# 2<sup>nd</sup> Standardization Workshop

**Approach to standardisation within the NetHelix project as part of WP8**

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# Motivation in applying standards for mining
## The NETHELIX perspective

- Fragmented systems leading to inefficiencies and data silos.

- Varying safety protocols across regions or sites.

- Difficulty in deploying and integrating advanced technologies.

- Innovation slow-down due to lack of shared frameworks.

- Ensures interoperability, safety, and sustainability across mining operations.

- Supports integration of automation, digital systems, and data sharing.

- Crucial for aligning global best practices and regulatory compliance.



**STANDARDISATION IN MINING**

INTEROPERABILITY

SAFETY

EFFICIENCY

SUSTAINABILITY

**NETHELIX**

# Points for consideration

- Mapping real-world mining use cases to existing standards.

- Identifying standardization gaps in digital mining.

- Promoting interoperability across sectors and systems.

- Involving stakeholders to build consensus and adoption pathways.

Operational Context

Stakeholder Consensus

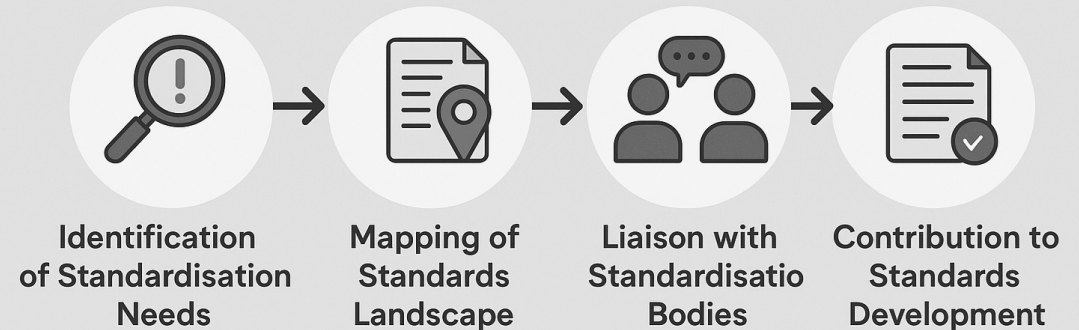Standardization Gaps

Interoperability

# NETHELIX Methodological Approach

- Continuously monitor compliance of the mining services developed as part of NETHELIX with standard practices and methodologies

- Methodology regarding the compliance to standardization includes

  - Establishment of standardization committee in the context of NETHELIX consortium for ensuring compliance monitoring and the identification of new standardization needs

  - Extended literature review of state-of-the-art services and international standards established focusing on the ecosystem corresponding to NETHLELIX activities

  - Correlation of existing standardization items with the activities of the NETHELIX including operational analysis of the proposed services,.

  - Identifying / highlighting potential standardization gaps fall well within the scope of the work and may lead to future considerations for standardization work

**STANDARDISATION ACTIVITIES METHODOLOGY**
in NETHELIX Project

Identification of Standardisation Needs → Mapping of Standards Landscape → Liaison with Standardisatio Bodies → Contribution to Standards Development

*How-to: 4-Step approach*

# Standardization Landscape (1/2)

- Capitalizing on outcomes of 1st Smart Ecomine Hub standardization workshop

- Initial step encompassed an extensive literature / desktop research (in line with NETHELIX scope of activity)

- Aimed to highlight (among others) trends in the standardization domain aligned in scope to the developed services within NETHELIX while also showcase some preliminary gaps

- Central focus on the mining industry covering both underground mining and open pit mining,

- Geographical scope of the review was not limited by the definition of the market of interest

- Market segments that were primarily investigated encompassed

  - Green, remote controlled & automated machinery

  - Health & safety in mining

  - Sustainable mineral extraction

  - Optimization of mining operations



Green, remote controlled & automated machinery

Health & safety in mining

Sustainable mineral extraction

Optimisation of mining operations

# Standardization Landscape (2/2)

- Desktop research (in line with NETHELIX scope of activity)

- 37 Standards identified

- Aim to

  - identify relevant international mining standards, with a particular focus on ISO standards

  - to compare the adherence of the consortium to relevant international standards w.r.t. their operational activities.

