MiFuture

Newsletter

December 2025

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1. Editorial from the Coordinator

As we approach the end of the year, I am pleased to share that MiFuture continues to advance with remarkable energy and commitment across the consortium. Our Doctoral Candidates have now fully consolidated their research activities within their host institutions, resulting in an impressive number of contributions to conferences and scientific publications. Also, a couple of patents are in progress of approval. These achievements reflect not only the dedication of our DCs, but also the close guidance provided by their supervisors.

This semester has also seen the successful completion of several key deliverables that lay the foundation for MiFuture's future research directions. Many of these documents were developed with substantial input from our DCs, demonstrating their growing engagement and their essential role in shaping the project's scientific vision.

Training has remained a central priority. In addition to the local activities organised by each institution, we have significantly expanded our programme with numerous online sessions led by supervisors and external experts. These have covered a wide range of topics: technical, methodological, and transversal, providing our DCs with a rich and diverse learning experience.

The project is now entering a phase in which interdisciplinary work, academia–industry interaction, and cross-country collaboration will intensify, particularly through the upcoming secondment periods. This marks an exciting milestone for all of us and will undoubtedly enrich both the scientific outcomes and the personal development of our DCs.

I would like to express my sincere thanks to all supervisors, partners, and DCs for their active engagement, flexibility, and enthusiasm throughout the year.

And given the time of year, I would also like to take this opportunity to wish you all a very Merry Christmas and a Happy New Year!

Ana García Armada

MiFuture Coordinator

2. Milestones and Deliverables

This semester we successfully completed and submitted several key deliverables that set the strategic direction of MiFuture for the coming years. Among them:

- D2.1 Channel models – initial (August 2025)
- D3.1 RRM and scheduling - initial version (September 2025)
- D2.2 Waveforms - initial version (October 2025)
- D2.3 Positioning and sensing algorithms – initial version (November 2025)
- D3.2 AI procedures and protocols - initial version (December 2025)
- D6.4 Training & mobility report – intermediate version (December 2025)

Also, Milestone 6, Mid-term status: Fulfilment of the research and training programmes' objectives of the period, with emphasis on CDPs, has been achieved.

These outputs matter because they create the operational backbone of MiFuture. With the structural elements in place, the project can now fully shift toward scientific exploration, innovation, and collaboration across partners.

3. Featured Stories

Radovan Juran

My name is Radovan Juráň and I come from the Czech Republic.

Within the MiFuture project I am hosted at Tampere University in Finland, with a secondment at the Autonomous University of Barcelona, and an industrial collaboration with Ericsson Finland. My research topic focuses on positioning and tracking of non-connected objects for vehicular safety using millimeter-wave signals.

My work deals with a very intuitive yet surprisingly complex question: how can we determine where things are, and how they move? In everyday life, terms like positioning, localization or tracking feel interchangeable. In engineering they are not. Positioning deals with estimating where something is, localization puts it within a framework of a map and tracking extends this to follow movement over time; and mapping means building an understanding of the surrounding environment.

Most wireless engineers think about how to deliver a signal from point A to point B. I do the opposite: I analyze how the signal arrived at the receiver in the first place. This idea connects Simultaneous Localization and Mapping (SLAM) with Integrated Sensing and Communication (ISAC) systems in future 6G networks. Millimeter-wavelength signals scatter on obstacles such as buildings or even cars themselves, and these reflections can be exploited to sense the environment. With many connected or even non-connected vehicles on the road, these devices become both users of the network and cooperative sensors. This leads to Collaborative SLAM, where multiple units build and update a shared map together – an approach with strong potential for safety-critical vehicular applications.

So far, my work has focused on laying the foundations: creating a flexible MATLAB-based simulation environment and exploring theoretical limits of parameter estimation. This backbone will support a full feasibility study of Collaborative Radio SLAM algorithms in the ISAC framework.

Living and working abroad has been an irreplaceable experience. Moving from the Czech Republic to Finland was technically smooth thanks to the EU freedom of movement, nevertheless bureaucracy has still it's place.

Finland quickly became a source of unexpected peace and quiet – almost addictive, really. The omnipresent nature and forests create an environment that is incredibly pleasant to live in.

