BOOK OF ABSTRACTS

A COLLECTION OF OVER 150 RESEARCH PROJECTS FEATURED IN MUSA'S POSTER SESSION ON DECEMBER 3–4, 2025

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DIGITAL TRANSITION

The *Digital Transition* category gathers multidisciplinary contributions showing how emerging technologies—AI, telemedicine, digital manufacturing, digital twins, blockchain, advanced electronics, and data-driven organizational models—are reshaping processes, services, and decision-making across sectors. The abstracts highlight both technological advances (from high-frequency devices to smart-home monitoring and secure traceability systems) and their social and organizational implications, including user acceptance, skills development, and new forms of work. Together, they illustrate a transition that is not only technological but systemic, requiring integration of innovation, human factors, and sustainable digital practices.

From Weak Links to Strong Joints: Bond and Shear Performance in 3D-Printed Concrete

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One of the main barriers to the wider use of 3D-printed concrete is the integrity of its connections—both between printed layers and between reinforcement and the layered material. Weak interlayer bonds and insufficient anchorage of reinforcement compromise structural reliability, limiting the scalability of digital construction. This study applies two experimental methods to address these challenges. Push-off tests compared 3D-printed triplets with monolithic and epoxy-bonded references to assess interlayer and cold-joint shear strength, while pull-out tests examined steel–concrete bond with bars embedded parallel and perpendicular to the print layers. Results show that bar orientation, interface type, and fabrication method strongly influence joint performance. These insights identify the key parameters governing connection integrity, paving the way for industrial-scale deployment of 3D-printed concrete in structural applications.

FORESEEN IMPACT

This study identifies the key factors influencing joint performance in 3D-printed concrete. The findings enhance understanding of connection behavior, supporting more reliable, durable, and scalable digital construction for structural applications.

KEYWORDS

3D PRINTED CONCRETE	BOND BEHAVIOR	STRUCTURAL DURABILITY

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Mapping research on Telemedicine and Healthcare Professionals: A Bibliometric Analysis of Global Research Trends

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Telemedicine has become a key part of healthcare delivery. However, to date, research on its implications for healthcare professionals' (HCPs) wellbeing and work practices remains limited and fragmented. This study overviews the research landscape on telemedicine, with a focus on HCPs' work and wellbeing. It maps the intellectual structure of the field and underexplored areas to guide future research. A systematic search in Web of Science and Scopus identified 160 empirical articles, analyzed with bibliometric techniques in Biblioshiny (R). Results show steady growth of publications since 2012, with a surge during COVID-19. Most studies appear in clinically oriented journals. Core themes include HCPs' wellbeing, primary care work practices, and patient-professional communication. Contextual (e.g., training) and personal (e.g., attitudes) factors also emerged. Resilience and provider satisfaction remain understudied, offering relevant directions for future research.

FORESEEN IMPACT

This bibliometric analysis provides a roadmap for future research, emphasizing the need for studies from a psychological perspective, exploring the long-term impact of telemedicine on HCPs, including how the use of these technologies may influence professional identity and collaboration among HCPs.

KEYWORDS

HEALTHCARE PROFESSIONALS	TELEMEDICINE	BIBLIOMETRIC ANALYSIS

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Remote Monitoring for Heart Failure: Insights into Patient Acceptance and Intention to Use

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Telemedicine offers a promising opportunity to improve care in chronic diseases such as heart failure (HF). In particular, remote monitoring apps can enhance clinical outcomes, foster patient engagement, and support sustainable use of healthcare resources, yet adoption remains limited. A crucial determinant of both intention and actual use is patient acceptance. Within the Azimusa project and grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT), this study investigates the factors shaping patient acceptance and intention to use the Healthentia® app. Data are being collected through a survey administered to patients with HF using validated scales at three time points during their six-month care pathways. Preliminary mediation analyses show that perceived ease of use is positively related to intention to use, both directly and indirectly through perceived utility. Additionally, social influence and facilitating conditions can influence these relationships.

FORESEEN IMPACT

Findings will offer insights to guide the design and implementation of patient-centered digital health solutions, fostering wider adoption and more effective chronic care management. The study will also advance theoretical understanding of technology acceptance in healthcare contexts.

KEYWORDS

TELEMEDICINE	REMOTE MONITORING	HEART FAILURE

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Protecting Handmade Products Through NFT Technology

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Within the framework of the Italian PNRR MUSA – Spoke 5 initiative on innovation and sustainability, we developed a proof of concept that harnesses blockchain and NFT technology to protect the uniqueness of handmade products. A digital twin of a crafted item was created as a non-fungible token on a blockchain, acting as a permanent and verifiable record of its originality. To ensure usability, we implemented APIs that connect the blockchain infrastructure with a dedicated mobile application, developed by a partner group. This integration enables artisans and consumers to seamlessly register, verify, and access information about the provenance of a product. Our approach demonstrates the potential of combining decentralized technologies with user-friendly tools to safeguard craftsmanship, preserve authenticity, and reduce the impact of counterfeiting in artisanal markets.

FORESEEN IMPACT

Developed within PNRR MUSA – Spoke 5, this proof of concept shows how NFTs and blockchain can build trust in handmade supply chains, offering a simple proof of originality and paving the way for scalable anti-counterfeiting solutions.

KEYWORDS

NFT	BLOCKCHAIN	DIGITAL TRANSFORMATION

LUXURY CRAFTSMANSHIP	MUSA SPOKE 5

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Understanding User Acceptance of Shared Mobility Services through Topic Modeling of Online Reviews

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The study explores user acceptance of shared mobility apps in the EU by analyzing over 150,000 multilingual user reviews from 25 car-, bike-, and scooter-sharing services. Using Structural Topic Modeling, the study identifies dimensions linked to key constructs of the Technology Acceptance Model: perceived usefulness, ease of use, trust, and risk. The results show that positive experiences — convenience, enjoyment, and ease — are associated with higher app ratings, while negative reviews often concern technical issues, hidden fees, safety, and customer service. The study contributes to sustainable mobility research by introducing a large-scale, user-generated content approach to TAM, offering a more behaviorally grounded perspective on technology adoption across platforms and countries. It demonstrates that while usefulness and ease of use drive satisfaction, trust and risk remain significant barriers, and environmental concerns alone may not suffice to influence user evaluations.

FORESEEN IMPACT

The study offers data-driven insights to improve shared mobility services, supporting user-centered design and policy. It advances TAM research with multilingual UGC and aids sustainable urban mobility adoption across diverse EU contexts.

KEYWORDS

SHARING MOBILITY	TECHNOLOGY ACCEPTANCE MODEL	USER-GENERATED CONTENT

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Compact Modeling and Characterization of pHEMTs for Microwave and Millimeter-Wave Applications

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This project, carried out in collaboration with Huawei, which has provided technical and educational support, focuses on the development and validation of compact models for GaAs pHEMTs devices aimed at high-frequency applications in next-generation communication systems.

A major achievement is the establishment of the mm-Wave Electronics Laboratory (WELab), equipped with a Vector Network Analyzer up to 220 GHz enabling precise measurements of S-parameters.

Using the measurements we extracted the Angelov non-linear model and validated up to 149 GHz, allowing accurate prediction of small- and large-signal behaviour.

These validated models support predictive RF and MMIC circuit simulations, including power amplifier design. The project establishes a reliable framework for advancing compound semiconductor electronics, bridging the gap between device physics and circuit performance for next-generation high-frequency technologies.

FORESEEN IMPACT

This project advances the understanding of pHEMT limits and bridges theory with experiment and education. The WELab trains students and researchers in 220 GHz measurements, and the partnership with a leading company such as Huawei further supports scientific and educational development.

KEYWORDS

HIGH-FREQUENCY	MODELING	SEMICONDUCTORS

Outcomes of AI Readiness Work in Municipalities

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We report the outcomes of an AI-readiness study conducted among Italian municipalities between June 2024 and March 2025. The study combined: (i) a multi-session training program for municipal staff; (ii) a web survey of 72 municipalities across Lombardy, Veneto, and Emilia-Romagna; and (iii) an LLM/NLP prototype that auto-classifies municipal web pages against a nationally defined taxonomy. The main outcomes of the study reveal a low level of digital skills, supported by a strong willingness to participate in training programs and learn to use AI tools to improve job performance. Expected benefits include the automation of routine tasks, faster information retrieval and triage, and more transparent, explainable decision support. Concerns focus on model opacity and human oversight rather than privacy. The pilot demonstrates practical gains, such as clearer information architecture and reduced manual tagging, offering low-risk entry points.

FORESEEN IMPACT

Clear, scalable guidance for municipal AI: the survey supplies a national baseline and prioritization criteria; the prototype delivers a step-by-step, AgID-aligned workflow for service taxonomy and tagging. Together, they enable nationwide adoption.

KEYWORDS

LLM-DRIVEN AUTOMATION	AI DECISION SUPPORT	AI-ENABLED PUBLIC SERVICES

E-NET: lab-scale water network for digital twin development

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The "Experimental Network for the Evolution of the Digital Twin" (E-NET) project aims to bridge the gap between advanced computer modelling and real-world applications by combining physical experiments with numerical simulations in a unique benchmark environment. This platform enables the testing and validation of algorithms, methods, and technologies — from software solutions to hydraulic devices and communication tools. Implemented at the Hydraulic Laboratory of Politecnico di Milano and inspired by one of the most widely used scientific benchmarks, the facility offers a dynamic space for experimentation and learning. Through hands-on activities and rigorous testing, E-NET fosters skills development and showcases the tangible benefits of innovative digital solutions.

FORESEEN IMPACT

The E-NET project supports skills development and accelerates technology transfer, promoting the adoption of innovative solutions by utilities and professionals while bridging the gap between research and real-world applications.

KEYWORDS

DIGITAL TWIN	WATER DISTRIBUTION NETWORK	HYDRAULIC DEVICES

GreenValve: Energy for the Digital Twin of Water Networks

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One of the main barriers to smart automation in water distribution networks is the lack of continuous power supply for IoT devices such as sensors and actuators. GreenValve is an enabling technology for Digital Twin applications that addresses this challenge by harvesting the energy normally dissipated by control valves, providing a localized and continuous source of electricity. This approach transforms the traditional paradigm "regulation = energy loss" into "regulation = energy availability". The recovered energy sustains real-time monitoring, control, and communication, making the valve a smart and self-sufficient node. GreenValve can replace conventional devices without altering existing infrastructures. When deployed across networks, it enables distributed intelligence and dynamic coordination, thus paving the way for Digital Twin–based management and more efficient, sustainable operation of complex water systems.

FORESEEN IMPACT

GreenValve enables energy-autonomous smart valves, allowing real-time monitoring and control in water networks. It supports Digital Twin implementation, improves operational efficiency, reduces water waste, thanks to a scalable and sustainable water management.

KEYWORDS

ENERGY HARVESTING	DIGITAL TWIN	SMART WATER NETWORKS

ASSESSING FAIRNESS IN AI: development of an end-to-end fairness evaluation tool

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Artificial Intelligence increasingly shapes decisions in critical areas such as hiring, credit approval, and law enforcement. As these systems gain responsibility in high-stakes contexts, ensuring fairness and minimizing bias has become essential. Biased outcomes risk reinforcing inequalities, and causing real harm to individuals and communities. Sources of bias include historically unbalanced data, opaque algorithmic processes that resist interpretation, and trade-offs between predictive accuracy and fairness. While research on fairness in machine learning has grown, most existing tools are highly technical, focus on specific stages of the ML lifecycle, and remain inaccessible to non-expert users. This project addresses this gap by proposing a user-friendly, web-based platform that integrates fairness across the entire ML pipeline.

FORESEEN IMPACT

The proposed platform could democratize fairness assessment in AI by making it accessible to both experts and non-specialists. It may foster more transparent, inclusive, and accountable AI systems, reduce risks of biased outcomes, and support compliance with emerging ethical and legal standards.

KEYWORDS

AI ASSESSMENT	FAIRNESS	ASSESSMET TOOL

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Design and Implementation of a RISC-V Microprocessor with Static-Random-Access-Memory for Aerospace Applications

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WITH UNIVERSITY OF NAPLES WITHIN CASCADE FUNDING PROGRAMS AND THALES ALENIA SPACE

This poster presents the enhanced implementation of a single-core RISC-V microprocessor for aerospace applications in TSMC 28 nm HPC+ BULK CMOS technology. The microprocessor integrates on-chip 2 kByte SRAM (Static Random Access Memory) and doubling the size of the "Data-RAM" memory (256 Bytes). This enabling higher data throughput while maintaining compliance with the standard, allowing the execution of official suite RISC-V tests. The design operates at 100 MHz with a nominal supply voltage of 0.9 V. Pre- and Post-layout simulations have been performed to validate functional correctness and assess the design's performance. The synthesized core achieves a silicon footprint of 0.056 mm², corresponding to 55.14 kGE, and exhibits a total power consumption of 1.617 mW, dominated by dynamic contributions (1.604 mW) with an average static power of 0.013 mW. Finally, this work has been physically implemented in a silicon implementation in a successfully completed Tape-Out on June 27th, 2025.

FORESEEN IMPACT

The updated RISC-V microprocessor, validated through simulations and FPGA prototyping and finalized with a successful tape-out, strengthens the adoption of open-ISA solutions in aerospace, enabling further research and industrial applications in critical environments.

KEYWORDS

MICROPROCCESSOR	RISC-V	AEROSPACE

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E-Welfare and the City: Co-Designing Digital Welfare Access and Social Inclusion

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The poster illustrates the last phases of the ongoing research "E-Welfare and the City" conducted by an interdisciplinary group of sociologists, urban planners and designers from the Department of Architecture and Urban Studies (DAStU) and the Design Department of Politecnico di Milano.

Among the final phases of the project, a co-design process was developed aiming at supporting welfare access and social inclusion for the inhabitants of Rozzano, a fragile territory in the metropolitan city of Milan. Focusing the workshops on the design of services and space, the aim was to promote welfare access. The co-design process engaged different profiles of inhabitants at risk of social exclusion due to digitalization at various levels, with the goal to create a shared, intergenerational space for digital facilitation and training.

FORESEEN IMPACT

A community space co-designed with Rozzano residents through a bottom-up approach, engaging vulnerable groups in both spatial design and governance to generate benefits beyond the initial target population and strengthen welfare access for the wider community.

KEYWORDS

SPACES AND SERVICES	DIGITAL WELFARE	CO-DESIGN FOR COMMUNITY

Understanding Technology Acceptance and Research Engagement in Mild Cognitive Impairment: Findings from the SERENADE pilot

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Mild cognitive impairment (MCI) affects one or more cognitive domains while daily functioning remains intact, but progression to dementia impacts social and work abilities. Predicting and mitigating decline is crucial, and smart-home technology offers continuous, non-invasive monitoring. The multidisciplinary SERENADE pilot combines psychology, medicine, engineering, and data science to design AI-based algorithms to detect decline via smart-home sensing devices, wearables and tablet-based cognitive tests. To investigate technology acceptance and engagement in research, we conducted and thematically analyzed semi-structured interviews (n=14). Acceptance was shaped by ease of use, perceived usefulness, social influence, and facilitating conditions. Participation was driven by both subjective and interpersonal motivations. Insights from interviews highlight how user perspectives guide the co-design of sustainable smart-home solutions and foster recruitment, engagement, and well-being.

FORESEEN IMPACT

Multidisciplinary insights reveal that usability, perceived benefits, and social factors drive technology acceptance in MCI. Understanding patients' motivations for participation informs recruitment and engagement, advancing dementia care and sustainable healthcare strategies.

KEYWORDS

HEALTHCARE	SMART-HOME TECHNOLOGY	TELEMEDICINE

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Unlocking Patient Activation in heart failure: Insights from digital care within the AZIMUSA project

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Heart failure (HF) is a chronic and complex condition that affects patients' daily lives and requires continuous care. Telemedicine, particularly telemonitoring, offers an opportunity to improve continuity and personalization of care, while fostering patient activation. Within the AZIMUSA project, which investigates the use of a telemonitoring app (Healthentia®), this study, grounded in patient activation literature, explores how activation may influence self-care behaviors and patients' quality of life. A prospective design with repeated surveys at three time points over six months is adopted. Preliminary analyses suggest that self-care influences quality of life indirectly through patient activation, highlighting its role as a key mechanism in HF management. These findings support the potential of digital health solutions to enhance outcomes in chronic care, while also stressing the importance of patient acceptance and engagement for their effective use.

FORESEEN IMPACT

In the context of telemedicine, this study will provide evidence on patient activation as a key aspect, offering insights into how it operates within digital health pathways and supporting the effective and sustainable adoption of innovative care solutions.

KEYWORDS

TELEMEDICINE	TELEMONITORING	PATIENT ACTIVATION

Accelerating Drug Discovery with DELTA: Balanced Ligand–Target Data for CADD Applications

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The rapid growth of biological and chemical data, coupled with advances in artificial intelligence (AI), has strengthened the role of in silico methods in drug discovery. However, most existing resources were not designed to meet the specific needs of AI-driven analyses. Available datasets can be broadly divided into curated structural databases supporting docking and scoring functions, and ligand-based collections developed for virtual screening. While extensively used, these resources lack the balance and standardization required for robust AI-based classification studies. To address this gap, we present DELTA (Database for Extended Ligand-Target Analyses), a novel resource comprising harmonized and balanced datasets for ~500 therapeutically relevant human targets. For each target, DELTA provides 200 experimentally tested ligands equally divided between actives and inactives, alongside high-quality 3D structures prepared for computational use.

FORESEEN IMPACT

this balanced framework enables reliable predictor development, comprehensive benchmarking, and structure-based simulations, offering a versatile tool to accelerate rational drug design.

KEYWORDS

DRUG DISCOVERY	VIRTUAL SCREENING	AI

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Hybrid Work and the Ambivalence of Digitalization: Navigating Paradigm Shifts and Enduring Constraints

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This article examines the impact of remote work—particularly hybrid models—on how work is performed, evaluated, and controlled from a human resources perspective. Based on interviews and focus groups with HR managers from 19 Milan-based firms and a survey of 480 Lombardy companies, the study highlights three shifts: (1) the negotiated boundaries of teleworkability, tied to productivity and organizational cohesion; (2) the partial decline of presenteeism in favor of goal-oriented evaluation criteria; and (3) the perception of a changing work ethic and prioritization among workers, driving firms to use flexibility as a tool for attraction and retention. Remote work introduces discontinuities in evaluation criteria and work-life balance, yet also reinforces control and self-exploitation. Digitalization emerges as an ambivalent force, enabling opportunities while reproducing constraints, and raising challenges for labor regulation, employment relations, and collective bargaining.

FORESEEN IMPACT

The study deepens understanding of how hybrid work reshapes performance evaluation, control, and employment relations. Its insights support HR strategies, inform collective bargaining, and guide policymakers in addressing risks of individualization, work intensification, and inequality.

KEYWORDS

HYBRID WORK	DIGITALIZATION	WORK PARADIGM SHIFT

TRAC3S Technology. Rethinking the luxury supply chain through Web 3.0 technologies

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TRAC3S Technology is an innovative solution for the luxury craftsmanship sector. It combines tamper-proof RFID smart labels, blockchain certification, and NFT digital twins to ensure authenticity, sustainability, and traceability across the supply chain. Each handcrafted product is linked to a digital passport recording materials, processes, and environmental impact, enabling transparency, anti-counterfeiting, and boosting the second-hand luxury market. Beyond compliance with the upcoming EU Digital Product Passport, TRAC3S introduces experiential pre-sale, allowing consumers to engage with the digital twin in immersive environments before the physical release. The platform also supports rapid prototyping, providing young artisans and designers with tools to access the market through certified and narratively enhanced creations. By merging traceability with interactive storydoing, TRAC3S redefines luxury communication at the intersection of technology, sustainability, and heritage.

FORESEEN IMPACT

TRAC3S supports the EU agenda on sustainable digital transition, demonstrating how luxury craftsmanship can integrate traceability, transparency, and immersive communication. The project fosters innovation, regulatory compliance, and new standards for responsible luxury markets.

KEYWORDS

LUXURY CRAFTSMANSHIP	FASHION WEB 3.0	MUSA SPOKE 5

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Development and Usability Testing of a WHO Caregiver Skills Training Smartphone Application (Kica)

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Background: Mobile-health approaches to caregiver-mediated interventions for autism show promise for scale-up, yet key development phases are often overlooked. This study reports on the development of Kica, a mobile app based on WHO Caregiver Skills Training (CST).

Methods: Phase 1 adapted CST content with a user-centered approach. In Phase 2, usability testing with 19 parents of autistic children (ages 2–6) included the System Usability Scale (SUS), Cognitive Walkthrough (CW), or Think-Aloud (TA) tasks.

Results: SUS scores and CW success were high, though three tasks were harder for parents with lower Italian proficiency. TA highlighted appreciation for caregiver–child focus, navigation ease, and visual branding, with suggestions for progress tracking, personalization, and reduced text. Findings informed redesign.

Conclusions: Usability testing confirmed strengths and guided refinements, supporting feasibility and pilot testing of clinical efficacy.

FORESEEN IMPACT

The Kica app expands access to evidence-based caregiver training, strengthening parental skills, interactions, and family well-being. Its scalable, user-centered design supports feasibility, cultural adaptation, and integration into public health systems, aiming to close the treatment gap.

KEYWORDS

MHEALTH	AUTISM	CAREGIVER TRAINING

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Navigating digital transformation: Linking hybrid work and data-driven-decision making

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This study examines hybrid work and data-driven decision making (DDD) as two key dimensions of digital transformation. Unlike earlier works that have studied these dimensions separately, we investigate their relationship and the factors correlated with their joint adoption. We conceptualize hybrid work as a transformation in the organization of work and DDD as an innovation in decision making. Using survey data from 423 firms in Lombardy, we find a significant correlation between the two practices and investigate the factors that are correlated to their adoption. Our empirical analysis suggests that firm size, sector, human capital, ICT intensity, innovation-oriented competitive strategy, and job autonomy are key factors. We further document substantial heterogeneity in digital transformation across sectors and firm age. Overall, the study advances the knowledge of digital transformation by digging into the multifaced components of organizational innovation in the digital era.

FORESEEN IMPACT

By considering the interdependence of hybrid work and DDD, the study offers a novel lens on the management of digital transformation aiming at improving employee well-being and organizational performance. Our results can inform organizational design choices in technology-driven contexts.

KEYWORDS

HYBRID WORK	DATA-DRIVEN DECISION MAKING	ORGANIZATIONAL INNOVATION

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EDUCATION AND TRAINING

The *Education and Training* category showcases initiatives that strengthen skills, inclusion, and learning innovation across schools, universities, and communities. The contributions span entrepreneurship education, financial literacy, STEM outreach, language training, digital learning tools, and university—industry partnerships. They also address key social challenges—school dropout, migrant inclusion, gender gaps, and student wellbeing—through data-driven tools, participatory practices, and evidence-based interventions. Together, these projects illustrate how multidisciplinary, accessible, and equity-oriented educational strategies can foster empowerment, enhance opportunities, and support more inclusive and sustainable learning ecosystems.