- Identified standardization items have been categorized as:

  - Environmental Sustainability

  - Saving energy

  - Occupational safety

  - Mining

| Standard | Title | Sector |
|---|---|---|
| ISO/IEC 42001:2023 | Artificial intelligence Manangement system | AI |
| ISO/IEC 23894:2023 | Guidance on risk manangement | |
| ISO/IEC 23053:2022 | Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML) | |
| ISO 14001: 2015 | Environmental management systems (Requirements with guidance for use) | Environmental Sustainability |
| ISO 50001: 2018 | Energy management systems (Requirements with guidance for use) | Saving energy |
| ISO 50002: 2014 | Energy audits (Requirements with guidance for use) | |
| ISO 50015: 2014 | energy management systems (measurement and verification of energy performance of organizations) | |
| ISO 45001:2018 | Occupational health and safety management systems (Requirements with guidance for use) | Occupational safety |
| ISO 45004:2024 | Occupational health and safety management (Guidelines of performance evaluation) | |
| ISO 45002:2023 | Occupational health and safety management system (general guidelines for implementation of ISO 45001:2018) | |
| ISO 17757:2019 | Earth-moving machinery and mining (Autonomous and semi-autonomous machine system safety) | Mining |
| ISO 19225:2017/Amd 1:2019 | Underground mining machines - Mobile extracting machines at face-Safety requirements for shearer loaders and plough systems | |
| ISO 19434:2017/Amd 1:2019 | Classification of mine accidents | |
| ISO 22932-1:2020 | Mining-Vocabulary-Part 1: Planning and surveying | |
| ISO 22932-2:2020 | Mining- Vocabulary -Part 2: Geology | |
| ISO 22932-3:2023 | Mining - Vocabulary - Part 3: Rock mechanics | |
| ISO 22932-4:2023 | Mining - Vocabulary - Part 4: Prospecting and exploration | |
| ISO 22932-5:2023/AWI Amd 1 | Mining - Vocabulary - Part 5: Drilling and blasting - Amendment 1 | |
| ISO/DIS 22932-9 | Mining-Vocabulary - Part 7: Ventilation | |
| ISO/DIS 22932-8 | Mining-Vocabulary - Part 8: Extraction | |
| ISO/DIS 22932-9 | Mining-Vocabulary - Part 9: Drainage | |
| ISO/AWI 22932-10 | Mining-Vocabulary - Part 10: Haulage | |
| ISO 23875:2021/Amd 1:2022 | Airquality control systems for operator enclosures - Performance requirements and test methods - Amendment 1 | |
| ISO 23872:2021 | Mining structures - Underground structures | |
| ISO/AWI 21557 | Mining Methods - Specification and Classification | |
| ISO 18758-2:2018 | Mining and earth-moving machinery - Rock drill rings and rock reinforcement Rings - Part 2: Safety requirements | |
| | ...rocessing | |
| | ... Part 1: Genaral | |
| | ... Part 2: On-board J1939 | |
| | ...perability | |
| | ... Part 3: Risk area and risk | |
| ISO 6183:2022 | Fire protection equipment - Carbon dioxide extinguishing systems for use on premises - Desihn and installation | |
| ISO 21795-1:2021 | Mine closure and reclamation planning - Part 1: Requirements | |
| ISO 21795-2:2021 | Mine closure and reclamation planning - Part 2: Guidance | |
| ISO 18589:2019 | Measurement of radioactivity in the environment - Soil | |

Indicative Visualisation

- ISO 19426 – Mining vocabulary (ISO).
- ISO 17757 – Autonomous and semi-autonomous mining systems (ISO).
- ISA-95 – Integration of control and enterprise systems.
- ETSI TR 103 588 – Industrial IoT use cases in mining

NetHelix

# Standardization aspects within NETHELIX

Elaboration of a survey for the collection of feedback on standards in use / elaboration by the partner's organisation.

The survey encompasses:

- Partner's name
- The name of the standard
- The status of the standard
- Responsible organisation
- Type of involvement of the partners
- Standards focus
- NetHelix domain

| | |
|---|---|
| Partner's name | |
| The name of the standard | |
| The status of the standard | |
| Responsibie organisation | |
| Type of involve-ment of the partners | |
| Standard's focus | |