Culture shocks? Not so many. However, in Czechia, when we say we'll go for "one beer", everybody knows it's a polite fiction. In Finland, however, there is a chance to

actually keep that promise, because a single 0.5 l beer can easily reach 10 EUR. And despite the prices, Finns truly love beer - they even import a lot of Czech brands I know well. Still, paying around 250 CZK for a Pilsner Urquell brewed back home, that's truly a cultural shock.

I also understand myself better. Such a sentence is usually an empty phrase from thousand other texts like this one, yet that is why I came here, too. I sometimes hardly recognize the pre-MiFuture version of myself – and probably neither do my supervisors.

In the next stages, I aim to complete the development and evaluation of the proposed algorithms and contribute to localization in future networks. One of my motivations to join MiFuture was to see how such networks operate from within; in the future, I hope to contribute to them from the academic side.

To the MiFuture community: Thank you for the opportunity and for the people that make this journey meaningful! And thanks for trusting me as your representative, researchers from our network!

Prabhat Vikas Gupta

Not too long ago, there was a boy named Prabhat who had just wrapped up his master's degree. Like many of us at that stage, he stood at a crossroads: One path leading deeper into academia, the other inviting him toward the fast-paced world of industry. He wanted both: the curiosity-driven exploration of research, and the grounded, practical impact of real-world engineering.

And then, almost by chance, he stumbled upon something called the MiFuture project, focused on Positioning-assisted Resource Allocation in Cell-free networks.

Now, this wasn't just any project. You see, the young man had already been working with positioning technologies, so when he discovered this opportunity, it felt as if someone had crafted it just for him. A near-perfect match.

The challenge of the project was fascinating. Imagine a network that not only connects users but also knows where they are. With this information, the goal was to optimize how the network shares its resources.

To simplify it, picture a child standing in the middle of a neighbourhood with a big box of sweets. The child wants to share them equally among all their friends. And because he knows exactly where each friend lives, he tries to make a fair plan.

But it's never that simple, is it?

Some friends live close by. Others live far away. And maybe..just maybe. . . his best friend lives at the very edge of the neighbourhood. Giving fewer sweets to the best friend? That's a hard call for a child.

So what does he do?

He transforms the whole problem into an eigen dimension. Suddenly, the distribution becomes smarter. Efficient. Balanced. And cleverly optimized so that after sharing, he still has enough sweets left to make new friends at the football field, finish his homework, and maybe even learn a new skill.

Now imagine this child moving to a completely new country. New streets, new faces, new languages, new ways of doing things. That's the journey our young researcher found himself in when he arrived in Coimbra, Portugal.

But Portugal welcomed him with open arms. The warm sunshine, the beautiful landscapes, and most importantly, the generous support from his new friends and the team at the Institute of Telecommunications. These people, this place, gave him the confidence and strength he needed to continue his adventure.

Of course, the journey hasn't been without its bumps. He has faced challenges while explaining his ideas and obstacles while implementing his work. But each stop along the way has taught him something valuable. Each hurdle has shaped him.

And the story isn't over not even close.

There are still more friends to meet, more questions to explore, more contributions to make. He dreams of collaborating with people from around the globe, knowing he's not the only child navigating the complexities of this world.

He wants to keep playing this game, this game of discovery, innovation, and connection, and travel far and wide, sharing his skills.

Before he continues, though, he wants to offer a heartfelt thank you to everyone who's been part of the journey so far. Their guidance and support have kept the project running smoothly, and he knows that even when things move faster than light, when the ride becomes a roller coaster, it is these very people who will be right beside him.

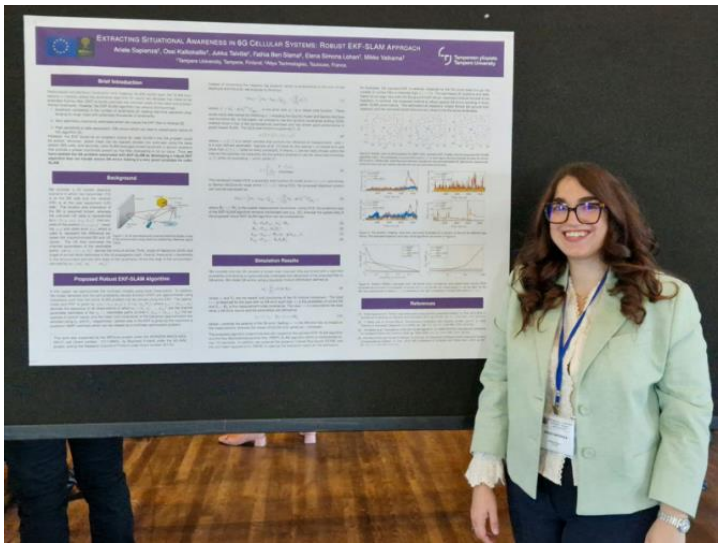
And so the story goes on. A story of learning, courage, curiosity and a child with a box of sweets who's determined to make the world a little better.

