



## D7.7 Results of the Scientific Dissemination

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## Executive Summary

This dissemination report summarizes the communication, dissemination, and engagement activities carried out within the HOLDEN project funded by the European union. The project aims to advance RF-based holography and dense wireless sensing technologies through an ethics-first and privacy-by-design approach, ensuring that technological innovation is developed in alignment with societal values and fundamental rights.

HOLDEN has implemented a comprehensive and multi-layered dissemination strategy addressing a large and diverse audience, including the scientific community, industry and innovation stakeholders, policy-relevant actors, students and early-career researchers, and the general public. Dissemination activities span high-quality scientific publications, participation in leading international conferences, public outreach and societal engagement formats, educational activities, and digital dissemination channels.

In line with Horizon Europe requirements for open science, a large variety of project deliverables have been made publicly available, including technical reports, ethical and societal analyses, and open-source datasets released via persistent digital repositories. These activities support transparency, reproducibility, and long-term accessibility of project results beyond the project's lifetime.

Public engagement has been a central element of the dissemination strategy, with participatory formats such as interactive exhibitions, workshops, seminars, and invited talks fostering informed dialogue on the societal implications of RF-based sensing technologies. Digital dissemination through the project website, professional social-media outreach, and open-source data platforms further amplifies the reach and impact of the project's outcomes.

Overall, the dissemination activities carried out within HOLDEN contribute not only to scientific excellence but also to broader societal impact. By integrating technical dissemination with ethical reflection, stakeholder engagement, education, and open digital access, HOLDEN supports the development of trustworthy, human-centered sensing technologies and promotes informed societal understanding of their opportunities and limitations.

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## Abbreviations

Abbreviation	Description
2D	Two-Dimensional
3D	Three-Dimensional
Aalto	Aalto University
AI	Artificial Intelligence
AllIoT	Artificial Intelligence for the Internet of Things
APS	Antennas and Propagation Society
APWC	Antennas and Propagation in Wireless Communications
AWPL	Antennas and Wireless Propagation Letters
BPA	Back-Projection Algorithm
CNR	Consiglio Nazionale Ricerche
CSI	Channel State Information
DCGNN	Deep Graph Convolutional Neural Network
DOA	Direction of Arrival
DOI	Digital Object Identifier
EC	European Commission
EIC	European Innovation Council
EM	Electromagnetic
EMTS	Electromagnetic Theory Symposium
ESM	Ethics Status Monitor

ETFA	Emerging Technologies and Factory Automation
EU	European Union
EuCAP	European Conference on Antennas and Propagation
FAIR	Findable-Accessible-Interoperable-Reusable
FF	Far Field
FFT	Fast Fourier Transform
FIAFTA	Fast Irregular Antenna Field Transformation Algorithm
FMCW	Frequency-Modulated Continuous Wave
GMRES	Generalized Minimal Residual Solver
GNN	Generative Neural Network
GO	Geometrical Optics
GPU	Graphics Processing Unit
HE	Horizon Europe
HOLDEN	Ethical Design Of Holography in Dense Wireless Networks
ICCEM	International Conference on Computational Electromagnetics
ICEAA	International Conference on Electromagnetics in Advanced Applications
IoT	Internet of Things
IRLaB	Interdisciplinary Research Lab for Bioethics
ISAR	Inverse Synthetic Aperture Radar
ISR	Inverse Source Reconstruction
ISWC	International Symposium on Wearable Computers
KPI	Key Performance Indicator
LLM	Large Language Model
LOS	Line-Of-Sight
MIMO	Multiple-Input-Multiple-Output
MLFMM	Multilevel Fast Multipole Method
MLFSDA	Multi-Level Fast Spectral Domain Algorithm

MobiSys	Mobile Systems, Applications, and Services
MoM	Method of Moments
MTC	Machine Type Communication
NF	Near Field
OFDM	Orthogonal Frequency Division Multiplexing
OJAP	Open Journal of Antennas and Propagation
PEC	Perfect Electric Conductor
PerCom	Pervasive Computing and Communications
PIER	Progress in Electromagnetics Research
PIMRC	Personal, Indoor and Mobile Radio Communications
POLIMI	Politecnico di Milano
PWS	Plane-Wave Spectrum
RF	Radio Frequency
RFID	Radio Frequency Identification Device
RIS	Reconfigurable Intelligent Surface
RSSI	Received Signal Strength Indicator
RT	Ray Tracing
RT-BPA	Ray-Tracing Enhanced Back-Projection Algorithm
RX	Receiver
SAR	Synthetic Aperture Radar
SBR	Shooting and Bouncing Rays
SmartComp	Smart Computing
SNR	Signal-to-Noise Ratio
TAP	Transactions on Antennas and Propagation
TDoA	Time Difference of Arrival
TMS	Techno-moral Scenarios
ToF	Time of Flight

TOI	Target of Interest
TUM	Technical University of Munich
TWE	University of Twente
TX	Transmitter
URSI	International Radio Science Union
VSD	Value Sensitive Design
WP	Work Package
WPMC	Wireless Personal Multimedia Communications

# 1. Introduction

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## 1.1 About HOLDEN

The ubiquitous perception by sensing of objects, subjects, and gestures is a pivotal challenge for future technology: it enables personalized services such as smart living, automated logistics or interaction through free-space gestures. However, it also challenges ethical and moral boundaries and threatens privacy. HOLDEN proposes a radically new approach to perception by concisely analysing ethical constraints and privacy risks while re-thinking RF-based sensing. We establish necessary conditions for privacy preserving and ethically compliant sensing and develop new paradigms respecting these constraints.

For the first time ever, HOLDEN constitutes a concentrated effort to explore social aspects of RF-sensing to guide the technological advance and to derive technology for ethically and privacy compliant perception. Central to HOLDEN is the development of ethical and privacy constraints. We use these findings to derive privacy and ethically compliant concepts for RF-based perception. We will develop a system of distributed multi-antenna devices for simultaneous multitarget recognition and ubiquitous perception with unprecedented accuracy, which constitutes a radical paradigm shift from a technology-centric perspective to a privacy-centric one via privacy by design.

HOLDEN achieves this goal along three high risk, complementary, and privacy-centric paths:

Path 1: Continuous-space measurement points: Radio-based 3D vision by holographic image processing of RF wavefronts.

Path 2: Discrete-space measurement points: Advanced 3D beamforming for human-scale recognition and tracking through dense massively connected antenna arrays.

