MINE.IO
A Holistic Digital Mine 4.0 Ecosystem

jotne connect

EcoMine Hub Workshop April 10, 2025 on Standardization

Jotne Connect - Pål Huse

Co-funded by the European Union

Main Achievements

- Results from standardization activities included in deliverable D7.3 - *Mine.io Outreach, dissemination, standardization and communication activities – version 1*.
- Collected and identified by partners following list of the Standards relevant to the Mining Industry based on the Standardization survey:
  - MIMOSA OSA-CBM for the Predictive Maintenance Module (ICCS)
  - IEEE 802.11 and MQTT for IoT Standards and Protocols (HMU)
  - ISO/TC 20/SC for aircraft and space vehicles (Acceligence)
  - (EASA) regulations in the Open Category A1/A3 for the drone classification (Acceligence)
  - ISO 10303 AP242/AP239 (Jotne)
  - PN-EN ISO 14001 Environmental Management System (KGHM)
  - ISO 50001 Energy Management System (KGHM)
  - PN-ISO 45001 Occupational Health and Safety Management System (KGHM)
  - PN-EN ISO 22301: Universal safety - Business continuity management systems (KGHM)
  - PN-EN ISO/IEC 27001 Information security (KGHM)


HORIZON EUROPE – 101091885 – MINE.IO
D7.3 – Outreach, Dissemination, Standardisation and Communication Activities (V1)

MINE.IO

A Holistic Digital Mine 4.0 Ecosystem

D7.3
Mine.io Outreach, dissemination, standardisation and communication activities - v1

submitted

Editor(s)	Mona Chaure
Lead Beneficiary	Jotne
Status	Final
Version	1.0
Due Date	30/09/2024
Delivery Date	30/09/2024
Dissemination Level	PU - Public

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Page 1 of 45

SAE standard on inductive charging – J2954/2

- Inductive charging remains a rapidly evolving field, with global standardization efforts still underway.
- Mine.io partner ENRX is involved development of the J2954/2 standard - Wireless Power Transformation or Heavy-Duty Electrical Vehicles, relevant for the mining industry:
  - Actively participating in monthly SAE meetings
  - Actively contributing by presenting their dynamic wireless charging concept developed by the company
  - This ongoing engagement aims to ensure that this innovative approach is incorporated into the standards within the SAE J2954/2 framework.
  - ENRX is participating in real-world validation tests at the Utah State Test Track at the Electric Vehicle Road Center (EVR) in Logan, Utah.

Identified standards from Survey among Mine.io partners (as also shown in 1st Workshop)

Partners	Standards	Type of involvement	Focus of this standard	Mine.io components	Relevance for Mine.io categories			
					Develop sustainable and smart mining technologies for exploitation of EU mineral resources	Contribute to a more safe and environmentally friendly, resource- and production efficient sustainable	Develop methods, technologies and processes aiming for digitisation and automation of raw materials	Contribute to the implementation of the following actions of the EU Action Plan on Critical Raw Materials: Action 8:Develop Horizon Europe R&I projects on processes for exploitation and processing of critical raw materials to reduce environmental impacts starting in 2021 and Action 3: Launch critical raw materials R&I in 2021 on waste processing, advanced materials and substitution.
PoliTO	ISO/AWI TR 3502	Develop	Robotics and automation	4, 5, 12, 14, 17	Yes	No	Yes	Yes
LTU	ISO-17757	Develop	Robotics and automation	14, 21		Yes	Yes	Yes
Innov-acts	ISO 10303	Use	Interoperability and Big Data	16	Yes	No	No	No
TECNALIA	IEEE 2418.2-2020	Use	Interoperability (sharing of data and resources between different systems)	24	No	No	Yes	Yes
University of Oulu	Global Industry Standard on	Develop	Mine waste management	18, 24		Yes		Yes
ICCS	ISO 13374 - MIMOSA OSA-CBM	Use	Interoperability (sharing of data and resources between different systems)					
ACCELIGENCE ltd	European Union Aviation Safety Agency (Open Category A1/A3)	Use	Robotics and automation	21	Yes	Yes	Yes	Yes
GFT	BPMN (Business Processing modelling notation)	Use	Orchestration (configuration, coordination, and management of systems)	24	No	No	Yes	Yes
Muon Solutions		Develop	Terminology	1, 2, 3, 5, 25, 26	Yes	Yes	Yes	Yes
Fluorchemie	Advanced automated mining	Develop	Security & safety	4, 9, 11, 12, 14,26	Yes	Yes	Yes	No
Wigner Research Centre for Physics		Monitor/Develop	Interoperability (sharing of data and resources between different systems)	1, 2, 3, 4, 6, 18, 23	Yes	No	No	Yes
Jotne	ISO 10303	Contribute/Monitor	Circular economy, Interoperability (sharing of data and resources between different systems), Orchestration (configuration, coordination, and management of systems), IoT	4, 5, 6, 10, 13, 17, 25, 26	Yes		Yes	Yes
	ISO 23247	Monitor/Use	Terminology, Interoperability (sharing of data and resources between different systems), Portability (enables using the system in different environments)	4, 6, 14, 21, 22	Yes	Yes	Yes	
HMU	LoRaWAN	Use	IoT, Big Data	17	Yes	No	Yes	No

1.Underground muography instrumentation
2. Waterproof casing for an underwater muon detection system
3.Underwater muon imaging system
4.Autonomous exploration underwater robot
5.Digital twin underwater data export software system
6.Infrastructure for flooded mine exploration/ digitalization
7.Smart drill core analysis with X-ray diffraction
8.Smart drill core analysis with X-ray computed tomography
9.Development of new concepts for automated big data mining and AI for MWD-data
10.Development of virtual test bed for demonstration of MWD results
11.Primary track pavement
12.Primary electronic sub-system
13.Secondary sub-system (mechanical, electronic and hardware)
14.Autonomous driving
15.Dual energy x-ray sorting using deep learning
16.PIT System and software
17.Sensor based-digital-twins-for-smelting system
18.Surveillance and monitoring of tailings facilities
19.Passive seismic interferometry
20.Characterization system for stockpiles
21.UAV system prototype
22.Digital architecture for the 3d slagheap model (data acquisition module included)
23.Simulation processes algorithms for the 3D dump model evolution
24.Sustainable waste management based on distributed ledger technology
25.Digital Twin Infrastructure including IoT
26.Data Interoperability

and more…

Further on

- A deeper look into blockchain related standardization
- To collect further details or suggestions/recommendations of the standards partners following up during the Project related to mining.
- Project partners updates on their standardization interests
- Further collaboration with Smart EcoMine Hub Cluster EU projects to identify the standards used by them that might be beneficial to our project.
- Prepare next intermediate version of the deliverable covering standardization.

Plan for D7.6 Completion (due M33, September '25)

- Responsible Partners
  - Standardization (Jotne, Ł-ITR, ENRX, KGHM)
- Deadlines (for next intermediate version):
  - partner inputs by end of July
  - draft to be finished by end of August
  - Send for review by mid of September
  - Submission by end of September