Search for An ESS Integration Solution for SoNDe

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European Spallation Source ERIC

SoNDe Collaboration Meeting, 6th of April 2018

Jülich Proposal

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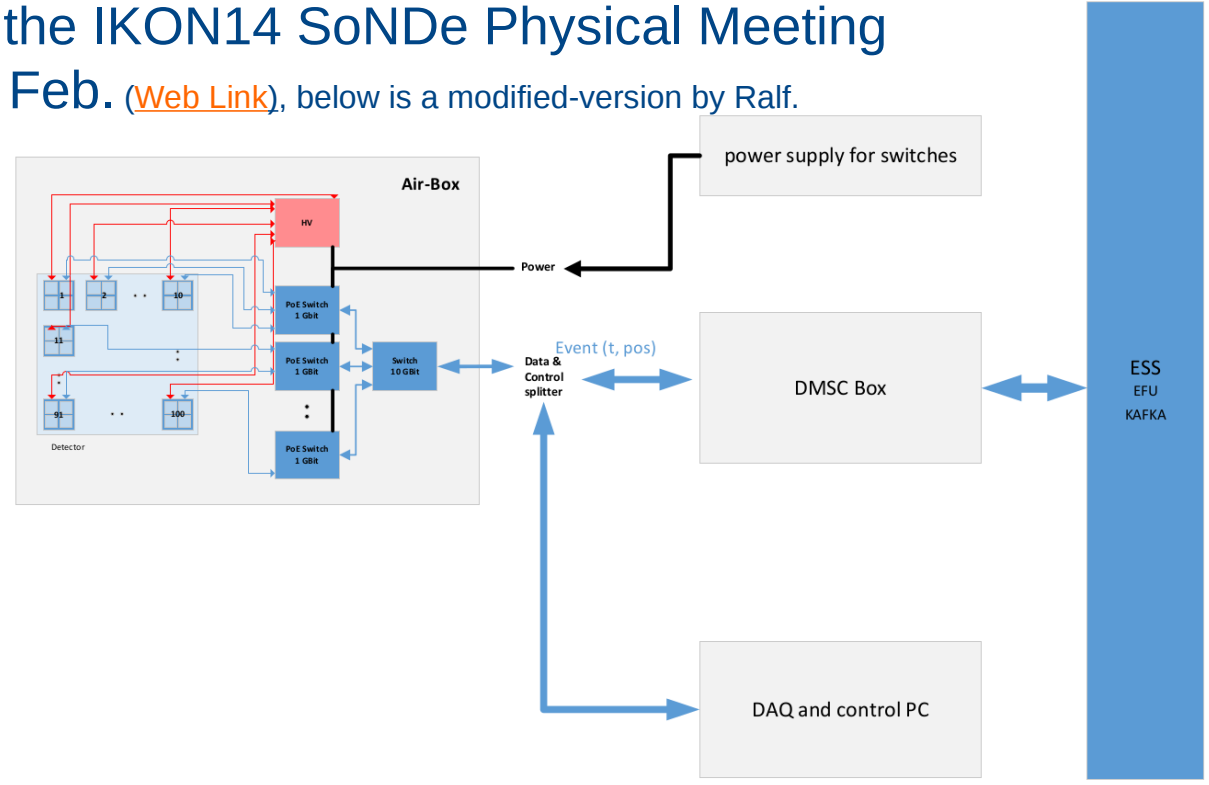
Presented at the IKON14 SoNDe Physical Meeting on the 16th of Feb. (Web Link), below is a modified-version by Ralf.



Alert!

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- Description of how Detectors Readout electronics should be integrated with ESS is presented in BrightnESS deliverable Report: D4.1 Integration Plan for Detector Readout. June 2018 (Web Link) and Nov 2015 (Web Link), DOI: 10.17199/BRIGHTNESS.D4.1.

- Generic DG/DMSC Data protocol definition, Presented by Steven Alcock, On September 2017 (Web Link). The DG/DMSC Data protocol definition was agreed on in a DG/DMSC Jamboree: Detector Data Links to Event Formation held in May 2017 (Web Link). A second Jamboree was held last February 2018. (Web Link).

Special Thanks goes to Scott Koyla and Steven Alcock for their efforts on this.

D4.1 Integration plan BrightnESS deliverables.

