical and virtual models. In this study, we present a comprehensive approach to colon training by integrating a physical model of the colon with a mixed reality (MR) application.

AIM

To perform a preliminary validation of several tools for training in colorectal surgery in the framework of the MIREIA (Mixed Reality in medical Education based on Interactive Applications; http://www.mireia-project.eu/) project:

a. A colon model developed using 3D printing techniques;
b. An application based on mixed reality technology.

METHOD

The physical model of the colon was designed based on a basic geometry to achieve the anatomical shape of the rectum. To create the silicon model of the colon, a molding box consisting of two components was designed and 3D printed in PLA: negative model of the colon and model wrap. We used two negative models filled with platinum silicones to get the internal layer (mucosa) with some lesions and the external layer (muscular).

Regarding the use of mixed reality (MR) application, two training scenes were implemented: (1) Lesion identification in CT views (sagittal, coronal and axial), and (2) lesion identification in a 3D virtual model.

Participants indicated demographic information regarding their medical/surgical field and level of experience. Participants were asked to interact, in a random fashion, with both educational tools. After interacting with the 3D printed colon model, participants were asked to complete a survey on objective and subjective aspects of their experience. Regarding the MR application, execution time and accuracy in locating the lesion were analyzed.

RESULTS

Fourteen subjects participated in this study (3 medical students, 8 novice surgeons and 3 expert surgeons).

Regarding the physical model of the colon, flexibility (4.1/5), usability for training in anatomy (4.43/5), colonoscopy (4.21/5) and transanal surgery (4.5/5) were the best scored features. However, color (2.85/5) and layer thickness (3.14/5) were the lowest scored features.

For the holographic model, participants considered the use of the 3D virtual model easier to identify the lesions. Subject with previous experience with MR devices required less time to identify the lesions (17.40 vs 101.92 s).

Moulding box with the negative model (A). Printed model of the colon (B and C).

MR application for the colon training scenario. Lesion identification in the CT views (D) and using a 3D virtual model (E).

CONCLUSIONS

This preliminary validation indicated that the physical model of the colon is a useful tool for use in a laparoscopic box trainer for colonoscopy and transanal surgical training. The holographic application using a 3D virtual model of the colon is considered a functional tool for anatomic training, diagnosis, and surgical planning.

REFERENCES

1. Kenngott HG, Wünscher JJ, Wagner M et al. OpenHELP (Heidelberg laparoscopy phantom): development of an open-source surgical evaluation and training tool. Surg Endosc. 2015; 29:3338-3347.
2. Zegovic B, Whereat S, Cheng K, Hong J, Storey D. Royal Prince Alfred Hospital Institute of Academic Surgery skills model: shifting paradigms in surgical education. ANZ J Surg. 2021;91(6):1062-1065.

ACKNOWLEDGEMENTS

Work has been partially funded by the Junta de Extremadura (Spain), the Spanish Ministry of Science and Innovation, the European Regional Development Fund, the Erasmus+ Programme of the European Union (CPI-2019-33-1-TRE-14, GR20121, TA18023, IB20189, 621668-EPP-1-2020-1-ES-EPPKA2-KA)

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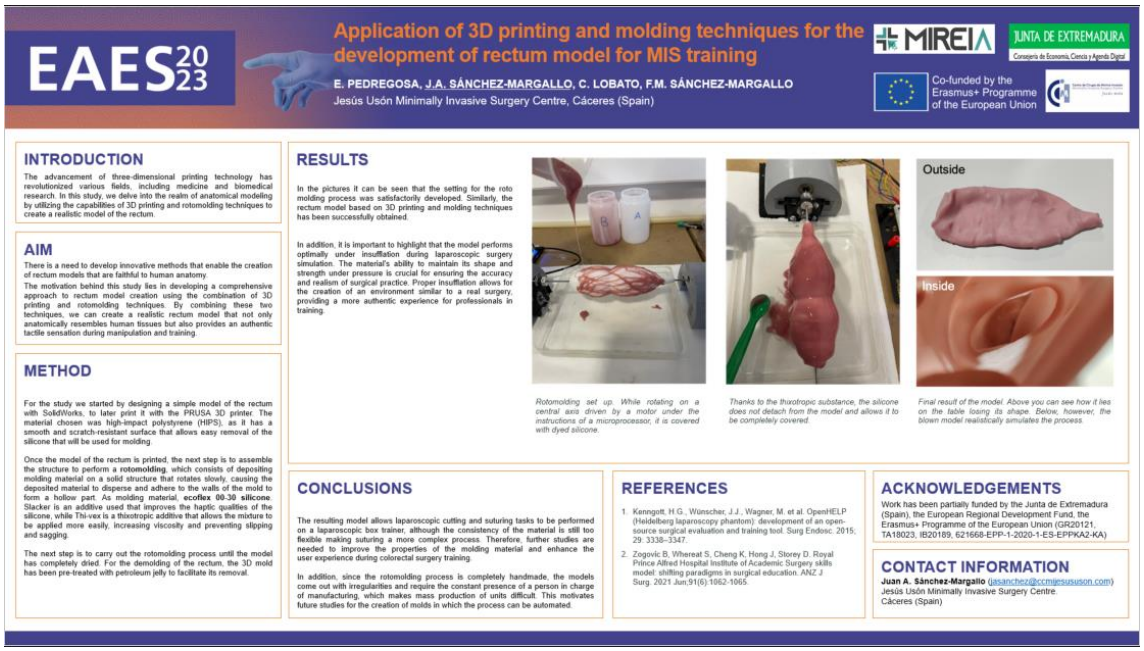