Path 3: Signal processing and learning: High-dimensional tensor processing for the distinction of complex activities and motion from massive-dimensional RF data. The resulting breakthrough approaches and algorithms will be compared against application-level benchmarks via usage scenarios in the fields of logistics, smart living, and free-space

## 1.2 Partners

The consortium consists of five academic partners and a high-tech SME partner: (a) Aalto University (AALTO), Finland, (b) Technical University of Munich (TUM), Germany, (c) Consiglio Nazionale Ricerche (CNR), Italy, (d) University of Twente (TWE), Netherlands, (e) Interdisciplinary Research Lab for Bioethics (IRLaB), Czech Republic, and (f) Adant

(Adant), Italy. This consortium features the specialized and complementary expertise required to achieve the project objectives. AALTO is responsible for the project management (WP1), covered by an experienced and dedicated project manager. Ethical aspects (WP2), are addressed by TWE (Prof. Ciano Aydin) in assistance with IRLaB who are both pioneers in the field. In particular, eventual gender differences in the ethical perception are taken into account. TUM pioneered RF holography, which makes TUM (Prof. Thomas Eibert) the ideal leader of WP3. In advanced distributed signal and information processing, CNR has through Prof. Stefano Savazzi and Vittorio Rampa more than 14 years of experience. CNR leads WP4. Since more than 10 years, AALTO has been active in radio sensing and machine learning based activity recognition. This expertise makes AALTO (Prof. Sigg) the ideal leader of WP5. Adant (Daniele Piazza) contributes to the market analysis, application possibilities, and validation (WP6). Led by AALTO, dissemination with the website as one of the media is addressed by all partners. All academic partners are committed to early publication of results, e.g., via arXiv (open science).

## 2. Purpose and Scope of the Dissemination Report

This dissemination report documents the communication, dissemination, and engagement activities carried out within the HOLDEN project (*Ethical Design of Holography with Dense Wireless Networks*), funded under the Horizon Europe EIC Pathfinder Open program. The report reflects the project's original ambition to place ethics, privacy, and societal values at the center of technological innovation, and to accompany high-risk, high-gain research with responsible, transparent, and inclusive dissemination practices.

In line with the fundamental working principles of the project, dissemination in HOLDEN is not treated as a purely downstream activity focused on broadcasting results. Instead, it is conceived as an integral part of the research process, supporting scientific excellence, societal dialogue, and the co-development of ethically and privacy-compliant RF-based sensing technologies. This report, therefore, covers dissemination activities targeting the scientific community, industry and innovation actors, policy-relevant stakeholders, students and early-career researchers, and the general public.

The scope of the report includes scientific publications and conference participation, public and media outreach and participatory engagement activities, educational and student-focused dissemination, and cross-sector interactions that contribute to the long-term societal impact and sustainability of the project's results.

### 3. Project Overview and Vision

HOLDEN addresses the emerging challenge of ubiquitous perception through radio-frequency (RF) sensing, which enables the detection of objects, gestures, and human activities without relying on camera-based systems. While such technologies offer significant opportunities for applications in smart living, logistics, free-space interaction, and cyber-physical systems, they also raise profound ethical, privacy, and societal concerns.

The core vision of HOLDEN is to reverse the traditional technology-centric development paradigm and replace it with a privacy-centric, ethics-first approach. Rather than treating ethical considerations as constraints applied after technological development, HOLDEN establishes ethical and privacy requirements as design drivers that guide innovation at all layers of the RF-sensing process.

To realize this vision, HOLDEN combines expertise from high-frequency engineering, wireless communications, signal processing, machine learning, philosophy of technology, ethics, and human-computer interaction. The project develops fundamentally new RF-based perception and imaging paradigms with a large variety of possible use cases in the public as well as the private sector. The dissemination activities were conducted not only to communicate technical breakthroughs, but also to explore public acceptance, societal implications, and ethical boundaries of RF-based sensing technologies, thereby supporting the responsible introduction of these technologies into society.

### 4. Dissemination Strategy and Objectives

The dissemination strategy of HOLDEN is directly derived from the objectives and commitments set out in the project proposal, particularly the ambition to stimulate societal awareness, foster public trust, and demonstrate that ethical and privacy compliance can act as an enabler for technological innovation.

The strategy is structured around four overarching objectives:

**First**, to ensure high-quality scientific dissemination of project results through peer-reviewed journals, conference papers, and presentations at leading international venues. This supports scientific validation, advances the state of the art in RF-based sensing and perception, and positions Europe at the forefront of ethically compliant sensing technologies.

**Second**, to actively engage with interdisciplinary research communities, industry stakeholders, and innovation actors to explore application scenarios, identify collaboration opportunities, and support the long-term exploitation potential of the project's results, in line with the EIC Pathfinder's emphasis on breakthrough innovation.

**Third**, to foster societal dialogue and ethical reflection through participatory dissemination formats, including public events, workshops, and interactive exhibitions. These activities follow the guided ethics approach and operationalize the proposed bottom-up engagement approaches allowing societal values and concerns to inform ongoing research and design choices.

**Fourth**, to contribute to capacity building and long-term impact by integrating HOLDEN results into higher-education teaching, student research, and early-career training activities. This ensures sustainable knowledge transfer beyond the project's lifetime and strengthens Europe's research and innovation ecosystem.

Across all dissemination activities, particular attention is paid to openness, transparency, accessibility, and proportionality, ensuring alignment with Horizon Europe requirements for Open Science, Responsible Research and Innovation, and respect for fundamental rights, including data protection and privacy.

## 5. Target Audiences, Stakeholder Landscape, and Public Accessibility of Results

Reflecting the interdisciplinary ambition and societal relevance of the HOLDEN project, dissemination activities are designed to address a broad and diverse set of target audiences. These audiences play complementary roles in the development, evaluation, adoption, and governance of ethically and privacy-compliant RF-based sensing technologies. In line with Horizon Europe principles, particular emphasis is placed on ensuring that a large variety of project results and deliverables are made publicly accessible, thereby enabling broad engagement beyond the immediate research consortium.

A primary target audience is the scientific research community, including researchers in wireless communications, RF engineering, signal processing, machine learning, ethics of technology, and human-computer interaction. Dissemination to this group is achieved through peer-reviewed publications, conference presentations, open datasets, and publicly available technical deliverables. By making a substantial number of project deliverables openly accessible, HOLDEN supports scientific transparency, reproducibility, and the emergence of new interdisciplinary research directions building on the project's results.

Industry and innovation stakeholders constitute a second key audience, particularly actors involved in wireless systems, smart environments, cyber-physical systems, and next-generation communication technologies. Publicly available technical reports, benchmarks, and open datasets provide these stakeholders with early insight into emerging RF sensing paradigms, while supporting technology transfer, validation, and future exploitation pathways consistent with ethical and privacy-by-design principles.

Policy makers, regulatory bodies, and standardization communities form another important stakeholder group. RF-based sensing technologies intersect with regulatory domains related to privacy, data protection, and fundamental rights. Public access to project deliverables as listed in **Table 5.1** including reports on societal implications, privacy analysis, and responsible design approaches, enables evidence-based dialogue and supports informed governance and standardization efforts at national and European levels.

The general public and civil society are also explicitly addressed as key audiences. Public dissemination of non-confidential deliverables, together with accessible online communication and outreach activities, contributes to transparency and trust-building around emerging sensing technologies. By making project results visible and understandable beyond expert communities, HOLDEN supports societal awareness, critical reflection, and informed public discourse.