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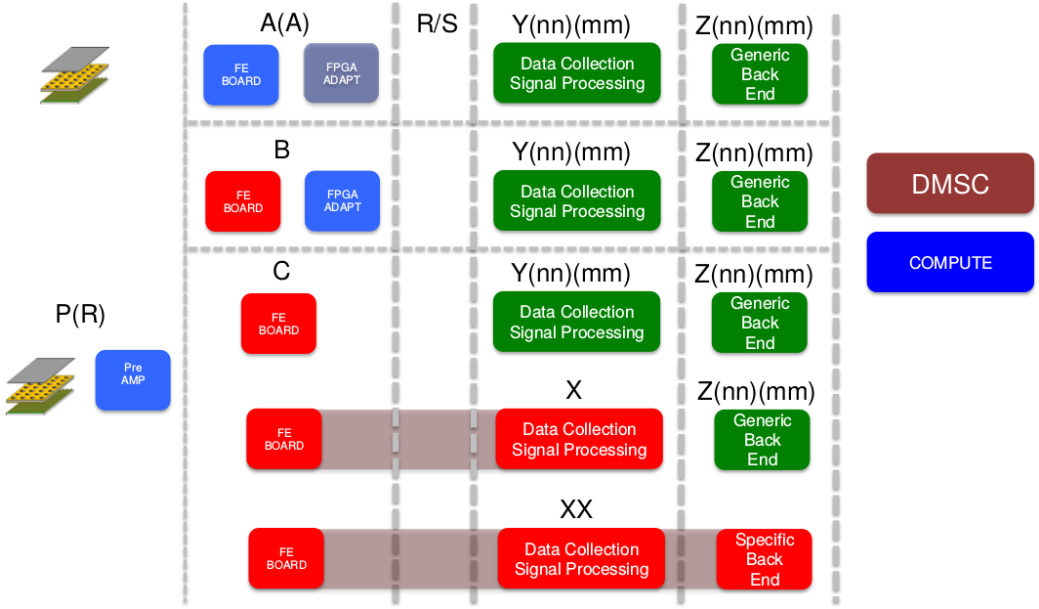
A) ESS provides all aspects of the readout electronics.

(B) ESS provides the readout electronics after the front-end board. The in-kind partner provides the front-end board and ASIC chip, and the preamp signal amplification if needed.

(C) ESS provides the readout electronics from after the front-end board. The in-kind partner provides the front-end board and ASIC chip, and the preamp signal amplification if needed. This front-end board directly communicates with the Data collection and Signal processing layer, with no FPGA adapt layer.

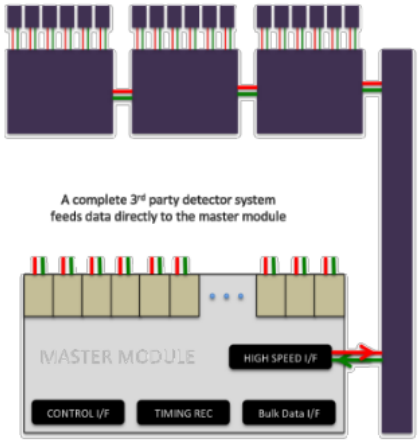
(X) ESS provides the generic back-end readout. The in-kind partner provides all other aspect of the system. Given the support issues that this raises for the detector electronics, this model is not favored. The support and and provision and guarantee of spares of the electronics integrated into the system needs to be determined for a period of at least 10-15 years. This support is very difficult for anyone, expect for a research institute, to provide.

(XX) Here ESS detector group is not involved. The in-kind partner must integrate their own back-end directly into the DMSC and provide all the support and maintenance. This module is not acceptable for a system requiring support.



Deliverable Report: D4.1 Integration Plan for Detector Readout (Link). June 2016

D4.1 Integration plan BrightnESS deliverables.



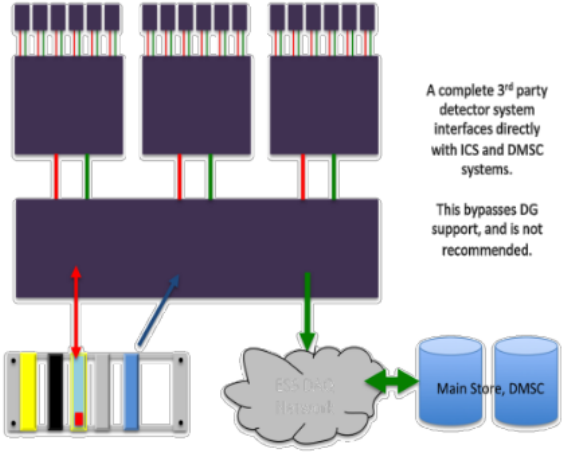
In this case the external partner supplies essentially a complete readout system for the detector array.