Omid Abbassi Aghda

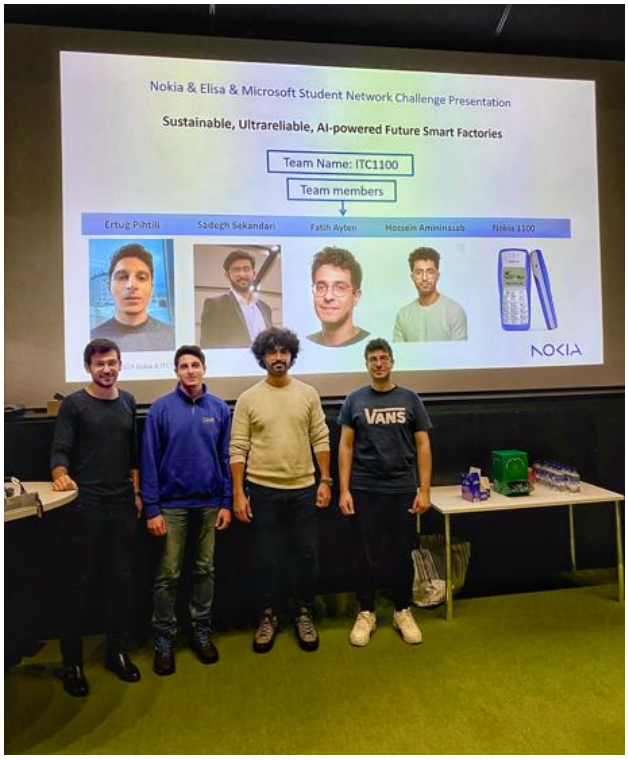
Ctrl + click in the picture for the video

4. Dissemination Events

ARIELE SAPIENZA, Poster session in ASILOMAR 2025 in Pacific Grove, CA, USA



FATIH AYTEN and ERTUG PIHTILI at ICT



MOHD ADNAN at ICLGNS 2025

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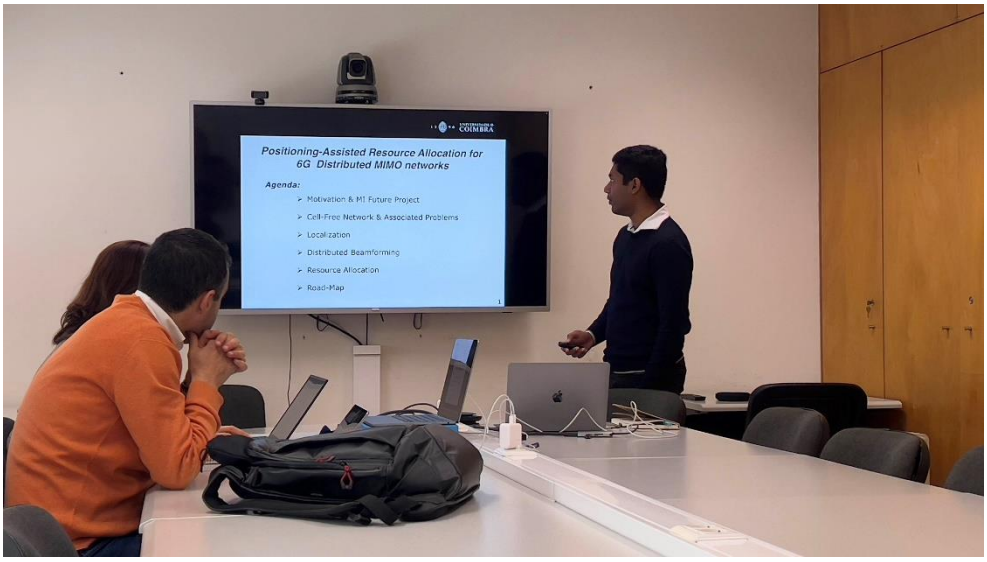
RUBEN de MIGUEL at “La Noche de los Investigadores” (UC3M)

ALEKSANDAR BIRMANCEVIC at workshop "Swe-CTW 2025" held in Linköping, Sweden

PRABHAT GUPTA at Aveiro University



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5. From MSCA Researcher to Industry Innovator: Akshay Jain Journey of Growth and Purpose

Could you tell us a bit about your career path and how your experience as an MSCA doctoral candidate shaped your professional journey?