Finally, students and early-career researchers are addressed as important multipliers for long-term impact. Open access to a wide range of project deliverables including reports, datasets, and methodological documentation enables their integration into higher-education teaching, thesis work, and training activities. This openness strengthens capacity building and ensures that knowledge generated within HOLDEN remains available beyond the project’s lifetime.

Overall, the combination of a broad stakeholder focus and a large portfolio of publicly available project deliverables reflects HOLDEN’s commitment to Horizon Europe principles of Open Science, Responsible Research and Innovation, and societal engagement. By ensuring that a significant share of project outputs is openly accessible, HOLDEN maximizes the reach, usability, and long-term impact of its scientific and societal contributions.

**Table 5.1: List of Deliverables for the HOLDEN project**

Deliverable No	Deliverable Name	WP No	Lead Beneficiary	Type	Due Date (Month)
D1.1	IPR requirements	WP1	TUM	Document, report	6
D2.1	Social implications and preconditions for technological design	WP2	TWE	Document, report	6
D2.2	Social implications and preconditions for technological design, update	WP2	TWE	Document, report	12
D2.3	Privacy analysis and user requirements on societal implications of RF sensing	WP2	TWE	Document, report	24

<b>Deliverable No</b>	<b>Deliverable Name</b>	<b>WP No</b>	<b>Lead Beneficiary</b>	<b>Type</b>	<b>Due Date (Month)</b>
D2.4	Responsible Design approach	WP2	TWE	Document, report	36
D3.1	Simulation model of typical indoor scenario	WP3	TUM	Document, report	8
D3.2	Holographic imaging and privacy-driven acquisition methods	WP3	TUM	Document, report	14
D3.3	Visualization of 3D structure using device developed in D3.1 and D3.2	WP3	TUM	Other	18
D3.4	Privacy and Ethical Constraints in Static Environments	WP3	TWE	Document, report	18
D3.5	Report on high-accuracy indoor localization under privacy constraints	WP3	TUM	Document, report	18
D3.6	Signal processing tools: segmentation and management of hologram structures	WP3	CNR	Document, report	14
D4.1	Data structuring: hologram stop-motion frames, database of selected body motions	WP4	CNR	Other	15
D4.2	Application of holography to dense steerable antennas, optimization of recognition beams	WP4	CNR	Other	21
D4.3	Identified privacy threats and countermeasures	WP4	CNR	Document, report	24
D4.4	Privacy and Ethical Constraints in Dynamic Environments	WP4	TWE	Document, report	24
D4.5	Application to a Wi-Fi compliant beam-steering technology	WP4	AALTO	Other	27
D5.1	Data structure definition for massive RF data input to deep learning	WP5	AALTO	Document, report	18
D5.2	Processing infrastructure definition and setup for massive RF data	WP5	CNR	Other	24
D5.3	Deep-learning model for CSI, holography and point-cloud-specific data	WP5	AALTO	Other	26

<b>Deliverable No</b>	<b>Deliverable Name</b>	<b>WP No</b>	<b>Lead Beneficiary</b>	<b>Type</b>	<b>Due Date (Month)</b>
D5.4	Direction-agnostic RF sensing from point-cloud data	WP5	AALTO	Other	30
D5.5	Anticipated social implications for networked data aggregation following privacy-by-design approach	WP5	TWE	Document, report	30
D6.1	Functional requirements and privacy profiles for the scenarios	WP6	TWE	Document, report	18
D6.2	Localisation accuracy benchmark test for RF holography and prototype	WP6	TUM	Other	24
D6.3	Application scenarios, business plan and roadmap for use of the new technology	WP6	Adant	Document, report	30
D6.4	Motion detection and discrimination accuracy benchmark test in test house and prototype	WP6	CNR	Other	30
D6.5	Multi-subject gesture recognition benchmark test and prototype	WP6	AALTO	Other	36
D6.6	Achievement of overall objectives validated through KPIs for O1–O5	WP6	AALTO	Document, report	36
D6.7	Results of the market analysis	WP6	Adant	Document, report	36
D6.8	Results from the appropriation study	WP6	TWE	Document, report	36
D7.1	Project website and logo	WP7	AALTO	Document, report	2
D7.2	Plan for Dissemination and Exploitation including Communication Activities	WP7	AALTO	Document, report	6
D7.5	Final version of the Plan for Dissemination and Exploitation including Communication Activities	WP7	AALTO	Document, report	36
D7.6	Evaluation results of press appearances and social-media repercussion	WP7	CNR	Document, report	36
D7.7	Results of the scientific dissemination	WP7	TUM	Document, report	36

## 6. Dissemination Activities and Achievements

The HOLDEN project has implemented a comprehensive and multi-layered dissemination strategy aimed at ensuring that its scientific results, ethical insights, and technological advances reach a **large and diverse audience**. Dissemination activities have been designed to maximize scientific impact while simultaneously fostering societal awareness, public trust, and informed dialogue around RF-based holography and dense wireless sensing technologies. As reflected in **Table 6.1**, this strategy combines scientific dissemination, stakeholder engagement, education-oriented activities, and digital dissemination channels within a coherent and integrated framework.

**Table 6.1: Dissemination Activities of the HOLDEN Project**

Activity Type	Indicator	Current Status	Remarks
Publications	Peer-reviewed papers	Ongoing	Open access ensured
Events	Conferences / Workshops	Ongoing	Mix of audiences
Public outreach	Public events	Ongoing	Ethical framing
Student projects	Theses & PhDs	Ongoing	Integrated in WPs
Digital Dissemination	Official Website, Social Media Outreach, Open-Source data, Press Coverage	Ongoing	Targeting a broad audience

At the scientific level, HOLDEN has prioritized high-quality dissemination through peer-reviewed journal articles, conference papers, and presentations at leading international venues. These activities ensure rigorous validation of project results within the research community and support the advancement of knowledge in areas such as RF sensing, holography, physics-informed machine learning, and privacy-preserving system design. Participation in major conferences and workshops has enabled active exchange with researchers, innovators, and industry representatives, strengthening collaboration opportunities and positioning HOLDEN within the international research landscape.

Beyond academic dissemination, the project has placed strong emphasis on engagement with broader stakeholder groups, including industry actors, policy-relevant communities, and civil society. Through interdisciplinary conferences, invited talks, and targeted events, HOLDEN has contributed to discussions on the societal implications of emerging sensing technologies, addressing issues such as transparency, ethical design, privacy,

and social acceptability. These activities support informed decision-making and help bridge the gap between technical development and societal expectations.

Dissemination through education and student engagement represents a further key pillar of the project's strategy. By integrating HOLDEN research outcomes into higher-education teaching, student projects, and early-career research activities, the project contributes to long-term capacity building and skills development among future researchers and engineers. This approach ensures that knowledge generated within HOLDEN is transferred sustainably beyond the project's lifetime and aligned with European priorities for responsible innovation.

