



# Cryogenic Autofill for AGATA

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AGATA cryogenic Autofill System has to:

Fill regularly or on exception up to 60 ATC

Fill the buffer tanks (if existing) regularly or on exception

Provide information on  
the LN2 status and the detector temperature  
the LN2 status and the tank pressure

To send alerts if needed

To interface any command signals coming in or outgoing to DSS

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## Definition of the cryogenic Autofill System

- oThe Autofill System (or Autofill) is a system dedicated to maintenance of the HPGe-detectors at cold state by LN<sub>2</sub>. It implies temperature monitoring of the detectors, regular or extraordinary filling of them, and verification of the processes of temperature monitoring and filling, and taking protective measures in case of inability to maintain them at cold state.
- oThe Autofill is supposed to be powered by the network electricity power and any battery operation of the full system or its particular section (except alerting devices) is not allowed. The network power has to be supported by UPS;
- oThe Autofill is supposed to be built in a way to eliminate the possibility for reduction of its integrity;
- oThe Autofill is supposed to be built in a way to allow monitoring of its operational status and alerting in case of unauthorized transition to inactive state;
- oThe filling of the detectors can be managed automatically, semiautomatically and manually.

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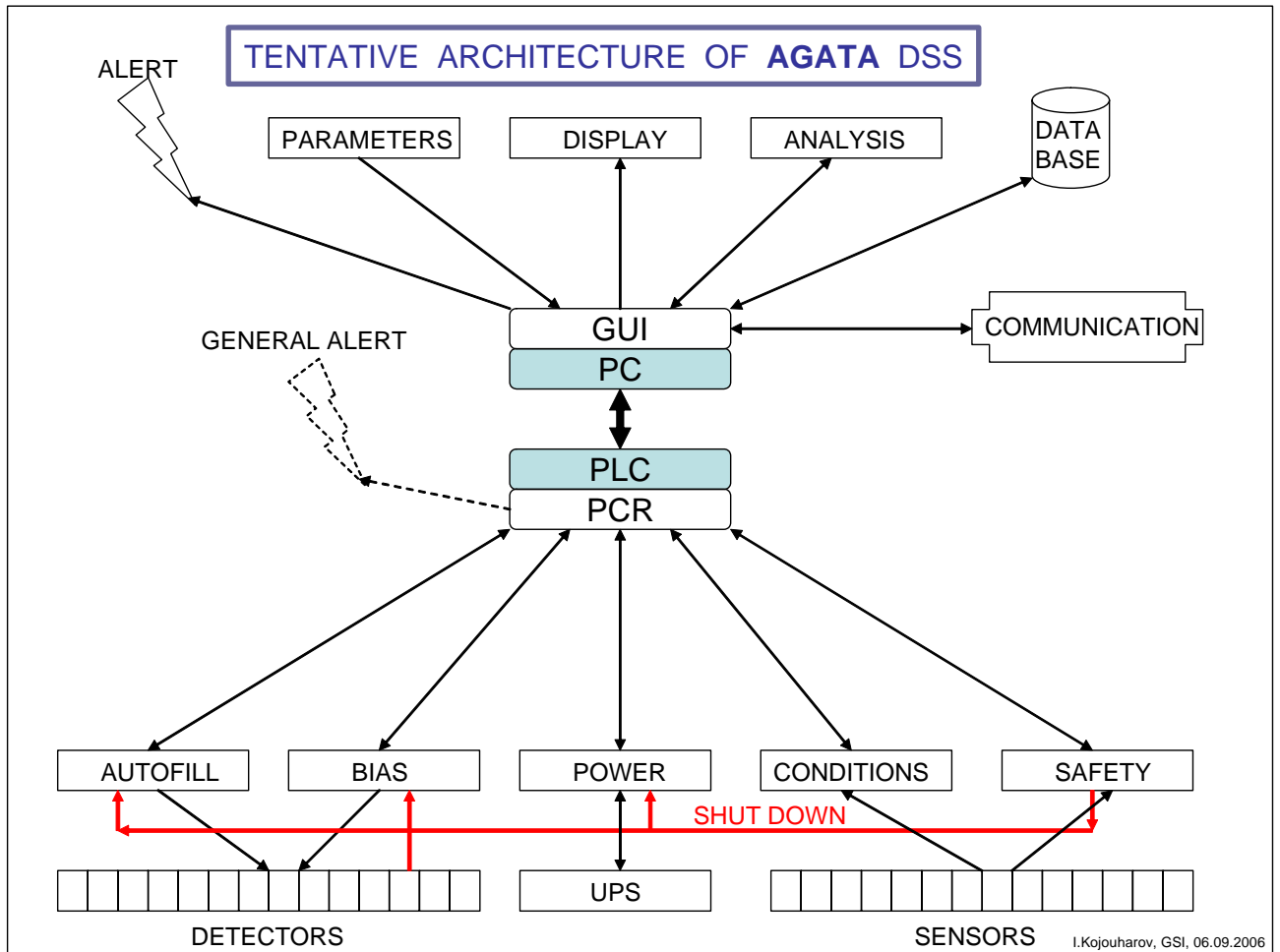
## Functionality of the cryogenic Autofill System

