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	Empowering Autonomous Flow meter control- Reducing time taken to "proving of meters"	
Application domain	Manufacturing	
Deployment model	Cloud services	
Status	In operation	
Scope[1]	Calibration of control devices	
Objective(s)[2]	Reduce the time taken for trial & error methods to set the VFD and FCV setpoints	
Narrative	Short description (not more than 150 words)	The customer had to set VFD and FCV % manually to achieve desired flowrate using trial & error methods, which could take about 3-4 hours. Efficiency for the proving of the meters was very less & improvement was needed to remove any aberration in reading as it was time consuming.
	Complete description	Cerebra was integrated with the system considering the flow of the fluid. The customer can choose between the available options of high flow rate, low flow rate or multi viscous flow. Then, with the master meter in the loop of testing, the meter from the field was introduced to analyse

[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?.

<table>
<tr><td></td><td></td><td colspan="3">how much of aberration is there and then proving it more efficiently. Since it took more time for them to get the exact values of VFD & FCV % to achieve the desired flow rate, Cerebra's Prognostics Engine was introduced. Purely based upon machine learning algorithms, the data models for the VFD & FCV % was used to predict the values to be chosen with an accuracy of about 98%. Since there was a presence of a closed-loop system, this predicted value was automatically registered on the valves' monitors which only required small tweaking in the end, thus reduced human efforts.</td></tr>
<tr><td>Stakeholders[3]</td><td colspan="4">Process Industries; Humans</td></tr>
<tr><td>Stakeholders' assets, values[4]</td><td colspan="4">Competitiveness; Stability.</td></tr>
<tr><td>System's threats & vulnerabilities[5]</td><td colspan="4">Challenges to accountability, security threats</td></tr>
<tr><td rowspan="3">Key performance indicators (KPIs)</td><td>ID</td><td>Name</td><td>Description</td><td>Reference to mentioned use case objectives</td></tr>
<tr><td>1</td><td>Model Accuracy</td><td>Accuracy of the prediction model</td><td>The extent to which the setpoints have correctly predicted</td></tr>
<tr><td>2</td><td>% Reduction in Calibration Time</td><td>The amount of time saved from manually setting the calibration</td><td></td></tr>
<tr><td rowspan="5">AI features</td><td>Task(s)</td><td colspan="3">Prediction</td></tr>
<tr><td>Method(s)[6]</td><td colspan="3"></td></tr>
<tr><td>Hardware[7]</td><td colspan="3">Application Server: 64 GB RAM/ 16 Core / 500 GB HDD;
Data Server: 128 GB RAM/ 16 Core, 3 TB HDD</td></tr>
<tr><td>Topology[8]</td><td colspan="3"></td></tr>
<tr><td>Terms and concepts used[9]</td><td colspan="3">ISO 13379, 13381, 13374, 14224, 17359
ISA-95</td></tr>
<tr><td>Standardization opportunities/ requirements</td><td colspan="4">• 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</td></tr>
</table>

[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.

[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.

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 or less.
- **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
- **Guidelines for Training AI models**
  A defined set of guidelines for AI models would be useful for the data scientists to follow. It will also aid the consumers of AI models to understand how the outcome has been deduced
- **Guidelines around AI model explainability**
  With so many black box models floating around in the industry, it is difficult for consumers of AI models to understand then and their output. And with engineers and domain experts, coming into the picture, it is very much required to make these models more explainable.
- **Process Guidelines and methods for model evaluation (retraining)**
  Before deployment and post deployment, it is very critical to have standard methods for models. And also post deployment, we must set guidelines for retaining the model on a periodic basis or based on data

<table>
<tr><td></td><td colspan="2">volatility. This is increasingly becoming important as AI models are being involved in more strategic and operational decision making.
• Guidelines for disaster recovery and autonomous operations
With the aid of AI models, the operations of an equipment or manufacturing plant are becoming more and more autonomous and self- sufficient. But the human monitoring is also important as any kind of inaccurate prediction can lead to a disaster and it is must to have some standard to recover from this situation and to assess the conditions to go for autonomous operations.</td></tr>
<tr><td>Challenges and issues</td><td colspan="2"></td></tr>
<tr><td rowspan="2">Societal Concerns[10]</td><td>Description</td><td>Promoting sustainable industries, and investing in scientific research and innovation, are all important ways to facilitate sustainable development.</td></tr>
<tr><td>SDGs[11] to be achieved</td><td>Industry, Innovation, and Infrastructure</td></tr>
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[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

References

References						
No.	Type	Reference	Status	Impact on use case	Originator/organization	Link
1	Web Page	Accelerating shale production through digital technology integration	Published	Use case taken from this source	Flutura Business Solutions Pvt. Ltd. TechnipFMC	https://www.technipfmc.com/en/media/features/accelerating-shale-production-through-digital-technology-integration?type=features
2	Web Page	Fundamentals of meter provers and proving methods	Published	Fundamental definition of Meter Provers	Flow Management Devices	**https://asgmt.com/wp-content/uploads/2016/02/011_.pdf**