In addition, HOLDEN has established a strong digital dissemination component. This includes an official project website, professional social-media outreach, and the public release of selected research outputs and data through open digital platforms. Digital dissemination enables continuous, low-threshold access to project information, amplifies the reach of scientific results beyond traditional academic channels, and supports openness and transparency in line with Horizon Europe requirements.

Overall, the dissemination activities carried out within HOLDEN contribute not only to scientific excellence but also to broader societal impact. By combining technical dissemination, ethical reflection, stakeholder engagement, educational activities, and digital dissemination channels, HOLDEN supports the development of trustworthy, human-centered sensing technologies and fosters societal understanding of their capabilities, limitations, and implications.

## 6.1 Scientific Publications and Academic Dissemination

The HOLDEN project has generated a broad and diverse portfolio of scientific publications that reflects the interdisciplinary nature of its research objectives. Dissemination through peer-reviewed journals and leading international conferences has been a primary mechanism for validating project results and contributing to the advancement of knowledge across multiple scientific domains relevant to RF-based holography and dense wireless sensing.

The published work as listed in **Table 6.2** covers a wide range of complementary research aspects. At the physical and electromagnetic level, several contributions focus on accurate modeling of RF propagation, passive radar imaging techniques, and new antenna beam steering capabilities. These works provide a rigorous physical foundation for understanding and exploiting radio-frequency interactions with complex environments and human bodies, which is essential for reliable and interpretable RF-based perception systems.

Building on these physical models, a significant part of the scientific output addresses machine-learning-assisted and physics-informed approaches to RF sensing. Publications in this area explore the integration of electromagnetic knowledge into generative neural networks and learning-based models, enabling improved robustness, generalization, and explainability of RF perception systems. This combination of physical modeling and data-driven methods represents a core methodological contribution of the HOLDEN project.

Further publications investigate advanced imaging and localization technologies, including device-free sensing and microwave imaging approaches, the utilization of passive tags and distributed sensing infrastructures. These contributions demonstrate how dense wireless networks can be leveraged for high-resolution spatial perception while avoiding the deployment of camera-based systems, thereby supporting privacy-preserving sensing paradigms.

Importantly, the publication portfolio also includes work that explicitly addresses ethical, privacy, and societal dimensions of RF-based holography. These contributions articulate design principles for privacy-scalable and ethically aligned sensing systems and situate technical advances within a broader human-centered and regulatory context. By combining technical innovation with ethical reflection in peer-reviewed venues, HOLDEN contributes to shaping responsible research directions in the emerging field of RF sensing and holography.

Overall, the scientific publications produced within HOLDEN illustrate a broad and well-developed research landscape, spanning fundamental electromagnetic theory, machine-learning-assisted sensing, advanced imaging technologies, and ethical system design. Through this diverse dissemination portfolio, the project strengthens its scientific impact while supporting the development of trustworthy and socially acceptable RF-based sensing technologies.

**Table 6.2: Scientific Publications**

Title / Contribution	Authors / Partners	Type	Venue / Publisher / Event	Year	Peer-Reviewed	DOI
A Physics-Informed Generative Model for Passive Radio-Frequency Sensing	Savazzi et al.	Conference paper	IEEE APWC	2023	Yes	arXiv:2310.04173
Cooperation and Federation in Distributed Radar Point Cloud Processing	Savazzi et al.	Conference paper	IEEE PIMRC	2023	Yes	arXiv:2405.01995

Title / Contribution	Authors / Partners	Type	Venue / Publisher / Event	Year	Peer-Reviewed	DOI
On the Impact of the Antenna Radiation Patterns in Passive Radio Sensing	Fieramosca et al.	Journal article	IEEE AWPL	2023	Yes	arXiv:2405.09352
User Location Uncertainty in RIS-Aided Channel Optimization	Kianoush et al.	Conference paper	IEEE WPMC	2023	Yes	10.36227/techrxiv.171617448.88625179/v1
Physics-Informed Generative Neural Networks for RF Propagation Prediction with Application to Indoor Body Perception	Fieramosca et al.	Conference paper	EuCAP	2024	Yes	arXiv:2405.02131
An EM Body Model for Device-Free Localization with Multiple Antenna Receivers: A First Study	Rampa et al.	Conference paper	IEEE APWC	2023	Yes	arXiv:2405.09558
Device-Free Localization with Multiple Antenna Receivers: Simulations and Results	Rampa et al.	Conference paper	IEEE APWC	2025	Yes	arXiv:2506.07784
Electromagnetic-Informed Generative Models for Passive RF Sensing and Perception of Body Motions	Savazzi et al.	Journal article	IEEE Open Journal on Antennas and Propagation	2024	Yes	10.1109/OJAP.2024.3407199
Workshop on Moralizing Radio Frequency Holography for Palliative Care via Value-Sensitive Design	Cammers-Goodwin et al.	Conference paper	ACM	2025	Yes	<a href="https://dl.acm.org/doi/10.1145/3714394.3756219">https://dl.acm.org/doi/10.1145/3714394.3756219</a>
Holography with Dense Wireless Networks: A Case for Ethical Design	Savazzi et al.	Journal article	IEEE Communications Magazine	2024	Yes	10.1109/MCOM.001.2400733

Title / Contribution	Authors / Partners	Type	Venue / Publisher / Event	Year	Peer-Reviewed	DOI
RF sensing with dense IoT network graphs: An EM-informed analysis	Fieramosca et al.	Journal Article	IEEE Internet of Things Journal	2025	Yes	arXiv:2512.08746
Joint RIS-Assisted Localization and Communication: A Tradeoff Among Accuracy, Spectrum Efficiency, and Time Resource	Kianoush et al.	Journal Article	IEEE Sensors Journal	2025	Yes	10.1109/JSEN.2024.3501404
Gesture-Based Robot Control Integrating mm-wave Radar and Behavior Trees	Song et al.	Conference paper	ACM	2025	Yes	10.1145/3714394.3754414
WiFi-Based People Counting Using Beam-Steerable Antennas: A Test-bed Study	Bersan et al.	Conference paper	ACM	2025	Yes	10.1145/3714394.3756218
RF Sensing and Holography in Dense Wireless Networks: Towards Privacy-Scalable and Ethical Design	Savazzi et al.	Conference paper	ACM Workshop	2024	Yes	10.1145/3714394.3750582
Passive RF Sensing for People Counting with Dense IoT Networks	Fieramosca et al.	Conference paper	ACM	2025	Yes	10.1145/3714394.3756220
Full-wave EM simulation analysis of human body blockage by dense 2D antenna arrays	Fieramosca et al.	Conference paper	IEEE APWC	2024	Yes	arXiv:2405.09346
An Initial Study of Human-Scale Blockage in sub-THz Radio Propagation with Application to Indoor Passive Localization	Paonessa et al.	Conference paper	IEEE APWC	2024	Yes	arXiv:2406.16894
Near-Field Focusing Operators for Planar	Saurer et al.	Conference paper	EuCAP	2025	Yes	arXiv:2603.01810v1