Interfacing hardware could be provided in house (construction cost)

ESS system acts as a bridge to ESS standard interfaces.

The entire subsystem would have to be maintained by the external partner.

STRONGLY DISCOURAGED



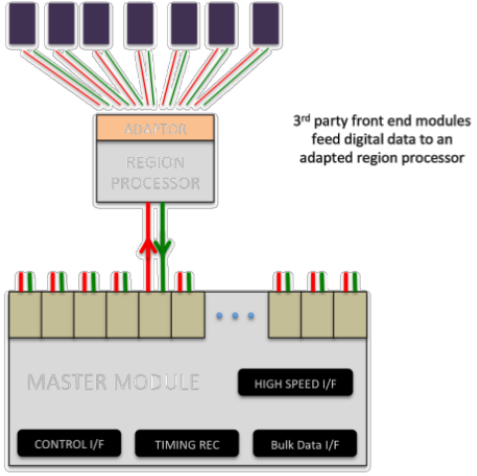
This is the case where an external system cannot (realistically) be adapted to use the ESS design as a bridge

Eg a commercial system where proprietary or confidential protocols are used.

DG provide NO support!!!

ONLY IN EXCEPTIONAL AND UNAVOIDABLE CIRCUMSTANCES…
ie **NEVER**

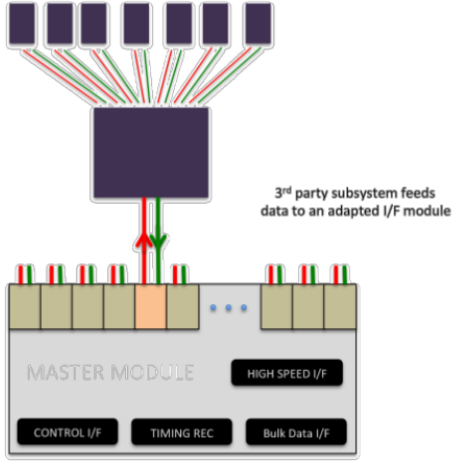
D4.1 Integration plan BrightnESS deliverables.



Existing design for pre-amp, digitizer etc from external partner.

Adaptor in-house

In this case the data processing provided by the region processor could be in house.

