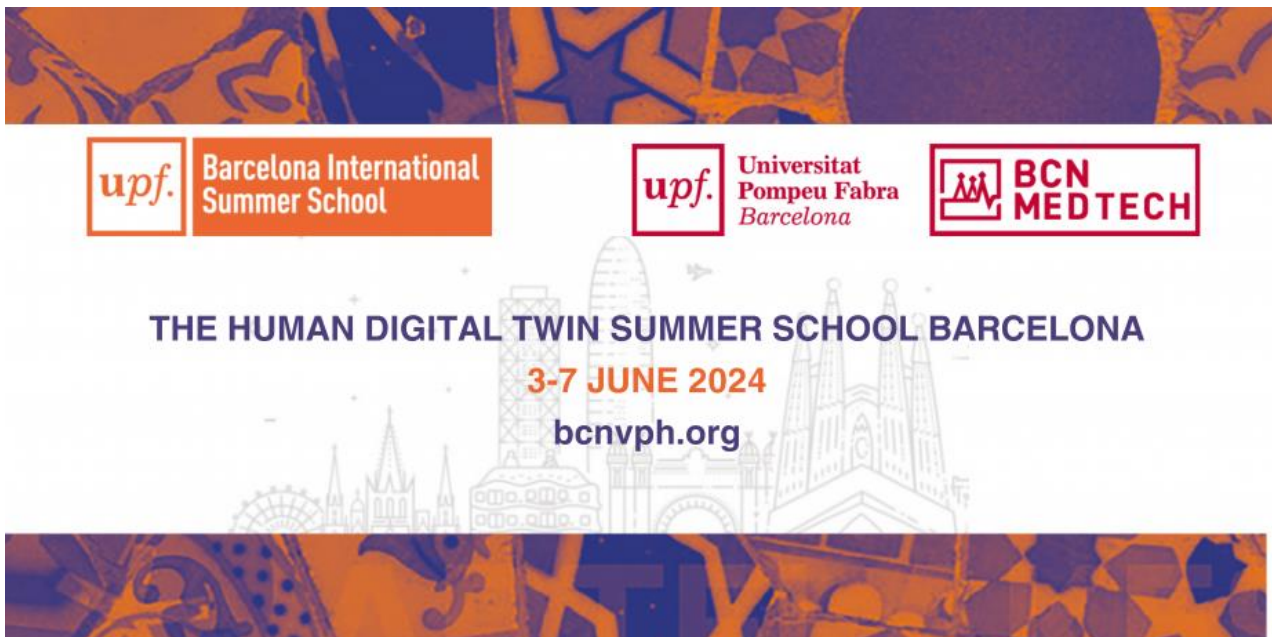


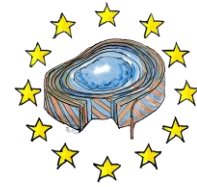
The Human Digital Twin Summer School Barcelona was held on June 3-7, 2024, and focused on Models and Simulation in Translational Research.



The Human Digital Twin Barcelona Summer School series is co-organized by BCN MedTech at the Department of Information and Communication Technologies, Universitat Pompeu Fabra (UPF) and by the Barcelona International Summer School (BISS), with the collaboration of the UPF department of Medicine and Life Science.

It provides junior engineers, early researchers and medical doctors with an integrative view of state-of-the-art research for *in silico* **medicine**, following a complete pipeline from basic science and clinical needs, to model application. The Summer School has the support of the Disc4All European Project, European Society of Biomechanics, of the Spanish Network of Excellence in Biomechanics and CompBioMed.

The key methodological and technological concepts are enriched by **afternoon hands-on sessions** that stand for 15,5 hours of **transversal training in *in silico* medicine** technologies during the whole week, under the supervision of expert researchers.

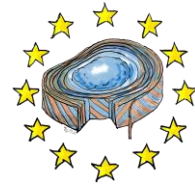


This year, we had the pleasure to welcome 18 international speakers and 80+ attendees (online and offline), from different international institutions and Disc4All Project Members.