From framework to practice: implementing entrepreneurial and technology transfer training and networking events at Unimib.

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This work builds on a preparatory research phase mapping best practices in entrepreneurship and technology transfer (TT) education. As part of the MUSA project, targeted initiatives were designed and implemented for researchers, academic staff, startuppers and SMEs. Six Entrepreneurs' Cafés fostered peer learning and networking, and two editions of the SEIF Summer School trained PhD students in entrepreneurship, innovation and finance. Training contents are being developed for the MUSA matchmaking platform, including ten modules on design thinking and business planning/modeling and one on product development, to ensure long-term accessibility. A training needs analysis was carried out for Unimib's Research and Third Mission Area, identifying skill gaps in research management and TT, leading to tailored courses. Across ECs and Summer Schools, 141 participations with an average satisfaction of 67% strengthened entrepreneurial culture and TT practices, enriching Unimib's training offer.

FORESEEN IMPACT

Stable integration of entrepreneurial and TT training at Unimib; improved competences for research managers, startuppers and SMEs; consolidation of Entrepreneurs' Cafés as networking and exchange events; creation of a sustainable ecosystem for entrepreneurship and innovation.

KEYWORDS

ENTREPRENEURIAL TRAINING	TECHNOLOGY TRANSFER	IMPACT

Effective ways to teach financial education to girls and recommendations for the future: the EFFE SUMMER CAMP case

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In Italy, the level of financial literacy remains below the European average, with a gender gap (female performing worse) already evident in adolescence. The country also ranks among those with the lowest entrepreneurial propensity, with a gender gap larger than in other advanced economies. These findings underscore the urgency of engaging girls early in targeted programs and testing innovative methods to reduce such disparities. An effort is the EFFE Summer Camp, the first free financial and entrepreneurial education camp designed exclusively for adolescent girls, now in its second edition. The 2025 edition, held in Milan and Bari, involved 120 female students (cohorts 2007-2009). The program combined modules aimed at improving financial, entrepreneurial competencies and soft skills, together with workshops with women entrepreneurs. Pre- and post-camp surveys show preliminary improvements in knowledge. Full results will be presented at the conference, with policy recommendations.

FORESEEN IMPACT

- Improve financial literacy among young generations, while empowering participants to act as peer ambassadors.
- Meeting women entrepreneurs contributes to enhancing self-efficacy and reshaping beliefs about career possibilities.
- Generate evidence-based insights for policymakers and educators.

KEYWORDS

FINANCIAL EDUCATION	ENTREPRENEURSHIP	GENDER GAP

One Square Meter of Biodiversity

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"One Square Meter of Biodiversity" transforms public green spaces into educational micro-laboratories that reveal the hidden life of the city. The heart of the project is a standardized 1m² physical module that becomes a creative canvas for sponsor brands: a window into biodiversity, corporate showcase, and urban element all in one. Each module can be interpreted in infinite ways - from smart seating to interactive totems, from vertical gardens to light installations - always maintaining the central educational function. It operates on three levels: social-educational (citizen awareness), ecological-environmental (contribution to urban ecosystems), communicative-commercial (brand sustainability values). The scalable project creates an urban network of widespread environmental education that integrates strategic partnerships with collective wellbeing and urban quality objectives. A replicable MUSA project for every city. One square meter at a time.

FORESEEN IMPACT

Raising awareness on urban biodiversity through informal education. Strengthening nature-city psychological connection for wellbeing. Creating community gathering points. Enhancing urban aesthetics through design. Supporting green policies with evidence.

KEYWORDS

BIODIVERSITY	WELLBEING	URBAN DESIGN

Ambasciatrici di Scienza: role models for a gender-equal STEM future

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Analysis of INVALSI data shows that from primary school onwards, girls tend to perform better in Italian, while boys perform better in math. These differences are frequently linked to gender stereotypes that can influence self-perception and, consequently, future educational choices. To address this issue, a project was implemented in primary and middle schools involving female scientists from the University of Milan-Bicocca as STEM role models. Through interactive meetings, hands-on experiments, and work experience stories, students had the opportunity to explore scientific topics such as light and color, nuclear fusion, rocks, and black holes. Perceptions and attitudes toward STEM subjects were measured both before and after the interventions, with particular attention to girls' confidence in their scientific skills. The initiative highlights the importance of engaging all students equally in science and fostering equal opportunities for pursuing STEM studies in the future.

FORESEEN IMPACT

The expected impact is the increasing girls' and boys' confidence and interest in STEM, reducing gender stereotypes and promoting more balanced educational choices, thus providing equal future opportunities in science.

KEYWORDS

STEM	ROLE MODEL	GENDER EQUALITY

Financial Literacy in Action: Reducing the Risk of Vulnerability through Financial Knowledge

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In recent years, financial literacy and the programmes that promote it—such as financial education initiatives—have drawn growing attention from institutions, international organisations and the academic community, for their role in enhancing financial capability, thereby fostering financial well-being. Despite this interest, empirical analyses remain scarce on whether financial skills help to prevent financial vulnerability and in turn protect individuals from social exclusion. This study investigates the relationship between financial knowledge—measured by the OECD/INFE FK index—and the financial vulnerability of Italian households, drawing on a sample (N=4,412) from the Bank of Italy's IACOFI surveys. The findings show that an increase in financial knowledge reduces the probability of vulnerability, although the effects differ according to individuals' economic and sociodemographic characteristics.

FORESEEN IMPACT

This study provides empirical evidence for policy makers, showing that higher financial knowledge reduces the risk of vulnerability among Italian households and thereby informing the design of measures to prevent financial vulnerability and exclusion.

KEYWORDS

FINANCIAL LITERACY	FINANCIAL KNOWLEDGE	FINANCIAL VULNERABILITY

Dropout-DNA: Understanding University Attrition through a Data-Driven, Diversity-Aware Lens

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This study introduces Dropout-DNA, a novel data-driven tool designed to evaluate university dropout risk by profiling students using a combination of early indicators and academic progress metrics. The approach highlights the importance of context-aware and interpretable models for predicting student dropout, representing a notable advancement in student retention analytics. The practical implications are significant: by identifying at-risk students early, institutions can implement targeted, personalised interventions, enhancing the effectiveness of student support services. Moreover, Dropout-DNA's quantifiable risk representation enables more strategic, data-informed policy-making at the institutional level. Future research will focus on the temporal dynamics of dropout risk profiles, supporting continuous, time-sensitive monitoring and interventions throughout a student's academic journey.

FORESEEN IMPACT

Dropout-DNA enables early identification of at-risk students, allowing targeted interventions, improving student retention, and informing strategic institutional policies for more effective support services.

KEYWORDS

STUDENT DROPOUT PREDICTION

STUDENT PROFILING

STATISTICAL MODELING

MACHINE LEARNING ALGORITHMS
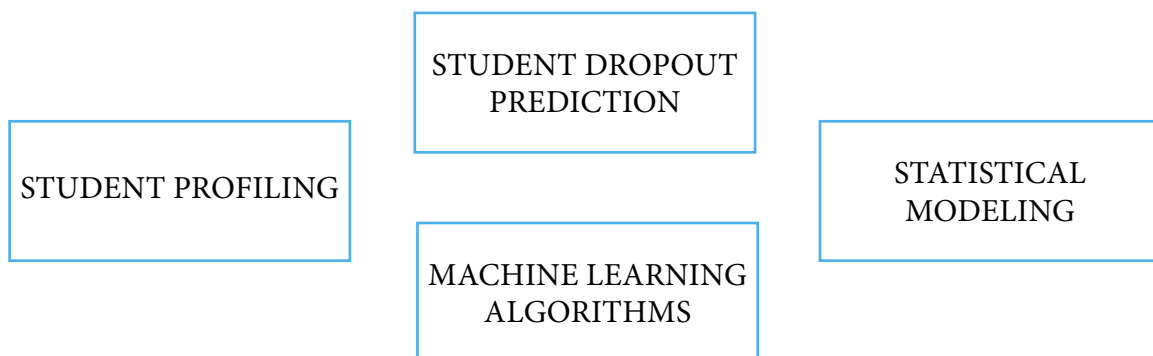
Toward a Digital Health Curriculum: Evidence from a Multi-University Survey in Italian Medical Schools

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Telemedicine (TM) offers numerous benefits to healthcare. However, various barriers, such as healthcare professionals' insufficient technological skills, impede its effective implementation. This inter-university study aims to evaluate the preparedness of future physicians in Italy for TM, identifying gaps in current medical education regarding (1) technical readiness and (2) behavioural readiness, including previous experiences and future intentions related to TM education and implementation.

A cross-sectional study was conducted using a web-based questionnaire administered to medical students and residents at five Italian universities.

Results: We received 438 responses from five universities across Italy. Personal telemedicine experience was low (22%) and uniform across universities, while curricular exposure varied significantly (4–19%). Willingness to use TM: 84% during training, 70% in future practice; 7% would refuse even if employer-required.

FORESEEN IMPACT

This study underscores the need for medical students and residents to receive specific digital health and TM training, alongside the development of national guidelines. The call for introducing curricula and courses in this domain is critical for tackling the challenges of the digital healthcare era.

KEYWORDS

MEDICAL EDUCATION	TELEMEDICINE	DIGITAL HEALTH

Educational Inequalities, School Transitions, and Dropout Risk in Milan

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While Milan has a solid secondary school system, sharp inequalities in educational opportunities persist across neighborhoods. Economic, social, and family circumstances shape access to resources and guidance, with long-term consequences for students' academic success, future income, health, and social inclusion. This project maps and analyses anti-dropout initiatives in Milan's lower secondary schools, focusing on school transitions and orientation as key levers for preventing dropout. In particular, we test interventions designed to improve the alignment between teachers' recommendations and families' school choices. We combine survey and administrative data with identification strategies based on a randomized controlled trial and geographic variation across schools. By turning data into actionable tools for educators and policymakers, we seek to promote informed decision-making and support scalable strategies for social inclusion and improved educational outcomes.

FORESEEN IMPACT

The project will generate rigorous evidence on dropout prevention programs and on how activities addressing choice mismatches between teachers and families can foster social inclusion and reduce inequalities through education.

KEYWORDS

INEQUALITIES

EDUCATION

DROPOUT

SCHOOL CHOICE
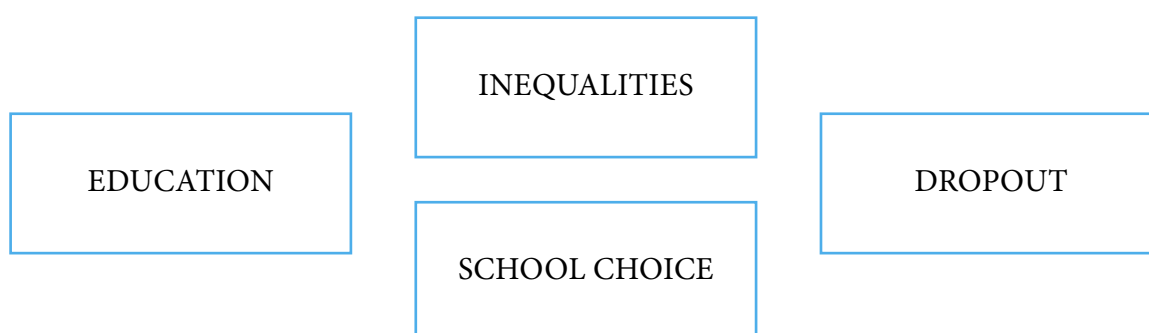
Crossing Disciplines, Safeguarding Minors: Findings from the HumanHall Project

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This poster presents the main results of the MUSA Project within the HumanHall center, focused on the inclusion of unaccompanied migrant minors in Italy, one of the most vulnerable groups in current migration flows. Using a multidisciplinary approach – legal, medico-legal, and sociological – the project examined protection and integration processes. A key issue was age assessment, crucial for ensuring rights, addressed during major legislative reforms. The team produced national and international publications and carried out dissemination activities (seminars, conferences, international panels), as well as collaborations with institutions and civil society organizations such as LABANOF and Agevolando. These efforts strengthened interdisciplinary dialogue and bridged research with practice, increasing the project's impact. The poster highlights how HumanHall advanced knowledge and practice on minors' protection and inclusion, stressing the value of integrated, cross-sectoral approaches.

FORESEEN IMPACT

The project is expected to strengthen protection and inclusion pathways for unaccompanied migrant minors by informing policies, improving age assessment practices, and fostering collaboration between academia, institutions, and civil society to ensure more effective rights protection.

KEYWORDS

INCLUSION	UNACCOMPANIED FOREIGN MIGRANTS	MIGRATION

Widening the Horizons: The Impact of Information and Role Models on High School Choice

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We study whether role models improve how middle schoolers learn about high-school options in Italy's tracked system. In a randomized trial in Milan, schools were assigned to: (i) an information arm, where education experts gave objective features of tracks; and (ii) a role-model arm, where speakers conveyed the same information plus their own experience in the track they had completed. Both treatments reduced uncertainty—students were less likely to answer "don't know" about their preferred track—and increased interest in vocational programs relative to control. Students reported greater identification with speakers in the role-model arm, yet effects on stated choices did not differ statistically between the two interventions. Impacts were concentrated among students from fragile socio-economic backgrounds. Overall, the findings suggest supplying clear information, rather than fostering identification per se, is the key lever for reducing uncertainty for disadvantaged students.

FORESEEN IMPACT

We aim to provide a cost-effective policy to middle schools to reduce the uncertainty of students in high-school choice and, ultimately, reduce drop out of students from most fragile backgrounds.

KEYWORDS

SCHOOL-CHOICE	DROP-OUT	INEQUALITY

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The Glossary of Inclusion in the Workplace

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The "Gender Equality and Work" group is proposing, for the event on December 3, a poster illustrating the project The Glossary of Inclusion in the Workplace, a scientific dissemination tool (available from September 2025 online in open access format), the fruit of three years of work within the Human Hall laboratory under the coordination of Prof. Marilisa D'Amico.

The Glossary was created to help workers who are victims of violent behavior in the workplace, even if they have no legal training, to understand their rights and, in particular, the protections afforded to them by the legal system.

FORESEEN IMPACT

The poster aims not only to illustrate the project and the methodology used, but also its potential use as a strategic tool for information (within civil society) and training (in the world of work).

KEYWORDS

INCLUSION	WORK	VIOLENCE

LEI – Language, Empowerment, Inclusion

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The LEI project strengthens the skills of foreign residents to foster social inclusion and empowerment. Implemented in Milan's San Siro district, with over 50% foreign residents, it tackles the link between poor Italian proficiency and social exclusion, especially among women. In collaboration with the University Language Centre and four local schools, 40 volunteer teachers were trained to adapt free Italian L2 courses to CELI exam preparation. Certification costs dropped from €200 to €30, ensuring accessibility. In 2024, 20 women participated with a 95% pass rate; further sessions in 2025 involved around 35 women, with results pending. Interviews reveal multiplier effects: higher self-esteem, improved employability, better support for children's education, stronger communication with schools, and more autonomous interaction with institutions. The project combines academic research, university third mission, and local networks, offering a replicable model for inclusive policy design.

FORESEEN IMPACT

LEI is expected to enhance women's and foreign-background residents' autonomy, employability, and civic engagement, improve children's educational support, and facilitate access to further training and stable jobs, while providing a replicable model for inclusive social and educational policies.

KEYWORDS

LANGUAGE	EMPOWERMENT	INCLUSION

B-YOUth Forum. Research and active citizenship for young generations

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B-YOUth Forum is an educational and research project that opens the university's doors to young people aged 14 to 25, helping them develop citizenship skills and explore future opportunities. The project invites students into university research labs where – side by side with PhD students, postdocs, and researchers – they learn how to ask real questions, collect data, use scientific tools, analyze information critically, and share their findings with others. Research here is not something to listen to, but something to do: knowledge is not handed down, it is built together in dialogue with the world. The experience culminates in the Festival GenerAzioni. In this public, participatory event, young people become peer educators and facilitators: they guide their peers through university labs, present the topics explored, and lead hands-on activities, building a bridge between high-schools, the university, and the local community.

FORESEEN IMPACT

Between 2022–2025, the project engaged youth from schools, services, and university. Results: 75% had never visited university before, 87.7% improved data skills, and 85% recognized its value for their future.

KEYWORDS

YOUTH PARTICIPATION	UNIVERSITY	RESEARCH

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Voicing Change: Rethinking Participation and Well-being in Upper Secondary Schools

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In the international educational debate, education is increasingly conceived as a holistic process of human development, where schools become spaces for well-being, inclusion, and democratic participation. Despite growing interest in Italy, secondary schools remain tied to transmissive models, often disconnected from students' lived experiences. Grounded in the Student Voice framework, the project La scuola siamo noi! ("We Are the School!") explored student-led participatory practices in promoting well-being and participation. The project developed over two years: the first employed a sequential explanatory mixed-methods design to investigate students' experiences; the second initiated participatory research pathways, aimed at critically analyzing school contexts, formulating proposals, and implementing change in a perspective of shared educational responsibility. Findings show the transformative potential of these practices in fostering inclusive and democratic school cultures.

FORESEEN IMPACT

The second year acted as a democratic laboratory, enabling students to exercise voice and initiative while facing real design complexities. This shift fostered a move from a "school endured" to a co-constructed culture of shared responsibility between students and teachers.

KEYWORDS

STUDENT VOICE	STUDENT PARTICIPATION	PARTICIPATORY RESEARCH

MOOC: Moda & Design a Milano: circolarità e competenze

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The MOOC "Moda & Design a Milano: circolarità e competenze" runs over four weeks, blending theory and practice to promote sustainability and circularity in fashion and design. Week 1 introduces sustainability with a multistakeholder approach involving organizations, institutions, and citizens. Week 2 explores the circular economy's key "R's"—including Reduce, Reuse, Repair, Recycle—to extend product lifecycles and cut waste. Week 3 focuses on environmental sustainability, highlighting Made in Italy's value, textile and leather choices, certifications, and digital product passports, stressing the need to educate retail professionals to guide responsible consumer behavior. Week 4 covers education, emphasizing preserving Italy's fashion technical skills and engaging youth to innovate sustainability and digital transformation. This course equips learners to build a sustainable, circular fashion ecosystem in Milan.

FORESEEN IMPACT

The MOOC empowers young learners to understand sustainability and circularity in fashion and Design, promoting responsible consumption, skills preservation, and stakeholders collaboration. It supports informed choices and fosters new talents for a circular, sustainable fashion ecosystem.

KEYWORDS

FASHION&DESIGN	CIRCULARITY	EDUCATION

Implementation of an accounting plug-in in Moodle.

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This project, developed at the University of Milan within the Department of Economics, Management and Quantitative Methods, focuses on the design and implementation of an accounting plug-in for Moodle to streamline the teaching and learning of financial accounting. The plug-in is designed to offer high flexibility to instructors, who can upload a customized chart of accounts and a set of accounting exercises, and define specific grading criteria for assessment. The tool enables students to record accounting entries using both the general journal and the general ledger, and to prepare the income statement and balance sheet starting from an opening trial balance. Within this integrated digital environment, students apply accounting procedures, submit entries, and receive real-time feedback on the accuracy of their work. The plug-in is available in Italian and English and is supported by video tutorials and guidelines in both languages to facilitate its adoption and dissemination. By integrating practical accounting training into Moodle, the project advances digital learning practices and contributes to innovation in higher education.

FORESEEN IMPACT

The project will strengthen digital accounting education by offering innovative tools for teaching and learning and by supporting the development of practical skills in financial accounting.

KEYWORDS

INNOVATION	ACCOUNTING	DIGITAL LEARNING

Unlocking Alternative Finance for Entrepreneurs: The Matchmaking Platform

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This work presents the development of a matchmaking platform designed to strengthen entrepreneurs' financial skills, with a focus on alternative finance. Building on an extensive mapping of educational initiatives and interviews with both entrepreneurs and ecosystem actors, the platform addresses persistent knowledge gaps by offering a structured and hybrid learning environment. Its educational core is organized in dedicated knowledge silos, covering all key areas of alternative finance. The platform combines short, targeted video lectures with interactive workshops and mentoring opportunities, ensuring accessibility and practical relevance. Beyond training, it fosters networking and collaboration between entrepreneurs and investors, thus creating a dynamic ecosystem for innovation and growth. By integrating tailored content with community-building tools, the platform represents a scalable model for empowering entrepreneurs in navigating the complexities of alternative finance.

FORESEEN IMPACT

The platform is expected to empower entrepreneurs by addressing financial knowledge gaps, enhancing access to alternative finance, and fostering collaboration. This will enable informed decision-making and drive innovation, growth, and resilience in Lombardy's entrepreneurial ecosystem.

KEYWORDS

ALTERNATIVE FINANCE	ENTREPRENEURSHIP	MATCHMAKING PLATFORM

Setting the Stage for an App-Based Caregiver-Mediated Intervention for Autism: Findings from A Stakeholder Consultation

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Background: Mobile-health approaches to caregiver-mediated interventions for autism show promise for scale-up, yet key development phases are often overlooked. This study reports on the development of Kica, a mobile app based on WHO Caregiver Skills Training (CST).

Methods: Phase 1 adapted CST content with a user-centered approach. In Phase 2, usability testing with 19 parents of autistic children (ages 2–6) included the System Usability Scale (SUS), Cognitive Walkthrough (CW), or Think-Aloud (TA) tasks.

Results: SUS scores and CW success were high, though three tasks were harder for parents with lower Italian proficiency. TA highlighted appreciation for caregiver–child focus, navigation ease, and visual branding, with suggestions for progress tracking, personalization, and reduced text. Findings informed redesign.

Conclusions: Usability testing confirmed strengths and guided refinements, supporting feasibility and pilot testing of clinical efficacy.

FORESEEN IMPACT

The study informed the design of scalable, evidence-based caregiver interventions for autism and directly inspired the development of Kica, a WHO-CST–based mHealth app. By integrating stakeholder input, it supports cultural adaptation, public health integration, and closing the treatment gap.

KEYWORDS

MHEALTH	STAKEHOLDERS CONSULTATION	AUTISM

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Do people understand ESG/ SRI investing?

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We study how financial education influences sustainable investing behavior through a randomized controlled trial with over 10,000 retail investors in Italy. Participants receive monetary incentives to watch short videos on ESG/SRI investing or a placebo video on AI. We assess how education affects understanding of ESG risks, capital allocation, and performance expectations, beyond regulatory definitions of sustainability. Treatments focus on ESG risk-return logic and societal impact. We also explore heterogeneous effects by gender, financial literacy, and socio-economic background.

