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Common Problems in Early Stage Projects at the ISIS Neutron and Muon Source

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At the ISIS Neutron and Muon Source, we are still relatively early on in our pursuit to integrate machine learning into the operations of the accelerator. Consultation with various teams across the accelerator has highlighted three key areas where machine learning can be leveraged most effectively, namely fault diagnosis and prediction, the use of virtual diagnostics and intelligent control of the machine. However, in the case of each of these themes we have encountered complications that may limit their development or practical use that we are keen to discuss with other facilities who may have more knowledge and experience mitigating against these issues. Some of these items to be considered include high dimensional feature selection, dealing with highly correlated outputs and how to match models trained on physics simulation with live behavior of the machine.

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