Consolidated Alarm Panel - Improving Alarm Management and Operator Response

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INTRODUCTION

The Applied Technology Group at TRIUMF operates three cyclotron accelerators in three connected buildings. To maintain safe operation of the ATG facility, operators not only run the cyclotrons, but must also respond to ventilation, safety, and building alarms.

Efficient management of alarms improve operator response times and can minimize risk to personnel, damage to equipment, and reduce recovery time. Towards this goal, ATG utilizes a Consolidated Alarm Panel that improves the way alarms are perceived, processed, and acted upon. Rooted in human factors philosophies, this physical, centralized interface is designed to optimize operators' cognitive capabilities, ensuring rapid comprehension of critical information and facilitating decisive actions.

DESIGN

Based on human factors philosophies, the Consolidated Alarm Panel was designed to support operators in maintaining safe, normal operations. The design include:

- A centralized location – can be clearly seen/read from anywhere in the Control Room
- Grouped/Hierarchical alarm presentation – separated by building and grouped with critical alarms on top
- Reduces nuisance alarms – active alarms are suppressed for 5 min
- Alarm flood prevention – single acknowledgement for all active alarms
- A user-friendly interface – simple, physical buttons/switches

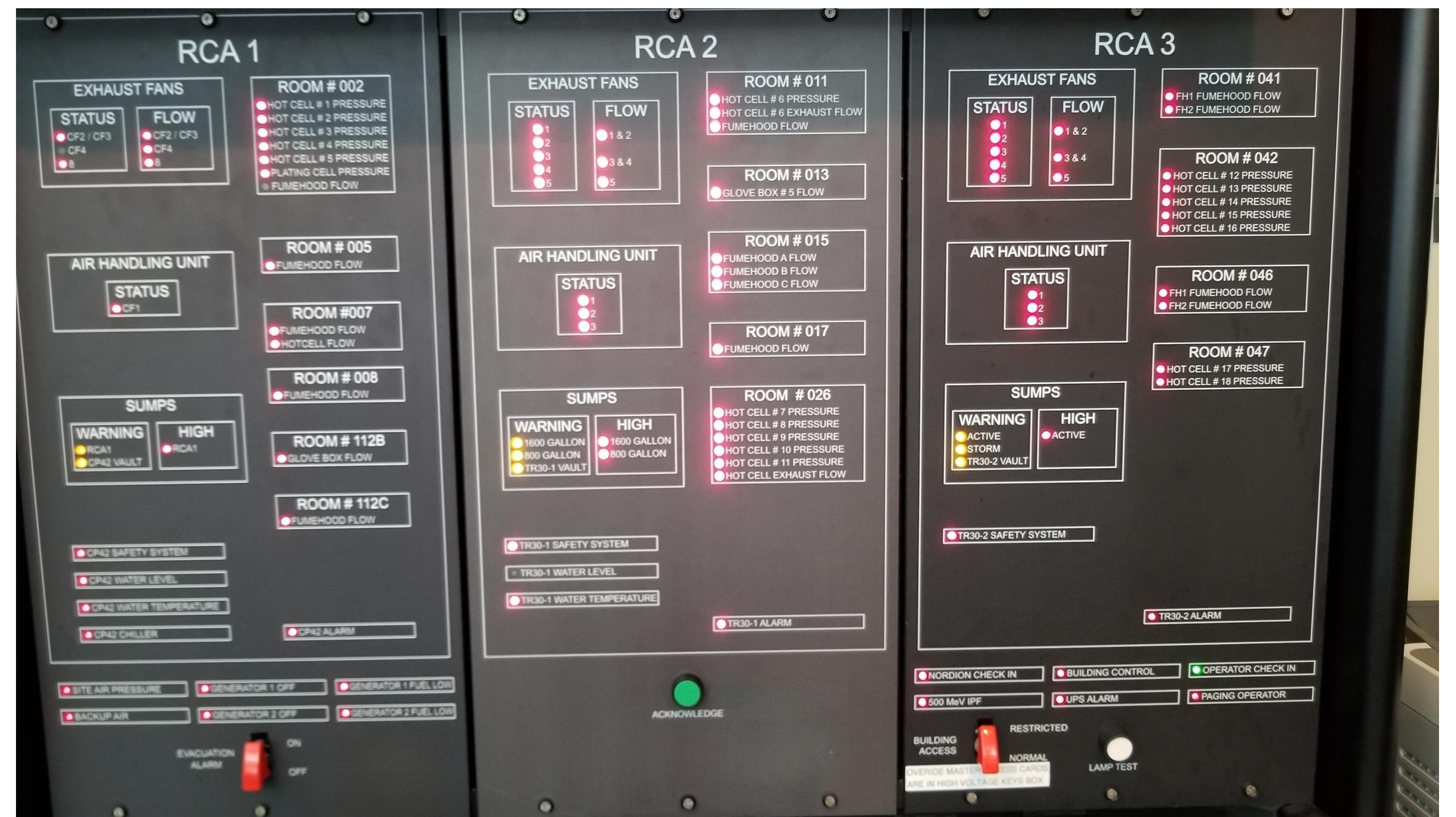Acknowledge button - Single point of interaction

