**IPIC** 2023

9th International
Physical Internet Conference

Expanding the logistics Scope

**13-15 JUNE**

Athens, Greece
www.pi.events/IPIC2023

CALL FOR
CONTRIBUTIONS &
SUBMISSIONS



**alice** | Alliance for
Logistics Innovation
through Collaboration
in Europe

Institute of Communication and
Computer Systems (**ICCS**) of the
National Technical University of
Athens (NTUA)

ΕΠΙΣΕΥ
ICCS

#IPIConference
#PhysicalInternet2023

## Contents

## Short introduction on the Physical Internet

The Physical Internet concept aims to get freight flows and logistics services as accessible and connected as information and services are over internet in both global and last mile scopes. The Physical Internet (PI, π) has opened a paradigm-breaking field encompassing the interconnectivity and interoperability of smart logistics networks, transportation systems, manufacturing systems and supply chains, enabling seamless open asset sharing and flow consolidation on a massive scale.

It aims to ease the way physical objects are moved, deployed, realized, supplied, designed, and used all around the world to improve by an order-of magnitude the overall performance in terms of economic, environmental and societal efficiency and sustainability.

## Aim of the conference

The 9th Annual International Physical Internet Conference (IPIC) under the theme *'Physical Internet: Expanding the Logistics Scope'* aims to provide an open forum for industry, innovators, researchers, government officials and citizens to introduce leading edge concepts, technology applications and methodologies for future interconnected logistics; to review the state-of-the-art technologies and latest projects, and to identify critical issues and challenges for future Physical Internet induced research, innovation, and implementation. Specifically, the conference focuses on insights for

implementation steps of the Physical Internet in the different generations and time frames from next year to 2030-2040[1].

IPIC 2023 will be taking place on **13-15 June, 2023 in Athens, Greece**. This year's conference will be open to all physical internet topics and focusing on Physical Internet as a suitable approach to overcome the latest global breakthroughs. Physical Internet principles and developments contribute to:

- Support freight transport and logistics *decarbonization* in an affordable way by bringing further efficiency to logistics and enabling collaboration and sharing of assets at marginal set up costs.

- Provide further *resilience* to global and regional supply chains through the implementation of synchromodal strategies and interconnected logistics multimodal networks.

- Support the development of the *circular economy* by better addressing reverse logistics and close loop circular networks.

- Address *urban logistics challenges*, e-commerce and retail distribution in cities thanks to open an interconnected logistics and distribution networks

## Conference topics

The contributions may be related, yet not limited, to the following themes:

➢ *Autonomous systems and logistics operations (robotic process automation, autonomous transport/drones/AGVs/swarms)*

➢ *Business models and use cases*

➢ *Digital systems and technologies for interconnected Logistics*

➢ *Last mile & city logistics*

➢ *Manufacturing networks and the PI*

➢ *Modularization, material handling and transhipment technologies*

➢ *New communication networks enabling interconnected logistics (5G)*

➢ *Omnichannel & e-commerce logistics*

➢ *PI fundamentals and constituents*

➢ *PI impacts (sustainability, resilience, agility)*

➢ *PI implementation and governance*

➢ *PI modelling and simulation*

➢ *Ports and hubs in the PI*

➢ *Synchromodality and Interconnected freight transport, logistics and supply networks*

➢ *Transport modes in the Physical Internet*

This conference builds on previous efforts of the Physical Internet Community and ALICE [Roadmap on Towards the Physical Internet](#) and is looking for contributions addressing different generations of the roadmap implementations as well as applications or technologies supporting its implementations.

➢ *From Logistics Nodes to PI Nodes*

➢ *From Logistics Networks to Physical Internet Network*

➢ *Developing the System of Logistics Networks towards the Physical Internet*

➢ *Access and Adoption*

➢ *Governance*

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[1] ALICE-ETP, 2020. Roadmap to the Physical Internet. https://www.etp-logistics.eu/alice-physical-internet-roadmap-released/

## IPIC 2023 expected contributions

International Physical Internet Conference (IPIC) 2023 welcomes:

**Paper & poster contributions** in the following forms (more information below):

- *a research paper/poster on, for example, conceptual research, assessment research, case study research, modelling and validation research.*

- *a white paper or case study describing an application in practice.*

- *a report/poster describing the results of novel applications and technologies or innovative ideas and positions resulting from a project jointly performed by an academic and industry partner.*

Paper and poster abstracts contributions must be made on-line by 27th January 2023 via:
**https://easychair.org/conferences/?conf=ipic2023**
TRACK IPIC2023

Please note that you must first register for an EasyChair account to be able to access the above link. First-time users, please visit EasyChair's "How to make a new submission" for an overview of the submission system.

Templates for Paper & Poster contributions:

- IPIC2023 Paper Abstract Template

- IPIC2023 Full Paper Template

- IPIC2023 Poster Abstract Template

- IPIC2023 Poster Template

**Presentations** If you want to participate in a conference session with a presentation, but you do not want to prepare a full paper or poster, please contact the organizers at ipic@etp-alice.eu by 24th of February including a summary of your presentation. We welcome:

- Company presentations of PI related services and products.

