ISA-101

Applied to a collider project

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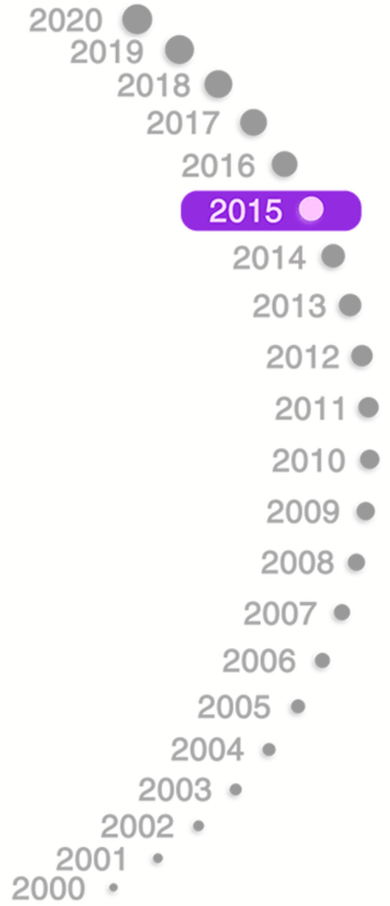
Content

HMI

Human-Machine Interface (HMI) is a physical or
virtual interface that allows humans to interact with machines or systems. This interaction can involve controlling, monitoring, or receiving feedback from the machines or any system

Main idea

The International Society of Automation (ISA) develops standards for industrial automation and control systems. ISA-101 is a standard specifically focused on human-machine interfaces (HMIs) for process automation systems. Applying ISA-101 to a collider project involves designing and implementing user interfaces that enable efficient operation, monitoring, and control of the collider facility.



The International Society of Automation

ISA 101

The use of this standard must:

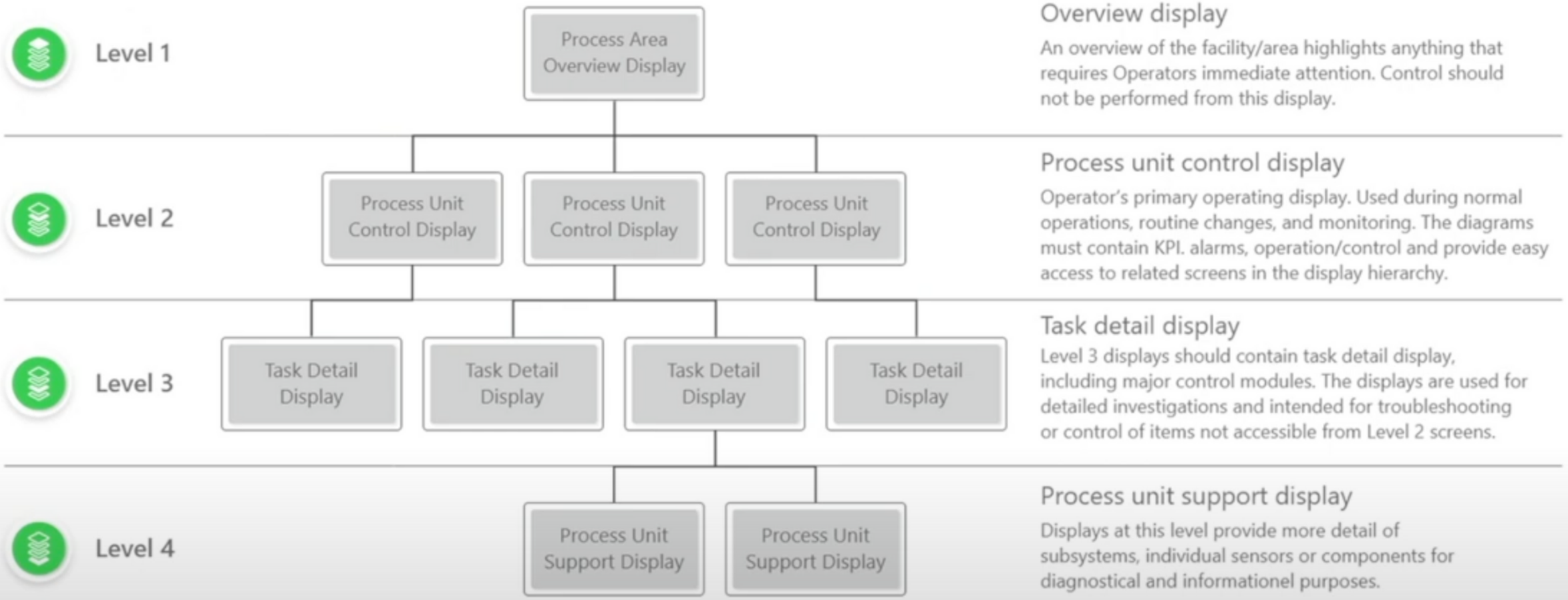
a) provide guidance to design, build, operate an HMI for correct operation and maintenance, and thus achieve a safer, more effective and more efficient process control system under all operating conditions. and a more efficient process control system under all operating conditions.

b) improve the user's abilities to detect, diagnose and respond appropriately to situations.