FORESEEN IMPACT

Findings inform scalable financial education strategies and contribute to research on the behavioral drivers of sustainable finance and responsible investment decisions.

KEYWORDS

SUTAINABLE FINANCE	FINANCIAL LITERACY	INVESTING BEHAVIOR

Open-Air Lab digital platform. Experiences, events and research on urban sustainability

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The poster presents the activities carried out by the Open-Air Lab research group as part of the MUSA project, aimed at building a participatory culture of sustainability in the neighbourhood of the University of Milan-Bicocca. The contribution illustrates the main sections of the web platform www.openairlab.it, designed as a permanent digital infrastructure to collect, promote and disseminate practices, research and events related to sustainability in the area. Starting from a multidimensional and contextual vision of sustainability, the main results of the actions promoted by the Open-Air Lab will be presented: a mapping of active sustainability experiences in the neighbourhood; the podcast Sustainability and the City, aimed at recounting and documenting the research of the MUSA project; the organisation of public events aimed at promoting a shared and inclusive culture of urban sustainability.

FORESEEN IMPACT

The expected impact is the preservation and accessibility of the practices and research collected on the platform, so that they become a shared knowledge base, useful and accessible to citizens and the scientific community over time.

KEYWORDS

DIGITAL PLATFORM	URBAN SUSTAINABILITY	PARTICIPATORY CULTURE

Milanese Tradition of Textile and of Luxury Textile (1500-1859)

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The work, with its results compiled in databases, consists of two sections:

1.a survey of bibliography on the history of Milanese textile manufacturing and craftsmanship between 1500 and 1796. The analysis included texts published both in the period under study and from the early 20th century to the present. References to technical data sheets of Milanese textile products have also been incorporated into the database, as examples of Milanese textile production from the 16th to the 18th century.

2.a mapping of the main luxury textile artisans active in Milan between 1815 and 1859. The research focused on tailors and embroiderers The names, location of the activities, training, clients and any recognitions were found from a variety of sources: archival documents, periodicals and bibliographical texts.

Furthermore, we worked with iconographic materials, focusing specifically on portraits of charity institution benefactors, a precious source for the study of both fashion and textile.

FORESEEN IMPACT

Both scholars and non-specialist readers will be able to find information on the Milanese textile tradition from the 16th century, when Milan produced fabrics sought abroad, and the 19th century, when France was the center of fashions and the Milanese artisans working for a demanding clientele.

KEYWORDS

TEXTILES	CRAFTSMANSHIP	FASHION

Collaboration Technologies in The New Work Landscape

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The study explores how to foster collaboration in the context of technology use with aim: to ensure that diverse stakeholder groups benefit from well-being-centered development of both collaboration and technologies.

To address the aim the research draws on Human-Centered Design (Cooley, 2000), Network Theory (Borgatti & Halgin, 2011), and Structural Hole Theory (Burt, 2004), which explain how collaborative technologies shape the work landscape.

Methodologically, the study combines focus groups and interviews to capture both the diverse viewpoints and individual experiences.

The findings highlight benefits and drawbacks of collaborative technologies, the mechanisms of technologies impact on employee well-being and work-life balance, contribute to nuanced understanding of Human-Centered Design, and Network Theory. The study offers practical implications for business and university leaders with recommendations for human-centered implementation of technologies.

FORESEEN IMPACT

The findings are relevant for the business and education sectors, for understanding how to organize work and learning processes more effectively within collaborative contexts; for policymakers in labor market to develop strategies for implementing collaborative technologies.

KEYWORDS

COLLABORATIVE TECHNOLOGIES	NETWORK THEORY	HUMAN-CENTERED DESIGN

Contrasting and preventing school drop-out in disadvantaged urban neighborhoods from early childhood education

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As part of the MUSA Spoke 6 project Innovation for Sustainable and Inclusive Societies, the research-intervention adopts an ecological paradigm and a perspective of democratic, inclusive citizenship. It explores the synergy between school and extra-school contexts to integrate formal and non-formal education against school drop-out. The study unfolds in phases: 1) exploratory action-research, with focus groups and participatory observation, to detect needs and existing interventions on educational poverty; 2) creation of a multiprofessional team to analyze contextual conditions and reinforce L'ABC del quartiere, a multifunctional service engaging families, teachers and students in Teacher Professional Development Research; 3) research-intervention in lower secondary schools, with teachers, to test innovative curricula improving competences and social climate, within a national PRIN project.

FORESEEN IMPACT

Consolidation of the network and participation in its design; stabilization of ties between families and schools; definition of a multi-professional, cross-sectoral intervention model, replicable in complex ecosystems.

KEYWORDS

SCHOOL DROP-OUT	SOCIAL COHESION	INNOVATIVE EDUCATIONAL APPROACH

GREEN TRANSITION

The *Green Transition* section brings together research advancing environmental sustainability across materials science, energy systems, urban ecology, and climate-resilient design and behaviours. The contributions span breakthrough low-impact technologies—from novel catalysts, photovoltaics, hydrogen systems, flow batteries, and fusion diagnostics to innovative bio-based materials and scalable characterization tools. Equally, several works address urban challenges through microclimate monitoring, heat-island mitigation, air-quality improvement, acoustic and ecological restoration, biodiversity assessments, and nature-based solutions. Complementing the technological perspective, other studies examine sustainable mobility, green finance, governance models, and community engagement. Together, these projects illustrate how interdisciplinary approaches can accelerate decarbonization, enhance ecosystem health, and support more resilient and sustainable cities and industries.

Fabrication of Scalable MoS$_2$ p-n Diodes for Next-Generation Gas Sensors

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Molybdenum disulfide (MoS$_2$) is a promising two-dimensional material for gas sensing due to its high surface area, adjustable electronic properties, and significant conductivity change upon molecule adsorption. Compared to resistor-based devices, MoS$_2$ p-n diodes offer superior sensitivity, faster recovery, and greater stability. However, MoS$_2$ naturally exhibits n-type behavior, and achieving stable p-type conduction remains challenging. In this study, we present an edge doping strategy that uses SF6 plasma to incorporate fluorine atoms into MoS2. This enables localized p-type behavior in nanoribbons while maintaining conductivity in wider regions. This approach results in p-n diodes in which the n-type flake interfaces with the p-type nanoribbons to form high-quality junctions. Using this method, we fabricated large-area, interdigitated MoS$_2$ p–n diodes that can sustain milliampere-level currents, demonstrating their potential for next-generation gas sensing applications.

FORESEEN IMPACT

This work presents a strategy to obtain MoS$_2$-based p-n diodes through edge doping. This approach allows for the creation of scalable, low-power sensors with the potential to reliably detect pollutants in next-generation environmental monitoring systems.

KEYWORDS

2D-MATERIALS	GAS SENSORS	MOS$_2$

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Data-driven solutions for sustainable and inclusive mobility. The case of the Bicocca Mobility ID Card

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The poster presents research activities on sustainable mobility carried out by the University of Milan-Bicocca, in collaboration with local companies, aiming to improve mobility in the Bicocca neighborhood. The project combined diverse data sources, including telco data, traffic flows, air and sound sensors, surveys, and field observations, with methodological approaches such as urban audits, spatial analysis, and mobile methods to develop a "Mobility Identity Card" of the district. This integrated framework enabled a detailed understanding of mobility behaviors, urban transformations, and interactions between local communities and the built environment. The findings support the development of sustainable mobility policies, promoting company and neighborhood mobility management, multimodal transport, improved accessibility, and better integration between public transport and active mobility, while addressing the specific needs and characteristics of the local context.

FORESEEN IMPACT

The research consolidated the collaboration between the University and Bicocca's companies mobility managers, building innovative and replicable methods for neighborhood mobility management. Furthermore, it put forward concrete policy interventions and solutions for improving Bicocca's mobility.

KEYWORDS

MOBILITY	MOBILITY MANAGEMENT	ACCESSIBILITY

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HyExpander: producing electric power from wasted exergy with a safe and simple technology

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Hydrogen powered systems with compressed gas storage usually do not recover the energy used for fuel compression, relying instead on throttling valves to reduce pressure. HyExpander replaces part of the throttling process by introducing an expansion stage, recovering part of the wasted exergy from compressed hydrogen while generating electricity, potentially powering ancillary systems of a hydrogen truck or train. It employs a rotary vane expander coupled with an electric generator. Key innovations are cooling the generator with low-pressure cold hydrogen released by the expander, and integrating both devices in a shared sealed enclosure. These features enhance overall efficiency and safety with respect to already available devices. This work experimentally tested a scaled air expander with hydrogen, filed a patent for the innovations included in HyExpander, and established contacts with a technological partner for production and a potential buyer for the technology.

FORESEEN IMPACT

Increase the efficiency of hydrogen powered systems as trucks or trains with a safe and simple technology. HyExpander is expected to be produced thanks to a technological partnership with an Italian company.

KEYWORDS

HYDROGEN EXPANDER	WASTE EXERGY RECOVERY	EXPERIMENTAL VALIDATION

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Air quality and related health impacts during urban regeneration activities: the case of MUSA Open-air laboratory at University of Milano-Bicocca

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There is a strong association among human health and good air quality that should be safeguarded. This work presents a multidisciplinary methodology developed to estimate the impact of airborne particulate matter (PM) emissions on public health. During the urban regeneration process at the MUSA Open-Air Lab at University of Milano Bicocca a new network of fixed sensor and an innovative portable sensor (RESPIRO) were combined with a novel biosensor. Through the integration of aerosol science and toxicological studies new information were collected. The quantification of airborne pollutants through field monitoring and sampling campaigns, employing sophisticated and low-cost instruments, together with the characterisation of the sampled particles, the personal exposure through RESPIRO dedicated 'citizen science' campaigns and the toxicological assessment through laboratory experiments with advance in vitro models at real exposure scenarios and doses are presented.

FORESEEN IMPACT

This interdisciplinary approach provides important evidences on the impact that urban microenvironments could have on air quality. Moreover, the employment of a citizen science approach with low-cost sensors will allow the collection of data to adopt mitigation strategies to improve citizen health.

KEYWORDS

AIR QUALITY	AIRBORNE PARTICLES	CITIZEN SCIENCE

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The Role of the Source in Nudge Communication for Sustainable Mobility

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Our research investigates the role of nudge communication in promoting sustainable mobility at Milano-Bicocca University. The study employed a 2×2 experimental design manipulating source (Student Representative vs. pro-sustainability association Volunteer) and message (social norm vs. typical message of pro-sustainability associations). Messages were randomly presented via an online questionnaire to 125 undergraduate students recruited by one of the sources. Results showed that the Student Representative was perceived as more proximal, and that this proximity mediated the effect. When delivering the typical message, the proximal source increased intentions compared to the Volunteer. Conversely, the external source was more effective when paired with the social norm message. Moreover, the source perceived as more proximal remained effective regardless of message type. These findings suggest that the source plays a crucial role in effectively promoting sustainable intentions.

FORESEEN IMPACT

The study shows that not only the message but also the source plays a crucial role in fostering intentions toward sustainable mobility. Perceived source proximity enhances effectiveness, providing valuable insights for more targeted and impactful communications.

KEYWORDS

NUDGE	SOURCE	SUSTAINABLE MOBILITY

Designing invisible forests: photocatalytic coatings for urban regeneration

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Urban areas face the combined challenges of air pollution, building degradation, and rising energy demand. In Milan, one of Europe's most polluted cities, health-related costs reach €2,843 per person annually, while façades deteriorate quickly, requiring frequent maintenance and driving up cooling needs. Urban greening helps but demands space and long timelines. Photocatalytic coatings provide an innovative response. Rooted in Milan, REair has developed eCoating, a transparent, water-based nanotechnology activated by light and air, decomposing NOx, VOCs, particulates, viruses, and bacteria into harmless residues without energy input. With over 1,000,000 m² already treated, this technology can cut 200,000 kg of NOx per year, equal to 432,000 urban trees. Case studies, including the Sole 24 Ore HQ and Luxottica HQ in Milan, highlight gains in air purification, façade durability, lower maintenance, and reduced energy demand.

FORESEEN IMPACT

Photocatalytic coatings offer a sustainable design solution for urban regeneration, turning façades into active purifiers. They cut pollution, extend building life, reduce maintenance and cooling needs, and support healthier, more resilient cities.

KEYWORDS

INNOVATION	URBAN REGENERATION	SUSTAINABLE DESIGN

ZnO decorated with Au-Cu nanoclusters: a model system for investigating the CO$_2$ conversion to methanol

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The thermal catalytic conversion of CO$_2$ to methanol is typically performed using Cu-based catalysts, often as CuO/ZnO/Al$_2$O$_3$, with poorly defined Cu/(Cu+Zn) ratios. The active sites are believed to reside at Cu/Zn interfaces, but the precise roles of each component remain unclear. Thiolate-protected metal nanoclusters (NCs, Mn(SR)m) offer atomically precise, monodisperse surfaces ideal for studying structure–reactivity relationships. In this work, novel Cu/Au NCs supported on ZnO nanoparticles were synthesized and characterized by UV-vis and MALDI. Catalytic tests for CO$_2$ methanolation showed notable conversion and selectivity even at low loadings (0.5 wt%). EPR analysis revealed both surface and bulk defect sites in ZnO, highlighting how NCs deposition and reaction conditions modify oxygen and zinc-related defects. These findings provide insights into the role of Cu/Zn interfaces and ZnO defectivity, offering a framework for understanding and optimizing CO$_2$-to-methanol catalysis.

FORESEEN IMPACT

This study provides atomic-level insights into ZnO defect modification and its connection to catalysts activity, guiding the design of more efficient catalysts for CO$_2$-to-methanol conversion and supporting the development of precise nanocluster-based catalytic systems.

KEYWORDS

CO$_2$ METHANOLATION	Cu/Au NANOCLUSTERS	ZnO DEFECTS

Digital Twin in a Polluted Urban Environment

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The steps from laser survey to BIM modelling to an operational digital twin were completed. It was integrated with low-cost sensors (temperature, humidity, pressure, illuminance, CO_2, particulate matter) and a control loop that opens windows via actuators. A custom board was designed and manufactured (Eagle CAD, JLCPCB) to enhance sensor mobility, and Python/Dynamo workflows were developed for data exchange with the BIM model. Two inter-group calibration campaigns for aligning measurements were completed and enabled a public Zenodo repository, supporting comparability and data reuse. The decision system combines CO_2 thresholds with an external air-quality index (IQAir/usAIR); validation against a reference sensor showed deviations < 1 °C and < 10 ppm, while tests on PM1.0/2.5/10 and interaction with Epipremnum aureum for potential CO_2 abatement are ongoing. Expected outputs: a survey protocol, a replicable platform, and a portable multi-index device.

FORESEEN IMPACT

A low-cost, replicable DT for environmental comfort enables data-driven adaptive ventilation. It provides operational tools to public bodies, schools and labs, accelerating decisions and technology transfer.

KEYWORDS

DIGITAL TWIN	LOW-COST SENSORS	INDOOR AIR QUALITY

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The Startup Competition StartCup Lombardia as a Regional Innovation Policy Instrument: Early Evidence from a University–Institution Partnership

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This study examines StartCup Lombardia as a regional innovation policy instrument jointly promoted by Regione Lombardia, MUSA, the Universities in Lombardia, and their incubators and accelerators, within the framework of the Startup Days initiative and the national Premio Nazionale Innovazione. It represents a first systematic attempt to analyse StartCup Lombardia to generate insights into the role of regional startup competitions in fostering entrepreneurial intention and supporting the transition from idea to venture. The initiative emerges as a catalyst connecting universities, public institutions, and private partners, while offering teams affiliated with universities visibility, training, and access to funding opportunities. Preliminary findings suggest that StartCup Lombardia contributes to shaping the regional entrepreneurial ecosystem and mobilising talent towards new venture creation, providing a foundation for comparative analyses across other regional StartCups in Italy.

FORESEEN IMPACT

The study informs European regional policy by showing how startup competitions foster entrepreneurial intention and strengthen the pipeline of innovative ventures, supporting their progression from regional ecosystems to national and international markets.

KEYWORDS

ENTREPRENEURSHIP	REGIONAL INNOVATION POLICY	STARTUP COMPETITIONS

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From Sustainability to Stability: CZTS Nanoparticles Enabling Long-Lasting Perovskite PV

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The commercialization of perovskite photovoltaics requires efficient, stable, and scalable modules. Here, we explore Cu2ZnSnS4 nanoparticles (CZTS NPs) as a sustainable hole-transport material (HTM) for perovskite solar cells (PSCs). CZTS, an earth-abundant p-type semiconductor, was synthesized via a hot-injection method and processed into thin films by spin-coating. Structural and optical analyses confirmed high-quality, transparent CZTS layers. PSCs using CZTS NPs as HTM showed enhanced operational stability, retaining or improving efficiency after one month, unlike devices with conventional HTM that degraded. Electrical and spectroscopic studies indicated improved charge transport through the CZTS NPs layer. These results highlight CZTS as a robust and eco-friendly alternative to conventional HTMs, advancing the durability of perovskite PV technologies.

FORESEEN IMPACT

The study supports sustainable innovation in perovskite photovoltaics by integrating CZTS, an earth-abundant and non-toxic material, as a stable hole-transport layer. This approach enhances device lifetime, lowers costs, and aligns with circular and eco-efficient energy manufacturing goals.

KEYWORDS

PEROVSKITE SOLAR CELLS	KESTERITE NANOPARTICLES	HOLE TRANSPORTING MATERIAL

Linking behavioural bioassays and soil biodiversity as an integrated strategy for environmental quality assessment

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This study evaluates behavioural bioassays as rapid indicators of soil degradation, based on limited habitat function. Since biodiversity metrics and behavioural responses often diverge, a comparative study was conducted linking behavioural changes in model organisms with in situ soil biodiversity. Tests detected habitat depopulation or fragmentation and were compared with structural and functional diversity of invertebrate and microbial communities. Results showed a clear match between behavioural changes and reduced invertebrate diversity. However, microbial data did not show similar patterns, indicating further investigation is needed. Behavioural bioassays, combined with invertebrate assessments, may serve as early-warning tools for soil degradation, supporting more efficient monitoring and restoration efforts.

FORESEEN IMPACT

Link between behavioral bioassay with in situ biodiversity measurement in order to monitor and prioritize soil ecosystems for sound environmental management.

KEYWORDS

SOIL ECOTOXICOLOGY	BIODIVERSITY

The micro-environmental analysis is conducted through the monitoring of environmental variables.

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The study focuses on the monitoring of environmental variables to characterise the urban microclimate at the microscale, with particular attention to surface and air temperatures. The integration of thermal cameras, drones, and in situ sensors facilitated the acquisition of high-resolution data, thereby enabling the capture of spatial and temporal variability in diverse urban contexts. These measurements supported the analysis of heat exchange processes between built surfaces and the atmosphere, providing insights into the drivers of local thermal conditions. The collated datasets were subsequently utilised in numerical simulations to assess the performance of a range of climatic and design scenarios. This combined approach underlines the significance of meticulous monitoring in enhancing the reliability of microclimate modelling.

FORESEEN IMPACT

The utilisation of a data-driven approach provides a robust foundation for the development of numerical modelling techniques. This modelling is intended to evaluate the efficacy of mitigation measures and to formulate sustainable and resilient urban design strategies.

KEYWORDS

MONITORING NETWORK	MICROCLIMATE	TEMPERATURE

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Analysis of the intensity and spatial distribution of UHI at the macro and meso scales

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The research investigates the Urban Heat Island (UHI) of Milan at macro scale, focusing on its intensity and spatial extent. Satellite imagery, predominantly from Landsat 8, was processed to derive land surface temperatures and analyse their temporal and spatial variability. The employment of remote sensing techniques facilitated the identification of thermal patterns across the metropolitan area, thereby accentuating the disparities between densely built zones and the surrounding rural landscapes. The analysis yielded substantial indicators of UHI magnitude, thus facilitating the assessment of seasonal dynamics and the influence of land cover heterogeneity. This large-scale perspective provides a complementary framework to microscale investigations, offering a comprehensive understanding of the drivers of UHI.

FORESEEN IMPACT

The results of the study contribute to the development of evidence-based strategies for urban climate mitigation and adaptation, thereby supporting planners and decision-makers in addressing the impacts of rising temperatures in rapidly changing metropolitan contexts.

KEYWORDS

UHI	LAND SURFACE TEMPERATURE	LANDSAT8

Microbiome-Informed Urban Design: Insights from the UniBiome Project on University Campuses

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Humans spend ~90% of their time in built environments (BE), ecosystems shaped by human activity and architecture, and are constantly exposed to their microbiomes. Urbanization has altered both human microbiomes and exposomes, yet BE–human links remain unclear. The UniBiome Project investigates microbial diversity in the campuses of the University of Milano-Bicocca and Politecnico di Milano, and their students, aiming to characterize BE-human microbiomes connections. Over 2 seasons, we analysed >1000 BE and >320 skin and gut samples, integrating microbial diversity metrics with environmental and questionnaire data. Indoor BEs were dominated by skin taxa, while indoor spaces with access to green supported significantly higher biodiversity and resembled outdoor profiles. Students' residence anthropization and time spent in Milan significantly correlate with their microbiomes. These findings support microbiome-informed urban design to foster microbiodiversity within a One Health framework.

FORESEEN IMPACT

The UniBiome Project aims to transform urban design by integrating microbiome science into city planning. By studying the impact of built environments on microbial diversity, it envisions healthier, more sustainable urban spaces through innovative, participatory urban design.

KEYWORDS

MICROBIOME	BUILT ENVIRONMENTS	STUDENTS

Predictive Acoustic Analysis of Urban Regeneration Strategies

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Understanding how urban regeneration contributes to noise reduction is crucial for designing, planning, and implementing an urban sound environment that aligns with sustainability principles and significantly enhances citizens' quality of life. This study aims to evaluate the acoustic benefits of the MUSA project intervention, which introduced a new pavement typology, green parterres, and street furniture in Piazza della Scienza, Milan. Prior to construction, noise sources were characterized using sound level meters and integrated into a high-fidelity acoustic model of university buildings and their surroundings. Simulations compared noise levels before and after intervention. In addition to the baseline scenario, alternative configurations were examined, incorporating further sound-absorbing measures such as vertical gardens, noise-reducing asphalt, and soundproof grids. Results indicate a noise level reduction and suggest even greater benefits if combined with additional strategies.

FORESEEN IMPACT

This research aims to promote sustainable urban building that integrates green infrastructure acting as noise mitigation techniques with sound absorption and building insulation properties. Implementing these strategies in cities can greatly reduce health problems from long-term high noise exposure.