[Akshay:] I did my bachelor's in technology in India from Sardar Vallabhbhai National Institute of Technology, Surat in Electronics and Communications Engineering. Subsequently, I went to the US to do my master's degree in electrical engineering at University of Florida, wherein I specialized in Spectral estimation and Detection theory. Later, I was one of the founding engineers for a Drone startup called Queen B Robotics. I led the communications systems design for a 360-degree capture drone and swarm systems of drones. Later, I moved to Spain to do my PhD in 5G communications as part of the 5GAuRA Marie Skłodowska-Curie ITN (current day Doctoral Networks). As an MSCA researcher I learnt a lot about critical thinking, how to conduct research and write papers and patents. This allowed me to get a prestigious postdoc position in UPC in the Computer Architecture department, where I worked on Graph Neural Networks (GNNs) and Reconfigurable Intelligent Surfaces (RIS) characterization. Subsequently, I became the VP of Telecom Engineering in Neutroon Networks, where I led the entire Telecom Engineering Research and Product development. I was also responsible for customer facing discussions and field deployments. Next, I moved to

Nokia Bell Labs in Finland, where I currently work as a Research Scientist and am responsible for multiple internal and external projects, including the MiFuture project from Nokia side.

What motivated you to apply for a Marie Skłodowska-Curie fellowship at the time?

[Akshay:] I think what really attracted me was the possibility to work on a cutting-edge topic as well as the possibility to work with Industrial partners. Additionally, my advisors also provided me with a very satisfying interview process, so that also motivated me to make the jump from US to Spain.

Looking back, what were the most valuable lessons or skills you gained during your MSCA project?

[Akshay:] I would point two important skills that I learnt during the MSCA project I was part of. They are:

a. Mathematical skills are important. Even if you believe in the current age of AI you might not need them that much, trust me they are even more important now than before
b. Networking and presentation skills are equally important. If you do good work but if you cannot sell your ideas well, then unfortunately nobody will take note of the good work that has been done. So, a balance is important, i.e., both good work and presentation skills are important.

I know that during your MSCA you maintained a good level of Spanish while living in Barcelona. What other things from that period have you incorporated into your life?

[Akshay:] I think you really pointed out to the most important thing, the language. I learnt it by just talking to the people who would serve food in the university cafeteria and through friends, and by talking to them. This has subsequently also allowed me to build strong relations and understand the culture and people a lot better. I can safely say I have a second home and a family away from family in Spain.

Was this fellowship your first experience for living in a foreign country? How was it?

[Akshay:] No Spain was my second experience living in a foreign country, as I had already moved to the US from India before moving to Spain. Nevertheless, the experience was completely different as the US culture is almost the opposite of the Spanish and by extension the European culture. I have to say I am lucky to have experienced both as it gave me a broader perspective allowing me to be a better judge of what was good for me and what I would rather avoid.

How does your experience as a former MSCA fellow influence the way you now supervise PhD students or postdocs?

[Akshay:] The most important thing I have is empathy. I believe 3 years, with all the mobility expectations and reporting, is a very intense PhD program. Hence, and having experienced the same intensity, it helps me to make decisions and plans that I believe may help reduce the stress that comes with such a condensed PhD program. Of course, the PhD candidates will be the right persons to answer if I have been able to do that successfully or not, but at least this has been my goal (backed by action) knowing very well the challenges MSCA fellows face.

What are the main differences you perceive between being a researcher within an MSCA project and coordinating or supervising one?

[Akshay:] This is a very good question. I think as a researcher I was focused more on what I had to do for my PhD and the networking that comes with it. However, as a coordinator and supervisor I feel the responsibility to not just the project and my own company Nokia, but also towards the PhD students in helping them with their studies and careers, and to the general public whose tax money is used for these trainings. At the end, we want to do impactful work so that the taxpayers' money is put to good use.

