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University of Basilicata, Matera, Italy

The Ecology of Knowledge in the AI Era

CALL FOR EXTENDED ABSTRACTS - IFKAD 2027
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Special Track n.: 24

Ecology of Knowledge in Extreme Environments: Bridging OSCM and OI in Space Economy, Environmental and Humanitarian Disasters

Description

The new Space Economy (SE) represents a transformative frontier and an "extreme case" laboratory that redefines how organizational value, capabilities, knowledge, and innovation are created, distributed, and sustained under severe operational constraints. Off-Earth operations – e.g., long-duration space missions, commercial space stations and orbital habitats, and lunar/Martian supply networks – serve as pilot projects that sharpen organizational, management, and biological theories. As artificial intelligence (AI) transitions from a passive tool to an active participant in (inter-) organizational cognitive architectures and ecosystems – sensing, inferring, and deciding alongside humans -, the Space Economy demands an integrated Ecology of Knowledge that bridges Operations and Supply Chain Management (OSCM) with Open Innovation (OI) and Neuro-Organizational Behaviour.

In extreme off-Earth environments, human-machine teams and hybrid supply networks operate under unprecedented conditions, including orbital trajectories, signal latencies, severe environmental uncertainty, microgravity, isolation, and confinement. These extreme factors render human biological mechanisms – e.g., stress physiology, cognitive fatigue, and neurostructural connectivity – central determinants for (inter-)organizational/team performance, innovativeness and decision-making.

Open Innovation serves as an overarching and enabling paradigm to leverage knowledge ecosystems, multi-sided platforms, and Quadruple Helix partnerships, bridging upstream space capabilities with downstream terrestrial applications. OI mechanisms – e.g., crowdsourcing, orbital additive manufacturing/3D printing, and In-Situ Resource Utilization (ISRU) – facilitate real-time data sharing and zero-waste closed-loop supply networks in space missions as well as terrestrial climate and humanitarian crises. Simultaneously, OI enables cross-sector knowledge spillovers regarding real-time biometric monitoring (e.g., EEG, fNIRS) and human-AI cognitive architectures and ecosystems. This cross-pollination protects shared team cognition, mitigates burnout, and safeguards worker safety and human dignity across high-strain Earth and off-Earth operational frontiers.

Managing these complex systems requires a living knowledge ecosystem perspective where human cognitive limits, physiological state monitoring, automated AI decision agents, and circular supply chain routines interact symbiotically.

SE's theoretical mechanisms, operational protocols, and neurobiological insights directly translate to terrestrial extreme contexts facing acute disruption. The severe physical constraints of space operations mirror the critical demands of climate change adaptation, post-disaster humanitarian logistics, deep-sea exploration, health outbreak responses and, finally, provide transferable frameworks for deploying resilient, decentralized, and zero-waste supply chains in resource-scarce or disaster-stricken environments on Earth. Concurrently, the systemic convergence of isolation, high stakes, and severe biological strain in space missions parallels the physiological and cognitive stress experienced by emergency medical personnel during outbreaks, rescue teams in climate catastrophes, and crews in extreme (e.g., nuclear or polar) installations and, finally, equips scholars with generalizable knowledge and models to enhance (inter-)organizational/ team coordination and innovativeness in terrestrial contexts.

This track aims at examining, under the lenses of integral ecology, how knowledge living in hybrid human-AI-technological ecosystems is cultivated, governed, and protected under extreme pressure. By bringing together OSCM, Open Innovation, resilience, circularity, and terrestrial-orbital synchronization with neurobiological underpinnings of team cognition and leadership under strain, this track provides a holistic forum to explore how organizations can leverage AI co-agents and

bio-sensing technologies without eroding human dignity, safety, or cognitive diversity, thereby advancing responsible innovation and sustainable wealth creation both in space and on Earth.

Indicative Topics

OSCM and knowledge ecology in space operations

- How can organizations design and synchronize terrestrial and orbital supply chains through real-time data sharing and AI co-agents under signal latency and extreme disruption?
- How do closed-loop supply networks, In-Situ Resource Utilization, and 3D printing reframe traditional knowledge routines regarding sourcing, inventory positioning, and circularity under severe physical constraints?
- What governance models and stakeholder dynamics are required to manage public-private knowledge sharing and resilience in space ecosystems?

OI, human-AI symbiosis and knowledge ecology

- How can open innovation paradigms – such as inbound and outbound knowledge flows and multi-sided digital platforms like CLEOS – accelerate the co-creation of resilient, closed-loop supply networks and ISRU strategies across space missions and terrestrial climate/humanitarian disaster zones?
- In what ways can OI and collaborative Quadruple Helix ecosystems facilitate the ethical integration of AI decision co-agents and real-time neuro-biometric tracking (e.g., EEG, fNIRS) to support team cognition under extreme strain while protecting worker privacy, psychological safety, and human dignity?
- How do technology transfer mechanisms and OI models derived from space exploration inform organizational routines, leadership resilience, and burnout prevention during acute terrestrial health outbreaks and environmental crises?