KEYWORDS

PREDICTIVE ACOUSTIC MODEL	URBAN NOISE	SOUND-ABSORBING SURFACES

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Does Sustainability Reporting Pay Off for Unlisted Firms? Evidence from Milan

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SRB Lab examines whether voluntary sustainability reporting creates value for non-listed firms. We conducted surveys and case studies to investigate, through a combined qualitative and quantitative analysis, how sustainability reporting reshapes decisions, processes, and control systems, as well as the relationship between sustainability reporting and economic performance. Methodologically, we assemble a novel dataset of Milan-based firms and implement a matched-sample design that pairs sustainability report adapters with non-adopters, matching them on sector, size, and location. Beyond adoption, we develop a quality index that captures both the depth of disclosure and its credibility. Evidence indicates little change in year one; from year two onward, performance improves, and gains are more substantial when report quality is higher. Overall, the analysis offers decision-relevant evidence on how sustainability reporting and high-quality reporting enhance competitiveness.

FORESEEN IMPACT

By constructing a Milan-based dataset and a quality-scoring protocol, the project enables firms to design reporting that supports their strategy and performance. It also provides policymakers and standard-setters with evidence on when the reporting contributes to competitiveness for SMEs.

KEYWORDS

SUSTAINABILITY REPORTING	ECONOMIC PERFORMANCE	DISCLOSURE QUALITY

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Silicon Carbide Solid-State Detectors for Fast Neutron Diagnostics in Fusion Plasmas

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Nuclear fusion offers sustainable, large-scale energy with no carbon emissions, little long-lived waste, abundant fuels, and intrinsic safety. As devices like ITER and SPARC push toward practical power plants, advanced diagnostics are needed to withstand extreme tokamak conditions. This work investigates Silicon Carbide (SiC) Solid-State Detectors (SSDs) for fast neutron detection. SiC combines compactness, resilience, insensitivity to magnetic fields, transparency to gamma radiation, radiation hardness, and operation up to 500 °C. Our results show SiC can achieve 14 MeV neutron spectroscopy with 2–3% resolution, sufficient for key tasks such as plasma ion temperature, fuel ratio assessment, and tritium monitoring. We report detailed characterization against charged and neutral radiation, performance at high temperatures, and novel operation modes (e.g., partial depletion) enabling efficiency tuning. SiC SSDs emerge as promising tools for future fusion diagnostics.

FORESEEN IMPACT

The use of SiC SSDs could significantly enhance neutron diagnostics in fusion reactors, enabling reliable operation in harsh environments. Their adoption may improve plasma monitoring, guide reactor optimization, and accelerate the path toward practical fusion energy.

KEYWORDS

FUSION ENERGY	NEUTRON DIAGNOSTIC	SILICON CARBIDE

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Testing of innovative materials for radiative exchange with the deep sky in the Climate of Milan

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Innovative materials have emerged as an effective strategy to enhance thermal comfort in both indoor and outdoor environments, through the reduction of cooling loads in buildings as well the mitigation of the urban heat island. The performance of four radiative cooling materials and a retroreflective material is examined in this study, which was conducted on one of the rooftops of the POLIMI Leonardo Campus in Milan. Radiative cooling materials reflect most of the incoming solar radiation with high thermal radiation emissivity in the atmospheric transparency window (8–13 μm). Retroreflective materials on the other hand redirect incident solar radiation back toward the source, reducing heat absorption while restricting glare and light scattering into the surrounding environment. Their inclusion provides an important assessment to determine how well these materials function in Milan's environment, which is defined as a humid subtropical climate with reasonably high summertime PWV.

FORESEEN IMPACT

These materials reduce heat absorption in building surfaces like roofs and façades, which lowers cooling loads and improves energy efficiency. They also improve indoor comfort by lowering surface temperatures, mitigate urban heat islands, and preserve outdoor thermal comfort.

KEYWORDS

RADIATIVE COOLING MATERIALS	RETROREFLECTIVE MATERIALS	THERMAL COMFORT

Green solutions for space propulsion technologies: the heritage of MUSA program

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Space propulsion is a multidisciplinary technology and is a key driver of the new space economy. The Space Propulsion Laboratory of Politecnico di Milano (SPLab-POLIMI) focuses its R&D on low environmental impact propulsion. Within MUSA, two missions were pursued: (i) strengthening industrial capacities to advance high TRL solutions, and (ii) developing credible low TRL propulsion concepts for future exploitation. This dual approach led to the creation of a joint lab with a local company and three technological roadmaps ready for external support (i.e., water-based propulsion, 3D-printed propellant catalysts, and additive manufactured solid propellants). This approach consolidated ties with the regional industrial sector and created the basis for new projects, patents, and academic studies, supported by a network of national and international partnerships. The presentation will outline this heritage and highlight the exploitation of one of the new technologies beyond the MUSA program.

FORESEEN IMPACT

Creation of consolidated academy/company partnership. New green propulsion solution ready for exploitation. Creation of competences to support innovation of new products for high-tech space companies and spin-offs.

KEYWORDS

GREEN SPACE PROPULSION	JOINT LABORATORY

Amphibian allies: impacts of varying amphibian species assemblages on tiger mosquito survival and development

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Biotic interactions of synanthropic species provide key information for biodiversity management in urban landscapes. We assessed direct and indirect effects of predation and trophic competition with varying assemblages of amphibian species on survival and development of Aedes albopictus (Asian tiger mosquito), an invasive and widespread urban vector. Mosquito larvae were reared both in caged exposure or direct contact with amphibian predators (newt larvae), benthic grazers (brown frog tadpoles), water-column foragers (tree frog tadpoles). Direct predation from newts lowered mosquito larvae survival by 98.5% within 24 hours, while contact with tadpoles lowered both survival and activity, impacting time to and size at metamorphosis. Non-direct exposure to amphibian larvae impacted aquatic life-stages resulting in accelerated development. Promoting amphibian biodiversity in urban landscapes can contribute mitigating the spread of mosquitoes with relevant implications on human health.

FORESEEN IMPACT

The project will provide key information for biodiversity management in urban landscapes, highlighting the value of preserving biodiversity in human-altered environments and amphibian role in mosquito control, while promoting their conservation and potential applications as biocontrol agents.

KEYWORDS

BIOTIC INTERACTIONS	AMPHIBIAN CONSERVATION	MOSQUITO MANAGEMENT

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Assessing multitrophic biodiversity and nutrient dynamics across an urban gradient in Milan's freshwaters

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Freshwaters are biodiversity hotspots increasingly threatened by anthropic pressures, especially in metropolitan areas. Therefore, we aimed to assess how freshwater's functional communities change along an urbanization gradient from central Milan outwards, to provide guidelines for ecosystem evaluation and restoration, within a One Health perspective. During April 2024 we filtered environmental DNA from 117 natural and artificial water bodies (ponds, channels, backwaters, fountains), targeting aquatic insects, amphibians and teleost fishes. Parallel traditional surveys on amphibians in a subset of sites allowed for methodology performance evaluation. We also recorded nutrient and organic load indicators (nitrate, COD), field parameters (temperature, pH, conductivity) and ecological descriptors (aquatic vegetation, riparian cover, shading, substrate, meteorological data) to contextualize biodiversity patterns.

FORESEEN IMPACT

Results will clarify urbanization effects on freshwater ecosystems in Milan metropolitan area, delivering baseline indicators on biodiversity, nutrient dynamics and habitat features useful for identifying One Health-oriented management and restoration policies.

KEYWORDS

URBAN FRESHWATER	ENVIRONMENTAL DNA	FUNCTIONAL COMMUNITY ECOLOGY

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Development of Leather-like Materials from Enzymatically Treated Green Kiwi Peel and Valorization of By-Products for Microbial Bioprocesses

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The management of agro-food waste is a major issue in the view of a zero-waste economy, while its valorization is an opportunity to pursuit. Green kiwi peel (GKP), the primary by-product of kiwi fruit consumption, offers an attractive source of raw material for the development of bio-based functional materials. We aimed to entirely valorize GKP by combining material functionalization and biomanufacturing approaches. Starting from mechanically ground GKP, either citric acid or two commercial enzyme preparations were employed to treat the biomass and obtain biobased films. We showed that the mechanical properties of the GKP-derived films can be tuned depending on treatment conditions, offering the possibility to match different requirements. We demonstrated that the by-product of GKP treatments can be also valorized to formulate growth media for industrially relevant yeast cell factories, namely *Saccharomyces cerevisiae*, *Yarrowia lipolytica*, and *Rhodotorula toruloides*.

FORESEEN IMPACT

Italy is the third worldwide producer of kiwi, with an annual production of about 480 kilotons. The proposed approach enables an integrated valorization of GKP, showing a versatile methodology that can be applied to other agro-food material, enabling a bio-based valorization of these wastes.

KEYWORDS

BIOBASED CIRCULAR ECONOMY	WASTE VALORIZATION	LEATHER-LIKE MATERIALS

Redox Exsolution of Cu Nanoparticles from SrTiO$_3$ for CO$_2$-to-Methanol Catalysis

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Supported Cu-based nanoparticles are key catalysts for CO$_2$-to-methanol thermal conversion, though their long-term stability is limited by weak support interactions, leading to sintering and coalescence. Redox exsolution, especially in perovskites, offers a simple, robust, and reversible method to form well-anchored, durable metal nanoparticles with improved catalytic performance. In this frame, the work aims at the preparation and deep characterization of Cu-doped SrTiO$_3$ systems exploiting redox exsolution at different Cu loadings and at their potential application for CO$_2$ thermal conversion. Surface modifications and Cu evolution during exsolution were monitored using multiple techniques, confirming the formation of surface-exsolved Cu nanoparticles and revealing a heterogeneous Cu chemical environment. Preliminary catalytic tests showed promising CO$_2$ conversion efficiency, highlighting the materials potential in sustainable catalysis.

FORESEEN IMPACT

This work paves the way for designing more stable and efficient catalysts for CO$_2$-to-methanol conversion, promoting sustainable chemical processes. The redox exsolution strategy could be extended to other systems, enabling scalable, robust catalyst development.

KEYWORDS

REDOX EXSOLUTION	COPPER-BASED CATALYSTS	CO$_2$ CONVERSION

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The greenness of European Green Bonds

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Based on a sample of European corporate green bonds issued between 2013 and 2024, we develop a synthetic green indicator that incorporates various factors that contribute to the "greenness" of a bond. This includes information on green labels attributed by data providers based on the intended use of the funds raised, as well as certifications by external institutions. We also include variables relating to the management of green bond proceeds and commitment to ongoing reporting on funded projects, ensuring transparency in bond issuance. To determine its influence on green bond yields, we conducted a regression analysis in line with the existing literature on measuring the "greenium". The results highlight a significant negative premium, indicating that, all other things being equal, the greater a bond's "greenness", the higher its greenium.

FORESEEN IMPACT

This study provide clearer insight into the mechanisms behind the quality assessment of green bonds and the factors that influence their pricing. The study's implications may be relevant to market participants, rating agencies and policymakers.

KEYWORDS

CORPORATE GREEN BONDS	GREEN PREMIUM	SUSTAINABLE FINANCE

CLIMATE POLICY	MULTILEVEL MODELS

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The ecosystem services related to leaf form and function in urban landscapes

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Disturbed water cycles and low air quality are consequences of urban development. However, the leaves of urban vegetation add three-dimensional complexity, increasing the interaction between plants and environmental factors. Leaf traits such as size and shape, and trichome and stomatal density may be employed as predictors of (particulate matter) PM deposition and water-use efficiency. In Piazza della Scienza, we are testing currently established models that correlate leaf trait intensities with air quality and water-use efficiency. Data from the first year of monitoring contradict the current PM abatement model with lower PM levels in plots with deciduous-only species. The presence of trees and shrubs results in greater diurnal variability in soil moisture than an herbaceous-only groundcover. This information will be used to refine the models, to determine which traits are best suited to provide some part of the ecosystem services we associate with pristine landscapes.

FORESEEN IMPACT

The data will validate and improve the currently established models by incorporating novel traits and considering plant functional groups. This data will be valuable to those planning re-vegetation activities with the goal of increasing the ecosystem services provided in an urban context.

KEYWORDS

ECOSYSTEMS SERVICES	FUNCTIONAL LEAF TRAITS	MODELING

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Urban ecological restoration: a collaborative proposal

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Urban ecological restoration represents a critical frontier according to the EU Nature Restoration Regulation. The interplay between biodiversity decline, soil sealing, and socio-economic pressures demands approaches that transcend traditional planning instruments, often limited in transparency, inclusiveness, and ecological effectiveness. This contribution builds on an interdisciplinary framework – combining legal discipline, ecological science, linguistic analysis and governance studies – to explore restoration as both a regulatory obligation and a driver of urban resilience. By integrating ecological indicators, innovative governance models (including participatory and multi-party agreements, the poster will highlights the key points of a research group that aims at proposing a new tool to reconfigure urban policy.

FORESEEN IMPACT

The research shows how Member States can implement the Ecological Restoration Law in urban contexts by integrating ecological indicators and innovative governance tools, fostering partnerships with enterprises and stakeholders to support resilient, inclusive cities.

KEYWORDS

ECOLOGICAL RESTORATION	COLLABORATION	URBAN REGENERATION

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Scale-up of Innovative Components for Vanadium Redox Flow Battery

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The Vanadium Redox Flow Battery (VRFB) is a promising technology for integrating stationary energy storage with renewable energy sources. A key advantage of VRFBs lies in their ability to decouple energy storage capacity from power output. However, their competitiveness is hindered by capacity decay during operation. In addition, non-uniform electrolyte distribution within the porous electrode structure limits power density. Both challenges become more pronounced when scaling up the system.

In this work, two innovative components [1–2] are further developed for large-area cells. Specifically, capacity decay is mitigated by a selective layer directly deposited on the membrane (patent WO 2019/197917), while power density is enhanced through optimized flow-field design, which ensures improved electrolyte distribution.

FORESEEN IMPACT

The innovative components developed in this work resulted in higher efficiency and lower cost, increasing the competitiveness of the Redox Flow Battery.

KEYWORDS

ENERGY STORAGE	REDOX FLOW BATTERY

REFERENCES

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[2] Messaggi M. et al. J Power Sources 526 (2022).

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Bacterial communities of the phyllosphere in Piazza della Scienza

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Urban vegetation can reduce atmospheric hydrocarbons (HC), plant-associated bacteria that colonize leaf surfaces (the phyllosphere). Leaf samples from magnolia, ivy, and lime were collected in Piazza della Scienza (Milan) before and after its rebuilding; new tree species were sampled only after. Bacterial communities will be characterized and their bioremediation potential assessed. Results from the first sampling campaign showed that bacterial communities change among plants, with Rhodococcus (a HC-degrading genus) abundant in magnolia. The second campaign will reveal community stability and whether on new plants HC-degrading populations have already been selected. Combining the quantification of HC-degrading bacterial population with leaf area estimates will quantify phyllospheric potential for HC removal.

FORESEEN IMPACT

This study will clarify how urban vegetation supports hydrocarbon-degrading phyllosphere bacteria, informing sustainable city planning and plant selection strategies to improve air quality and ecosystem services in urban environments.

KEYWORDS

BACTERIA	PHYLLOSPHERE	BIOREMEDIATION

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Effects of the MUSA regeneration of Piazza della Scienza on the sonoscape

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Here, for the first time, the changes due to the regeneration project founded by MUSA on the sonoscape in Piazza della Scienza, are shown.

Piazza della Scienza belongs to the University of Milan-Bicocca. It is arranged on two levels, surrounded by 6-floor buildings and heavily impacted by technical installations, tram passages and road traffic. The renovation substituted the pavement of the ground floor and 2'000 m2 out of 5'390 m2 were planted with trees, shrubs and herbaceous plants.

Seven passive acoustic recorders were placed in May 2023 (ante operam) and May 2025 (post operam) for one week. The recordings were equalized to ensure a flat frequency response and comparability between devices. Using those recordings, ecoacoustic indices (i.e., ACI, ADImin, H, DSC, ZCR, HP, AR) have been calculated.

Differences in sonoscapes are highlighted with a particular focus on noise source roles and changes like more presence of people talking, traffic and biophonies fluctuations in time.

FORESEEN IMPACT

This study shows that regeneration projects can change the sonoscape of urban green areas even if the aim regards other environmental compartments. The ecoacoustic indices can be an evaluation tool for assessing changes in human attendency rates of places and effects on land cover modification.

KEYWORDS

ECOACOUSTICS	SONOSCAPE MONITORING	URBAN REGENERATION

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MusaNext: Empowering Sustainable Choices in Fashion

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MusaNext is the app of MUSA Spoke 5 to promote sustainable practices in fashion and design industries. The app offers interactive maps to discover vintage stores, repair shops, and sustainable business activities on the territory. The app also includes DIY video tutorials for clothing repair, and a "virtual stylist" to support restyle garments through AI-based suggestions. Further features are the integration with the TRAC3S technology, adding a layer of transparency to product information. Sustainability-themed games are also provided by the app, as well as the possibility to register for thematic events. MusaNext is also the official channel to promote the latest news of Spoke 5 and related innovations from sustainable fashion research. By bridging research with practical application, MusaNext aims to build a community of conscious consumers and drive a tangible shift towards a more sustainable future in fashion.

FORESEEN IMPACT

MusaNext will empower consumers to adopt sustainable habits, reducing waste and promoting a circular fashion economy. By showcasing the research and achievements of MUSA Spoke 5, the app will accelerate the transition to more responsible consumption patterns.

KEYWORDS

SUSTAINABLE FASHION	CIRCULAR ECONOMY	MUSA SPOKE 5

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LabXAS: a new table-top instrument for in-lab x-ray spectorscopy

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X-ray Absorption Spectroscopy (XAS) is a powerful technique used to characterize the chemistry and the structure of materials. However, the need of an intense and tuneable-in-energy x-ray beam has limited the use of this technique to synchrotron facilities, thus precluding its wide-spreading. We have designed a new table-top XAS spectrometer, called LabXAS, based on the use of a conventional but micro-focused x-ray source with suitable brilliance. Besides the source, the spectrometer also comprises a Johansson-type Ge(nn0) crystal analyser and a silicon drift detector, all arranged on a Rowland circle. The instrument works in low-vacuum, between 3 and 15 keV energy. LabXAS is intended to minimize the costs, the size and the mechanical complexity of existing spectrometers, while reaching state-of-art performances. Moreover, it aims to provide a fast access to XAS characterization of novel, advanced and sustainable materials to local communities of scientists.

FORESEEN IMPACT

LabXAS is intended to minimize costs, size and mechanical complexity of existing x-ray absorption spectrometers and provide a fast access to XAS characterization of novel advanced materials to the local communities of scientists.

KEYWORDS

SPECTROSCOPY	X-RAYS	MATERIALS

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Comfortable sufficiency, the living-lab of 11B

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Addressing Global Warming and maintaining within Planetary Boundaries requires immediate, rational, and realistic actions. For decades, misguided ideas and policies have shaped our built environment into uncomfortable, hard-to-maintain, and unresilient spaces. Misunderstandings about comfort and poor decision-making during the design, construction, and operation phases of buildings often lead to energy-intensive and yet unpleasant buildings.

In this research, we have analysed the efficacy of simple techniques and technologies in making a passive building comfortable and pleasurable. This research has explored the interplay between building physics, physics-informed controls, greenery for shading and visual pleasure, and has used improved models of comfort to operate a retrofitted building without active cooling during one of the most severe summer seasons in Italy, while maintaining comfort for the majority of hours and areas of the building.

FORESEEN IMPACT

This research promotes low-energy building design by utilizing cost-effective technologies, demonstrating that it can maintain comfort without the need for active cooling. It challenges conventional comfort models and supports sustainable retrofitting for resilient, climate-adaptive architecture.

KEYWORDS

BIOCLIMATIC ARCHITECTURE	PASSIVE SYSTEMS	UP-TO-DATE COMFORT

Maturity model for sustainability

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The fashion-luxury industry, with global influence, faces major sustainability challenges due to resource use, waste, and labor issues. While firms adopt eco-materials, restoration programs, and social initiatives, the sector still lacks unified metrics and clarity on required capabilities, hindering accountability and strategy alignment. This study addresses these gaps by asking: (RQ1) What capabilities enable sustainable and circular practices, and how can they be categorized? (RQ2) How can maturity be assessed? Using a systematic literature review and design science, over 300 capabilities were mapped, then structured via the natural resource-based view into seven competence areas. Experts validated the resulting in five maturity levels from "Ad Hoc" to "Optimized." The model guides firms from compliance to fully integrated sustainability, offering a framework to benchmark, evaluate, and advance sustainable and circular practices across the supply chain.

FORESEEN IMPACT

The model can help fashion-luxury firms benchmark sustainability progress, identify capability gaps, and guide strategic improvements, fostering accountability, industry-wide transparency, and long-term integration of circular practices.

KEYWORDS

SUSTAINABILITY	FASHION	CIRCULAR ECONOMY

Flexible inkjet-printed kesterite solar cells

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Kesterite $Cu_2ZnSn(S,Se)_4$ (CZTSSe) is one of the most promising emerging photovoltaic (PV) materials thanks to its earth-abundant constituents and its efficient harvesting of the solar spectrum.This material can be easily grown as a thin film through different chemical and physical processes. Solution-based methods are currently considered the best choice and spin-coating in particular led to the current record efficiency. However, the small-area limitations of this methodology and the waste of a large amount of precursor solution, still hinder its scalability.

Drop-on-Demand (DoD) inkjet printing is a promising, fully automated solution-based technique, appealing from an industrial point of view thanks to its almost-zero wastes and its suitability for large areas.

In this work, inkjet printing has been used to fabricate the first working inkjet-printed flexible CZTSSe solar cell. This example of light-weight technology is suitable for integrated PV applications.

FORESEEN IMPACT

With inkjet printing technology, a significant reduction of preparation cost and better raw materials utilization has been possible, thus proving it as the most reliable path for a sustainable industrial scale-up of flexible CZTSSe solar cells, looking forward to the integrated photovoltaics era.

KEYWORDS

KESTERITE	INKJET-PRINTING	FLEXIBLE PV

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Electrification of the hydrogen release process from LOHC

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The project focus on hydrogen-based systems as energy storage technology. We have designed an electrified catalytic reactor to release H2 from the LOHC pair methyl-cyclohexane (MCH)/toluene. The electrification is reached through an internal SiSiC resistive element that converts renewable electricity into heat (Joule effect) to meet the endothermicity of the dehydrogenation reaction. A 130 L reactor module that employs this technology was designed and its operating parameters were optimized. The reactor reaches a productivity of 1.1 $Nm^3/h/m^3R$, with a maximum T of 380 °C operating at p=2 bar. Five reactor modules have been integrated into a process layout that represents a large-scale hydrogen refueling station for the dayly delivery of 1 ton of H_2. The system releases 95.5% of the H_2 contained in the MCH, with a purity of 99.8 %, and a specific consumption of 13.5 kWh kgH_2^{-1}, lower than that necessary to produce green H2 directly on site through H2O electrolysis (55 kWh kgH_2^{-1}).