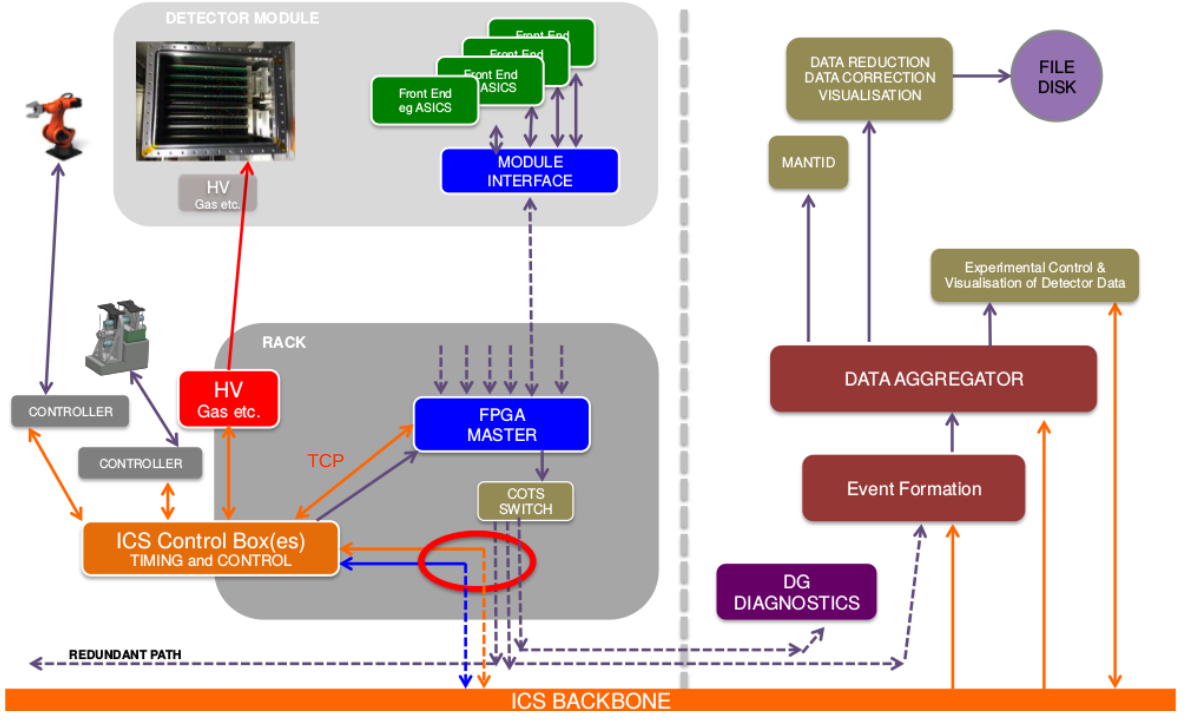


Entire subsystem provided by external partner. In this case the local region processing is handled by the external design.

Firmware for this intermediate stage would have to be provided and maintained by external partner.

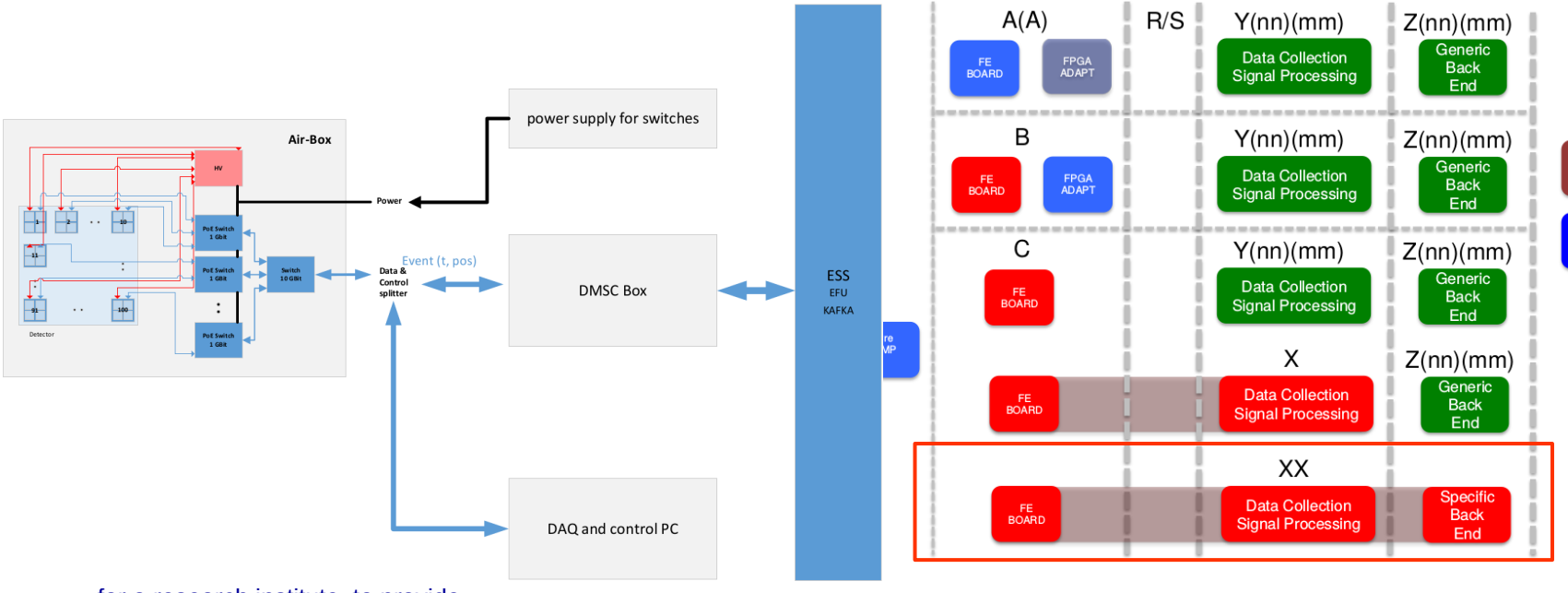
Custom Interface module may be designed locally.

D4.1 Integration plan BrightnESS deliverables.



Data and control flow from a detector electronics perspective. The interfaces with the DMSC and ICS are indicated. How the data fits into the various aspects of the system are shown .

Where are we with the Jülich proposal?



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Deliverable Report: D4.1 Integration Plan for Detector Readout (Link). Jun 2016

Where are we with the Jülich proposal?

Moving from integration model “X” to “C” is not as problematic as moving from “XX” to the “C” model, it is a matter of definition.

Nevertheless, ESS has been highly involved with the SoNDe project which makes an integration model of “XX” for SoNDe is even an “**XX++**”.