It was a memorable event with 11 keynote lectures and 1 workshop, given by leading international researchers, who shared insights and cutting-edge advancements in their respective fields. Attendees were inspired by the depth of knowledge and the innovative approaches presented, sparking lively discussions and collaborations. The hands-ons provided experience, allowing participants to apply new concepts and techniques under the guidance of experts. This combination of theoretical and practical learning made the event highly impactful, leaving a lasting impression on all who attended.





Disc4All Consortium was well represented.

Andrea Nüesch showed novel results about the residence and possible biological effects of bacteria in the intervertebral disc.

Paola Bermudez Lekerika went deep into the action of anti-inflammatory cytokines in the intervertebral disc, shaking the current paradigm about IL-4.

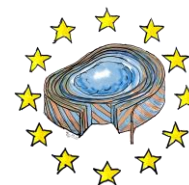
Roger Compte Boixader scaled up the determinant of intervertebral disc degeneration to the population level, with molecular epidemiology, and highlighted the relation with STarT Back Screening Tool.

Francesco Gualdi talked about ontologies and protein-protein interactions to bridge gaps between genotype and phenotype through data-driven approaches.

Francis Chemorion gave an insightful presentation about the management of heterogenous data, including quality, interoperability and standards.



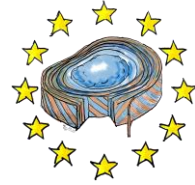
The Summer School participants were guided by Estefano Muñoz-Moya, Sofia Tseranidou, Francesco Gualdi, Sai Natarajan, and Katherine Crump were through practical developments of important pieces of the human digital twin, during the hands-ons.



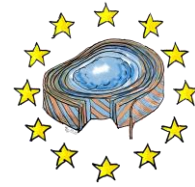
The key methodological and technological concepts were enriched by afternoon hands-on sessions that stand for 15,5 hours of transversal training in in silico medicine technologies during the whole week. The most of the attendees participated to the 4 hands-on sessions led by a total of 11 expert researchers. See the agenda below.

The Human Digital Twin Summer School Barcelona						
Models and Simulation in Translational Research						
Department of Information and Communication Technologies, Universitat Pompeu Fabra						
		Monday, June 3rd	Tuesday, June 4th	Wednesday, June 5th	Thursday, June 6th	Friday, June 7th
		<i>Basic Science and Clinical Understanding</i>	<i>Acquisition, processing, quantification</i>	<i>Organ, cell, molecular</i>	<i>Implementation, validation, coupling</i>	<i>Understanding, decision-support, therapy support</i>
Sala Nau	08:30 - 09:30	08:30 - 09:00 Registration 09:00 - 09:30 Welcome				
	09:30 - 11:00 (Keynote Speakers)	Cristina Ruiz-Romero Instituto de Investigación Biomédica de A Coruña - Chair: Jérôme Noailly	Aleksei Tiulpin University of Oulu - Chair: Jérôme Noailly	Natasa Przulj Barcelona Supercomputing Centre, ICREA - Chair: Janet Piñero	Miguel Angel Gonzalez UPF, ICREA - Chair: Bart Bijmens	Júlia Rodríguez-Comas Sycal Medical - Chair: Miguel Ángel González Ballester
	11:00 - 11:30	Coffee break				
	11:30-12:30	11:30-12:10 Andrea Nuesch University of Sheffield - Chair: Laura Baumgartner 12:10-12:50 Paola Bermudez University of Bern - Chair: Zerihun Getahun Workneh	11:30-12:30 Workshop on "Data in translational Medicine" Francis Chemorion	11:30-12:10 Francesco Gualdi IMIM - Chair: Mane Sargsyan	Javier Reina University of Sevilla - Chair: Elham Alizadeh	11:30 - 12:30 Pitches Jordi Mill, UPF Sergio Sanchez, UPF Morteza Rasouligandomani, UPF Pablo Orons, UPF - Chairs: Nuria Brunet, Jérôme Noailly
	12:30 - 13:30	12:50-13:30 Roger Compte Kings College London - Chair: Francesco Gualdi	12.30 -13.30 Open Round Table "Career Development in Translational Medicine and Research" - Chair: Aneta Toncheva	12:10-13:10 Gil Serrancoli UPC - Chair: Mayra Loayza	Andrea Malandrino UPC, FAU - Chair: Carlos Ruiz Wills	12:30 - 13:30 Testimonies & Discussion - Chairs: Nuria Brunet, Jérôme Noailly
	Cafeteria on Campus	13:30 - 14:30	Lunch			
Hall Tallers	14:30 - 16:30	Hands-on (Rooms Tallers)	Hands-on (Rooms Tallers)	Hands-on (Rooms Tallers)	Hands-on (Rooms Tallers)	14:30-17:00 Hands on presentations & Certificates - Chairs: Jérôme Noailly, Vladimir Estivill
	16:30 - 17:00	Coffee Break				
	17:00-18:00	Hands-on (Rooms Tallers)	Hands-on (Rooms Tallers)	17:00 - 18:30 Hands-on (Rooms Tallers)	17:00-18:00 Hands-on (Rooms Tallers)	17:00-17:30 Summer School Closure & Farewell Social Event (Guttenberg Square on Campus)
	18:00 - 19:30				Preparation of the hands on presentations	