FORESEEN IMPACT

Electrified LOHC dehydrogenation allows exploiting carbon-free H_2 in regions with low availability of renewables: the LOHC-based system shows lower consumption compared to electrolysis. The reactor design and process integration represent fundamental steps for the implementation of this solution.

KEYWORDS

HYDROGEN	LOHC	ELECTRIFICATION

Common Factors behind Environmental Ratings as a Compass for Corporate Sustainability

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The increasing interest in sustainability within economics and finance has led to the widespread adoption of Environmental, Social, and Governance (ESG) metrics, expressed as ratings or indices, to assess the sustainable performance of companies. However, inconsistencies among data providers stem not only from definitional differences but also from disagreements on how to measure ESG factors. This paper proposes a novel approach by conversely focusing on ESG factors common to data providers. Through three empirical approaches – correlation analysis, principal component analysis, and panel data regressions – we aim to understand the shared components shaping common ESG metrics, particularly in the Environmental Pillar. Our findings emphasize a limited number of indicators that act as common factors across three providers, primarily concerning managing natural resources.

FORESEEN IMPACT

This analysis offers valuable insights for companies, financial institutions, practitioners, scholars, and policymakers, enabling more concise information for analyses and decision-making in their respective fields.

KEYWORDS

ESG	COMMON FACTOR	ENVIRONMENTAL PILLAR

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From Noise to Well-Being: Exploring Peoples' Soundscape Perceptions during the MUSA Regeneration of Milano-Bicocca

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Urban noise pollution harms health, while traditional reduction strategies often ignore perception differences. The MUSA project in Milan promotes sustainability, including the regeneration of Piazza della Scienza at Milano-Bicocca. This study assessed acoustic environments and sound perception before (2023) and after (2025) the regeneration across eight sites, with ~800 participants. In ante-operam, traffic dominated at street-level sites, technical installations in underground courtyards, and human activity in central areas. Street-level sites were less pleasant and eventful. Post-operam perceptions improved in the four renewed areas and in an adjacent non-renovated courtyard, showing that redesign enhanced sound perception beyond restructured spaces. Findings highlight the importance of combining objective acoustic metrics with subjective assessments to support healthier, more sustainable campus environments.

FORESEEN IMPACT

The study demonstrates how urban regeneration, within the MUSA project, enhances people's soundscape perception and acoustic comfort, showing that integrating eco-acoustic indices with subjective evaluations supports healthier, more sustainable urban environments.

KEYWORDS

SOUNDSCAPE	NOISE PERCEPTION	ECO-ACOUSTIC INDICES

Alkanolamines as Efficient Pretreatment Solvents for Lignocellulosic Biomass Fractionation

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Alkanolamines represent promising pre-treatment solvents for enabling low-intensity conversion processes of lignocellulosic biomasses. In particular, monoethanolamine (MEA) functions as a dual-purpose solvent, acting both as a Brønsted base (proton acceptor) and as a hydrogen-bond donor/acceptor in diverse chemical reactions. This unique combination makes MEA a highly effective lignin solvent, achieving high delignification efficiency while preserving favorable pulp yields. Moreover, the system could be integrated with CO_2 capture processes by exploiting the well-established ability of MEA-water solutions to act as CO_2-triggered switchable solvents.

FORESEEN IMPACT

The well-preserved structure of the isolated lignin is particularly intriguing for catalytic methodologies aimed at transforming MEA-pretreated lignin into well-defined bio-based platform molecules such as 1,4-cyclohexanediol and 1,4-cyclohexanediamine.

KEYWORDS

ALKONOLAMINES	BIOMASSES	CHEMICALS

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MUSA Spoke 1: An unusual report. Exploring results and applications from a multidisciplinary research project

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Over three years of collaborative scientific activity, MUSA Spoke 1 has fostered the creation of four Joint Labs dedicated to urban regeneration as a collective and multidisciplinary process. This poster outlines the path taken - from shared research and experimentation to the development of applied solutions - and presents the main outcomes achieved. Each Joint Lab is introduced through a short brochure that summarizes its objectives, expertise, and services, offering a practical overview of how research results can support innovation and sustainable transformation in urban contexts. The presentation aims to highlight both the methodological integration among different universities and companies and the foreseen impact of these collaborative platforms on future urban policies and practices.

FORESEEN IMPACT

The project strengthens collaboration between academia, public institutions, and companies, fostering innovative tools and services for sustainable urban regeneration and creating long-term synergies for future research and policy development.

KEYWORDS

INNOVATION	JOINTLAB	FUTURE

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From plant to product: extraction of anti-aging molecules and cream formulation

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Prosopis cineraria (Ghaf), a desert-resilient plant rich in bioactive metabolites, was investigated as a sustainable source of anti-aging ingredients for cosmetic applications. Extracts were obtained and screened for safety, antioxidant capacity, and inhibition of key extracellular-matrix-degrading enzymes. *In vitro* assays demonstrated significant elastase, collagenase, and hyaluronidase inhibition, supporting the extract's ability to slow structural protein degradation and maintain skin firmness and elasticity.

Based on these results, a Ghaf-enriched cream was formulated as a proof of concept, integrating scientific evidence with sustainable sourcing. This work highlights the potential of Ghaf-derived bioactives for innovative, eco-conscious skin-care products aligned with the goals of the MUSA Spoke 5 program.

FORESEEN IMPACT

The project promotes sustainable innovation in the cosmetic sector by valorizing resilient plant biomolecules and supporting the development of eco-friendly anti-aging products. Ghaf-based extracts could foster greener supply chains and high-value formulations.

KEYWORDS

PROSOPIS CINERARIA	ANTI-AGING BIOACTIVES	SUSTAINABLE SKINCARE

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GROWTH
AND INNOVATION

The *Growth and Innovation* section explores how human capital, advanced technologies, and organizational infrastructures drive economic dynamism. The contributions range from startup ecosystems, venture capital performance, and investment responses to shocks, to cutting-edge developments in electronics, neuromorphic computing, quantum devices, and testing frameworks. Other works highlight new models for knowledge transfer, innovation support, and sustainable business practices—particularly in fashion and design—alongside tools that use data, sensing, and digital twins to guide urban and industrial transformation. Together, these studies show how growth emerges at the intersection of talent, technology, and collaborative ecosystems.

Global Learning Pathways: The Role of Foreign Education in Shaping Lombardy's Innovative and Productive Entrepreneurial Ecosystem

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We examine how foreign educational trajectories of startup founders shape Lombardy's productive, innovative entrepreneurial ecosystem. Using a unique dataset of 290 funded startups (2010–2024), we map founders' degree types, countries of study, and sectoral outcomes. Our analysis shows that foreign-educated founders are disproportionately active in ICT and consultancy, while domestically educated peers are more active in manufacturing and scientific R&D startups. We also find that foreign postgraduate study (Master's, MBA, PhD) puts founders into globally connected, knowledge-intensive sectors, whereas undergraduate study abroad produces broader, less specialised patterns. These findings extend entrepreneurial ecosystem theory, highlighting education abroad as both a form of human capital and a channel for international knowledge spillovers and show the importance of diversifying Lombardy's international education pipelines while sustaining domestic capacities in R&D and manufacturing.

FORESEEN IMPACT

Foreign-educated founders drive Lombardy's ICT and consultancy growth, while domestic talent anchors R&D and manufacturing. This research shows how education abroad creates global spillovers that complement local strengths—insights key for policy and ecosystem design.

KEYWORDS

ECOSYSTEMS	INNOVATIVE STARTUPS	FOREIGN EDUCATION

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Sustainable Channel

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Sustainable Channel is a multidisciplinary initiative launched by the Human Hall scientific hub at the University of Milan to promote knowledge sharing and public engagement in the fields of sustainability, diversity, and inclusion. Designed as both a research platform and a communication tool, Sustainable Channel showcases video interviews with leading companies recognized for their Environmental, Social, and Governance (ESG) practices. The project is conceived as a laboratory of ideas aimed at
fostering collaboration and dialogue across academia, business, and civil society. Sustainable Channel provides real-world empirical insights into how sustainability principles can be integrated into business models and community partnerships. The video interviews, which include English subtitles, are freely available online. By making these experiences publicly accessible, the initiative contributes to spreading a culture of corporate social responsibility and supports educational programs aimed at strengthening sustainability-oriented skills.

FORESEEN IMPACT

The collection of video interviews provides an evidence-informed framework of best practices in sustainability across different industries, contributing to academic debates on diversity, equity, and inclusion, and opening avenues for further comparative research.

KEYWORDS

SUSTAINABILITY	DIVERSITY	INCLUSION

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Regional M&A activities and natural disasters. Evidence from Europe

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This paper investigates the impact of natural disasters on mergers and acquisitions, and under which circumstances the effects are more or less severe. We construct a sample of M&As over the period 2007-2022 of around 1,200 European NUTS-3 regions. We estimate a panel regression model using the Poisson pseudo-maximum likelihood estimator (PPML) with high-dimensional fixed effects, in a difference-in-differences setting. Our findings show that natural disasters have a negative and persistent effect on investment inflows. We also find that M&A activities are reduced mainly in those regions hit less frequently by a natural disaster and in those regions affected by hydrogeological disaster, including both floods and landslides. The adverse effect is largely driven by local investors; however, the negative impact on M&A is significantly limited in regions where the quality of institutions is higher.

FORESEEN IMPACT

The findings may support policymakers in designing effective disaster management strategies, help strengthen institutional quality, and provide insights to investors in developing strategies for mitigating risks, ultimately fostering resilience and stable investment flows in disaster-prone regions.

KEYWORDS

NATURAL DISASTER	REGIONAL	MERGER AND ACQUISITIONS

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Investigating the Effect of General Partners on Venture Capital Funds' Performance using Machine Learning

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Despite extensive work on VC performance and persistence, the assumption that General Partners materially drive fund outcomes has rarely been tested with rigorous prediction. We use machine-learning and out-of-sample evaluation to assess whether individual GPs improve forecasts of VC fund performance. Using 29,021 quarterly observations on 722 funds managed by 811 GPs (1997–2022, PitchBook), we compare: (i) a baseline model with fund characteristics only; (ii) a GP-enhanced model (GP identifiers); and (iii) a firm-enhanced model (VC firm identifiers), across several ML methods. Results show that GPs matter: the best model (random forest) raises out-of-sample R^2 from 74.2% to 77.8% when GP information is included. Moreover, the GP effect exceeds the firm effect across algorithms, indicating that individual-level information adds more predictive content than firm-level labels. These findings support theories of performance persistence and underscore GPs' central role in VC performance.

FORESEEN IMPACT

Evidence that individual GPs measurably drive VC outcomes lets LPs improve due-diligence and manager selection, refine incentives and benchmarks, and build persistence-aware portfolios, while informing policy and research on human-capital drivers in private markets.

KEYWORDS

GENERAL PARTNERS	MACHINE LEARNING	VENTURE CAPITAL

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New generation dampers for the seismic protection of hospitals

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Hospitals are strategic structures for civil protection during emergencies and are particularly sensitive to earthquakes due to the presence of vulnerable medical and technological content. Conventional anti-seismic devices are unable to provide the required level of performance, since they are mainly intended to protect the structure against strong events with long return periods, but may overlook moderate earthquakes which may occur more frequently during the service life of the structure, and often require replacement after major shocks. Within MUSA, research has focused on a new generation of energy dissipation systems that combine resilient and adaptive behavior. Extensive experimental testing and computational modeling have been conducted to investigate new fluids and new designs that can provide self-regulating behavior. These findings provide scientific ground for the future development of innovative devices tailored to safeguard hospital functionality.

FORESEEN IMPACT

The project has laid the foundation for a new class of self-regulating energy dissipation systems, where geometry, nonlinear fluid behavior, and dynamic excitation interact to create passive yet responsive solutions, reframing resilience in the built environment.

KEYWORDS

RESILIENCE	ENERGY DISSIPATION	HOSPITALS

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Exploring Analog Circuits in Advanced 7 nm FinFET Technology

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Being among the first Universities in Europe to gain academic access to 7 nm FinFET Technology, this work presents the successful integration of a tapeout in this scaled node. The ASIC includes a diverse set of intellectual property (IP) blocks, including a Voltage-Controlled Oscillator (VCO), and Integrate-and-Fire Neuron, Rauch Filter, Sallen-Key Filter, and a Charge-Sensitive Preamplifier. Furthermore, single-structure transistors for DC characterization, radiation damage analysis, and cryogenic temperature studies are present. By leveraging the unique properties of FinFET devices, state-of-the-art performances were targeted while lowering system-level power consumption and silicon area utilization. Applications spans from IoT devices, telecommunications, imaging, neuromorphic and quantum computing and the presented work represents the first step in studying analog integrated circuits in this advanced nanometer-scaled technology node.

FORESEEN IMPACT

By enabling ultra-low power consumption, enhanced device reliability, and reduced silicon footprint, this work paves the way for highly integrated systems in IoT, telecommunications, imaging, neuromorphic and quantum computing.

KEYWORDS

INTEGRATED CIRCUITS	FINFET TRANSISTOR	COMPUTING

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Satellite constraints on volcanic CO$_2$ fluxes from OCO-2, OCO-3, and wind observations

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Monitoring volcanic CO$_2$ fluxes from satellites remains largely marginal, and limited to a few eruption events. Distinguishing actual emissions from the atmospheric bulk is difficult, and requires satellite overpasses above the plume and accurate local calibration.
Here, we utilize L2 XCO$_2$ OCO-2, OCO-3, and associated wind field data products to first assess the capability of spaceborne measurements to monitor emissions in the absence of eruption events. Especially for volcanoes with high-altitude summit vents releasing gases into the upper-atmosphere, the satellite can systematically capture CO$_2$ plumes. This is particularly important as volcanic emissions injected into the free troposphere, disperse over larger regions affecting atmospheric effects on a much broader scale than low-altitude sources. This integrated approach provides a first benchmark for systematic satellite monitoring of remote volcanoes, whose emissions are unconstrained.

FORESEEN IMPACT

Systematic satellite monitoring of ground-based CO$_2$ sources.

KEYWORDS

SPACE-BORNE MONITORING	NATURAL CO$_2$EMISSION SOURCES	CALIBRATION OF SATELLITE DATA

Potential of space-borne measurements for the a large scale monitoring of CO$_2$ atmospheric content: influence of local atmospheric effects on the calibration of space-borne CO$_2$ measurements

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The TAS-SHIVA platform has been utilized to compare L2 XCO$_2$ measurements from the ASA satellites OCO-2 and OCO-3 with ground-based measurements of atmospheric CO$_2$. Space-borne and ground-based measurements from different ICOS stations in Europe with the same characteristics showed high discrepancies for stations located in urban areas, where ground-based CO$_2$ values are consistently up to 25% higher than those measured from space. On the other hand, the comparison of data from space and from ground in the low-pollution areas indicates a perfect coincidence of the CO$_2$ atmospheric concentration. In this last case, the comparison also shows an excellent retrieval of the seasonal behavior of the atmospheric bulk. This underlies the very strong effect of urban pollution in the calibration of the satellite measurements, and gives a way for an extended use of CO$_2$ satellite monitoring, provided the correct calibration of local atmospheric effects.

FORESEEN IMPACT

Extended use of space-borne monitoring of atmospheric CO$_2$.

KEYWORDS

LARGE SCALE USE OF CO₂ MONITORING FROM SPACE	EFFECTS OF URBAN POLLUTION ON THE CALIBRATION OF SATELLITE DATA

CODE	NAME	SURNAME	ORGANISATION	EMAIL
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Adaptive Urban Morphologies for Thermal Resilience: Design Strategies

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Climate Change is demanding better thermal performance for comfort in outdoor environment from cities because of heat waves becoming more frequent, intense, and prolonged, increasing health risks and highlighting social inequalities regarding access to cooling. Recent research also confirms and gives better quantitative assessment on how the quality of the outdoor environment impacts the thermal comfort of the indoor environments of buildings and their energy consumption. This research defines design strategies for urban morphologies adapted for thermal resilience, assessing the decision-making through computational simulation of urban microclimate, establishing a workflow that provides increased accuracy of the outputs from the modeling step to the intervention proposal, evaluating both outdoor and indoor performances in the city of Milan, Italy. Urban design improvements were simulated, and the results can provide valuable data to guide public health measures and urban policy action.

FORESEEN IMPACT

Establish a design process methodology that allows designers to make better decisions regarding thermal comfort and energy efficiency of public and private outdoor environments and provide data that can boost urban policies aiming to provide thermal resilience for cities in face of Climate Change.

KEYWORDS

THERMAL COMFORT	OUTDOOR ENVIRONMENT	CLIMATE CHANGE

The Startup Clinics: B4i – Bocconi for Innovation Legal and Sustainability Clinics for Specialized Support to Startups

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This work presents the model and early outcomes of the Startup Clinics promoted by B4i - Bocconi for Innovation to provide at least six months of support to early-stage ventures in law and sustainability. The initiative follows a win–win–win-win model:
- startups access free expertise;
- partners engage with innovation;
- students gain practical skills under academic supervision;
- and the university strengthens its role as a catalyst of responsible entrepreneurship.
In the Legal Clinics, over 30 law firms provide startups with tailored advice on governance, contracts, intellectual property, and compliance.
In the Sustainability Clinics, over 5 consulting firm and NGO partners support startups in integrating impact and ESG dimensions into the strategy through impact assessment, alignment with global standards, and sustainability roadmaps.
Early results show this approach reduces legal risks, accelerates sustainability, and demonstrates how academia can generate systemic value.

FORESEEN IMPACT

The Startup Clinics will continue to strengthen the resilience and responsibility of early-stage ventures by reducing legal risks and embedding sustainability strategies. The model also advances student training, partner engagement, and the university's role in shaping the innovative ecosystem.

KEYWORDS

ENTREPRENEURSHIP SUPPORT	LEGAL INNOVATION	SUSTAINABILITY STRATEGY

CODE	NAME	SURNAME	ORGANISATION	EMAIL
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A 28-nm CMOS Nano-Gravity Accelerometer Analog Front-End for Low-Power Deep Space and Planetary Gravimetry

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This work presents the current state of the proposed Nano-gravity Accelerometer Analog Front-End (nG-AFE) for deep space and planetary gravimetry measurements. The nG-AFE introduces a new signal processing technique that enables full front-end integration in scaled-down CMOS technology (28 nm CMOS BULK), compared to conventional solutions that rely on bulky analog front-ends with off-the-shelf transformers and low-flicker transistors. This approach reduces both the power and weight budget of the probe component. The system is divided into an amplification stage, an analog-to-digital converter, and digital filtering and signal processing. The interface is adapted to the capacitive sensor for micro-acceleration detection, amplifying and modulating the signal to achieve higher sensitivity. The nG-AFE reach a final 23.5 dB SNR at 10 nm/s² input acceleration after digital reconstruction, with a total power consumption of 3 mW, all implemented in a single compact microchip.

FORESEEN IMPACT

New generation of Analog front end for capacitive sensor in aerospace breaking the fronteer of the ng sensitivity.

KEYWORDS

GRAVIMETRY	FRONT-END

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A Sustainable Design-driven Retail and Service Model for the Fashion Industry

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The poster presents a design driven framework for sustainable fashion retail. It visualizes research that shifts the focus from material innovation to the last mile of the supply chain, examining how services can foster circular practices. Drawing on more than 300 European case studies, the poster maps "servitization" strategies and distills them into service templates. The content is organized around three interconnected areas of sustainability: Environmental, highlighting circular production, reuse, repair and collaborative consumption; Cultural, detailing tools and activities that raise awareness, educate consumers and guide retailers; and Social, showcasing initiatives for inclusion, community development and distributive justice. The poster also introduces two applied outcomes: the Su.Re Digital Hub and the Su.Re participatory toolkit, which help designers, researchers and companies integrate these models into real world retail strategies.

FORESEEN IMPACT

The retail and service model is a framework guiding design and innovation in sustainable retail. It helps companies track distribution trends, plan their role in a greener future, and use digital tools to find providers, adopt eco-friendly solutions, and strengthen connections with local communities.

KEYWORDS

SUSTAINABILITY	FASHION RETAIL	SERVITIZATION

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Supporting the sustainable transition: the Su.Re Toolkit and the Digital Hub

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The poster presents a set of tools that foster sustainable innovation in fashion retail. It introduces the Su.Re Toolkit, a participatory design activity where retail teams and facilitators co-create strategies for "servitization," shifting from product sales to integrated goods-and-services models. Using seven boards, about 200 cards, and voting tokens, the toolkit guides analysis and collective decision making in a visual and interactive way. The Su.Re Digital Hub is an online resource for retailers, designers, students, and researchers. It provides a searchable database of over 140 sustainability-related services already active in Europe and a configurator to match services with company goals. Users can explore case studies, collect data sheets, and download curated sets of examples. Together, the toolkit and the hub form an evolving ecosystem grounded in the Sustainable Design-driven Retail and Service Model, enabling professionals to plan concrete, future-ready retail strategies.

FORESEEN IMPACT

The Su.Re ecosystem empowers retailers to drive circular fashion by linking industry and research, promoting transparency and traceability, enabling aftercare and take-back services, and turning stores into spaces for dialogue, inspiring sustainable practices and informed consumer choices.

KEYWORDS

SUSTAINABILITY	FASHION RETAIL	SERVITIZATION

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Maturity and Financial Implications of Sustainability Reporting in the Fashion Industry

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Over the recent years, companies have increasingly strived to enforce their sustainability commitment and reporting, mainly in the most impacting industries, such as fashion. The completeness and quality of sustainability reports are at the core of European policy. In particular, the upcoming regulation will harmonize current fragmented approaches by aligning reporting practices with the European Sustainability Reporting Standards (ESRS), which define critical topics within each ESG domain. Fitting in the debate on sustainability reporting, this study aims to explore: i) the maturity of current sustainability reporting practices as a proxy for CSRD readiness; and (ii) the extent to which current disclosed topics align with the ESRS requirements. Using a content analysis of 2022 reports from 33 European listed fashion companies, we find that a good readiness, but there needed to be more consistent results regarding related financial implications.

FORESEEN IMPACT

This study intends to contribute at introducing a new perspective on sustainability commitment among fashion companies, which goes beyond the prevalent approaches adopted so far in the literature, whose primary focus has been on strategy and business models.

KEYWORDS

SUSTAINABILITY REPORTING	FASHION INDUSTRY	EUROPEAN SUSTAINABILITY REPORTING STANDARDS

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Platform Thinking: collaboration at the heart of innovation in non-digital in MUSA platform Spoke5

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MUSA platform Spoke5 was designed and launched to ignite innovation in the Italian fashion, design, and luxury ecosystem, reducing friction between sustainable and wannabe organizations. The project experimented with platform dynamics in a non-digital context by matching two customer sides with limited interaction chances. Face-to-face collaborations create a community that obtains value through knowledge and idea exchange, exploring platform mechanisms within non-digital platforms. Combining literature research and the design of 3 events, including startups and established firms, MUSA platform has advanced both the academic and managerial knowledge about how platforms work in non-digital settings. Dialogue and practice exchange drive matchmaking, fostering collaboration for sustainable transition. Serendipitous connections emerged through participants' proactive engagement, delivering unexpected knowledge sharing, with non-digital platforms as catalysts of sustainable transformation.