ISA 101

In collider projects, operational efficiency and safety are paramount. To achieve these goals, we have integrated ISA-101 principles into our Human-Machine Interfaces (HMIs). This report highlights how ISA-101 standards enhance our collider project's HMI framework, contributing to optimized processes and heightened safety measures.

Display Hierarchy in ISA 101



Overview display

An overview of the facility/area highlights anything that requires Operators immediate attention. Control should not be performed from this display.

Process unit control display

Operator's primary operating display. Used during normal operations, routine changes, and monitoring. The diagrams must contain KPI. alarms, operation/control and provide easy access to related screens in the display hierarchy.

Task detail display

Level 3 displays should contain task detail display, including major control modules. The displays are used for detailed investigations and intended for troubleshooting or control of items not accessible from Level 2 screens.

Process unit support display

Displays at this level provide more detail of subsystems, individual sensors or components for diagnostical and informationel purposes.

Collider project

The success of collider projects relies heavily on the efficiency and safety of their control systems.

Human-Machine Interfaces (HMIs) play a pivotal role in facilitating effective operation, monitoring, and control of collider facilities. In this report, exploring the application of ISA-101 standards to the design and implementation of HMIs in a collider project, focusing on enhancing operational efficiency, situational awareness, and safety.

With this commitment to operational excellence and safety established, let's explore how dynamic process visualization serves as a cornerstone in optimizing collider performance.

Therotical Framework

Dynamic Process Visualization:

ISA-101 principles drive dynamic visualization in our HMIs, providing intuitive displays of critical parameters like beam trajectories and equipment statuses. This real-time feedback empowers operators to swiftly respond to changes, enhancing collider performance.

Situational Awareness Enhancement:

By adhering to ISA-101 standards, our HMIs offer clear and concise information presentation, enhancing operators' situational awareness. This facilitates informed decision-making and prompt actions to uphold operational efficiency and safety protocols.

Flexible Display Configuration:

Our collider project's HMI framework, guided by ISA-101, allows operators to tailor interface layouts, enhancing usability and efficiency. This adaptability fosters smoother workflow management, contributing to overall collider performance.

Therotical Framework

Integration with Control Systems:

Seamless integration between HMIs and collider control systems, driven by ISA-101 principles, streamlines operator workflows and minimizes errors. This cohesive integration ensures optimal operational efficiency and reliability.

The incorporation of ISA-101 principles in our collider project's HMI design underscores our commitment to operational excellence and safety. By adhering to these standards, our facility ensures that operators benefit from intuitive, flexible, and integrated interfaces, reinforcing our dedication to advancing scientific discovery while prioritizing safety protocols.

Theoritcal Framework's analysis

Dynamic Process Visualization:

01

Requirement: HMIs should provide dynamic visualization of collider processes, including beam trajectories, energy levels, and equipment statuses.

Justification: Real-time visualization enables operators to promptly respond to changes, optimizing collider performance and ensuring efficient operation.

Situational Awareness Enhancement:

02

Requirement: HMIs must present clear and concise information on critical parameters such as beam intensity and collision events.

Justification: Enhanced situational awareness facilitates informed decision-making and prompt actions, upholding operational efficiency and safety protocols.

Flexible Display Configuration:

03

Requirement: HMIs should allow operators to customize interface layouts to suit their preferences and operational needs.

Justification: Flexible display configuration enhances usability and efficiency, enabling smoother workflow management and improving overall collider performance.

Integration with Control Systems:

04

Requirement: HMIs must seamlessly integrate with collider control systems to streamline operator workflows and minimize errors.

Justification: Integrated systems promote operational efficiency and reliability, ensuring optimal performance while reducing the risk of errors during collider oper

Conclusion

The incorporation of ISA-101 principles in our collider project's HMI design underscores our commitment to operational excellence and safety. By adhering to these standards, our facility ensures that operators benefit from intuitive, flexible, and integrated interfaces, reinforcing our dedication to advancing scientific discovery while prioritizing safety protocols.