ADVANTAGES

A Physical Consolidated Alarm Panel provides many advantages over separated software-based alarms. These include:

- Centralized information – alarms from multiple systems in a single display
- Large display – not limited by screen size
- Situational Awareness – all alarms seen at once, from anywhere in the control room. No need to navigate different screens or windows
- Reduced cognitive load – no need to remember and relate alarms from different systems, displays, consoles, or windows
- Faster response – immediate action after single button acknowledgement
- Robustness – no dependency on computers, operating systems or software
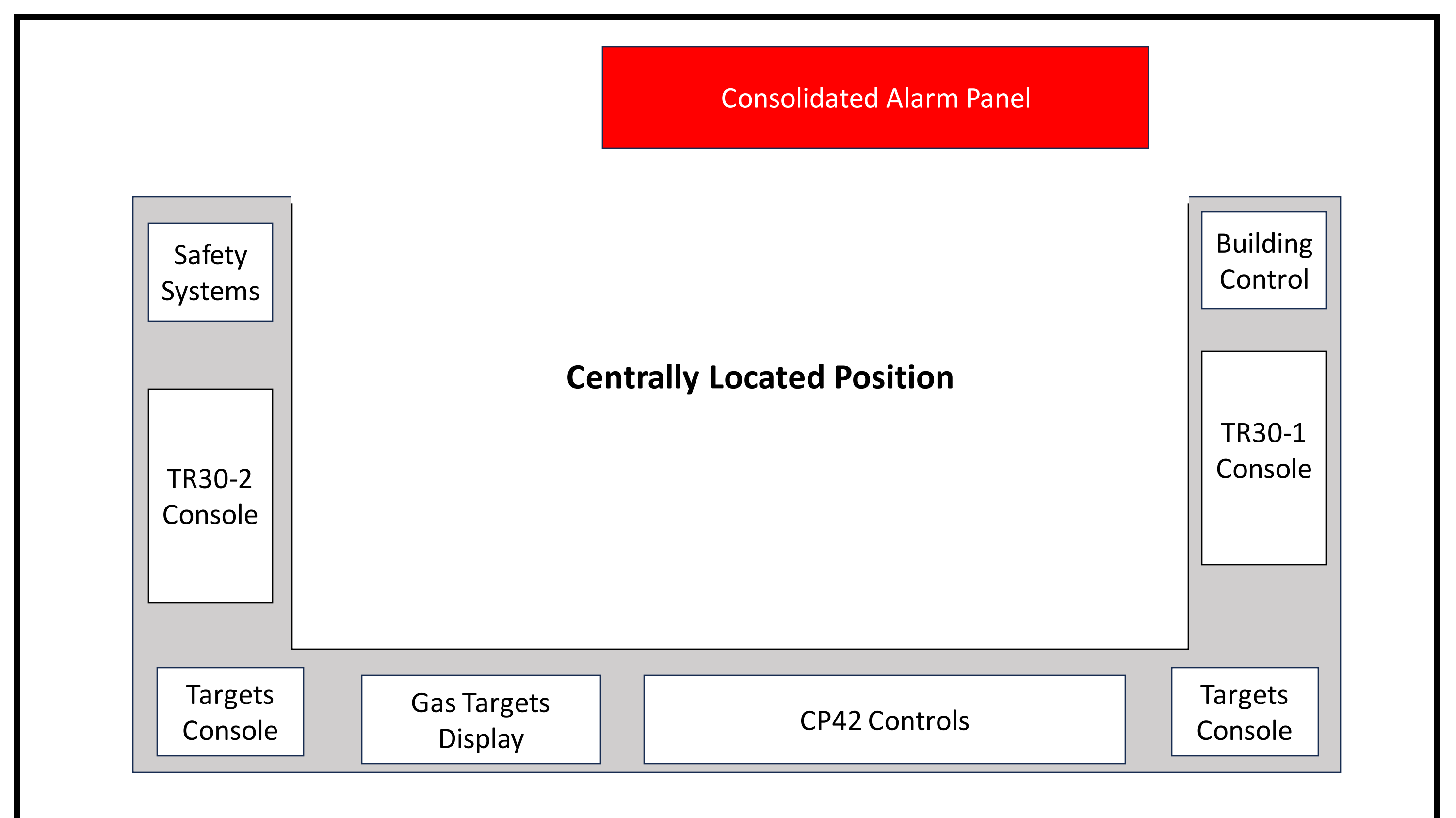- Minimal training – no software to learn