Where are we with the Jülich proposal?

So how to move from “XX” to the minimum acceptable integration model “C”?

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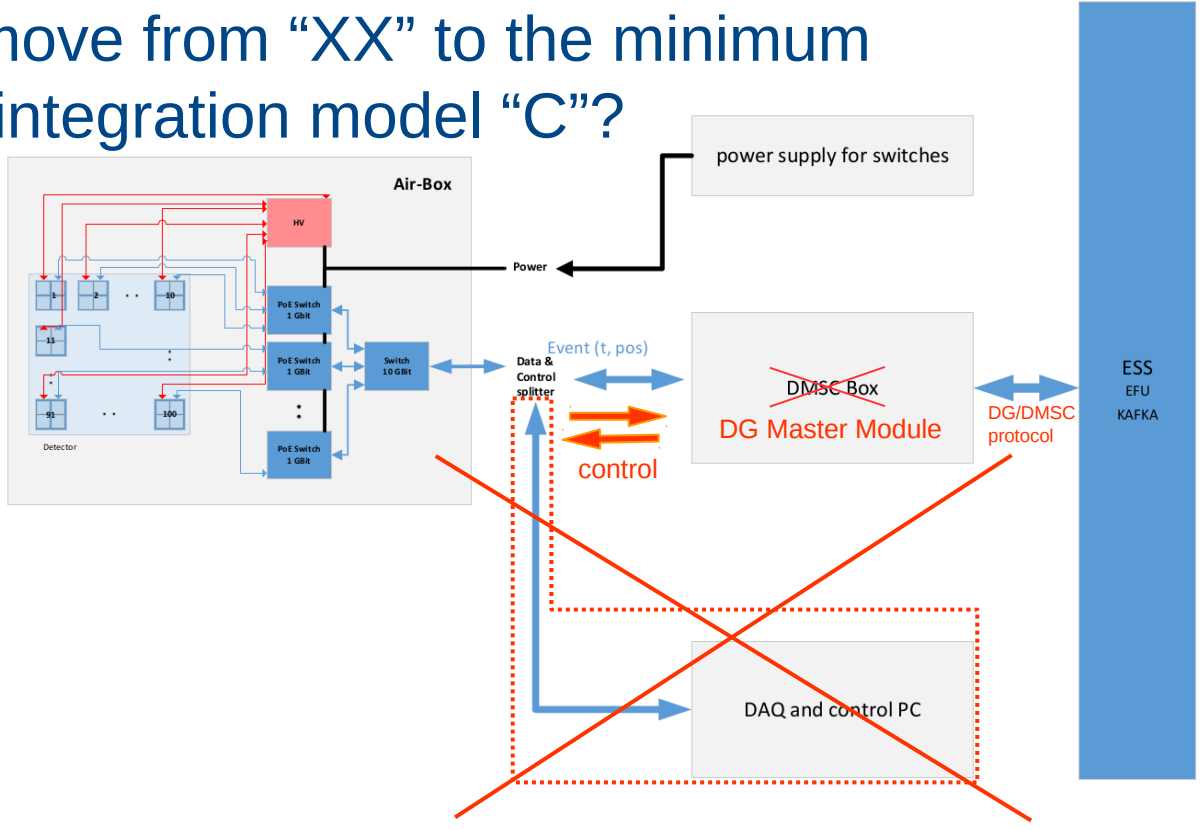
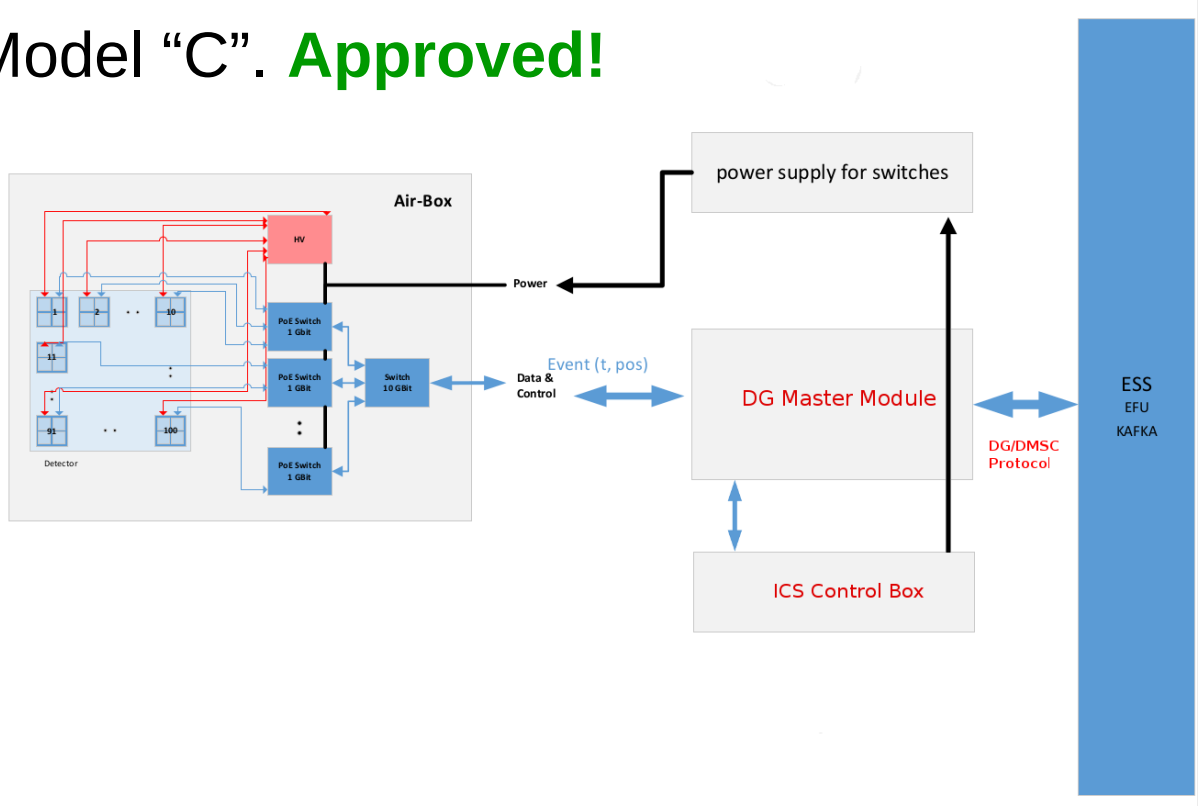