FORESEEN IMPACT

This experience shows how platform mechanisms foster local innovation and collaboration while offering a scalable model for MUSA's mission of sustainable transformation. The events underscored the need for dialogical and collaborative spaces to gather diverse views to tackle sustainable challenges.

KEYWORDS

NON-DIGITAL PLATFORMS	INNOVATION	COLLABORATION

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Measuring sustainability and circularity at urban level in the fashion, luxury, and design sector: a framework proposal and policy agenda

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The Fashion, Luxury, and Design industries have an increasing need to shift towards more sustainable and circular practices to support the environment, resources, and consumer values. It is crucial to measure and monitor key performance indicators as a practical tool to facilitate the improvement of future performance plans. The framework, praised for its inclusiveness and comprehensiveness and developed as a policy basis for real-time guidelines for further research, serves as a tool to support local governments and policy-makers in the fashion, luxury, and design sectors at the urban level. The originality of this research lies in its focus on the urban level and fashion sector.

FORESEEN IMPACT

We try to present a framework as a future guidelines for the policymakers.

KEYWORDS

LUXURY AND DESIGN

FASHION

SUSTAINABILITY

CIRCULARITY

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Adaptive Spiking Neural Network Architecture for Space Applications

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This work presents the development and validation of a Spiking Neural Network (SNN) architecture targeting space applications. These networks aim to improve the energy efficiency of artificial intelligence by taking inspiration from the functioning of biological neurons, where information is transmitted through binary spikes. The design is based on the adaptive Leaky Integrate-and-Fire (adLIF) neuron model, which enhances temporal memory through adaptive mechanisms that regulate spiking frequency. The network adopts a Time Division Multiplexing approach, where a single physical neuron sequentially updates the state of all network neurons by loading their parameters and updating their status at each timestep. The architecture has been functionally tested on a Spartan-7 FPGA using the PokerDVS dataset, demonstrating its capability to process event-based visual information and validating its potential as a neuromorphic accelerator for future space applications.

FORESEEN IMPACT

The proposed SNN architecture enables energy-efficient AI for space applications, reducing power consumption compared to traditional processors. By improving efficiency and resilience, it contributes to greener, more sustainable satellite systems with longer mission lifetimes.

KEYWORDS

NEUROMORPHIC COMPUTING	SPIKING NEURAL NETWORKS	EDGE COMPUTING

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Subsidy Schemes and Market Power

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We use Real Options modelling of dynamic investments to study the long-run impact of multiple forms of subsidy schemes on RES production. We do so by taking into account the role of the considerable market power fimrs detain in the energy sector and allow for capital to be invested over time through many investment bits that accrue. In doing so, the firm can manipulate size and timing of the investement path to make more money. We find that while subsidies scheme speed up investments, not all forms of public intervention have the same effect: while the proposed schemes reduce the waiting time for investments to occur, only some of them increase the growth rate of capital over time. The downside is that subsidies appear to increase the volatility of the investment path, thereby making more likely both underinvestment and overinvestment (w.r.t. to regulatory targets).

FORESEEN IMPACT

Reconsider the shape of public intervention in Energy markets, possibly toward a more pro-competitive solution.

KEYWORDS

MARKET POWER	SUBSIDY	REAL OPTIONS

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Emotional Cities

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Wearable devices enable the collection of a multitude of data from citizens interacting with the urban environment surrounding them, including physiological measures, psychological responses, and environmental measures.

Indexes that combine these sources of information can be used to quantify the citizens engagement with the city, track how it evolves across different areas and moments, and tailor experiences to individual citizens' specific needs and characteristics.

Fields such as healthcare, sports, and tourism can benefit from this approach: based on the single citizen's past interactions with the environment, actions and locations can be suggested to maximize physical and psychological wellbeing and promote activities that offer positive engagement with the local area, improving the relationship between people and territory.

FORESEEN IMPACT

The research will enable new wearable-based tools for monitoring and enhancing urban experiences, supporting citizen well-being, personalized services, and innovative applications in healthcare, tourism, and sustainable urban development.

KEYWORDS

WEARABLE DEVICES	PSYCHOPHYSIOLOGY	URBAN ENGAGEMENT

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Synthesis of C2-symmetric enantiopure bisphenol derivatives

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Our research group has developed a novel class of chiral bisphenols based on a highly tunable decahydroquinoxaline scaffold. This scaffold is readily accessible in enantiopure form from chiral trans-1,2-diaminocyclohexane through a diastereoselective imino-pinacol coupling reaction, which can be performed both via a traditional approach, based on the use of metal reductants, and via a more sustainable electrochemical method, carried out both under batch and continuous flow conditions. In order to explore the potential of these compounds as promising organocatalyst precursors, a new class of chiral phosphoric acids was synthesised, and their catalytic activity was tested, leading to excellent results in terms of stereocontrol.

FORESEEN IMPACT

This work provides a mild, efficient, and scalable alternative to traditional methods for the synthesis of tetrasubstituted enantiopure piperazines, with potential applications in the preparation of chiral ligands in a more sustainable manner.

KEYWORDS

ELECTROCHEMISTRY	SUSTAINABILITY	API

CODE	NAME	SURNAME	ORGANISATION	EMAIL
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Monitoring of digitally fabricated concrete structures in a digital twin framework

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The additive manufacturing process of concrete is a complex technology that must be properly controlled in terms of material, process, and subsequent monitoring. For this reason, as already occurs in other highly specialised manufacturing processes, it is necessary to move towards the creation of a digital twin framework capable of managing and integrating all these aspects. A digital model of this kind, which evolves, interacts, and exchanges information with the real artefact, whether related to the process or the product, first requires an understanding of how to obtain data from different monitoring technologies and systems, as well as the purposes for which these data can be employed. In this work, different methodologies are presented, including material, process, and product control, which represent a step toward the realisation of a digital model for 3D concrete printing, an objective that is currently extremely challenging.

FORESEEN IMPACT

The implementation of a digital twin model could help define shared standards among producers, ensure minimum quality in 3D-printed concrete elements, and foster the development of this technology in the civil engineering sector.

KEYWORDS

3D PRINTING CONCRETE	DIGITAL TWIN	QUALITY CONTROL

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Mapping Human Experience in Urban Digital Twins

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Urban environments shape human experience, yet planning rarely considers perception and emotions. The Phygital Platform 4P integrates spatial, environmental, physiological, and psychological data to build an experiential "digital twin" of urban areas. This allows mapping place experiences, showing how the same space can elicit diverse reactions. By linking environmental factors with perception, the platform supports evidence-based design. It has gained international attention for applications in walkability, heritage preservation, and urban transformation. Its goal is to predict citizens' responses to interventions, offering tools to improve well-being, safety, and social value. Future steps include new datasets, starting with thermal experience, to provide deeper representations of urban life from inhabitants' perspectives. This work highlights the potential of people-centered, data-driven planning to shape cities that truly resonate with those who live them.

FORESEEN IMPACT

This approach enables evidence-based urban planning that enhances citizens' well-being, safety, and quality of life, while providing municipalities and developers with tools to optimize investments and design interventions grounded in actual and future people experience.

KEYWORDS

URBAN EXPERIENCE	DIGITAL TWIN	PEOPLE-CENTERED DESIGN

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Strategies for Strengthening Academic Core Facilities: Fostering Collaboration and Sustainability

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Academic core facilities (CFs) are key infrastructures that provide technologies, expertise, and collaborative platforms for research and industry. Universities face challenges in governance, management, and sustainability. This scoping review analyzed 85 studies from Scopus and Web of Science on business models, management, governance, and university–industry collaboration. Two clusters emerged: operational issues (HR, quality, shared services, finance, technical operations) and strategic/governance issues (business models, strategies, financial frameworks, industry links). Findings show research is concentrated in life sciences, with limited input from management studies. The review highlights the need for clearer career paths, diversified funding, standardized quality, and governance aligned with institutional goals, offering insights for policymakers, leaders, and researchers.

FORESEEN IMPACT

This work provides evidence to guide universities and policy makers in developing sustainable business models, standardized governance, and staff career paths for academic core facilities, strengthening collaboration, innovation, and long-term impact.

KEYWORDS

ACADEMIC CORE FACILITIES	RESEARCH INFRASTRUCTURE	SUSTAINABILITY

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A SystemC-AMS Virtual Testing Framework for Power Devices Automatic Test-Solutions Development

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This work presents a methodology based on SystemC-AMS for the development of automatic test-solutions for power electronic devices, which optimises the design of test-hardware and the coding of test-programs. The methodology is developed within the Joint-Lab activities in collaboration with Infineon Technology Italia.

The proposed virtual testing framework allows efficient design of test-hardware schematics and rapid mixed-signal simulation of test-program sections, offering insight on the analog behaviour of the comprehensive test-setup and on the mutual interaction between test-hardware, Automatic Test Equipment and Device Under Test, allowing versatile pre-silicon troubleshooting of the test-solution.

The main aspects of the framework functionality are presented along with different industrial use-cases which proved, during the development phase, the validity of the presented methodology in and the possibility for further improvement and integration within the industrial workflow.

FORESEEN IMPACT

This project advances the involvement of the research group in automatic testing, improving on the synergy between academia and industry. ATLab trains students and researchers in automatic testing methodologies, and the partnership with Infineon Technologies plays a key role in the activity.

KEYWORDS

POWER ELECTRONICS	AUTOMATIC TESTING	PULSE MEASUREMENT

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Quantum Dot intersubband Photodetectors for LWIR photons

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The development of quantum nanostructures is of primary importance for the advancement of photodetector technologies in the long wavelength infrared (LWIR) window for remote Earth observation. Despite the promises, the performance of QD-based photodetector is still lacking compared to state-of-the art technology. We present an innovative solution to surpass the current generation of QD-based detectors by exploiting the absorption from quantum dot localized states to resonant states in the continuum, that is states in the semiconductor conduction band with an enhanced probability density in the quantum dot region. This approach takes advantage of the unique properties of such states to massively enhance carrier extraction, allowing to overcome one of the most crucial drawbacks of quantum dot-based infrared detectors.

FORESEEN IMPACT

Being able to detect LWIR photons at room temperature is of fundamental importance to reduce size and weight of the detectors. On top of that, it is crucial to reduce their cost by implementing novel nanostructured materials and to enable the next generation of infrared detectors.

KEYWORDS

QUANTUM DOT	INFRARED PHOTODETECTORS	INTRABAND ABSORPTION

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HEALTHCARE SERVICES

The *Healthcare Services* section showcases technological, clinical, and organizational innovations that are reshaping prevention, diagnosis, and care delivery. The contributions span AI-driven signal processing, wearable and telemedicine solutions, advanced imaging and microfluidics, pediatric and neurological care pathways, and digital platforms for remote monitoring. Together, they illustrate how data, sensors, and intelligent systems enhance clinical decision-making, support patients and caregivers, and enable more accessible, personalized, and sustainable models of healthcare.

Invertible Conditional Generative Adversarial Networks to Effectively Generate Myocardial Infarction from Normal ECG

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Deep Learning based style transfer shows promise in biomedical signal processing. This study uses Invertible Conditional GANs (IcGANs) to transform 12-lead ECGs from normal sinus rhythm to myocardial infarction (inferior/antero-septal). Unlike CycleGAN, style transfer technique requiring multiple models per generation, IcGAN uses a single conditional GAN and encoder, offering a more efficient and flexible approach. Both IcGAN and CycleGAN were trained on ECG heartbeats from the PTB-XL dataset (Physionet). Generated signals were evaluated via visual inspection and quantitative measures. Results showed IcGAN effectively captured MI-specific features (clinically meaningful), while preserving original ECG characteristics. Comparative analysis highlighted IcGAN's advantages in efficiency and performance over CycleGAN with similar architectures. This approach holds potential for domain adaptation and data generation for rare conditions paving the way for personalized treatment applications.

FORESEEN IMPACT

Our single-model solution generates synthetic ECGs to accelerate personalized cardiology, safeguard privacy, and fuel AI-driven biomedical innovation, while remaining easily integrable into commercial healthcare tools.

KEYWORDS

ECG	DEEP LEARNING	MYOCARDIAL-INFARCTION

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Sustainable Healthcare: development and test of a web app for ESG monitoring in healthcare infrastructures

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Healthcare is vital to society but ranks among the most carbon-intensive sectors. Hospitals play a key role, yet sustainability assessment tools often lack a holistic, validated approach and exclude the built environment, a major emissions source. This study presents SUSTHEALTH ESG, a novel, evidence-informed tool evaluating hospital sustainability across Social, Environmental, and Governance (ESG) domains using a weighted multicriteria methodology (SRF DCM). Integrated into the ATLAS web platform, the tool features a multilingual interface developed in Python, offering user and license management, questionnaire configuration, validation workflows, automatic scoring, and PDF reporting. The platform supports multiple tools and questionnaires through a modular architecture. Design elements include information architecture, wireframes, and a CSS-based style guide. The software is currently in testing and is being applied in major hospitals in Lombardy.

FORESEEN IMPACT

The tool developed and tested can support accountability and evidence-based decision-making in hospital leadership, supports healthier and safer environments for patients, staff, and communities and encourages resource-efficient design and operation of healthcare infrastructure.

KEYWORDS

HEALTHCARE INFRASTRUCTURES	SUSTAINABILITY	ASSESSMENT TOOL

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Wearable devices for mental stress monitoring: a reliability study in controlled environment

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In its negative connotation, psychological stress (i.e., distress) is caused by the disruption of balance between perceived cognitive and emotional load induced by external stimuli, it may impact on the individuals' quality of life, affecting human mood, attention, and engagement; potentially reducing work- and study-related efficiency. Wearable devices, in their many different forms, empower users to monitor their wellbeing at multiple levels and have been proposed for monitoring personal stress levels. However, the validity of the physiological signals and parameters collected by the devices and automatically processed by the system to extract meaningful information should be carefully assessed. This study evaluates the reliability of two wearable devices with different technical characteristics and user-affordability, in monitoring basic physiological parameters during a cognitive protocol inducing mental stress.

FORESEEN IMPACT

Wearable technology is increasingly used to monitor physiological parameters in different scenarios. The multidisciplinary approach proposed within MUSA project, involving biomedical engineering and psychology researchers can maximize the potential of this technology to improve human well-being.

KEYWORDS

WEARABLE DEVICES	WELL-BEING	STRESS

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A Technological Framework to Support Neurodevelopmental Screening in Children at School

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To support early screening of neurodevelopmental disorders at school, we developed a scalable web-app with ad-hoc questionnaires to collect data. It enriches classical pedagogical observation with AI-driven analytics and technological tools. Data from teachers' observations were collected from >100 schools and clustered to create Personas, archetypes of children's functional profiles, facilitating tailored interventions. For the web-app, serious games were developed to support difficulty training and enable data-driven alerts on performance. Then, AI algorithms were applied to classify >9,000 children needing a clinical visit (results at EMBC25: performance of 0.69 and 0.96 for the clusters). The visit can be performed remotely, via a teleconsultation module with a smart ink pen, tested with ~60 children for feasibility. The ultimate goal is to standardize school observation, build a family-school-clinic alliance, and leverage technology to improve care access for children with needs.

FORESEEN IMPACT

This system supports schools in neurodevelopmental disorders screening to ease healthcare services thanks to technology and data analytics. In ~200 Lombard schools, it enables shifting the focus from diagnosis to functionality, aligning with the recent transdiagnostic trends.

KEYWORDS

NEURODEVELOPMENTAL DISORDERS	EARLY SCREENING	DIGITAL TECHNOLOGIES

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Efficient Band-pass filtering

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Bandpass filters (BPFs) are essential in applications ranging from audio processing to biomedical signal analysis and communication systems, enabling the selective passage of desired frequency ranges while suppressing unwanted components. Despite their critical role, optimization-based design methods for BPFs remain underutilized, even though they offer strong performance guarantees. In this work, we introduce a Penalized Least-Squares Optimization (PLSO) framework for the design and implementation of BPFs. The proposed framework provides a unified and intuitive platform for designing filters with improved performance and robustness. By leveraging PLSO, our approach enables precise control over the filter characteristics, offering both theoretical insights and practical applicability. Numerical examples and illustrative designs demonstrate the effectiveness of the method, highlighting its potential for a wide range of signal processing applications.

FORESEEN IMPACT

The proposed PLSO approach enhances signal quality in diverse applications, including ECG, audio, and RF communications. The framework bridges theoretical insights and real-world applicability, making advanced filter design accessible to engineers and researchers.

KEYWORDS

PENALIZED LEAST-SQUARES OPTIMIZATION

BAND-PASS FILTER

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Bubble-based acoustic chip for label-free single-cell imaging via light scattering

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Cellular imaging enables the characterization of the chemical, structural, and morphological features of diverse cells, providing valuable insights into biological processes across various research fields. The objective of my doctoral project is to develop acoustic-based microfluidic channels for single-cell imaging by detecting scattering signals. To achieve this, I am designing and characterizing a bubble-based acoustic chip that exploits cavitation microstreaming. In this technique, acoustic waves induce bubble oscillations, generating a second-order steady flow capable of trapping and rotating single cells. The ultimate goal is to integrate this chip with a light-scattering imaging setup for label-free single-cell analysis. Light scattering is a non-invasive method that provides biophysical information about cells, including morphology and optical density, and enables the discrimination of different cell populations and developmental stages.

FORESEEN IMPACT

The ability to accurately characterize cellular populations provides huge insights into disease progression, therapeutic efficacy, and fundamental biological processes. Developing an instrument capable of precisely characterizing cellular populations offers numerous benefits in various fields.

KEYWORDS

ACOUSTIC	LIGHT SCATTERING	CELL-SENSING

Assessing the effect of sleep on cardiovascular risk: LS7 and LE8 compared in a European cohort

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Tools like Life's Simple Seven (LS7) help estimate cardiovascular disease (CVD) risk in healthy individuals using conventional factors such as age, sex, and blood pressure. Life's Essential Eight (LE8) was later introduced, adding sleep as a potential predictor. Yet, it remains unclear if this added complexity truly improves performance. We compared LS7 and LE8 in a European cohort using UK Biobank data to determine whether incorporating sleep information leads to better risk stratification. Sleep duration was self-reported, and outcomes included fatal and non-fatal CVD events. Associations with prevalence and incidence were examined through multivariable models, while the c-statistic was used to quantify differences in incident CVD discrimination. LE8 offered marginally better risk stratification than LS7. However, models also showed comparable performance in terms of risk discrimination, suggesting the addition of subjective sleep did not provide meaningful benefit.

FORESEEN IMPACT

Disrupted sleep is linked to higher cardiovascular risk. In a European cohort, cardiovascular metrics Life's Simple 7 and Life's Essential 8 supported risk stratification, but adding subjective sleep duration did not improve prediction, suggesting objective measures may capture risk more effectively.

KEYWORDS

CARDIOVASCULAR RISK PREDICTION	SLEEP DURATION	CARDIOVASCULAR PREVENTION

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Integrated strategies for mosquito monitoring and eco-sustainable control in urban context

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Milan's ongoing urban regeneration highlights the need to control invasive species that threaten both biodiversity and public health, particularly mosquitoes, which act as vectors of pathogens. Our study addresses this challenge with a dual approach: (i) systematic monitoring of adult mosquitoes in four urban areas (two central, two peripheral), and (ii) larval control through the development of an eco-friendly tool. Over two years, trapping campaigns collected and identified 8,000 adult mosquitoes, which were screened for pathogens using high-throughput microfluidic PCR. Parallelly, we have validated MoChito raft, a delivery device for bioinsecticide that extends its effectiveness. Results confirmed its efficacy against three mosquito species while showing no impact on two non-target laboratory models.

FORESEEN IMPACT

The project will improve control of harmful biodiversity and raise awareness of future risks. It provides new data on invasive and native mosquitoes and enables more effective, long-lasting larval population management through sustainable methods.

KEYWORDS

MOSQUITO SURVEILLANCE	VECTOR CONTROL	SUSTAINABLE CONTROL METHOD

Ocular Findings in the BEA Cardiovascular Project

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Within the BEA (Bicocca Epidemiological Assessment) project, a cohort was examined from an optometric and ophthalmological perspective. Data were collected to characterize participants in terms of visual defects, intraocular pressure as well as anterior and posterior segment features assessed through OCT and digital imaging. Additionally, OCT angiography scans were performed to explore microvascular parameters.
The results obtained, along with the correlations identified between the different parameters, will be presented and discussed.

FORESEEN IMPACT

Integrating ocular data with cardiovascular parameters may reveal novel associations and contribute to a broader understanding of systemic and visual health.

KEYWORDS

OCT	ANGIOGRAPHY	VISUAL DEFECTS

BioSonix: Can Physics-based Sonification Perceptualize Tissue Deformations From Tool Interactions?

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Perceptualizing tool interactions with deformable structures in surgical procedures remains challenging, as unimodal visualization techniques often fail to capture the complexity of these interactions. We presents a novel approach to augment tool navigation in mixed reality environments by providing auditory representations of tool-tissue dynamics. BioSonix utilizes tissue displacements in 3D space to compute excitation forces for a sound model encoding tissue properties. Biomechanical simulations were employed to model particle displacements resulting from tool-tissue interactions, establishing a robust foundation for the method. An optimization approach was used to define configurations for capturing diverse interaction scenarios with varying tool trajectories. Experiments were conducted to validate the accuracy of the sound-displacement mappings, revealing a strong correlation between tool-tissue dynamics and their corresponding auditory profiles.

FORESEEN IMPACT

Enhance nuanced decision-making in complex surgical tasks with auditory display, addressing the limitations of visualization in augmenting soft tissue deformation. The aim is to deliver perceptually intuitive feedback that enhances cognitive and procedural understanding.

KEYWORDS

SONIFICATION	COMPUTER-ASSISED INTERVENTION	MEDICAL AUGMENTED REALITY

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SmartCardioUp: an innovative App for improving pediatric cardiac diagnosis through automated murmur identification

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Seventy percent of children aged 3–10 have a heart murmur, but only 1% are pathological. In pediatrics, diagnosis is often hindered by noise from crying and movement.
We propose SmartCardioUp, an app with a denoising stage that preserves heart sounds while suppressing external noise. Using non-negative matrix factorization, the algorithm exploits the periodicity of heart sounds compared to signals like breathing. After denoising, heart tones are isolated, and two tracks are generated for S1 and S2, with precise timing localized within each. Murmur detection then relies on a machine learning algorithm that extracts features from the S1 and S2 tracks to classify patients as pathological or healthy. Trained on 53 patients and tested on 38 unseen cases (25 healthy, 13 with murmurs), the model achieved 85% accuracy, correctly identifying 92% of healthy and 69% of pathological patients.
SmartCardioUp will identify true heart murmurs in children, improving diagnosis and management.