- PI practical development, project, and initiatives presentation.

- Physical internet papers already published in journals you want to share and discuss with the IPIC community.

## Timetable

The timetable is as follows:

| | | |
|---|---|---|
| • Abstract submission: | | |
|    o Posters abstracts | | 27 January |
|    o Papers abstract | | |
| • Abstract acceptance notification | | 17 February |
| • Presentations of: | | 24 February |

|  |  |
|---|---|
| <ul><li>Company PI related services and products.</li><li>PI practical developments, projects and initiatives presentations.</li><li>PI research papers published.</li></ul> |  |
| • Full paper and poster submission | 24 March |
| • Review of the paper & poster | 14 April |
| • Final paper and poster submission | 29 April |

## Outreach

- Conference proceedings will be produced with the accepted full papers and poster abstracts contributions.
- The Proceedings papers are to be officially published in IPIC web: www.ipic.events and archived in ALICE Knowledge Platform except if requested otherwise by the authors.
- Georgia Tech SMARTech repository. It is indexed by Google Scholar. Georgia Tech Library will provide DOIs for content by registering each item with DataCite.
- The best research papers will be targeted for extension toward publication in special issues of scientific journals including:
  - Special Issue on Smart Product Platforming in the Industry 4.0

## Review process

All submitted papers will be evaluated with regards to their suitability for the conference, originality and technical soundness.

- Abstracts of paper and poster submissions will be reviewed by the Scientific Committee.
- The organization committee will evaluate the proposed presentations and contribution/value added to the conference.
- Authors of accepted abstracts of papers, posters and presentations will be invited to present them in related conference sessions.
- Research papers will be peer-reviewed by the Scientific Committee.

## Conference topics in detail

The contributions may be related, yet not limited, to the following themes and topics:

- **Autonomous systems and logistics operations**
  - Automated and autonomous logistics processes and systems.
  - Autonomous transport (road, rail, waterborne).
  - Autonomous and automated delivery systems (drones, AGVs, robots and swarms).
  - Robotic process automation.

- **Business models for open & interconnected logistics**
  - Business models, revenue models and profit models in hyperconnected logistics.
  - Data-driven revenue management and pricing;

- o Liability and insurance responsibilities.
- o Hyperconnected business model innovation.
- o Business models and cases to build networks of networks.
- o Business models promoting openness of proprietary logistics networks and resources.

- **Digital systems and technologies for interconnected logistics**
  - o 3D printing, internet of things (IoT), machine learning, augmented reality, big data, artificial intelligence (AI), blockchain, cloud computing, digital twins, collaborative decision making.
  - o AI-powered visual inspection for warehouse and distribution operations.
  - o Applications of digital technologies in smart supply chains.
  - o Data sharing, data sovereignty, data integrity.
  - o Development of intelligent logistics services.
  - o Digital ecosystems and platforms federation.
  - o New communication networks enabling interconnected logistics (5G)
  - o Novel ICT platforms enabling interconnected logistics and access to cloud logistics services (e-freight, e-booking, e-CMR…)
  - o Supply chain visibility: tracking, tracing, sensing, event management and prediction, asset monitoring.

- **Last mile & city logistics**
  - o Interconnected city logistics.
  - o City hubs.
  - o City regulations in support of physical internet.
  - o Modularization, boxes and handling units for city delivery.
  - o Autonomous logistics systems in cities.

- **Manufacturing networks and the Physical Internet**
  - o Modular and agile production, manufacturing and distribution networks.
  - o Physical Internet responsive to Industry 4.0 paradigm.
  - o Customer centric manufacturing and distribution.

- **Modularization, handling and transhipment technologies**
  - o Handling and transhipment technologies.
  - o Modularization and standardization.
  - o Packaging container design and engineering.
  - o Smart, active, intelligent containers, boxes and logistics units.

- **Omnichannel & e-commerce logistics**
  - o Crowdsourced delivery and transportation.
  - o Fulfilment strategies in meshed distribution networks
  - o Physical Internet based retail networks.
  - o Physical Internet & e-commerce
  - o Real-time decision-making related to fulfilment and delivery performance.

- **Physical Internet Impacts**
  - o Efficiency, sustainability, resilience, responsiveness, security, adaptability, agility in Physical Internet logistics and supply chains.
  - o End-to-end carbon footprint measurement, indicators and assessment of (policy/industry) practices, etc.
  - o Implications for congestion and infrastructure.

- o Implications for the circular economy: PI as part of the circular economy, waste avoidance and resource efficiency.
- o Physical Internet contribution to decarbonization and energy consumption reduction.
- o Other societal impacts: labour, equality, poverty abatement etc.