EAES 2023

Application of 3D printing and molding techniques for the development of rectum model for MIS training

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MIREIA — JUNTA DE EXTREMADURA Consejería de Economía, Ciencia y Agenda Digital

Co-funded by the Erasmus+ Programme of the European Union

INTRODUCTION

The advancement of three-dimensional printing technology has revolutionized various fields, including medicine and biomedical research. In this study, we delve into the realm of anatomical modeling by utilizing the capabilities of 3D printing and rotomolding techniques to create a realistic model of the rectum.

AIM

There is a need to develop innovative methods that enable the creation of rectum models that are faithful to human anatomy.
The motivation behind this study lies in developing a comprehensive approach to rectum model creation using the combination of 3D printing and rotomolding techniques. By combining these two techniques, we can create a realistic rectum model that not only anatomically resembles human tissues but also provides an authentic tactile sensation during manipulation and training.

METHOD

For the study we started by designing a simple model of the rectum with SolidWorks, to later print it with the PRUSA 3D printer. The material chosen was high-impact polystyrene (HIPS), as it has a smooth and scratch-resistant surface that allows easy removal of the silicone that will be used for molding.

Once the model of the rectum is printed, the next step is to assemble the structure to perform a **rotomolding**, which consists of depositing molding material on a solid structure that rotates slowly, causing the deposited material to disperse and adhere to the walls of the mold to form a hollow part. As molding material, **ecoflex 00-30 silicone**. Slacker is an additive used that improves the haptic qualities of the silicone, while Thi-vex is a thixotropic additive that allows the mixture to be applied more easily, increasing viscosity and preventing slipping and sagging.

The next step is to carry out the rotomolding process until the model has completely dried. For the demolding of the rectum, the 3D mold has been pre-treated with petroleum jelly to facilitate its removal.

RESULTS

In the pictures it can be seen that the setting for the roto molding process was satisfactorily developed. Similarly, the rectum model based on 3D printing and molding techniques has been successfully obtained.

In addition, it is important to highlight that the model performs optimally under insufflation during laparoscopic surgery simulation. The material's ability to maintain its shape and strength under pressure is crucial for ensuring the accuracy and realism of surgical practice. Proper insufflation allows for the creation of an environment similar to a real surgery, providing a more authentic experience for professionals in training.

Rotomolding set up. While rotating on a central axis driven by a motor under the instructions of a microprocessor, it is covered with dyed silicone.

Thanks to the thixotropic substance, the silicone does not detach from the model and allows it to be completely covered.

Final result of the model. Above you can see how it lies on the table losing its shape. Below, however, the blown model realistically simulates the process.

CONCLUSIONS

The resulting model allows laparoscopic cutting and suturing tasks to be performed on a laparoscopic box trainer, although the consistency of the material is still too flexible making suturing a more complex process. Therefore, further studies are needed to improve the properties of the molding material and enhance the user experience during colorectal surgery training.

In addition, since the rotomolding process is completely handmade, the models come out with irregularities and require the constant presence of a person in charge of manufacturing, which makes mass production of units difficult. This motivates future studies for the creation of molds in which the process can be automated.

REFERENCES

1. Kenngott, H.G., Wünscher, J.J., Wagner, M. et al. OpenHELP (Heidelberg laparoscopy phantom): development of an open-source surgical evaluation and training tool. Surg Endosc. 2015; 29: 3338–3347.
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CONTACT INFORMATION