FORESEEN IMPACT

SmartCardioUp will improve pediatric cardiac diagnosis by filtering noise and automatically identifying pathological murmurs, enabling earlier detection of real cardiac issues and optimizing diagnostic and care pathways.

KEYWORDS

HEART MURMURS	CHILDREN	DENOTING

Microfluidic technology for high-throughput drugs testing

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Patient-derived organoids (PDOs) are revolutionizing biomedical sciences because they preserve cellular heterogeneity and closely recapitulate the histopathological features and genomic profiles of the tumor of origin. Unlike 2D cell cultures, a tight correlation between patients' and derived 3D organoid cultures' responses to drugs has been established in several tumor types, supporting PDOs as patient avatars that could predict response to therapy.

However, organoids culturing with extracellular matrix (ECM) to support 3D architecture has been challenging for high-throughput screens (HTS) drug assays due to the technical issues in handling biological matrices.

The system we have been developing is a platform to allow seeding, growth, and testing, in static/flow conditions, of hundreds of 3D culture units of organoids, simultaneously. At this stage of development, tests involve drug sensitivity on cell/organoid lines or patient-derived but it can be extended to other applications.

FORESEEN IMPACT

The platform is promising to be suitable for drug screening but also to be extended to cover complex models, scaffolds and scaffold-free cultures, co-cultures, and to be a tool available to fundamental as well pre-clinical research, thanks to the versatility and the consistency of the obtained data.

KEYWORDS

HIGH-THROUGHPUT DRUG SCREENING	MICROFLUIDICS	PATIENT-DERIVED-ORGANOIDS

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Development of technologies and customisable tools for continuous monitoring, wellbeing, and health

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Providing tools for wellbeing and health requires the use of specific sensors and analysis procedures. Wearable systems make possible recording during daily life and usual activities. Automatic procedures for data collection and analysis allow proper feedback to the users.

The technical tasks developed during the project include:
• Choice of proper wearable and m-health solutions focused on selected applications
• Development of web-based tools to support the observation of selected populations.
• Development of methodologies for data analysis, feature extraction to obtain stratification, prediction, and support prevention.
• Co-design of solutions for adoption of safer lifestyles

Use Cases identified for specific applications:
• Well being during pregnancy for the mother and the fetus,
• Stress at workplace based on wearable and Co-design of specific solutions;
• Screening in children for early detection of learning disabilities;
• Stratification of general population for cardiac risk.

FORESEEN IMPACT

The scalability of the implemented solutions and the flexibility of the tools addresses multiple needs in the general population, for the improvement of citizens wellbeing through continuous monitoring, specific stratification, preventions and adoption of safer lifestyles.

KEYWORDS

| WEARABLE | WELLBEING | DATA ANALYSIS |

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Freeze-drying of tert-butanol containing formulations

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Lyophilization of organic solvent-containing formulations poses challenges, including the control of residual solvent content, which must remain within the limits imposed by the ICH. This is particularly important for tert-butanol (TBA), a class 3 solvent used in lyophilization due to its high sublimation rate and solubilizing properties. This study aims to optimize freeze-dried formulations containing high levels of TBA (0–30%) to minimize residual solvent content. Formulations with sucrose alone or combined with crystalline excipients were freeze-dried using different protocols. When only sucrose was used, several defects appeared. Gas chromatography showed a TBA content of around 3%. By adding amino acids, finished products with a uniform appearance were obtained and residual TBA was about 0.6%. This was due to an increase in the crystalline fraction of the final product, as indicated by DSC thermograms.

FORESEEN IMPACT

Our work demonstrates that MUSA's living labs can support the comprehensive characterization of parenteral dosage forms obtained by lyophilization, including residual solvent analysis. This approach can assist pharmaceutical companies in defining the quality and safety of final products.

KEYWORDS

LYOPHILIZATION	RESIDUAL SOLVENT	GAS CHROMATOGRAPHY

The SERENADE pilot: our experience in detecting behavioral changes in the home of elderly subjects

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WITH POLICLINICO DI MILANO

Mild Cognitive Impairment (MCI) is a critical pre-dementia stage where home behaviours may reveal early decline. In the SERENADE pilot (MUSA Spoke2-WP2), we deployed an AI-driven tele-monitoring system in 20 real homes of elderly subjects with MCI, with the goal of capturing digital markers of cognitive decline. The platform integrates multimodal sensing (to capture several dimensions, including sleep, nutrition, mobility, and daily activities) and a conversational assistant that administers cognitive tests. Continuous monitoring proved to be reliable and highly acceptable, as most participants kept the system for over 1 year. Clinicians valued the intelligent analysis of behavioural data, and automated cognitive evaluations matched neuropsychologists' assessments. SERENADE demonstrates the feasibility of large-scale AI-enabled home monitoring to support early detection and clinical decision-making in MCI.

FORESEEN IMPACT

SERENADE paves the way for AI-driven home monitoring at scale, enabling earlier detection of cognitive decline, reducing clinical burden through continuous insights, and fostering patient-friendly tools to support dementia research and care pathways.

KEYWORDS

SMART HOMES	BEHAVIORAL MONITORING	MILD COGNITIVE IMPAIRMENT

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Development of a microfluidic platform to generate vascularized colorectal cancer spheroids on chip

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We developed a microfluidic platform for tumor spheroid generation and vascularization, integrating a pressure-driven actuation system that modulates the central channel geometry for efficient trapping. A flexible membrane separates actuation and culture layers, adjusting height under pressure to activate C-shaped traps.

The culture layer features five channels: outer ones for medium replenishment, mid-channels with cell-laden fibrin gel (endothelial cells and fibroblasts) to form a vascular network, and the inner channel with traps for tumor growth. Tumor cells are injected during pressurization, and membrane deflection drives them into traps, preventing loss while fibrin in lateral channels acts as a barrier. Cells condense into spheroids within 3 days, then are embedded in fibrin with stromal cells. Over time, endothelial cells invade, promoting vascularization.

FORESEEN IMPACT

This system enables reliable spheroid formation and vascularization, offering physiologically relevant tumor models to study cancer progression, metastasis, and therapy response, thus advancing preclinical research and accelerating drug discovery.

KEYWORDS

ORGANS-ON-CHIP	IN VITRO MODELS	CANCER-ON-CHIP

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Stress-Induced Changes in Motivated Behavior: Insights from Consumer Wearable Devices

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Psychological self-monitoring represents a promising advancement for wearable devices, extending beyond their common use in measuring physical activity to capturing complex physiological states such as stress. However, the reliability of these devices in detecting stress-related physiological changes and their behavioral relevance in real-life contexts remains uncertain. In this study, participants completed an experimental protocol that included a standardized stress induction task, a decision-making task simulating gambling with potential monetary gains and losses, and an attention test designed to assess how motivation influences the perceptual priority of stimuli associated with wins and losses. The results revealed distinct decision-making and attentional biases, each interacting differently with stress. Wearable device data demonstrated partial sensitivity to behavioral measures depending on the task conditions, highlighting their potential for psychological self-monitoring.

FORESEEN IMPACT

We assessed the reliability of wearable devices to monitor stress in relation to motivated behavioral biases, addressing health monitoring and behavioral management, and investigating the interactions between stress, attentional processes, and risk-related decision-making.

KEYWORDS

WEARABLES	STRESS	ATTENTIONAL SALIENCE

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Telemedicine in Pediatric Rare Neurological Diseases: a complementary management model alongside in-person visits to improve quality of life

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Background: Pediatric rare neurological diseases (PRND) require continuous multidisciplinary follow-up, but nutritional and clinical management is often limited by difficulties in transporting fragile patients. Telemedicine may complement in-person visits scheduled as per routine clinical practice. Methods:The protocol includes telemedicine visits at two and four months after in-person consultations to assess caregiver satisfaction and quality of life, using a telemedicine questionnaire and PedsQL.
Results: Since 2023, 56telemedicine questionnaires and 61PedsQL surveys have been collected, including 36cerebral palsy modules. Families reported good acceptance of telemedicine, perceiving continuity of care, reassurance, and better control over patients' condition.
Conclusion: The project will clarify the role of telemedicine in nutritional and clinical follow-up of children with PRND, supporting innovative care models improving accessibility, emotional support, and caregiver's well-being.

FORESEEN IMPACT

Telemedicine can ease the caregiving burden and enhance parental reassurance, fostering better management of children with neurological disease. It also supports more accessible, sustainable, and multidisciplinary models of care for fragile pediatric patients.

KEYWORDS

TELEMEDICINE	PEDIATRIC NEUROLOGICAL DISEASE	QUALITY OF LIFE

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Dexter arm - DIY exoskeleton

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Exoskeletons have become a major research focus, inspiring strategies to make them efficient and biomimetic. Current solutions remain costly and accessible to few. This research, based on the case study "Il Volo di Ale," develops a wearable device to improve Ale's life. The system acts as a partial exoskeleton for the arm, restoring a limited but effective range of motion. It is self-sufficient, easy to use, and guided by inclusion. The design targets reduced delivery time, weight optimization, and universal accessibility, using parametric, adaptable, and open-source approaches. The final result is an adjustable robotic arm with two degrees of freedom, fully buildable from materials available online or in stores. This project demonstrates the potential of 3D printing for customizable, low-cost solutions.

FORESEEN IMPACT

The Dexter system is designed for the global maker community, enabling easy construction for users with difficulties. Once tested, all materials, manuals, and tutorials will be shared to build a collaborative space for improvements and continuous upgrades.

KEYWORDS

AFFORDABLE HEALTHCARE

EXOSKELETON

3D PRINT

OPEN-SOURCE

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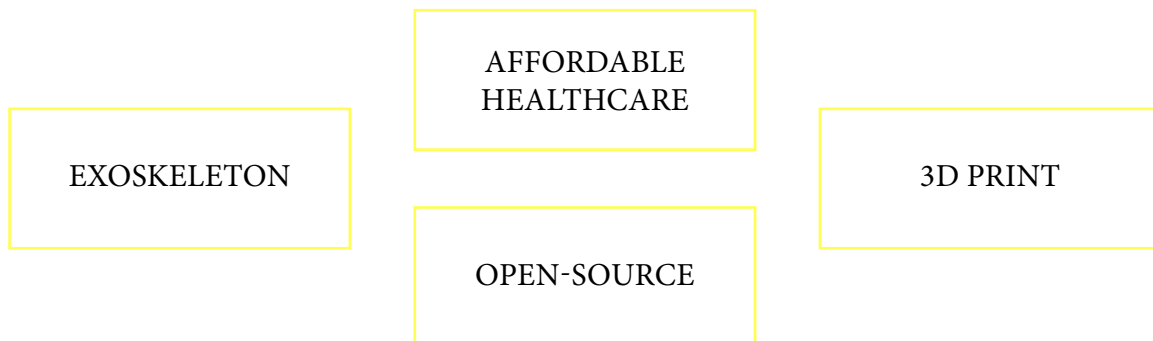
Localization-Guided Triangulation with Depth Cues for Accurate Colorectal Polyp Sizing

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Accurate assessment of colorectal polyp size is critical for resection, surveillance, and cancer risk management, yet current practice lacks a robust reference standard. We present a fully automated pipeline integrated into the Magnetic Flexible Endoscope platform, exploiting its localization system to enable automatic sizing. The algorithm was validated on a colon phantom with six 3D-printed polyps and a marked biopsy forceps for scale. Synchronized endoscopic videos and poses were used to segment polyp borders, match them across frames, and compute 3D coordinates through multi-view triangulation. After outlier removal, the 3D point cloud was projected onto a best-fit plane, and a 2D bounding box was computed to estimate the polyp's dimensions. Multi-view triangulation with depth correction achieved a mean absolute error of 1.64 mm (<2 mm clinical threshold). These results highlight the potential of localization-based triangulation for reliable polyp measurement in clinical practice.

FORESEEN IMPACT

This work enables accurate, operator-independent polyp sizing using localization-guided multi-view triangulation, providing a standardized and reproducible method that can improve clinical decision-making, guide resection strategies, and reduce variability in colonoscopy measurements.

KEYWORDS

COLONOSCOPY	POLYP SIZING	MULTI-VIEW TRIANGULATION

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Click or quit? A longitudinal study on patients' participation and withdrawal in digital healthcare co-delivery

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What motivates citizens to co-produce remains debated, particularly in digital co-production. Our study examines a clinical trial on home remote monitoring where patients actively collect their health data to manage care pathways. Based on Van Eijk and Steen (2016), Steen (2020), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), we identify a conceptual framework including: ease of use, trust, self-efficacy, performance expectancy, socio-demographic factors, and anxiety. Data collection used surveys and the digital device to observe actual use. We analyzed patients who reduced or discontinued app use, comparing drivers of those who continued versus those who decreased or stopped usage. We expect patients with higher internal efficacy, trust, and perceived ease of use will show greater endurance in digital service co-delivery.

FORESEEN IMPACT

This research enhances understanding of what sustains patient engagement in digital health co-production. By identifying key drivers like trust and self-efficacy, healthcare providers can develop effective strategies to prevent dropout, improving care continuity and reducing costs.

KEYWORDS

DIGITAL CO-PRODUCTION	REMOTE MONITORING	PATIENT ENGAGEMENT

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The interplay of coronary serial stenoses and their deceptive impact on hemodynamic and surgical planning

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Evaluating serial coronary stenoses is challenging, as hemodynamic interactions can mask individual lesion severity. We developed a non-invasive framework integrating CFD-derived indices with CAD-RADS classification to guide revascularization. A dataset of 400 virtual artery models was generated to assess hemodynamic changes and outcomes of different angioplasty strategies. Simulations revealed that in >20% of cases, distal intervention unmasked a significant proximal stenosis (FFR <0.8), while proximal treatment improved distal physiology. Based on these findings, a decision tree was designed and validated against CFD simulations and a clinical survey. The framework achieved high diagnostic performance (AUC 0.98, accuracy 0.97), showed 81.2% agreement with cardiologists' final decisions, and reduced unnecessary invasive procedures by 20%. This CFD-based decision support could improve accuracy in identifying significant serial lesions and enhance surgical planning.

FORESEEN IMPACT

The developed framework enables precise, non-invasive assessment of serial coronary stenoses, improving surgical planning, reducing unnecessary procedures, lowering patient risk, and supporting consistent, efficient decision-making in complex CAD management.

KEYWORDS

CORONARY ARTERIES	COMPUTATIONAL FLUID DYNAMICS (CFD)	FFR

PRACTICE:
an intelligent healthcare platform supporting research in hemophilia.

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We present PRACTICE (Pilot on Remote Automatic ulTrasound scan analysIs for hemophiliC patiEnts), a distributed healthcare platform that supports the acquisition, annotation, organization, and processing of medical data, making it accessible for machine learning training. The system comprises three main components: GAJA, a mobile app that guides patients in self-acquiring ultrasound images at home, enabling personalized remote monitoring of joint health; CADET, a web-based computer-aided diagnosis tool that assists practitioners through machine learning models; and ATOM, a system for orchestrating annotation tasks.

Although developed for detecting joint recess blood effusions in hemophilic patients, PRACTICE also addresses broader design and implementation challenges, positioning it as an advanced telemedicine application within the framework of MUSA Spoke 2.

FORESEEN IMPACT

PRACTICE aims to a) improve the quality of life for hemophilic patients through monitoring of joint health at home, b) support the practitioner through AI tools, and c) enable the development of new machine learning models thanks to the definition of data acquisition and annotation protocols.

KEYWORDS

| TELEMEDICINE | ULTRASOUND SELF-ACQUISITION | MACHINE LEARNING |

Impact of Telemedicine-Based Nutritional Management in Infants with Inherited Metabolic Disorders: Preliminary Findings

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IN COLLABORATION WITH OSPEDALE DEI BAMBINI VITTORE BUZZI , MILANO

Background: Telemedicine (TLM) may offer several benefits in the management of patients with chronic diseases, such as inherited metabolic diseases (IMDs), where diet is the pivotal therapy, requiring continuous adjustments. This pilot study evaluated the effectiveness of telemedicine (TLM) in nutritional follow-up during the first year of life of IMDs patients.
Methods: Biochemical markers were evaluated and a satisfaction score questionnaire was administered to caregivers.
Results: 9 patients were enrolled; 7 received TLM/in-person care, 2 only in-person care. Metabolic control and nutritional indices were comparable in both groups. Caregivers who used TLM reported high score satisfaction. The main issue was language barriers.
Conclusions: TLM is a useful tool for early nutritional management in IMDs, integrated into standard care, with attention to communication support.

FORESEEN IMPACT

Integrating telemedicine into the nutritional follow-up of IMDs during the first year of life can maintain clinical efficacy while improving caregiver satisfaction, paving the way for broader implementation in chronic care management, especially where access to specialized centers is limited.

KEYWORDS

TELEMEDICINE	INTEGRATED CARE	NUTRITIONAL

Fatigue-induced alterations in lower limb biomechanics and muscle activity during single-leg jumps

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Introduction: Neuromuscular fatigue (NMF) influences motor control mechanisms, possibly leading to risky movement biomechanics. We assessed how NMF alters motor coordination during single-leg hop for distance jumps (SLHD), possibly increasing ACL-loading.

Methods: 24 participants performed SLHD, before and after an individually tailored NMF protocol. We evaluated jump length, kinematics and EMG activity of lower limb muscles before and after landing.

Results: Following NMF, we observed a reduction in jump length, associated with alterations in hip and knee joints kinematics. We also observed a significant increase in quadriceps and a decrease of hamstrings muscle activity.

Discussion: NMF led to a quadriceps-dominant landing strategy (increased quadriceps activity & reduced knee flexion). Along with the increased knee abduction, results indicate that NMF increases the risk of ACL-injury. Alterations in EMG activity suggest that NMF affects both feedforward and feedback control strategies.

FORESEEN IMPACT

The study provides a comprehensive evaluation of how NMF influences movement neuromechanics, contributing valuable insights to sports injury prevention and rehabilitation. Furthermore, the use of a tailored NMF protocol ruled out possible confounders related to participants' fitness level.

KEYWORDS

NEUROMUSCULAR FATIGUE	ACL	BIOMECHANICS

Longitudinal Assessment of Visual and Anatomical Eye Parameters Across Age Groups

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Volunteers belonging to three age groups (8–18, 21–24, 40–45 years) participated in an 18-month longitudinal study with scheduled visits at baseline, 9, and 18 months. Various optometric variables were assessed, including refractive error, while multiple instruments were employed to monitor ocular features. In particular, axial length was measured using a biometer and tracked over time, with special focus on the paediatric group. Its progression was analysed in relation to changes in refractive error. Imaging tools were also applied to evaluate anatomical parameters, both longitudinally within each group and cross-sectionally across age ranges. The results will be presented and discussed. This study provides insights into the dynamics of ocular growth and refractive development over time.

FORESEEN IMPACT

Longitudinal evaluation of visual parameters in different age groups may help identify early predictors of refractive changes and inform preventive strategies.

KEYWORDS

AXIAL LENGTH	REFRACTIVE ERROR	LONGITUDINAL STUDY

Nothing is created, nothing is destroyed, everything is transformed: a study on sustainable value in digital service ecosystems

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Value creation unfolds in complex public service ecosystems, across macro, meso, micro and sub-micro levels, where it may emerge or be undermined. Yet empirical evidence remains limited. This study reports a three-year ethnography of a healthcare service re-design: two hospitals, a pharma company, and a university collaborated in a multicenter randomized trial, shifting heart failure care from in-person to at-home telemonitoring via a web app and digital platform collecting clinical and experiential patient data. Observations, surveys and interviews reveal how value dynamics span ecosystem levels. A three-level measurement model shows that value for organizations and individuals is neither simply created nor destroyed; rather, digitalization enables its transformation along with service delivery. Though requiring major organizational and financial effort, this transformation can advance public value in the long term by enhancing accessibility and responsiveness to citizens' needs.

FORESEEN IMPACT

This study advances the debate on value co-creation by showing a middle ground between creation and destruction. It offers empirical evidence for service ecosystem theory and a framework to guide policymakers and managers in sustainable digital healthcare transformation.

KEYWORDS

PUBLIC SERVICE ECOSYSTEMS	VALUE CO-CREATION	DIGITALIZATION

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Virtual Reality Meets Cognitive Health: New Tools for Aging Populations

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Emerging technologies like Extended Reality (XR) offer exciting possibilities for creating immersive and interactive virtual environments. These technologies are rapidly moving beyond entertainment applications, and many believe they will have a revolutionary impact on society.

In our project we developed an XR tool to assess cognitive functions in people with subjective memory complaints. Preliminary evidence shows high ecological validity and a better performance discriminating initial stages of cognitive decline as compared to classic paper-and-pencil tools.

Cognitive training and stimulation have proven valuable in preventing age-related cognitive decline in healthy older adults.

Therefore, we also tested an intervention program that uses gamified tele-cognitive-motor training to improve functionality and well-being in senior citizens. Results show that the program favoured an improvement in cognitive functions.

FORESEEN IMPACT

Our XR solutions support cognitive health in aging by detecting early decline more accurately than paper tests and strengthening mental functions through engaging, gamified training programs.

KEYWORDS

XR	AGEING	COGNITION

Integrating Wearables and EMA for Work-Related Stress Monitoring: An Acceptability-Focused Protocol.

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This study presents a protocol for monitoring work-related stress (WRS), a growing concern in occupational health. The protocol was developed through collaboration between the work psychology experts at the BICApP laboratory at the University of Milano-Bicocca and the IEX Interaction and Experience Design Lab at the Politecnico di Milano. This interdisciplinary approach ensures robust data collection and exploits a user-centred design approach. The protocol integrates subjective measures via ecological momentary assessments with physiological data from wearable devices, introducing an innovative focus on acceptability. Tested in a pilot study, the protocol collects data through focus groups, questionnaires, semi-structured interviews, and compliance indicators. The results demonstrate the effectiveness of this approach in investigating work-related stress and identifying factors that influence acceptance, as well as highlighting cognitive and behavioural factors.

FORESEEN IMPACT

The study delivers an experimental protocol and evidence-based recommendations to investigate stress in real workplaces, optimising the assessment of workers' acceptability.