- **Physical Internet fundamentals and constituents:**
  - o Physical Internet frameworks & protocols
  - o PI network design.
  - o Liability and insurance models in the PI
  - o Container and logistics units design & engineering.
  - o Design, engineering, planning and operation of handling, storage, transportation technologies, systems, facilities and infrastructures in the Physical Internet.
  - o Mobility web, distribution web, realization web, supply web and service web
  - o PI hub design & engineering: Hub definition, services and publications
  - o Physical Internet access.
  - o What can PI learn from other networks of networks: Telecom, Postal, Energy, Digital Internet?
  - o Decision and support models in the Physical Internet

- **Physical Internet implementation and governance**
  - o Physical Internet implementation drivers and issues
  - o Stakeholders and their roles in the Physical internet
  - o Stakeholder incentives for PI adoption and implementation
  - o Negotiation, collaboration and conflict resolution within Physical Internet
  - o Social innovation and new ways of working in the Physical Internet
  - o Impact of PI induced innovation on regulation, taxation and duties
  - o Design of the Physical Internet governance structure and processes
  - o Physical Internet roadmaps
  - o Mindset, collaboration and openness, behavioural aspects.

- **PI modelling and simulation**
  - o Novel descriptive, predictive and prescriptive analytics.
  - o Optimization and gaming approaches for Physical Internet.
  - o Qualitative and quantitative methodologies for studying proposed or existing PI induced systems, processes, phenomena & business models.
  - o ML and AI tools for demand forecasting and inventory control.

- **Synchromodality & interconnected freight transport, logistics and supply networks**
  - o Open and interconnected transportation, storage & distribution
  - o Cross-chain control and collaboration, interconnected cockpits and control towers.
  - o Logistics networks performance, impact assessment and resiliency.
  - o Logistics asset sharing, flow consolidation and load optimization.
  - o Interconnected ports and hubs.
  - o ML and AI for freight transportation optimization.
  - o Synchromodality.
  - o Smart hyperconnected inventory deployment and management.
  - o Open and interconnected logistics services, cloud logistics services.

- **Transport modes in the Physical Internet**
  - o Innovative Transportation modes and the Physical Internet (Pipelines, Hyperloop, etc.)
  - o Rail networks and the Physical Internet.

- o Road transport and the Physical Internet.
- o Waterborne transport and the Physical Internet.

Additionally, authors are asked to identify the area(s) of the ALICE Roadmap on Towards the Physical Internet related to their contribution (recommended):

**From Logistics Nodes to PI Nodes.** In Logistics Nodes, goods are consumed, stored, transformed, or transhipped from one transport mode to another. Ports, airports, logistics hubs, terminals, distribution centres, warehouses, depots are examples of Logistics Nodes. The Physical Internet envisions the development of the Logistics Nodes into Physical Internet nodes in which the operations are standardised and the usage of a family of standard and interoperable modular load units from maritime containers to smaller boxes is extensive. Services in PI nodes are visible and digitally accessible and usable including planning, booking and execution operation. Contributions may focus on any of the roadmap generations:

- Open and Seamless nodes service offering.
- Automated node service request and response.
- Nodes interconnect across networks.
- Autonomous PI nodes.

**From Logistics Networks to Physical Internet Networks.** Logistics Networks include Logistics Nodes as well as the transportation services connecting the Logistics Nodes and reaching to the destination. Logistics Networks are under the control of a single company either a shipper, a freight forwarder or a logistics service provider reaching their value chain (i.e., customers and suppliers). PI Networks are expected to build seamless, flexible and resilient, door-to-door services consolidating and deconsolidating all shipments within a logistics network in which all assets, capabilities and resources are seamlessly visible, accessible and usable to make the most efficient possible use of them. Contributions may focus on any of the roadmap generations:

- Operational/Synchromodality / Physical Intranets.
- Multiple shipment joint/split.
- Sense and respond optimization of network flows.
- Fully Autonomous PI Network services and operations.

**Developing the System of Logistics Networks towards the Physical Internet.** Includes individual logistics networks that are interconnected. Therefore, the assets, services and resources of the individual logistics networks can be accessed by all logistics networks owners. The System of Logistics Networks forms the backbone of the Physical Internet and requires secure, efficient and extensible services for the flow of goods, information and finances across logistics networks.

- Network to network connectivity.
- Extended inter-network connectivity.
- Scalable logistics networks interconnectivity.
- Complete PI functionality and networks interconnectivity.

**Access and Adoption.** This area includes the main requirements to access the Physical Internet through a logistics network part of it. It also includes different steps and the mind shift required to adopt Physical Internet concepts.

- Sectoral, regional, seamless vertical PI demonstration.
- Large-scale PI demonstrations.

- PI expansion.
- Everyone can access the PI.

**Governance.** Governance includes the developments needed to evolve the Logistics Nodes, logistics networks and the System of Logistics Networks into the Physical Internet, i.e. the rules defined by the stakeholders forming or using them as well as the trust building processes and mechanisms.

- Rules and governance for asset-sharing platforms.
- Foundation of PI governance body.
- Industrial adoption of PI rules and models.
- Stable PI rules and models.

For more information, please contact us via ipic@etp-alice.eu

Possible evolutions in the different areas and generations — PHYSICAL INTERNET