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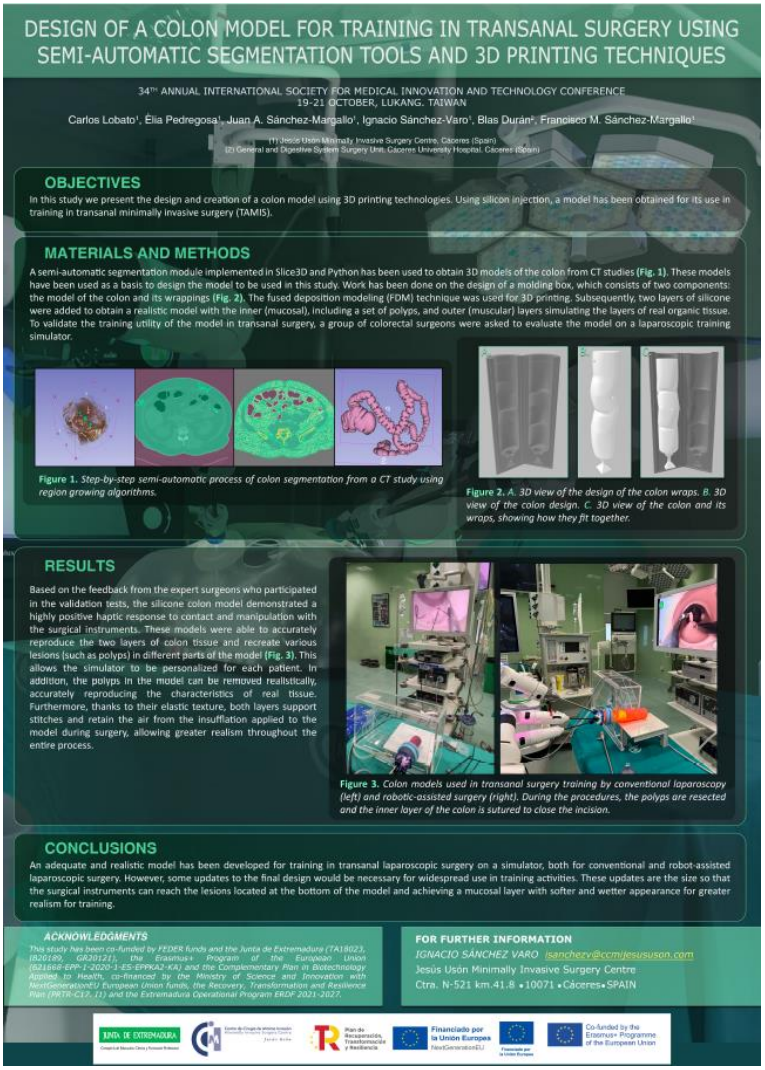
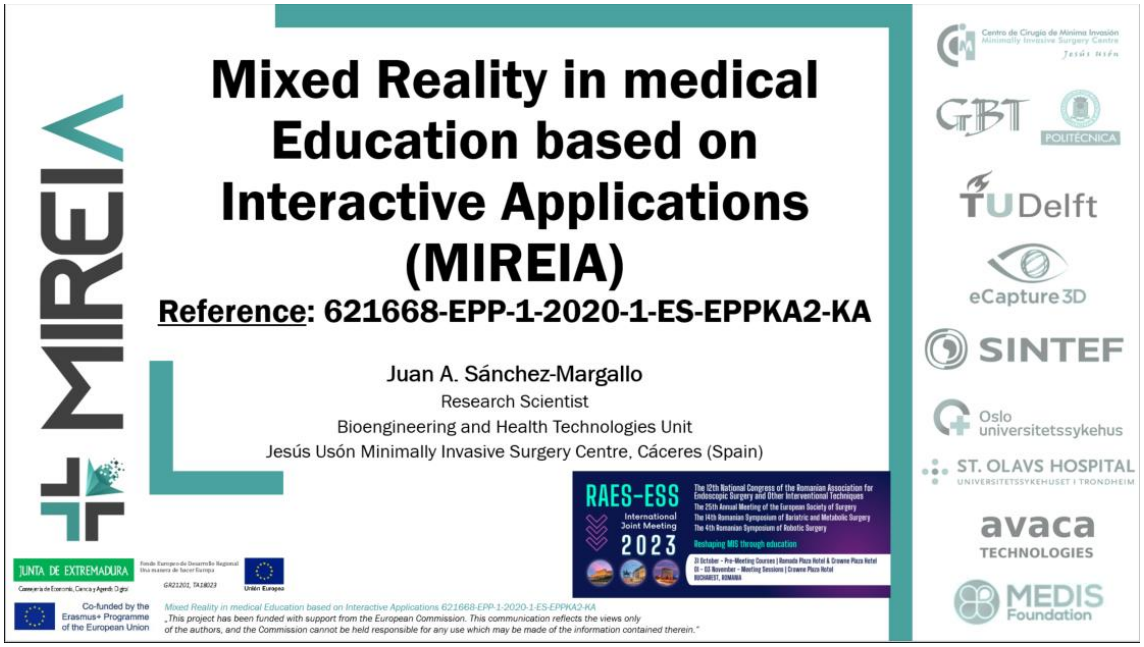
3.3. iSMIT Congress (Lukang, Taiwan; October 2023)

The 34th Annual International Society for Medical Innovation and Technology Conference (iSMIT 2023) took place in IRCAD-Taiwan, located in the historic town of Lukang, Taiwan. This conference serves as a leading forum where engineers and physicians come together to discuss innovations that will benefit patients in the future. iSMIT 2023 provided a platform for collaboration, knowledge sharing, and innovation in the field of medical technology.