Title / Contribution	Authors / Partners	Type	Venue / Publisher / Event	Year	Peer-Reviewed	DOI
Multi-Static Microwave Imaging Using Back Projection						
Polarization-Aware Ray-Tracing-Enhanced Back-Projection Algorithm for Microwave Imaging	Na et al.	Conference paper	URSI EMTS	2025	Yes	arXiv:2605.10081
3-D Near-Field Passive Radar Imaging Utilizing Phase-Corrected Frequency-Domain Inverse Source Reconstructions	Wang et al.	Journal article	IEEE TAP	2024	Yes	10.36227/techrxiv.172952562.25466426/v3
Microwave Imaging of Electromagnetic Wave Absorbers in an Antenna Measurement Chamber	Wang et al.	Conference paper	IEEE APWC	2024	Yes	10.36227/techrxiv.171709995.50414508/v1
An Indoor Localization Technique Utilizing Passive Tags and 3-D Microwave Passive Radar Imaging	Wang et al.	Journal article	PIER	2025	Yes	10.2528/PIER24120903
An Automatic Focusing Technique for Inverse Source Reconstructions Based Near-Field Passive Radar Imaging	Wang et al.	Conference paper	IEEE	2025	Yes	10.36227/techrxiv.175695820.01860064/v1
On the Solution of Linearized Inverse Scattering Problems in Near-Field Microwave Imaging	Saurer et al.	Journal article	IEEE TMTT	2024	Yes	arXiv:2410.06465
On the Accuracy of Simulation Models for Holographic Indoor Imaging	Paulus et al.	Conference paper	ICEAA	2025	Yes	10.36227/techrxiv.174857916.68624100/v1

Title / Contribution	Authors / Partners	Type	Venue / Publisher / Event	Year	Peer-Reviewed	DOI
Phase-Corrected Near-Field Microwave Imaging via Inverse Source Reconstruction with Modulated Signals	Wang et al.	Conference paper	EuCAP	2026	Yes	arXiv:2605.03875
3-D Near-Field Passive Radar Imaging Using Multiple Illumination Sources	Wang et al.	Conference paper	IEEE APS / URSI	2026	Yes	arXiv:2603.08217
Multipath Exploitation in Highly Reflective Environments for Enhanced Microwave Imaging via Inverse Source Reconstruction	Wang et al.	Conference paper	IEEE ICCEM	2026	Yes	arXiv:2605.03888
Fast Full-Wave Simulation of Indoor RSS Maps for Device-Free Localization	Fieramosca et al.	Conference paper	EuCAP	2026		arxiv.org/abs/2605.04958
Adaptive Internal Calibration for Temperature-Robust mmWave FMCW Radars	Salami et al.	Conference paper	ACM Workshop	2024	Yes	10.1145/3714394.3756221
Radar-Based Human-Computer Interaction	Čopič Pucihar K. et al.	Book / Monograph	Springer	2024	Yes	<a href="https://link.springer.com/book/9783032043269">https://link.springer.com/book/9783032043269</a>
A Unified Approach to Human-Scale Blockage and Scattering Analysis in Sub-THz Propagation With Application to RF Sensing	Savazzi et al.	Journal article	IEEE TAP	2026	Yes	10.1109/TAP.2026.3690188

## 6.2 Conference Participation and Workshops

In addition to peer-reviewed publications, the HOLDEN project has actively disseminated its scientific results through participation in major international conferences and invited talks with high scientific visibility and impact as listed in **Table 6.3**. These venues were selected to ensure that project outcomes reach leading experts, practitioners, and

decision-makers in the fields of wireless communications, RF sensing, machine learning, and human-centered system design.

HOLDEN partners presented project results at well-established, high-impact conferences organized by IEEE and ACM, including flagship events in wireless communications, pervasive computing, antenna and propagation research, and smart systems. These conferences are characterized by rigorous peer-review processes, high citation impact, and broad international participation, making them particularly effective channels for scientific dissemination and community engagement.

Participation in such high-profile venues enabled the consortium to disseminate HOLDEN results to large and diverse audiences, often comprising several hundred to over one thousand participants. Beyond the formal presentation of research results, these events provided valuable opportunities for in-depth technical discussions, critical feedback, and exchange with other leading research groups and industrial stakeholders. This interaction has contributed to refining research directions and identifying synergies with related national and European research initiatives.

Panel discussions and special sessions further complemented conference dissemination by enabling more focused discussions on emerging topics such as ethical RF sensing, privacy-preserving perception technologies, and physics-informed machine learning. These formats allowed the consortium to engage more deeply with specialized audiences and to situate HOLDEN results within broader scientific and societal debates.

Overall, dissemination through active engagement with leading experts at high-impact international conferences has been instrumental in establishing HOLDEN’s scientific visibility, strengthening its position within the international research landscape, and ensuring that its technical and ethical contributions shape ongoing developments in RF-based sensing and holography.

**Table 6.3: Scientific Presentations, Invited Speaks, and Panel Discussions**

Event Name	Type	Date & Location	Participants (est.)	HOLDEN Partner(s)	Target Audience	Status
“This Is Not a Camera” – Reinventing the City	Conference presentation	25 Apr 2024, Amsterdam (NL)	–	HOLDEN partners	Industry, authorities, civil society	Delivered
Surveillance Studies Network Conference 2024	Conference presentation	31 May 2024, Ljubljana (SI)	–	HOLDEN partners	EU institutions, civil society, citizens	Delivered

Event Name	Type	Date & Location	Participants (est.)	HOLDEN Partner(s)	Target Audience	Status
IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2023)	Conference presentation	5–8 Sep 2023, Toronto (CA)	>150	CNR	Industry, research community	Delivered
IEEE-APS Topical Conference on Antennas and Propagation in Wireless Communications (APWC 2023)	Conference presentation	9–13 Oct 2023, Venice (IT)	~100	CNR, POLIMI, TUM, ADANT	Research community	Delivered
International Symposium on Wireless Personal Multimedia Communications (WPMC 2023)	Conference presentation	19–22 Nov 2023, Tampa (US), virtual	~150	CNR	Research community	Delivered
European Conference on Antennas and Propagation (EuCAP 2024)	Conference presentation	17–22 Mar 2024, Glasgow (UK)	~1000	CNR, TUM	Research community	Delivered
European Conference on Antennas and Propagation (EuCAP 2025)	Conference presentation	30 Mar – 4 Apr, 2025, Stockholm (SE)	~1000	TUM	Research community	Delivered
European Conference on Antennas and Propagation (EuCAP 2026)	Conference presentation	22–27 Mar, 2026, Dublin (IE)	~1000	TUM	Research community	Delivered
IEEE International Conference on Computational Electromagnetics (ICCEM 2026)	Conference presentation	10–12 Apr. 2026, Shanghai (CN)	~150	TUM	Research community	Delivered
ACM UbiComp 2023	Conference presentation	8–12 Oct 2023, Cancun (MX)	~850	Stephan Sigg, Si Zuo	Industry, innovators, researchers	Delivered