Have you noticed changes in the research environment or in the opportunities available for young scientists since your own fellowship?

[Akshay:] I do think that there are more research opportunities in current globalized world, however there are the broader economical and geopolitical impacts that we can witness across the globe. This does make finding research opportunities for young scientists a lot more challenging than say 5-10 years ago. However, I would suggest to anyone who is looking for a job after their PhD or about to finish their PhD to do good work and then emphasize on selling it in the best possible way. This is the best method to increase your chance of getting a research position. Do not forget to network!

What is your role within the MiFuture project, and what attracted you to get involved?

[Akshay:] In the MiFuture project I wear several hats. I am involved in various boards of the project such as those that take care of supervision, recruitment and dissemination. I am also the lead PI at Nokia for two researchers, i.e., DC8 and DC9, in collaboration with Tampere University and IT, Portugal. I must thank my manager Dr. Mikko A. Uusitalo for allowing me to participate in this project and leading it from Nokia's perspective. I think I have a sentimental connection to the MSCA programme and that is what motivated me to join it.

How does MiFuture build on the values and goals promoted by the MSCA programme?

[Akshay:] The main aspect that MiFuture, like all other MSCA projects, does is that it provides a truly international cohort of talented students an opportunity to work with Industry and Academia as much as possible. For example, some DCs have been recruited in a 50-50 model by both Industry and Academic partners, thus allowing the student to spend equal amount of time at both places. This helps the students to develop both theoretical and practical skills in research, with the possibility of strong networking and thus better employment prospects within the European Union.

What do you think are the most exciting aspects or potential impacts of MiFuture's research?

[Akshay:] I am excited to see the solid quality of researchers that have joined the MiFuture project, both students and PIs. This provides the perfect melting pot for generating substantial contributions in the area of Cell-Free MIMO, Positioning, Resource Allocation and AI-native RAN methods and algorithms. Above all of this, I am most excited to see our doctoral researchers become leading researchers within the industry.

What advice would you give to current or future MSCA doctoral candidates?

[Akshay:] Remember the value of these three words, especially when it gets tough ➔ **P**erseverance **H**ardwork and **D**edication (PhD)
These usually lead to another concept which is called delayed gratification, which means you sacrifice something now for a better result in the future. It will help you to avoid making impulsive decisions, which can lead to sub-optimal results in both life and research.

What qualities do you think make a great researcher today?

[Akshay:] This is hard to say. I think every researcher, like every human, is different. Hence, different researchers will usually come up with their own methods to do their great work. I say great work here, because in my opinion, unless it is done with malicious intentions, no work is useless and the scale of greatness is relative to one's ambitions. Of course, if one wins the Nobel prize then that is great work which has wide-ranging impact. But even those who win the Nobel prize rarely win it with their PhD Thesis. But what helps them to win the Nobel prize is what they learnt during their doctoral studies, i.e., the ability to think critically and ask the right and hard questions.

If you could go back to your PhD years, is there anything you would do differently?

[Akshay:] Learn more math ☺

How do you see the role of international and interdisciplinary collaboration evolving in the coming years?

[Akshay:] Through my experiences I have seen that great work happens when one is able to collaborate and discuss ideas with colleagues from different areas. It breaks silos and can sometimes lead to the creation of interesting ideas that can possibly be groundbreaking. So, in my opinion, international and interdisciplinary collaboration will most likely end up playing a very consequential role in how research and by that extension science progresses.

What do you hope the MiFuture project will contribute to the research community or society at large?

[Akshay:] I have very concrete expectations:

a. Researchers who are great at their research, but at the same time they are empathetic and practical
b. Research outputs addressing sustainability, as this is and should be one of the core guiding principles of 6G

6. Training Activities and Network-Wide Collaboration

During this semester, numerous training activities were delivered both locally, within each participating institution, and remotely through network-wide training sessions open to all members of the consortium. These activities covered a broad range of topics, including advanced technical subjects as well as transversal and professional skills.