3.4. Romanian Association for Endoscopic Surgery Congress (Bucharest, Romania; October-November 2023)

The Romanian Association for Endoscopic Surgery and other Interventional Techniques (ARCE) held its XII National Congress in Bucharest, Romania from October 31 to November 3, 2023. This prestigious event brought together medical specialists from various fields, including general surgeons, thoracic surgeons, gastroenterologists, pediatric surgeons, and anesthetists.

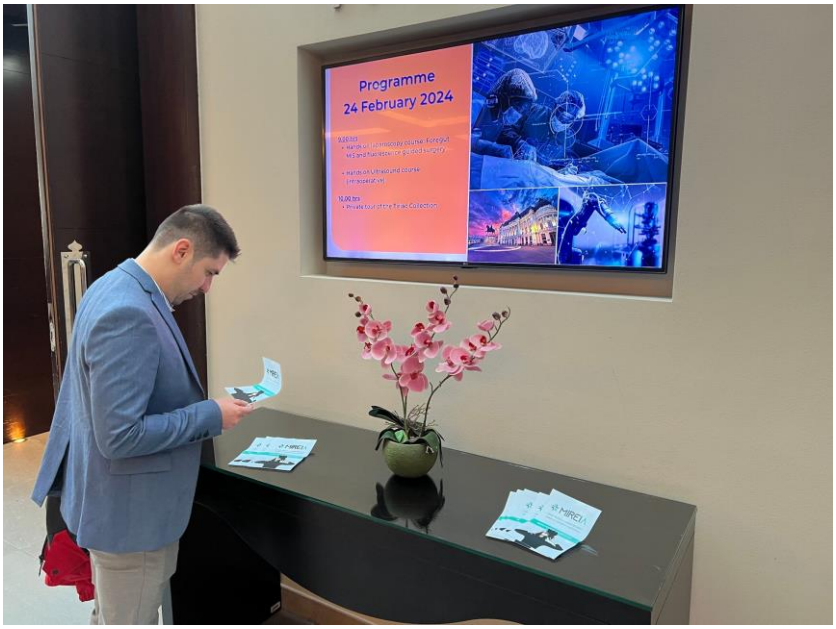


3.5. Annual National meeting on Future Operating Room of hospitals (Røros, Norway; February 2024)

This is an annual meeting for The Future Operating Room at St. Olavs hospital in Trondheim, Norway, organised at Røros. 80 participants from hospital, research, academia, and industry participated. Participants in MIREIA project both from SINTEF (Thomas Langø) and St. Olavs hospital (Jan Magne Gjerde) presented scientific talks at the meeting.

3.6. EAES Winter-Meeting (Bucharest, Romania, February 2024)

EAES Winter Meeting, February 22-24, 2023, Bucharest. Presentation of the MIREIA Project during the Ultrasound Course for Surgeons. MIREIA Exhibition corner.



3.7. Norwegian National meeting in Bronchoscopy (Oslo, Norway; March, 2024)

This is the annual meeting for pulmonologists in Norway interested in research and new clinical and technical methods/devices. Thomas Langø was invited to present the future technologies for flexible endoscopy for training and diagnostics. MIREIA was mentioned as one of the large-scale projects where Oslo and Trondheim collaborate in Norway.

3.8. Norwegian medical students in Trondheim innovation arena meeting (DRIV) 27. (Trondheim, Norway; September 2023)

This was part of a meeting series arranged by a student organisation for medical Innovation at St Olavs Hospital, Trondheim. The project was presented by Henrik Brun at a separate meeting with the MIREIA heart as the primary topic. Part of the study was undertaken at the same facilities earlier.

3.9. International Urogynecological Association (IUGA) (The Hague, The Netherlands; June 2023)

The fistula repair training device was presented at the International Urogynecological Association (IUGA) meeting by Jenny Dankelman in The Hague as part of an Interactive Workshop on Obstetric Fistula. It included an interactive round table discussion both covering the challenges of treating (obstetric) fistula and its sequelae. Fistula surgery, and treating its sequelae requires knowledge, skill and experience. The workshop focussed on: what can we learn from the past, how do we work in the present, what can be improved, how can training be more effective, what can international societies assist in fistula care, and do we have new solutions for the treatment of fistula.

IUGA 48TH ANNUAL MEETING

February 20, 2023

June 21-24, 2023
The Hague, The Netherlands

Web: iuga.org