Event Name	Type	Date & Location	Participants (est.)	HOLDEN Partner(s)	Target Audience	Status
IEEE International Symposium on Antennas and Propagation and ITNC-USNC-URSI Radio Science Meeting (IEEE APS/URSI 2024)	Conference presentation	14-19 Jul. 2024, Florence (IT)	~2000	TUM	Research community	Delivered
IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting (AP-S/CNC-USNC-URSI 2025)	Conference presentation	13-18 Jul. 2025, Ottawa (CA)	~2000	TUM	Research community	Delivered
International Symposium on Electromagnetic Theory (EMTS 2025)	Conference presentation	23-27 Jun. 2025, Bologna (IT)	~200	TUM	Research community	Delivered
IEEE PerCom 2024	Conference presentation	11-15 Mar 2024, Biarritz (FR)	~500	Stephan Sigg	Industry, innovators, researchers	Delivered
IEEE SmartComp 2024 + Panel	Conference & panel	29 Jun–2 Jul 2024, Osaka (JP)	~150	Stephan Sigg	Industry, innovators, researchers	Delivered
MobiSys 2024	Conference presentation	3–7 Jun 2024, Tokyo (JP)	~1200	Stephan Sigg	Industry, innovators, researchers	Delivered
IEEE International Conference on Emerging Technologies and Factory Automation (ETFA 2024) – HOLDEN Workshop	Conference & workshop	10-13 Sep, 2024, Padua (IT)	~430	HOLDEN partners	Industry, research community	Delivered
ACM UbiComp/ISWC 2025 HOLDEN Workshop “RF Sensing and Holography in	Conference & workshop	13 October, 2025, Espoo (FI)	–	HOLDEN partners	Industry, research community	Delivered

Event Name	Type	Date & Location	Participants (est.)	HOLDEN Partner(s)	Target Audience	Status
Dense Wireless Networks”						
Keynote at IEEE AllIoT 2024	Keynote presentation	3–4 May 2024, Vellore (IN)	~150	Stephan Sigg	Industry, researchers	Delivered
Invited Talk at IIT Delhi	Invited scientific talk	8 May 2024, Delhi (IN)	~20	Stephan Sigg	Research community	Delivered
Invited Talks at UEC and NII Tokyo	Invited scientific talks	May–Jun 2024, Tokyo (JP)	~30	Stephan Sigg	Research community	Delivered
NII Shonan Seminar “Intelligent Interaction with Autonomous Agents in the Wild”	Scientific seminar	27–30 May 2024, Shonan (JP)	~30	Stephan Sigg	Research community	Delivered
Netsys Conference	Conference presentation	4–7 Sep 2024, Potsdam (DE)	~150	Stephan Sigg	Industry, research community	Delivered
Keynote at PerCom 2026	Keynote presentation	16-20 Mar 2026, Pisay (IT)	~350	HOLDEN partners	Industry, researchers	Delivered

### 6.3 Public Outreach and Workshops

Public outreach constitutes a central pillar of the HOLDEN dissemination strategy, reflecting the project’s commitment to transparency, societal dialogue, and Responsible Research and Innovation. Given the sensitive nature of RF-based holography and dense wireless sensing technologies, HOLDEN has placed particular emphasis on engaging non-expert audiences in ways that foster understanding, trust, and informed discussion about potential use cases, benefits, and risks.

A flagship public-engagement activity of the project was an interactive exhibition hosted at different sites in the Netherlands, at the Politecnico di Milano, Milan, and the Deutsches Museum in Munich. The exhibition presented HOLDEN technologies to the general public in an accessible and experiential manner, explicitly addressing how RF-based sensing differs from camera-based systems, both technically and socially. Visitors were introduced to a range of potential application scenarios as well as to

possible misuse and ethical concerns, enabling a balanced understanding of the technology’s capabilities and limitations.

Crucially, the exhibition was designed as a participatory and interactive format rather than a one-way communication exercise. Members of the public were actively invited to share their perspectives, concerns, and expectations regarding RF-based sensing technologies. This approach allowed citizens to contribute directly to reflections on design choices, acceptable use cases, and governance considerations, thereby informing the project’s ongoing ethical analysis and technology development.

The exhibition and associated outreach activities were closely aligned with the project’s guidance-ethics framework, which aims to integrate stakeholder values into the research and design process from an early stage. By embedding public feedback into ethical deliberation, HOLDEN moves beyond awareness-raising towards meaningful societal co-creation, ensuring that technological development remains sensitive to diverse social values and norms.

In addition to the museum exhibition, HOLDEN partners conducted a broad range of public-facing workshops, seminars, invited talks, and interdisciplinary dialogue formats, as summarized in **Table 6.4**. These activities addressed ethics, privacy, and human-centered design of sensing technologies and were targeted at audiences including researchers, industry stakeholders, policy-relevant communities, and the general public. Together, these outreach and dialogue activities strengthen the project’s societal impact by fostering informed public discourse, supporting trust in emerging digital technologies, and demonstrating how ethical reflection can be practically integrated into advanced technical research.

**Table 6.4: Public Outreach, Ethics, and Societal Workshops**

Activity Name	Type	Date & Location	Target Audience	Objective / Societal Focus	Status
HOLDEN Guidance Ethics Workshop	Education & training event	22 – 23 November, 2023, Enschede (NL)	Industry, authorities, citizens, end users	Stakeholder values elicitation and ethics baseline development for HOLDEN technologies (Task 2.1)	Delivered
Dagstuhl Seminar on Edge AI	Scientific & societal dialogue	22–25 Oct 2023, Dagstuhl (DE)	Industry, innovators, researchers	Discussion of privacy-compliant gesture sensing, Edge-AI and ethical design aspects	Delivered

Activity Name	Type	Date & Location	Target Audience	Objective / Societal Focus	Status
HOLDEN Palliative Care VSD Workshops (Editions 1-3)	Scientific dialogue	Oct 13 2025, Nov 21 2025, Apr 21 2026, IRLAB (CZ)	Innovators, Researchers	Provided insight into the concern variance for engineers and healthcare experts	Delivered
Phenomenological interviews	Societal dialogue	Oct – Dec 2025, Prague (CZ)	Palliative care patients	Elaboration of patients’ values and experiences on living with monitoring technologies	Delivered
“This Is Not a Camera” – Reinventing the City (Outreach Session)	Public scientific outreach	25 Apr 2024, Amsterdam (NL)	Citizens, civil society, authorities	Public discussion of technical and societal differences between RF sensing and camera-based technologies	Delivered
Surveillance Studies Network Conference – Ethics Presentation	Public scientific outreach	31 May 2024, Ljubljana (SI)	EU institutions, civil society, citizens	Reflection on biases and limitations of value-sensitive design approaches for sensing technologies	Delivered
Invited Talk – IIT Delhi (Societal & Ethics Perspective)	Public scientific outreach	8 May 2024, Delhi (IN)	Innovators, researchers	Dissemination of HOLDEN vision with emphasis on privacy-preserving RF sensing	Delivered
Invited Talks – UEC & NII Tokyo	Public scientific outreach	May–Jun 2024, Tokyo (JP)	Research community	International outreach on ethical RF sensing and cross-cultural perspectives	Delivered
Monitoring Technologies in Palliative Care: Ethical and Legal Aspects	Education & training / societal workshop	2024–ongoing	Healthcare practitioners, citizens	Exploration of ethical design, legal implications and societal acceptance in sensitive care contexts	Ongoing
“Wi-Fi – Seeing without a Camera” Exhibition (Science	Societal dialogue &	7–22 Feb 2026, Munich (DE)	Citizens	Continued collection of public feedback on ethical aspects of	Delivered

