ISO/IEC JTC 1 SC 42 Artificial Intelligence – Working Group 4

Use Case Submission Form

The quality of use case submissions will be evaluated for inclusion in the Working Group's Technical Report based the application area, relevant AI technologies, credible reference sources (see References section), and the following characteristics:

— Data Focus & Learning: Use cases for AI system which utilizes Machine Learning, and those that use a fixed *a priori* knowledge base.

— Level of Autonomy: Use cases demonstrating several degrees (dependent, autonomous, human/critic in the loop, etc.) of AI system autonomy.

— Verifiability & Transparency: Use cases demonstrating several types and levels of verifiability and transparency, including approaches for explainable AI, accountability, etc.

— Impact: Use cases demonstrating the impact of AI systems to society, environment, etc.

— Architecture: Use cases demonstrating several architectural paradigms for AI systems (e.g., cloud, distributed AI, crowdsourcing, swarm intelligence, etc.)

1. General

ID	(leave blank, for internal use)	
Use case name	Powering Remote Drilling Command Centre	
Application domain	Manufacturing	
Deployment model	Cloud services	
Status	In operation	
Scope[1]	Oil and Gas Upstream (Deployed in 150 Oil Rigs and 2.5 Billion+ Data Points each)	
Objective(s)[2]	Automatic generation of Daily Performance Report, reduction in overall drilling time, cut down Invisible Loss Time and improve rig asset management	
Narrative	Short description (not more than 150 words)	It is important for a drilling contractor to have real time monitoring of rig parameters to optimize operations. The customer lacked granular insights during drilling, could not ascertain the root cause of non-productive time, and manual interpretation of signals led to missing of anomalies further degrading performance.
	Complete description	Cerebra product extracted and ingested different types of signals from surface and downhole sensors to perform near

[1] The scope defines the intended area of applicability, limits, and audience.
[2] The intention of the system; what is to be accomplished?; who/what will benefit?.

		real-time processing. More than **170 vital signals every second** from each oil rig were processed by Cerebra to provide near real time insights into drilling operations. This was achieved by handling **Data Format and Data Extraction standards** and Cerebra's **Visualization Studio** provides the flexibility of generating customized asset utilization reports, thus helping the oilfield engineers to understand the root causes of non-productive time and better utilize the assets on field. Rig specific utilization reports, and weekly and monthly utilization reports helped to plan drilling operations improving drilling efficiency.		
Stakeholders[3]	Oil and Gas Upstream sector; Environment, Humans			
Stakeholders' assets, values[4]	Competitiveness (operational excellence); Safety and Environment			
System's threats & vulnerabilities[5]	Challenges to accountability, security threats			
Key performance indicators (KPIs)	ID	Name	Description	Reference to mentioned use case objectives
	1	Invisible Loss Time	Indicates the lost time of the asset in being idle or off or unplanned downtime	Asset Utilization Reports indicate the effectively utilized time there indicating the lost time and their causes
	2	Overall drilling time	The time spent on one drilling job inclusive of the all downtimes	Real Time visibility into operations gives the operations early warnings to take actions immediately.
AI features	Task(s)	Knowledge processing & discovery		
	Method(s)[6]	Utilization and Performance Evaluation		
	Hardware[7]	Application Server: 64 GB RAM/ 16 Core / 500 GB HDD Data Server: 128 GB RAM/ 16 Core, 3 TB HDD		
	Topology[8]			

[3] Stakeholder are those that can affect or be affected by the AI system in the scenario; e.g., organizations, customers, 3rd parties, end users, community, environment, negative influencers, bad actors, etc.

[4] Stakeholders' assets and values that are at stake with potential risk of being compromised by the AI system deployment – e.g., competitiveness, reputation, trustworthiness, fair treatment, safety, privacy, stability, etc.

[5] Threats and vulnerabilities can compromise the assets and values above - e.g., different sources of bias, incorrect AI system use, new security threats, challenges to accountability, new privacy threats (hidden patterns), etc.

[6] AI method(s)/framework(s) used in development.

[7] Hardware system used in development and deployment.