Neuro-organizational behaviour and bio-sensing in extreme contexts

- How do microgravity, confinement, and altered stress physiology impact team physiological synchrony, shared team cognition, and high-consequence decision-making in space missions?
- How can advanced neuro- and bio-sensing technologies (e.g., fNIRS, EEG, continuous biometric tracking) be integrated into task design, operational training, and real-time fatigue management without compromising measurement validity?
- How do leadership dynamics and organizational routines adapt under severe strain and biological fatigue in high-reliability off-Earth environments?

Hybrid intelligence and human-AI symbiosis in space operations

- How does AI act as a cognitive partner – rather than a passive tool – in shaping organizational cognitive architecture within mission-critical space operations?
- How can space organizations safeguard cognitive diversity, human judgment, and tacit/embodied knowledge against algorithmic homogenization when scaling automated decision agents?

Ethics, governance and integral ecology

- What are the ethical limits, privacy standards, and data governance frameworks for continuous biometric monitoring and cognitive enhancement in safety-critical space roles?
- How can an integral ecology framework reconcile technological efficiency with human dignity, worker well-being, and ecological sustainability in off-Earth and terrestrial contexts?

Terrestrial transposition, climate crises and environmental disasters

- How can closed-loop supply chain models, In-Situ Resource Utilization principles, and additive manufacturing developed for space operations be adapted to build zero-waste, decentralized supply networks in post-disaster or climate-impacted regions?
- How do OSCM frameworks for managing extreme environmental uncertainty and signal/data latencies in orbital contexts inform the design of real-time data sharing and inventory positioning during acute terrestrial climate catastrophes?
- How can continuous neuro- and bio-sensing technologies (e.g., fNIRS, EEG) monitor physiological strain, cognitive overload, and decision fatigue among first responders and emergency management personnel operating under high-stakes climate stress?

Humanitarian logistics, health outbreaks and high-risk earth operations

- What lessons can humanitarian supply chain management draw from Earth-space integration protocols regarding real-time synchronization, stakeholder coordination, and risk mitigation during rapid-onset epidemic or war-zone crises?
- How do prolonged confinement, physiological disruption, and high-consequence decision-making dynamics observed in orbital crews parallel team physiological synchrony, leadership resilience, and coordination patterns in isolated medical teams or polar/nuclear installations?

- How do organizational routines adapt to prevent cognitive failure and maintain shared team situational awareness during prolonged terrestrial health or humanitarian crises characterized by high staff burnout and biological exhaustion?

Hybrid intelligence, knowledge ecology and ethics in terrestrial frontiers

- How can AI decision co-agents operate symbiotically with human teams in extreme terrestrial environments to enhance organizational cognitive architecture without eroding human judgment, creativity, or tacit knowledge?
- What data governance and ethical frameworks are required to regulate continuous physiological tracking and cognitive enhancement of workers in terrestrial safety-critical roles (e.g., healthcare workers during disease outbreaks, emergency crews), drawing from space bio-sensing ethics?
- How does an integral ecology perspective help reconcile operational efficiency with human dignity, cognitive diversity, and psychological safety across both space missions and high-strain Earth operations?

Keywords

Operations and Supply Chain Management; Open Innovation; Space Economy; Humanitarian and Environmental Disasters; Artificial Intelligence

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Guidelines and Requirements

Researchers wishing to contribute are invited to submit an EXTENDED ABSTRACT (in MS Word format) of min 500 and max 1000 words, not later than **22 JANUARY 2027**. All submission must be done via dedicated form on our website. The abstract should address theoretical background, research objective, methodology, and results in terms of expected contribution to Knowledge Management theory and practice.
Authors are required to follow the guidelines and templates available on IFKAD website: www.ifkad.org

Important Dates

22 January 2027 – Extended Abstract Submission Deadline
19 February 2027 – Acceptance Notification to Authors
16 April 2027 – Early-Bird Registration & Payment Deadline
23 April 2027 – Full Paper Submission Deadline
28 May 2027 – Regular and PhD Students Registration & Payment Deadline
12 June 2027 – Conference Program Release
28-30 June 2027 – Conference sessions *(to be considered as 3 full working days)*

Please note that all above indicated dates are **CUT-OFF** deadlines. There will not be an extention to any of these.

Further Information

For any information related to the conference and/or any special track, please see the event website at www.ifkad.org or contact the conference manager at **info@ifkad.org**