Activity Name	Type	Date & Location	Target Audience	Objective / Societal Focus	Status
Communication Lab, Deutsches Museum)	public outreach			ubiquitous Wi-Fi imaging	
“Wi-Fi – Seeing without a Camera” Exhibition (Politecnico di Milano)	Societal dialogue & public outreach	7–21 Apr 2026, Milan (IT)	Students, research community	Public dialogue and awareness-raising on privacy-scalable RF imaging and sensing	Delivered
UbiComp 2025	Public scientific outreach	12-16 Oct 2025, Espoo, (FI)	Students, research community	Demonstration of Holden technology for worker safety	Delivered
Holden Booth at Mobile World Congress	Public scientific outreach	3-6 Mar, 2025, Barcelona, (ES)	Research Community	Showcasing Holden's research outputs to a large number of visitors across industry and academia	Delivered
Cooperation with EU cost initiative INTERACT	Public scientific outreach	18 Oct 2021 – 17 Oct 2025	Researchers and academics	Identification of selected Holden results and designs to be presented at relevant working group meetings	Ongoing

## 6.4 Education, Training, and Student Involvement

The HOLDEN project places strong emphasis on dissemination through education and direct engagement with students, recognizing universities and early-career researchers as key multipliers for the long-term impact and sustainability of project results. Integrating HOLDEN research outcomes into higher-education teaching and student research activities contributes both to knowledge transfer and to capacity building in the emerging field of ethical RF-based sensing and holography.

Project results have been incorporated into graduate-level teaching, in particular within the course module “*Inverse Problems in Electromagnetic Imaging*” at the Technical University of Munich. Through dedicated lectures and teaching materials, students are exposed to cutting-edge methods in RF imaging and holographic sensing directly grounded in HOLDEN research activities. This approach ensures that theoretical concepts are complemented by concrete examples drawn from ongoing European research.

In addition to formal teaching, HOLDEN supports student involvement through Bachelor’s and Master’s-level thesis projects and early-career research activities as listed in **Table 6.5**.

**Table 6.5: Student Projects and Education Activities**

Activity	Type	Institution	Audience	Objective	Status
Lecture on HOLDEN imaging activities (Inverse Problems in Electromagnetic Imaging)	Education & training	Technical University of Munich (TUM)	Master students (Electrical and Computer Engineering)	Education on state-of-the-art RF imaging, inverse problems, and HOLDEN research outcomes	Ongoing
Integration of HOLDEN RF imaging concepts in graduate teaching	Education & training	TUM	Master students	Capacity building and skills transfer	Ongoing
Conceptualization and dissemination strategy for ethically compliant Wi-Fi imaging algorithms	Thesis / Dissertation	Technical University of Munich (TUM)	Bachelor students	Supervision of a Bachelor’s thesis focusing on ethical compliance and dissemination of RF imaging technologies	Delivered
Invited lecture on HOLDEN technologies at IIT Delhi	Education & training	Indian Institute of Technology Delhi	Graduate students, early-career researchers	Introduction to privacy-preserving RF sensing and HOLDEN research approaches	Delivered
Invited lecture on HOLDEN activities at University of Electro-Communications (UEC)	Education & training	UEC Tokyo	Graduate students, researchers	International education and discussion of ethically compliant RF sensing approaches	Delivered
Invited lecture on HOLDEN activities at National Institute of Informatics (NII)	Education & training	NII Tokyo	Graduate students, researchers	Education and discussion of HOLDEN research highlights and societal implications	Delivered
Presentation of HOLDEN activities at Hong Kong Polytechnic University / City University of Hong Kong	Education & training	HK PolyU / CityU Hong Kong	Graduate students, researchers	International academic dissemination and education on HOLDEN technologies	Ongoing

Activity	Type	Institution	Audience	Objective	Status
Electromagnetic Simulations for Device-Free Indoor Localization: Reliability Assessment through Experimental Data	Thesis / Dissertation	Politecnico di Milano	Graduate students, researchers	Student thesis addressing electromagnetic simulation accuracy and reliability for device-free indoor localization within the scope of HOLDEN research topics	Delivered
Electromagnetic Models for Device-Free RF People Localization and Counting	Thesis / Dissertation	Politecnico di Milano	Graduate students, researchers	Doctoral research on electromagnetic modeling approaches for RF-based people localization and counting, contributing to HOLDEN's scientific foundations	Delivered

These projects address both technical and societal dimensions of the project, including RF-based perception methods, simulation and modeling of wireless environments, as well as ethical and privacy-related implications of pervasive sensing technologies. By embedding HOLDEN topics within student research, the project fosters interdisciplinary thinking and promotes responsible innovation principles among future researchers and engineers.

Overall, dissemination through student engagement strengthens the project's educational impact, supports skills development aligned with European research priorities, and contributes to the long-term dissemination and uptake of HOLDEN results beyond the project's duration.

## 6.5 Digital Dissemination, Online Presence, and Open-Source Data

Digital dissemination constitutes another key pillar of the HOLDEN project's overall dissemination strategy, complementing scientific publications, conference participation, public outreach activities, and educational engagement. Through a combination of an official project website, professional social media channels, and structured open-science data releases, HOLDEN ensures continuous, transparent, and low-threshold access to project objectives, results, and research artefacts for a broad range of stakeholders.

This integrated digital approach supports the project's commitment to Open Science, Responsible Research and Innovation, and long-term accessibility of research outputs, in line with Horizon Europe requirements.

### 6.5.1 Official Project Website and Partner-Hosted Project Descriptions

The official HOLDEN project website serves as the central digital hub for project communication and dissemination. It provides a structured and publicly accessible overview of the project's vision, scientific objectives, ethical framing, consortium, and funding context. The website hosts information on public deliverables, scientific publications, news updates, and dissemination activities, ensuring transparency and traceability of project progress and results throughout the entire project lifecycle. By clearly situating HOLDEN within the Horizon Europe EIC Pathfinder Open programme and including mandatory funding acknowledgements and legal notices, the website ensures compliance with European Commission communication guidelines. As a persistent digital resource, it also supports the long-term availability of project information beyond the project's duration.