KEYWORDS

WORK-RELATED STRESS	PROTOCOL	ACCEPTABILITY

From emergency to Innovation: the roadmap of a comprehensive telehealth platform

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Born from the urgent need to manage patients during the COVID-19 emergency, our telehealth platform began as COD19/20, a service for active home surveillance and virtual consultations. It has since evolved through the MUSA project into a comprehensive, horizontal platform designed to seamlessly connect hospitals, community services, and the patient's home. Current development focuses on integrating new core services like telemonitoring and telecontrol ensuring full interoperability with the National Health Service (e.g., electronic health records, e-prescriptions), and empowering patients through a dedicated mobile app. The platform's capabilities are being validated across multiple pediatric areas, including nutrition, cardiology, neurology, endocrinology, diabetology and inborn errors of metabolism, as well as through pilot studies such as early hospital discharge and tele-gym. The roadmap envisions an intelligent care ecosystem, leveraging AI to enhance clinical decision support.

FORESEEN IMPACT

Our platform breaks down healthcare silos by connecting hospitals, local services, and patient homes. This improves care continuity, optimizes resources, and empowers patients, creating a more resilient and integrated healthcare ecosystem.

KEYWORDS

TELEMEDICINE	INTEGRATED CARE	DIGITAL HEALTH PLATFORM

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Accuracy of the comestai App, using remote photoplethysmography, for wellness self-monitoring

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Mobile health applications (Apps) support self-monitoring, crucial for early diagnosis of chronic diseases such as hypertension, dyslipidemia and diabetes.

To assess the accuracy of the comestai App, based on remote photoplethysmography (rPPG), in monitoring vital signs and biochemical indicators adult volunteers were enrolled. rPPG data were collected via smartphone front cameras. Simultaneously, heart rate, blood pressure, and oxygen saturation were measured with reference devices, while biochemical tests (hemoglobin, glycated hemoglobin, cholesterol) served as standards for comparison with App data.

Results: High accuracy was observed for heart rate and oxygen saturation (>90%), moderate for blood pressure (61%), hemoglobin (75%), cholesterol (65%), and lower for glycated hemoglobin (48%).

The comestai App shows promise as a non-invasive self-monitoring tool, with potential to support personalized prevention and reduce the burden of chronic diseases.

FORESEEN IMPACT

The comestai App, based on rPPG, offers a scalable, non-invasive tool for self-monitoring. It may support personalized prevention, empower patients, and help reduce the burden of chronic diseases by enabling early detection and continuous health tracking.

KEYWORDS

APP	REMOTE PHOTOPLETHYSMOGRAPHY	SELF-MONITORING

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SOCIAL INFRASTRUCTURE

The *Social Infrastructure* section examines how institutions, communities, and technologies shape inclusion, equity, and everyday wellbeing. The contributions address gender and migration, urban accessibility, legal empowerment, welfare models, and social innovation, offering tools and insights that strengthen collective capabilities. Together, they highlight how socially responsive policies and infrastructures can support fairer, more resilient, and more cohesive urban and civic environments.

Migrant Women Civic Engagement: Towards an Active Intersectional Citizenship

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The project Women's political engagement and the prevention of gender-based violence examined the social life quality of migrant women in Milan, applying the notion of active citizenship to identify processes of empowerment and emancipation from violence, while challenging gender and cultural stereotypes that portray migrant women as inherently vulnerable and victims. The research, structured in three phases: 1) a review of international and national literature on migration from an intersectional and postcolonial perspective; 2) engagement with institutional actors - particularly the Municipalities and the Mayor's Delegate for Gender Equality - and third-sector organizations to valorize integration practices and co-design local initiatives; 3) training activities for social actors focused on gender-based violence and intercultural dialogue, and focus groups with migrant women conducted through the narrative method (in collaboration with local associations and cultural mediators).

FORESEEN IMPACT

The action-research outlined the contours of an intersectional, postcolonial, gendered and intercultural citizenship, capable of transforming migrant women's vulnerabilities into resources of agency. The project is designed for replication in other territorial contexts.

KEYWORDS

ACTIVE CITIZENSHIP	EMPOWERMENT	INTERSECTIONALITY

Reimagining Milan: Integrating Intersectional Approaches to Gender-Inclusive City Planning

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The urban environment has predominantly been shaped through technocratic practices that have often reinforced existing power dynamics and overlooked gender as a critical factor. This research examines how a gender perspective can be integrated into urban analysis in Milan.

Building on intersectional feminist theory, the research advocates for three interwoven dimensions: a spatial interpretation of intersectionality, recognition of bodily diversity, and the development of unbiased urban data. By incorporating gender-disaggregated data that captures how the overlapping and intersecting systems of oppression affect different demographics, it will highlight areas where traditional urban designs may fail to address the daily needs of diverse populations. Using available datasets, the study constructs a composite intersectional indicator that combines gender, age, migration background, and socio-economic status.

FORESEEN IMPACT

The project helps identify hotspots where multiple disadvantages overlap, providing a more detailed view of inequality and offering a transferable method that applies intersectionality in urban analysis. This enables policymakers to identify vulnerable areas and develop inclusive interventions.

KEYWORDS

GENDER PLANNING	INTERSECTIONALITY	GENDER DATA GAP

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Mapping the RRR activities in Milan

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This work involves creating a map that includes traditional services related to Recycling, Repair, and Reuse (RRR) activities. In particular, it includes the mapping of crafting and repair services, and of recycling and resale services for discarded clothing/objects. Moreover, it measures the effect of the presence of services in Recycling/Repair/Reuse and identifies the effect of the presence/absence of these services/shops on various local outcomes (sense of community, perception of safety, etc.). Finally, this work aimed to raise community awareness about the importance of RRR and increase knowledge of issues and opportunities. To reach this aim, the researchers collected the RRR activities from multiple resources by conducting a desktop research, then matched secondary data and survey responses at the NIL level in Milan.

FORESEEN IMPACT

Help Milanese residents to identify the activities that provide repair, recycle, reuse services in the Milan city area for mostly fashion and design products. Provide to Comune key metrics and relations that show the impact of these activities in the city in terms of safety, maintenance and density.

KEYWORDS

REPAIR	REUSE	RECYCLE

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Social impact assessment of urban regeneration operations; for a methodological and operational approach aimed at planning and implementing interventions

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Exp-EIA is a method and participatory digital tool combining geographical information and psychological constructs into automatic cartographic representations of people's subjective experience of places. This work presents its integration within a broader framework for assessing urban regeneration projects, aimed at fostering a just city by preventing exclusion and gentrification. The case study concerns the Città Studi neighborhood in Milan, which is currently undergoing a significant crisis with major impacts on its inhabitants. By merging Social Impact Assessment with a spatial justice perspective, we examine whether this approach can ensure more just projects and processes, and whether it can move beyond its evaluative role to function as a proactive planning instrument. The results highlight: 1) mapping of involved communities; 2) representation of people's experiences in the area; 3) strategies to reinforce the tool as a community resource for assessing social impact and justice.

FORESEEN IMPACT

The research builds a practical alliance between University and community, raising awareness on urban transformations and their effects. It delivers concrete strategies and tools that communities can directly use to assess and influence the spatial justice impact of regeneration projects.

KEYWORDS

SOCIAL IMPACT ASSESSMENT	SPATIAL JUSTICE	EMPOWERMENT

Legal Clinics Behind Bars: Empowering Rights, Building Inclusion

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Bocconi Legal Clinics, within the MUSA ecosystem funded by the PNRR, bring legal expertise into prisons to promote inclusion and combat inequality. The legal desk at Bollate, active since 2019 and now supported by MUSA, and the new desk at San Vittore, launched in 2023, provide free legal assistance to detainees while training law students through direct engagement with real cases. In Bollate (mainly convicted inmates), students often help draft applications for alternative measures, while in San Vittore (mostly pre-trial) activities focus on listening and counselling. Two weekly sessions are held in each prison, involving around fifteen students in Bollate and five in San Vittore, all supervised by faculty members and tutors. Weekly coordination meetings turn these experiences into a "law in action" laboratory, strengthening research, drafting and communication skills. The Clinics support more than three hundred detainees each year, highlighting their social and educational impact.

FORESEEN IMPACT

Consolidating legal clinics as replicable models; producing research outputs and best-practice guidelines; developing students' legal, social, and interpersonal skills; and empowering detainees to understand their rights, access benefits, and foster social reintegration.

KEYWORDS

RIGHTS	INCLUSION	EMPOWERMENT

Robot-Enhanced Imitation Therapy for Autism: Insights from a Randomized Controlled Trialt

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Autism Spectrum Disorder (ASD) affects about 1% of the Italian population and is marked by socio-communicative difficulties. This project introduces a Robot-Enhanced Imitation Therapy (RET) to foster social abilities, evaluated in a Randomized Controlled Trial with IRCCS Fondazione Don Gnocchi. Preliminary findings on 14 preschool children showed significant gains in social skills for the RET group compared to controls (Δ=5.93 ± 7.07 for RET vs. −4.57 ± 7.71 for control, p<0.01). To support objective assessment, innovative gaze-based Joint Attention (JA) metrics were extracted during an adaptation of the Early Social Communication Scale, showing significant differences between ASD and typically developing peers matched for developmental age (18–24 months). AI algorithms were also developed to estimate gaze direction and quantify JA, while additional AI models were designed to measure engagement—the proportion of imitated gestures—showing correlation with treatment effectiveness.

FORESEEN IMPACT

This project integrates clinical and engineering research to advance ASD intervention and assessment. The clinical impact is grounded in one of the few RCT available in this field. On the engineering side, it advances AI algorithms capable of quantifying behaviours in challenging environments.

KEYWORDS

AUTISM	ROBOT-ENHANCED THERAPY	JOINT ATTENTION ASSESSMENT

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Development of Territorial Welfare Models in Milan

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This research explores the development of territorial welfare models in Milan, examining how new infrastructures of care emerge at the intersection of public institutions, third sector actors, and community networks. These models highlight the potential of proximity, co-programming, and data-informed governance to foster inclusion and citizen participation. At the same time, they face structural limits: fiscal constraints, housing exclusion, demographic pressures, and the fragmentation between institutional levels. The analysis reveals both opportunities and risks: community approaches can complement traditional systems by mobilizing local resources and enhancing responsiveness, yet may also generate uneven access, shifting responsibilities, and fragile sustainability. The project thus critically assesses Milan's evolving welfare architecture, offering insights for urban policies seeking to balance innovation with equity in the pursuit of social cohesion.

FORESEEN IMPACT

The research is expected to inform policy design by providing evidence on effective governance arrangements, highlighting transferable practices for inclusive welfare, and supporting stakeholders in developing sustainable strategies to reduce inequalities and strengthen urban cohesion.

KEYWORDS

LOCAL WELFARE	TERRITORIAL GOVERNANCE	SOCIAL INCLUSION

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The Advance of the Invisible Giant: Occupational Welfare in Italy from Workers' Perspective

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In recent years, Italy has experienced a marked growth of occupational welfare, defined as the set of benefits and services offered by employers, institutions and organisations as a complement to wages, provided through either collective bargaining or unilateral initiatives. Despite its expansion, occupational welfare has so far attracted limited scholarly attention, largely due to the scarcity and fragmentation of reliable data. The poster will present the preliminary results of the first national survey on occupational welfare, based on a representative sample of 3,000 individuals. The survey investigates both the availability and actual use of occupational welfare provisions, as well as their perceived relevance among workers and job-seekers. The analysis aims to assess whether such measures may foster greater equity among employees or, conversely, reinforce existing inequalities by mainly benefitting those already in a privileged labour market position.

FORESEEN IMPACT

The study will provide findings that can be used by policy makers to better calibrate alternative welfare responses to emerging social needs, and by employers' associations and trade unions to jointly explore solutions that may enhance equity and workers' well-being.

KEYWORDS

OCCUPATIONAL WELFARE	COMPANY-BASED WELFARE	WELFARE MIX

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The Planning Game. Inclusion and Coordination in the Governance of Urban Regeneration Projects.

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Urban regeneration projects are often negotiated on a case-by-case basis, resulting in weak community involvement and fragmented outcomes. This research develops a model to explain why public and private actors tend to opt for minimal commitments, even when stronger cooperation would benefit all parties. Using a game-theoretic lens, the study reveals the factors that prompt municipalities and developers to opt for safer but suboptimal choices. To overcome this, the research proposes "collaborative frameworks" that include local communities from the outset and establish clear baseline obligations in urban plans. These act as territorial social contracts, aligning expectations and anchoring regeneration projects to fairness and sustainability. By combining theoretical modelling with practical design principles, the project offers governance tools that can guide municipalities, developers, and industry partners toward more stable, equitable, and innovation-driven regeneration strategies.

FORESEEN IMPACT

The research provides municipalities, developers, and communities with collaborative frameworks that reduce risks, anchor projects to fairness and sustainability, and translate theoretical insights into governance tools that support inclusive and innovation-driven regeneration.

KEYWORDS

URBAN REGENERATION	COLLABORATIVE FRAMEWORKS	TERRITORIAL SOCIAL CONTRACT

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WizRD: a Framework for Personalized Wayfinding

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WizRD is a wayfinding system that goes beyond conventional platforms, which optimize only for time or distance while overlooking comfort, safety, and accessibility. It allows users to set personal preferences (e.g., avoiding crowded areas, favoring green spaces, choosing accessible paths) and generates tailored routes using flexible cost functions and different routing algorithms. The system supports multimodal navigation with integrated interchange stations (LUMI) and enriches OpenStreetMap data with heterogeneous sources, such as traffic, air quality, and walkability indices. A prototype was developed at the University of Milano-Bicocca, with particular attention to vulnerable users. It also features an interactive dashboard that visualizes and combines environmental metrics, making the decision process transparent. WizRD shows that personalized navigation and situational awareness can coexist practically and effectively.

FORESEEN IMPACT

The foreseen impact is providing a toolset for developing customized navigation solutions, possibly extending it to a broader geographic area. The proposed solution also considers the possibility of developing stand-alone, custom dashboards to support domain experts.

KEYWORDS

WAYFINDING	VISUALIZATION

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From Annotation to Detection: Evaluating LLMs for Hate Speech and Stereotype Identification in Italian

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Data annotation, the process of labeling raw data, is essential for machine learning but remains costly, slow, and difficult to scale—particularly for subjective tasks like hate speech and stereotype detection. Recent advances in Large Language Models offer potential to automate this process, yet state-of-the-art models such as GPT-4 are impractical at scale due to high computational and resource demands. Knowledge distillation provides a promising alternative, though current methods often lack diversity and contextual richness. To address these limitations, we propose a teacher–student framework where three large LLMs generate labels through a voting system, and a smaller student model learns from them. This approach leverages the complementary reasoning of multiple teachers while ensuring label reliability. Applied to Italian hate speech and stereotype detection, our method improved accuracy by 17.06%, demonstrating the effectiveness of committee-based annotation and distillation.

FORESEEN IMPACT

This work offers a reliable and scalable alternative to manual annotation, reducing the cost and time for creating large-scale datasets for subjective NLP tasks. It demonstrates the effectiveness of LLM-committee knowledge distillation for training small but accurate models for the Italian language.

KEYWORDS

LARGE LANGUAGE MODELS	STEREOTYPE DETECTION	KNOWLEDGE DISTILLATION

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FASHION FOR GOOD - Enhancement of social tailoring «Ke Chic»

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This is a Pilot Project to enhance Kechic, a social tailoring based in Milan: it is an Italian-African tailoring and also a clothing brand. It is a hope that takes shape, a dream that becomes reality, a common work that, with needle and thread, unites Dakar with Milan. It was born from the meeting between Valeria and Cheikh. He is Senegalese and a tailor, she is Italian and a communication expert. It originates from this friendship, from the desire to create something beautiful together and share it.

The project has aimed to boost tailoring communication, producing video material to be used on its social profile and its website and also on the Musa Next App. Through the collaboration with the fabric company Brunello Spa, of whose BemBAZINTM fabric the social tailoring is the only retailer in Italy, and with the Unimi synergy the production of social tailoring has been enriched with new digital patterns for reusing fabrics or old clothes to create new clothes and for rethinking clothes with fabric inserts.

FORESEEN IMPACT

It is a long-term impact from the point of view of the usability of video materials for communication and the digital patterns, while it is a shorter-term impact for the availability of fabric sizes.

KEYWORDS

SOCIAL TAILORING	DIGITAL PATTERNS	MUSA NEXT APP

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Between access and exclusion: The social consequences of platform-based welfare in local contexts

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Digital welfare platforms are reshaping local welfare ecosystems, offering new forms of service coordination while often reinforcing inequality. Based on an original global dataset of 285 cases, this study develops a multidimensional classification framework to analyze how platform models vary by target group, ownership model, delivery channel, pricing structure, and reporting logic. Findings show a dominance of fee-based and digital-only services, limited inclusion of vulnerable users, and a marginal role of public actors. Platforms targeting mental health or medical needs are more developed than those serving youth, the elderly, or disabled people. In local settings where proximity and trust are essential, platformization risks eroding inclusive support structures. The study highlights the need for co-produced digital infrastructures and renewed public governance to align platform development with territorial cohesion, social justice, and urban equity goals.

FORESEEN IMPACT

The study provides new evidence on how platform-based welfare affects social inclusion, equity, and public responsibility. It informs urban policy by identifying governance gaps and design failures, while supporting co-creation strategies for fairer digital infrastructures.

KEYWORDS

DIGITAL WELFARE	SOCIAL INCLUSION	URBAN GOVERNANCE

Permanent Legal Observatory on the Rights of Persons with Disabilities

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The Permanent Legal Observatory on the Rights of Persons with Disabilities monitors legislative and case law developments in anti-discrimination law, addressing the lack of structured indicators in this field. Over 1,800 rulings have been selected and analyzed, and are available with summaries on the website: www.osservatoriodisabilitahumanhall.unimi.it. Each year, the most relevant decisions are discussed in the Observatory's Annual Report, now in its second edition. Since January 2025, the monthly newsletter "Diritti ad ostacoli", published on LinkedIn and the website, provides ongoing updates on key developments in disability rights law.

FORESEEN IMPACT

The Observatory will ensure continuous monitoring, provide accessible legal information, and promote awareness on disability rights, becoming a stable reference for professionals and supporting inclusion in line with the UN CRPD's aims.

KEYWORDS

PERSONS WITH DISABILITIES	RIGHTS	CASE LAW

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The Epistemic Dimension in Innovation Diffusion and Fair Policy Making

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While many green technologies have clear environmental advantages, individual resistance and societal inertia can slow down their widespread adoption. Overcoming these barriers requires combining governmental incentives with social structures that promote diffusion through imitation. However, discrimination based on social identity can hinder this process. By formalizing the epistemic properties of a social environment through relational credibility and individual reliability, along with the concept of epistemic fairness, we analyze the impact of epistemic unfairness on innovation diffusion in open-loop and closed-loop scenarios. Our findings underscore the influence of epistemic factors on adoption dynamics and fair policy design, offering insights into solutions for a fairer dissemination of sustainable technologies.

FORESEEN IMPACT

By accounting for epistemic factors, policymakers can craft interventions that are both distributively and epistemically fair, reducing marginalization, improving policy efficiency and cost-effectiveness, and fostering equitable diffusion of sustainable technologies.

KEYWORDS

EPISTEMIC FAIRNESS	OPINION DYNAMICS	ADOPTION DIFFUSION

Student housing and inequalities: insights form the University of Milan-Bicocca

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The project draws on two survey waves with over 20,000 students at Milan-Bicocca (2023–2025), examining housing trajectories, commuting, neighbourhood needs, discrimination, financial stress, and satisfaction. Over half commute more than 45 minutes, mainly those living with parents, while independent students face high rents, overcrowding, instability, and reliance on family support. Discrimination in the rental market, especially against international and non-EU students, deepens inequalities. Housing satisfaction differs by tenure: highest among owner-occupiers, lowest among private renters. Key determinants include privacy, sociability, affordability, and stability. Student housing emerges as a key equity issue, requiring integrated policies linking housing, transport, and regeneration. Dissemination includes AIS Bari, ENHR 2024 and ENHR 2025, submitted publications, and two annual reports publicly available.

FORESEEN IMPACT

The project informs research-based university policy. Concrete outcomes so far include the creation of the Centro di Ricerc-Azione sull'Abitare Studentesco di Ateneo (C.A.S.A.) and ABC Abitare Bicocca Città, UniMiB's housing support service.

KEYWORDS

STUDENT HOUSING	STUDENT MOBILITY	SOCIAL INEQUALITIES

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Children's Trust and Cheating: The Impact of Who You Play With

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This study examined how diversity exposure influences trust and honesty in children during a sticker-based trust game. Participants made investment decisions with partners varying in gender, disability, and migrant status, followed by opportunities to retrieve their earned stickers autonomously. Trust was measured through transfer choices, while honesty was assessed by comparing actual versus retrieved stickers. Results revealed slight variations in both trust and cheating, with partner characteristics shaping investment behavior and honesty to a modest degree. These findings suggest that children's responses to diversity are nuanced, influencing trust and trustworthiness in subtle but measurable ways.

FORESEEN IMPACT

The results provide insight into how early experiences with diversity shape social decision-making. They may inform educational strategies to foster inclusion, fairness, and trust from an early age.

KEYWORDS

TRUST	HONESTY	DIVERSITY

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When Difference Matters: Shifts in Trust Toward Diverse Partners

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This study investigated how exposure to diversity influences trust in economic exchanges. Using an online trust game with a representative Italian sample, participants made investment decisions with partners whose characteristics—gender, migrant status, and disability—were exogenously varied through AI-generated photos. Results reveal slight but consistent differences in trust, most pronounced when partners displayed a visible disability, while effects of gender and migrant status were less marked. These findings highlight the subtle ways in which perceptions of diversity shape trust, underscoring the importance of understanding how biases influence economic and social interactions.

FORESEEN IMPACT

These findings shed light on the subtle role of disability in shaping trust, offering new evidence of how visible differences influence social and economic interactions. They can inform policies and educational programs aimed at reducing bias and fostering inclusion in diverse societies.

KEYWORDS

TRUST	DISABILITY

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Universal Design Based Signage and Wayfinding

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Our research provided comprehensive insights into the orientation challenges faced by Bicocca University from multiple perspectives through various actions.

A literature review established guidelines for evaluating the current signage system and analysing issues from a universal design perspective. We examined the needs of diverse groups, including new students, students with disabilities and international students.

Based on these findings, we created a preliminary prototype inspired by metro maps, organising buildings into metro lines and stops. The name of each stop identifies its location while giving it an identity through relevant characters or topics that match its function. For example: The 'Education' area features the names of educators. This creates 'cultural gravity centres', helping students to feel connected to something larger.

The Metro Map is simple and relatable: it is organised around user expectations, a proven system used in major cities worldwide.

FORESEEN IMPACT

We expect that the Concept Protype Proposal and the field research made based on the Literature Review will inspire a more inclusive wayfinding system for Bicocca University. We plan to continue developing these ideas further together with B.Inclusion in the coming years.

KEYWORDS

SIGNAGE	WAYFINDING	UNIVERSAL DESIGN

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