A Possible Solution

Integration Model “C”. **Approved!**



Summary

- The Full integration of SoNDe with ESS master module/ICS is beyond the scope of the SoNDe project.

- A working demo of the master module does exist and it is located at ESS workshop “Utgard”. It was used in a recent proof-of-concept measurement at V20 in Berlin to demonstrate ICS Timing Integration Iand DMSC Event Formation Unit with beam monitors. However, this is still in a very early stage and I do not expect anything to be ready for SoNDe this year.

- We consider the proposed DAQ PC/DMSC box configuration for SoNDe as a bridge solution until the ESS Readout chain is finalised. However, for a smooth integration later on that is accepted and approved by ESS, and to help to finalise plans for the master module that we would like to know the following:

- What is exactly being done at the DAQ/Control computer? What control is needed and what/how configurations/settings can be selected by PC/DAQ computer. Bear in mind the functionally of the DAQ/Control computer has to be matched by the master module.

- How power supply control is going to be done?

Friendly Request for Information from our Collaborators

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- Full documentation of what is being done with the DAQ/Control computer.
  - Control?
  - Settings?
  - Power supply?

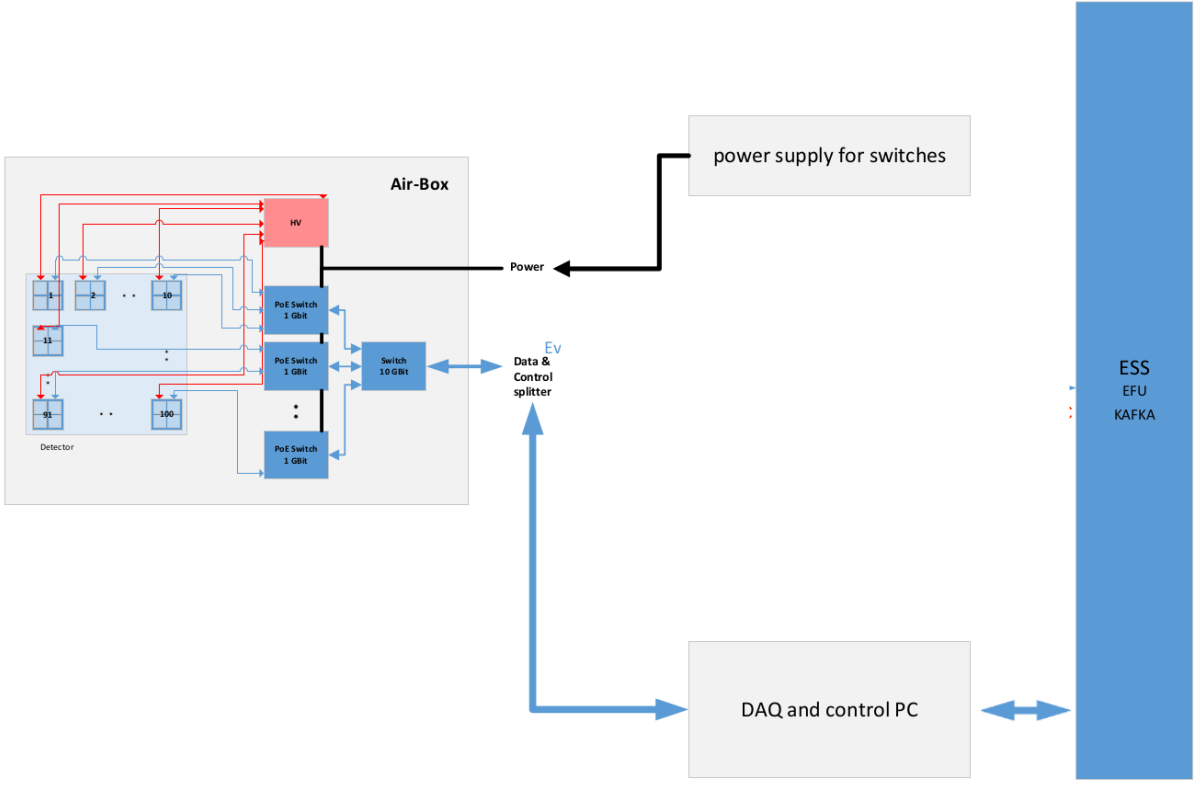
- More clarification on how the timing synchronisation? Time stamp quality?

- Maintenance: Current integration solution would implies an in-kind maintenance for > 10 years. Are current key people in the project going to be available?

- Electrical and Mechanical Integration: ESS has recently created a centralised database in an effort to standardize equipments and components.

- There is also high restrictions within ESS on things like grounding and heat dissipation allowed to be pumped into the air for example. These elements has to be carefully looked at during the final design/building phase. Grounding guideline for example **must be followed**.

Deliverable for SoNDe.



Deliverable for ESS/SKADI.