On Tuesday, June 4th, an open round table on "Career development in translational research and medicine" took place. The session brought together professionals to discuss key topics such as technology transfer, proposal writing, and funding opportunities. Experts shared valuable insights on navigating the complexities of transferring research innovations to practical applications. Participants engaged in discussions on effective strategies for writing successful grant proposals. There were also in-depth conversations about securing funding from various sources. By the end of the event, attendees gained practical advices.



On Friday, June 7th, an entrepreneurial session was held, featuring start-up pitches and discussions. Aspiring entrepreneurs, many of them current or recent PhD students, presented their innovative ideas and business plans. The pitches covered a range of sectors, showcasing cutting-edge technologies and solutions. Following the presentations, there were engaging Q&A sessions where the panel provided feedback and advice, specifically tailored to the academic and research backgrounds of the presenters. The event concluded with a sense of excitement and optimism for future collaborations, inspiring the students to pursue their entrepreneurial ambitions.

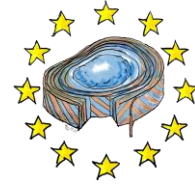


The final day featured a series of hands-on presentations where students showcased their projects, demonstrating the skills and knowledge they had acquired throughout the event. These projects addressed real-world problems, incorporating elements of digital technology, design thinking, and user experience.

A highlight of the closing ceremony was the Best Hands-on **“Multiscale knee modelling; from patient motion capture, to tissue deformation and cartilage biology”** awarded by Prof. Vladimir Estivill-Castro, PhD, Head of Department, Department of Engineering and the winners were: Maia Campanale, Jordi Callau, Silvia Valls Santafe, Berta de Ciurana, Aylin Kadkhodamanesh with instructors: Laura Baumgartner, Mayra Loayza, Corine Post.

Certificates were awarded to all participants, celebrating their achievements and readiness to apply their new skills in their careers.





Undoubtedly, the Human Digital Twin Summer School Barcelona has been a great inspiring experience, for both junior and senior scientists! The Summer School's last afternoon concluded with a farewell social gathering, attended by more than 50 participants.



Stay tuned! Watch the recordings on our YouTube: Disc4All European Innovative Training Network: <https://www.youtube.com/channel/UCorjbmLkHPXu6JVbg0rr-EA>
Join & follow us in LinkedIn: @Disc4All_EU_Project, Twitter @Disc4all_EU, website: <https://disc4all.upf.edu/>.

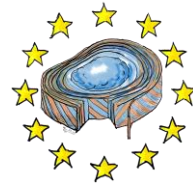
Acknowledgment:

Sponsors & Supporting grants:

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Dissemination Partners:

SimCardioTest, Simulation of Cardiac Devices & Drugs for in-silico Testing and Certification, EU Horizon 2020 Research & Innovation Program Digital transformation in Health and Care SC1-DTH-06-2020, GA: 101016496, **VPH Institute**, **Bioinformatics Barcelona**, **European Society of Biomechanics**, **CompBioMed**, **INSILICO WORLD**, **Avicenna Alliance**, **iSi Health - KU Leuven Institute of Physics-based Modeling for in silico Health**.



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