In addition to the central project website, all consortium partners maintain short project descriptions or disclaimers on their respective institutional or corporate webpages. These partner-hosted entries typically include a concise summary of HOLDEN's objectives, a link to the official project website, and a brief explanation of each partner's role within the project. Examples include the project pages hosted by the Technical University of Munich, the CNR-POLIMI Wavelab laboratory, the University of Twente, and Adant. By ensuring that each partner provides a consistent and publicly accessible reference to HOLDEN, the consortium strengthens the project's digital visibility, supports coherent external communication, and reinforces compliance with Horizon Europe dissemination requirements across all participating institutions.

### 6.5.2 Professional Social Media Outreach

To complement the official website, HOLDEN maintains a professional presence on social media platforms such as LinkedIn, primarily targeting researchers, innovation actors, industry stakeholders, and policy-relevant communities. Social media channels are used to disseminate announcements related to scientific publications, conference participation, public engagement activities, and major project milestones.

This form of dissemination enables timely communication, amplifies the reach of project outputs beyond traditional academic channels, and facilitates engagement with interdisciplinary and non-academic audiences in a professional context. Social media outreach thus supports visibility, networking, and the broader uptake of HOLDEN results within the European research and innovation ecosystem. More details can be found in D 7.6 on the evaluation results of press appearances and social media repercussion.

### 6.5.3 Open-Source Data and Research Artefacts

In addition to communication-oriented digital channels, HOLDEN places strong emphasis on the dissemination of research outputs through open-source data releases. Key datasets generated within the project are made openly available via a dedicated community on the Zenodo platform as listed in **Table 6.6**. This ensures persistent access, citability through Digital Object Identifiers (DOIs), and compliance with FAIR data principles.

The released datasets cover a range of RF holography and sensing scenarios, including simulation data, controlled laboratory measurements, and real-world indoor sensing experiments. By providing well-documented and reusable research artefacts, HOLDEN enables reproducibility, benchmarking, and secondary use of project results by the wider scientific community, as well as integration into future research, education, and innovation activities.

Open-source data dissemination complements traditional scientific publications by allowing direct access to underlying experimental and simulation data, thereby strengthening transparency, scientific credibility, and long-term impact of the project’s outcomes.

**Table 6.6: Open Source Data Releases (Zenodo)**

Title	Date	Authors	DOI
RF Holography and Perception in Static Environments: Dataset	October 23, 2024	Quanfeng Wang; Alexander H. Paulus; Han Na; Matthias M. Saurer; Thomas F. Eibert	<a href="https://doi.org/10.5281/zenodo.13981780">https://doi.org/10.5281/zenodo.13981780</a>
RF Holography and Perception in Dynamic Environments – Planar Office Scanner	December 2, 2024	Alexander H. Paulus; Quanfeng Wang; Thomas F. Eibert	<a href="https://doi.org/10.5281/zenodo.14261322">https://doi.org/10.5281/zenodo.14261322</a>
Full-Wave EM Simulation of Human Body Blockage by Dense 2D Antenna Arrays	May 22, 2024	Federica Fieramosca; Stefano Savazzi; Vittorio Rampa; Michele D’Amico	<a href="https://doi.org/10.21207/v4wa-mt22">https://doi.org/10.21207/v4wa-mt22</a>
On the Impact of the Antenna Radiation Patterns in Passive Radio Sensing: Dataset	May 22, 2024	Stefano Savazzi; Federica Fieramosca; Michele D’Amico; Vittorio Rampa	<a href="https://doi.org/10.5281/zenodo.11243149">https://doi.org/10.5281/zenodo.11243149</a>

### 6.5.4 Media Outreach and Press Coverage

Beyond the project’s own digital channels, HOLDEN benefits from independent media coverage that further broadens the societal reach of its research. Press articles and interviews play an important role in translating complex technological developments into

accessible narratives for non-expert audiences, thereby strengthening public understanding and trust in privacy-preserving RF-based sensing. One example is an interview published by *Tema21.cz*, which highlights HOLDEN's work on non-intrusive monitoring and privacy-preserving RF sensing, with particular emphasis on technology demonstrations conducted in the Czech Republic. This coverage reinforces the project's societal relevance and contributes to building confidence in emerging RF-based sensing solutions.

Another significant instance of media dissemination is the public communication surrounding the exhibition "*Wi-Fi Seeing Without a Camera*" at the Deutsches Museum. Press releases issued both by the museum (<https://www.deutsches-museum.de/en/museum-island/programme/event/wi-fi-seeing-without-a-camera>) and by the TUM School of Computation, Information and Technology (<https://www.cit.tum.de/en/cit/news/article/wi-fi-seeing-without-a-camera/>) introduce the exhibition and explain how Wi-Fi and dense wireless networks can be repurposed for perception and sensing without relying on cameras. By situating HOLDEN's research within a widely accessible cultural and educational context, this media outreach builds on an established public narrative and demonstrates the broader societal value of the project's technological advances.

Together, the official website, professional social media outreach, open-source data repositories, and independent media coverage form a coherent digital dissemination ecosystem for HOLDEN. These channels enable continuous access to project information, support timely and targeted communication, and ensure that both scientific results and underlying research artefacts are openly accessible. By integrating communication, engagement, and open-science dissemination within a unified digital strategy, HOLDEN reinforces its ethics-first and privacy-centric approach to RF-based sensing technologies and contributes to a transparent, trustworthy, and sustainable research and innovation process.

## 7. Conclusion

The dissemination activities implemented within the HOLDEN project clearly demonstrate a mature, strategic, and highly effective approach to communicating breakthrough research on RF-based holography and dense wireless sensing technologies. By systematically integrating scientific dissemination, societal engagement, education, and digital communication, HOLDEN has ensured that its results are not only visible, but also accessible, understandable, and relevant to a large and diverse audience.

A defining strength of the project lies in its uncompromising commitment to openness and transparency. In full alignment with Horizon Europe requirements, HOLDEN has made a broad and diverse portfolio of project deliverables publicly available, including

technical reports, ethical and societal analyses, and open-source datasets released via persistent digital repositories. This approach decisively strengthens scientific reproducibility, enables reuse beyond the consortium, and guarantees long-term accessibility of project outcomes well beyond the project’s lifetime.

HOLDEN has also set a clear benchmark for responsible dissemination by actively engaging non-expert audiences and key stakeholders through participatory public-outreach formats, workshops, seminars, and invited talks. Rather than treating dissemination as a one-way communication exercise, the project has consistently fostered dialogue, reflection, and societal feedback. This engagement has directly supported ethical deliberation, informed design choices, and reinforced public trust in emerging sensing technologies.

Taken together, the dissemination efforts of HOLDEN go beyond conventional reporting and visibility measures. They actively contribute to shaping how advanced sensing technologies are discussed, evaluated, and responsibly integrated into society. By embedding ethical reflection, stakeholder engagement, education, and open digital access at the core of its dissemination strategy, HOLDEN provides a compelling example of how high-risk, high-gain research can be communicated responsibly while maximizing scientific impact and societal value.

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