# Data Collection Template

## Template Illustration

| Partner | Standards | Status of the Standard | Responsible Organisation | Typ of Involvement | Focus of this Standards | NetHelix Domain | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Published, in development, etc. | ISO, TC, etc | Developer, User, contributor, Monitor, etc | (see the description on the right side in green) | Contribute to or regulate the development of green, remote & automated machinery (Yes/No) | Contribute to the improvement of health and safety in mining (Yes/No) | Contribute to or regulate the process of sustainable mineral extraction (Yes/No) | Contribute to the optimisation of mining operations (Yes/No) |
| ALTUS | ATLAS 8, Heavy Lifter UAV | In development | ISO | User, Monitor | Robotic and automation, Security & safety | NO | YES | YES | YES |
| | RC Heavy Machinery | In development | ISO | User, Monitor | Robotic and automation, Security & safety | YES | YES | YES | YES |
| UULM | Laser-based air quality analysers | In development | ISO, IEC62990-1 | Developer | Security and safety | YES | YES | | NO |
| | | | ISO, IEC60079-29-1 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NTUA | UAV Multispectral Imaging, Machine Learning | In development | Open source | Developer, User | Robotic and automation | NO | NO | YES | YES |
| TUBAF | | | | | | | | | |
| EITRM | | | | | | | | | |
| EMPH | Ventilation on Demand | In development | Private | Monitor | Mine process monitoring | no | no | no | yes |
| ABAUT GMBH | ISO 27001, ISO 9001 | | | | | | | | |
| | MEMT - Mobile machinery Monitoring tool | In development | Private development | Developer, User, Mo | Machinery monitoring and reporting | No | No | Yes | YES |
| ALTUS | ATLAS 8, Heavy Lifter UAV | In development | ISO | User, Monitor | Robotic and automation, Security & safety | NO | YES | YES | YES |
| | RC Heavy Machinery | In development | ISO | User, Monitor | Robotic and automation, Security & safety | YES | YES | YES | YES |
| UULM | Laser-based air quality analysers | In development | ISO, IEC62990-1 | Developer | Security and safety | YES | YES | | NO |
| | | | ISO, IEC60079-29-1 | | | | | | |
| SORECC | ISO 22301:2019/Amd 1:2024 | Published | ISO | User | Business continuity | No | NO | NO | YES |
| PLEGMA LABS | Rest APIs | In development | Open source | Developer, User | IoT, Big data | No | No | No | |
| RISA | ISO 14040:2006, ISO 14044:2006 | Published | ISO | User | Framework for LCA | No | No | Yes | No |
| | ETSI GS CIM 029 V1.1.1 (2024-04) | Published | ETSI | User | Context Information Management | No | No | No | No |
| CyRIC | Lithium battery standard IEC 62133-2 | Published | IEC | User | Security and safety | No | Yes | No | No |
| | Bluetooth & LoRaWAN standards and specifications | Published | | User | IoT, Big data | No | No | No | No |
| | Information security management standard ISO/IEC 27001 & GDPR compliance | Published | ISO/IEC | User | Data protection | No | Yes | No | No |
| ESI | No standards followed | | | | | | | | |
| MPL | | | | | | | | | |
| OMYA GmbH | | | | | | | | | |
| DPMC | | | | | | | | | |
| MYTILINEOS | | | | | | | | | |
| DELPHI | | | | | | | | | |
| HELLAS GOLD | | | | | | | | | |
| ALPES LASERS | Related to gas sensing - See UULM reply | | | | | | | | |
| CSEM | ISO 9001: Project management | | | User | | | | | |
| VRUMP | Machinery health monitoring through ML and AI | In development | IEC, ISO | Developer, User, Monitor | IoT, Big data | NO | YES | YES | YES |

**Focus of the standard**

Robotic and automation
Interoperability of Big Data
Interoperability (sharing of data and resources between different system)

Mine west manangement
Security & safety
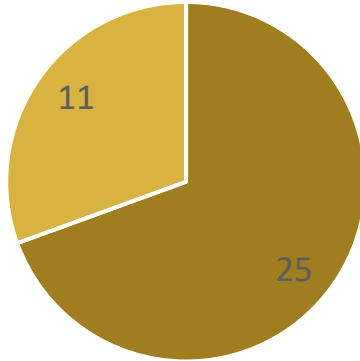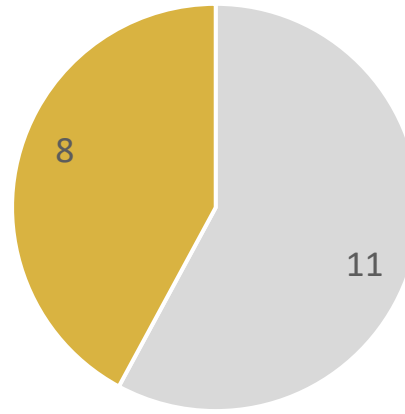IoT, Big Data

Terminilogy
Etc.

# Indicative results so far
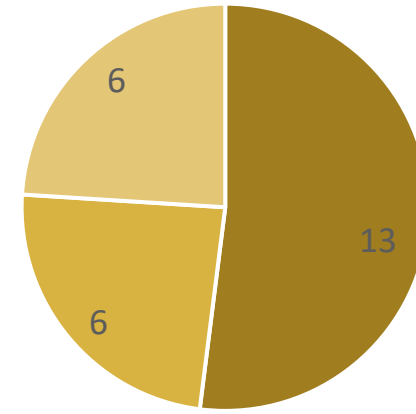
### Total Nr of project Partners vs Mapped Partners



- 11
- 25

■ Total number of partners  ■ Mapped partners

### Status of the Standards



- 8
- 11

■ Published  ■ In development

### Involvement of the Partner



- 6
- 6
- 13

■ User  ■ Developer  ■ Monitoring

**Responsible Organisation:**

- ISO; IEC; Open Source; ETSI, Private

# Outcomes & Next Steps

- Continue monitoring compliance of NETHELIX activity.

- Elaboration od roadmap for adoption and alignment within WP8.

- Highlight areas where new or updated standards are needed.

- Investigate a harmonized framework for digital mining standardization.

- Engage further with ISO, ETSI, and industrial stakeholders.



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ANY QUESTION?

NETHELIX