DRAWBACKS

Despite the many advantages, a physical Consolidated Alarm panel has disadvantages to consider. Such as:

- Limited flexibility – updates and changes require physical adjustments or replacement of hardware components
- Space – a large area is needed to maintain a clear unobstructed view
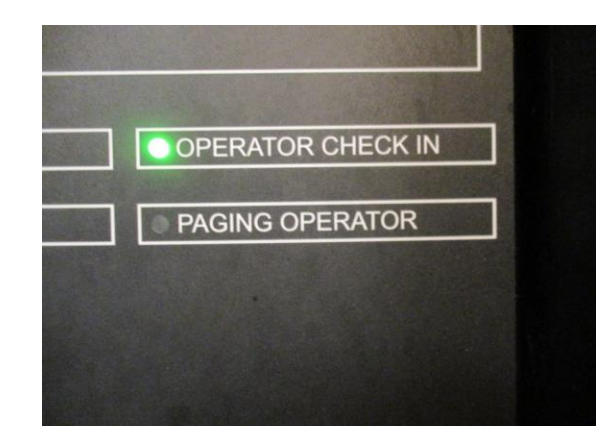- Cost – initial setup and changes may require higher costs

Clear text with bright alarm indication

ADDITION FUNCTIONS

The Consolidated Alarm Panel in the ATG control room has integrated addition functions to facilitate safe operations. These functions also benefit from a centralized location with physical interfaces. These include:

- A building evacuation switch – triggers the evacuation sirens in all three buildings
- A building access lockout – disables RFID access to perimeter doors except for emergency access cards
- Operator check-in alarm – afterhours alarm that triggers every 30 min as a safety check-in with TRIUMF Driver Control Room
- Operator paging – send page to operator pagers if alarms are not silenced after one minute. Page can be sent manually through alarm panel

CONCLUSION

Ultimately, the decision to consolidate alarms onto a single physical panel must be based on the specific needs, technical and budgetary considerations of each control room. However, by integrating human factors design, a physical Consolidated Alarm Panel can benefit any control room. By simplifying alarm presentation, it allows operators to spend less time managing alarms and take immediate decisive actions.