[8] Topology of the deployment network architecture.

	Terms and concepts used[9]: ISO 13379, 13381, 13374, 14224, 17359
Standardization opportunities/ requirements	• **Mandate of the key sensors based on the type of equipment** Based on the type of equipment, the makers need to have the basic set on sensors imbibed onto the system. E.g. for a pump – it is important to measure the input flow and output flow rates, vibrations, rotation speed, lube oil temperature and pressure. This will guide the equipment manufactures to provide their customers and their data products to capture the minimum required data and understand the equipment performance. • **Mandate for the organizations to expose the minimum and key parameters** The equipment owners need to enable the basic set of sensors for the equipment health and performance which are required for monitoring the asset from any failures. • **Standards for data formats** Each organization has a different way of capturing data and storing them in different formats. Due to which the solutions are not scalable across organizations though the product behind them is same. It takes customised efforts each time. • **Guidelines for deciding the sampling frequency based on the type of data** We see a need to have a specific set of guidelines to capture data at a minimum required sampling frequency. For e.g. a vibration sensor should capture data at least at 1 ms. • **Guidelines for feature engineering** There must be guidelines as to how the features need to be engineered for AI models. Lack of this would lead to more black box models not explaining how the models behave the way they do. • **Guidelines for standardization of event types and codes** There are multiple events which occur for an asset or in a manufacturing plant. Guidelines would help people capture the data in a similar fashion helping the industry to benchmark against one another and at industry level we can understand, which events are the most critical. • **Guidelines for standardization of fault and error codes for an equipment or process** Similar to events, it is also useful to capture fault, failure and error codes in a standard way. • **Process guidelines for event related data (maintenance and work orders)** Guidelines would help people capture the data in a similar fashion helping the industry to benchmark against one another and at industry level we can understand, which events are the most critical.
Challenges and issues	Compliance of organizations

[9] Terms and concepts used here should be consistent with those defined by Working Group 1 (AWI 22989 and AWI 23053) or to be recommended for inclusion.

Societal Concerns[10]	Description	Promoting sustainable industries, and investing in scientific research and innovation, are all important ways to facilitate sustainable development.
	SDGs[11] to be achieved	Industry, Innovation, and Infrastructure

[10] To be inserted.

[11] The Sustainable Development Goals (SDGs), also known as the Global Goals, are a collection of 17 global goals set by the United Nations General Assembly. SDGs are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.
URL: http://www.undp.org/content/undp/en/home/sustainable-development-goals.html

Data (optional)

Data characteristics	
Description	Data from an Oil & Gas Rig
Source[12]	Drilling Equipment
Type[13]	Time-Series Sensor Data
Volume (size)	
Velocity[14]	2.5 Billion+ Data Points each day
Variety[15]	Machine Data
Variability (rate of change)[16]	
Quality[17]	

[12] Origin of data, which could be from customers, instruments, IoT, web, surveys, commercial activity, simulations, etc.
[13] Structured/unstructured text, images, voices, gene sequences, numbers, composite: time-series, graph-structures, etc.
[14] The rate of flow at which the data is created, stored, analysed, or visualized. Could be in real time.
[15] Domains and types of data employed including formats, logical models, timescales, and semantics. Could be from multiple databases.
[16] Changes in data rate, format/structure, semantics, and/or quality.
[17] Completeness and accuracy of the data with respect to semantic content as well as syntax of the data (such as presence of missing fields or incorrect values).

References

References						
No.	Type	Reference	Status	Impact on use case	Originator/organization	Link
1	Web Page	Upstream Sensor Data + Big Data Analytics = Game Changer in Oil n Gas industry	Published	Use case take from this case study	Flutura Business Solutions Pvt. Ltd.	https://www.flutura.com/blog/Upstream-Sensor-Data--Big-Data-Analytics-=-Game-Changer-in-Oil-n-Gas-industry
2	Web Page	Cerebra creating game changing impact on upstream outcomes	Published	Use case take from this case study	Flutura Business Solutions Pvt. Ltd.	https://flutura.com/case-study-oil-and-gas