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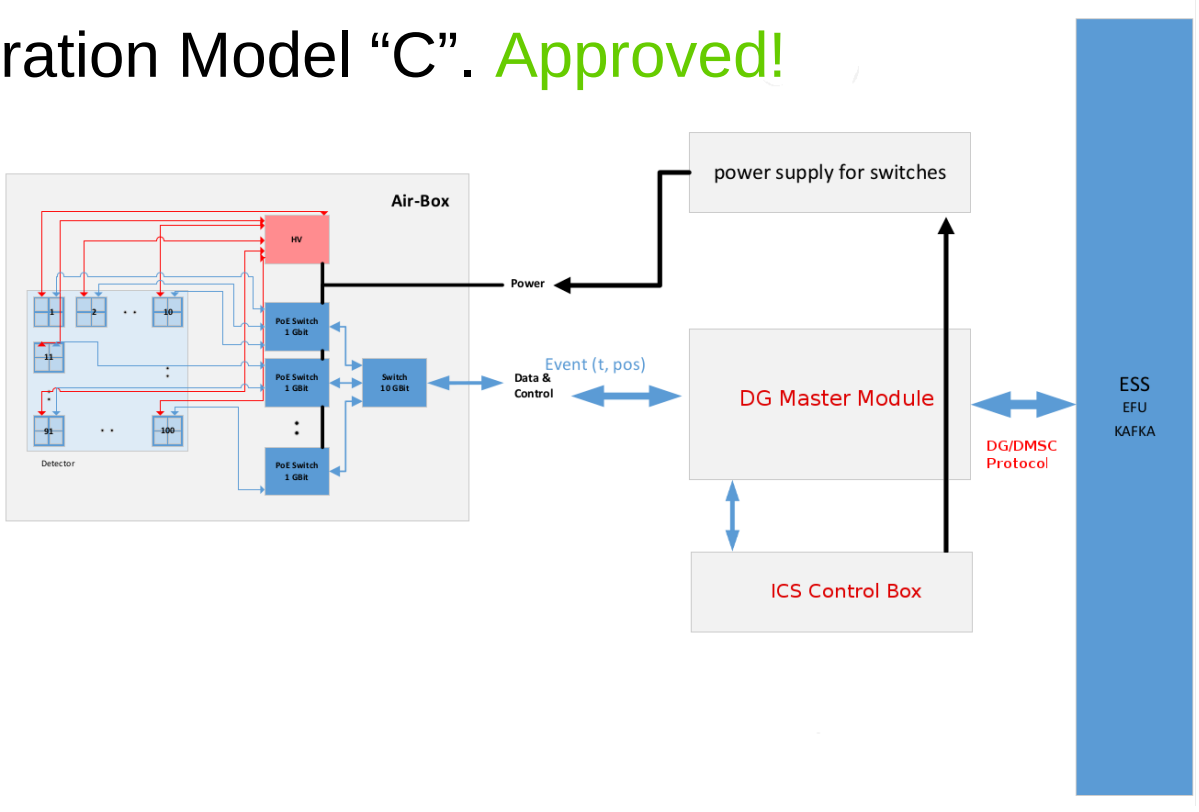
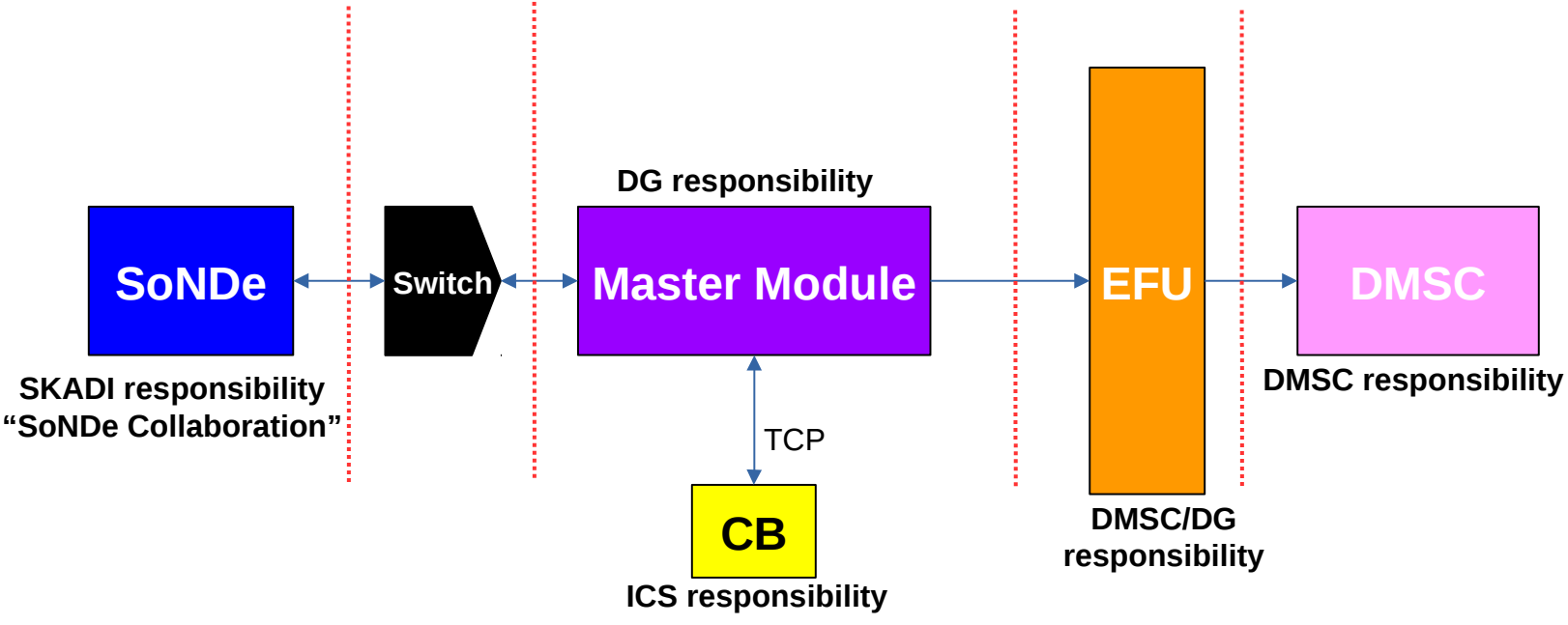
Integration Model “C”. Approved!



Responsibility Allocation



Acronyms:

DMSC: Data Management and Software Centre.
ICS: The Integrated Control System.
EFU: Event Formation Unit.
DG: Detector Group.