Technical sessions in the Network-wide training included:

Program	Training Session	Date	Speaker	Organization
ST1	FM-OFDM: a novel waveform for wireless communication in highly doubly-dispersive channels	10-abr	Javier Lorca	UC3M
ST1	Wireless channel models	28-may	Simona Lohan	TAU
ST1	Open RAN	04-July	CarlosUbeda	VOIS
ST1	An Overview of Localization and Sensing in 5G and 6G	29-sep	Alessio Fascista	UAB
ST1	Developing Knowledge Graphs for Sustainable network design	31-oct	Akshay Jain	NOF
ST1	AI/ML for ISAC	31-oct	Dariush Salami	NOF
ST1	Ultra-reliable communication with distributed MIMO, is there a problem?	10-nov	Fredrik Tufvesson	ULUND
ST1	Vodafone NTN Solution for Direct-To-Device – Radio aspects, performance, and limitations	17-nov	Oscar Moreno	VOIS
ST1	RAN Intelligent Controller – Open RAN Networks Optimization	01-dec	Pablo Oliver	VOIS

The transversal training programme included courses on:

Program	Training Session	Date	Speaker	Organization
TT1	Communication and Presentation Skills	18-sep	Nidhi Seth	NOP
TT	Responsible, Interdisciplinary and Inclusive Research	03-nov	YUFE	UC3M
TT2	Couse on SDGs, environmental awareness, energy impact of communications networks	02-dec	Eeva-Liisa Viskari	TAU

A highlight of the semester was the Mid-Term Meeting, which took place in Madrid from March 11 to 13. The event was structured around three dedicated sessions, as described below, and was honoured by the presence of Roberta Gentile, Project Officer at REA (European Commission).

Program	Training Session	Date	Speaker	Organization
MTM	Perspectives on Testing and Measurement for 6G	12-march	Carles Navarro Manchón	VOIS
MTM	Nokia and Hexa-X-II update on 6G	12-march	Mikko A. Uusitalo	NOF
MTM	Hexa-X-II End-to-End System Design: An Enabler selection Perspective for the 6G System	12-march	Akshay Jain	NOF
MTM	Introduction to non coherent massive MIMO	12-march	Prof.Ana García Armada	UC3M
MTM	Latest developments in ISAC channel modeling: Standardization perspective	12-march	Mehmet Ilter	NOP
MTM	Visions on 6G	12-march	Rickard Ljung	ERS
MTM	Achieving High Power Efficiency with Variable Envelope Signals	12-march	Rui Dinis	IT
MTM	Network evolution in Telco	12-march	Lucia de Miguel	VOIS
MTM	6G Architecture and sensing topologies for ISAC	12-march	Julia Equi	ERF
MTM	Researching within the Framework of Sustainable Development	13-march	Prof. Gema Quintero	UC3M
MTM	Becoming Open Researchers: Open Science Skills and Challenges	13-march	Raul Aguilera Ortega	UC3M
MTM	How Wireless Signals Can Predict Flash Floods?	13-march	Prof. (Emerita) Hagit Messer	Tel Aviv University
MTM	Protecting your innovation: patents in a nutshell	13-march	Juan Manuel Vázquez	OEPM

This meeting marked the first opportunity for MiFuture members to meet in person. Beyond the scientific and organisational discussions, participants shared valuable moments during the social dinner and a guided visit to Madrid's historic city centre, strengthening personal connections and reinforcing the collaborative spirit of the project.

7. Upcoming events

Mid-term Review: Coimbra, March 11-13

The Mid-Term Review will take place from March 11 to 13 in Coimbra, hosted by the Instituto de Telecomunicações. As we reach the halfway point of the project, we will hold an in-person meeting to review progress and participate in a set of technical and transversal dissemination sessions. The meeting will also include a joint day with the PHYSEC COST Action (6G-PHYSEC – Physical layer security for trustworthy and resilient 6G systems).n

Programme overview:

- March 11: Project Review
- March 12: Technical / Horizontal Sessions
- March 13: Joint COST–MiFuture Workshop

Further details and the full agenda will be shared soon.

PHYSEC
6G - Physical Layer Security

Sc3: Training on Standardization procedures (KEY-SP) and Special Session in EU CNC - Málaga June 2-5

In early June, we will hold Sc3: Training on Standardization Procedures, organised by Keysight Spain in Málaga. Taking advantage of the EU CNC & 6G Summit (2026 EuCNC & 6G Summit – IEEE Spain Signal Processing and Communications Joint Chapter), MiFuture will also host a Special Session within the event.

All those interested in participating are invited to submit their proposals (including title and authors) to Ana García Armada and Eduardo Alonso.

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