- o **Regular filling.** Regular filling of any detector within given time schedule. The time schedule is variable and can be altered by the Operator;
- o **Forced fill;**
- o **Extraordinary filling triggered by the temperature of the detector.** The forced fill parameters can be altered by the Operator;
- o **Extraordinary filling triggered by the Operator (“Fill Now”).** Software (semiautomatic) and Hardware (semiautomatic manually and full manually) features are foreseen. The filling time schedule can be reset in case of software and hardware semiautomatic “Fill now” and by “Forced fill” (Legnaro Option);
- o **Verification of all (regular or forced) filling processes in order to avoid statistic or systematic errors;**
- o **Display of the filling parameters in real time;**
- o **Detector temperature monitoring and relevant actions;**
- o **Measuring the detector temperature continuously in real time (accuracy of 0.1 K) and reporting it;**
- o **Correcting the temperature measured in order to compensate any systematic errors;**
- o **Detecting “Detector Warm” temperature (105 K) and issuing warning. Threshold is variable;**
- o **Detection “Detector Too Warm” temperature (110 K) and performs “Forced Fill” filling procedure.** Issues warning to and reports the beginning and the end of the “Forced Fill” procedure. Timeout and threshold are variable ;
- o **Detection “Detector Hot” temperature (115 K) and performs a Software Bias Shut Down (SBSD).** It issues warning and reports the time of SBSD. Timeout and threshold are variable;
- o **Verification of Detector Filling procedures and Detector Temperature critical thresholds (“Detector Warm”, “Detector Too Warm” and “Detector Hot”) in order to obtain a distinct definition of critical situation under when certain actions can be taken;**
- o **Optional monitoring of the LN2 level of the detector Dewar and “Forced Fill” performance at appr. 10% of the LN2 level.**

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## Structure of DSS and Autofill System

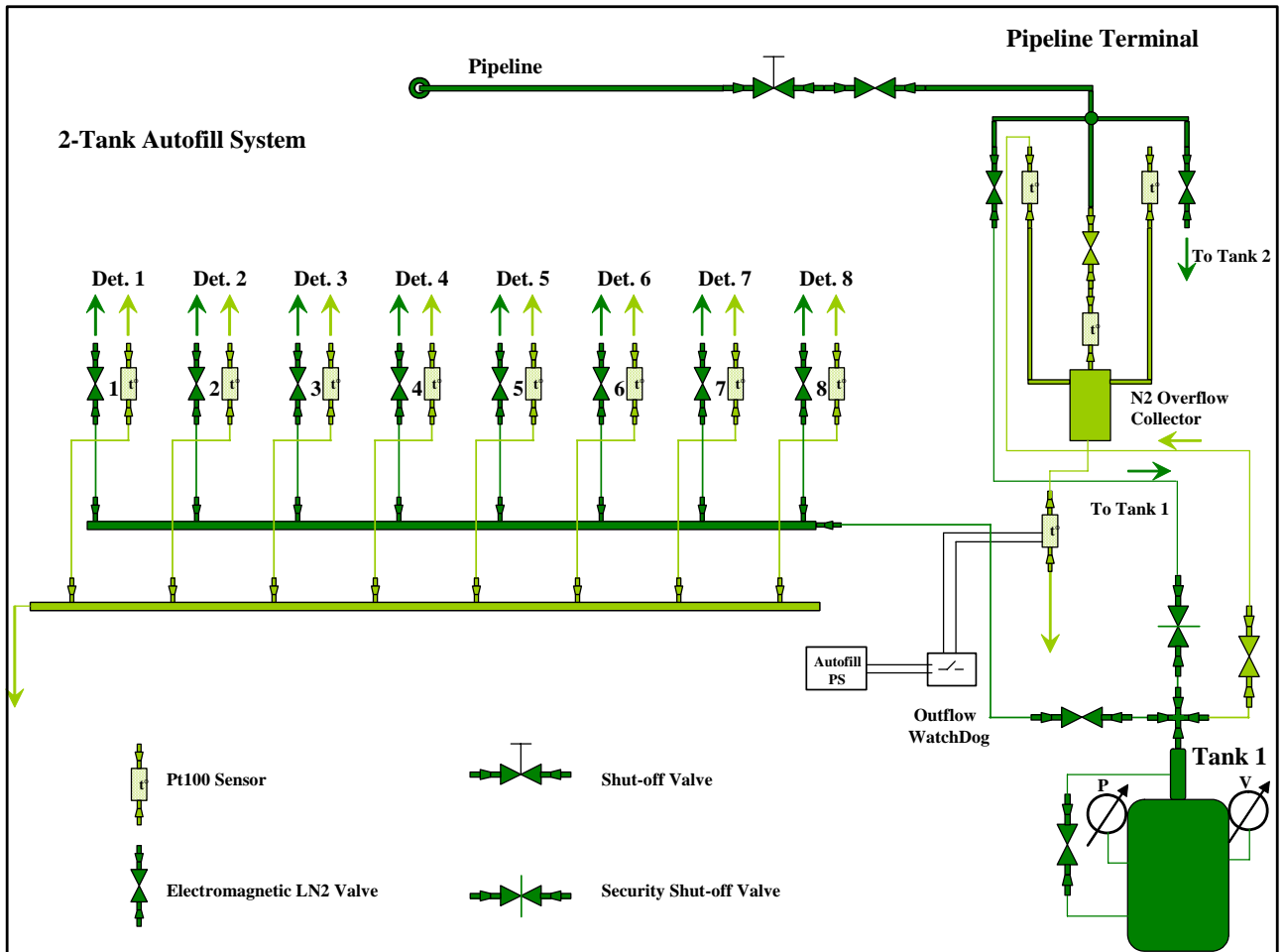


I.Kojouharov, GSI, 06.09.2006

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## Structure of the Autofill System

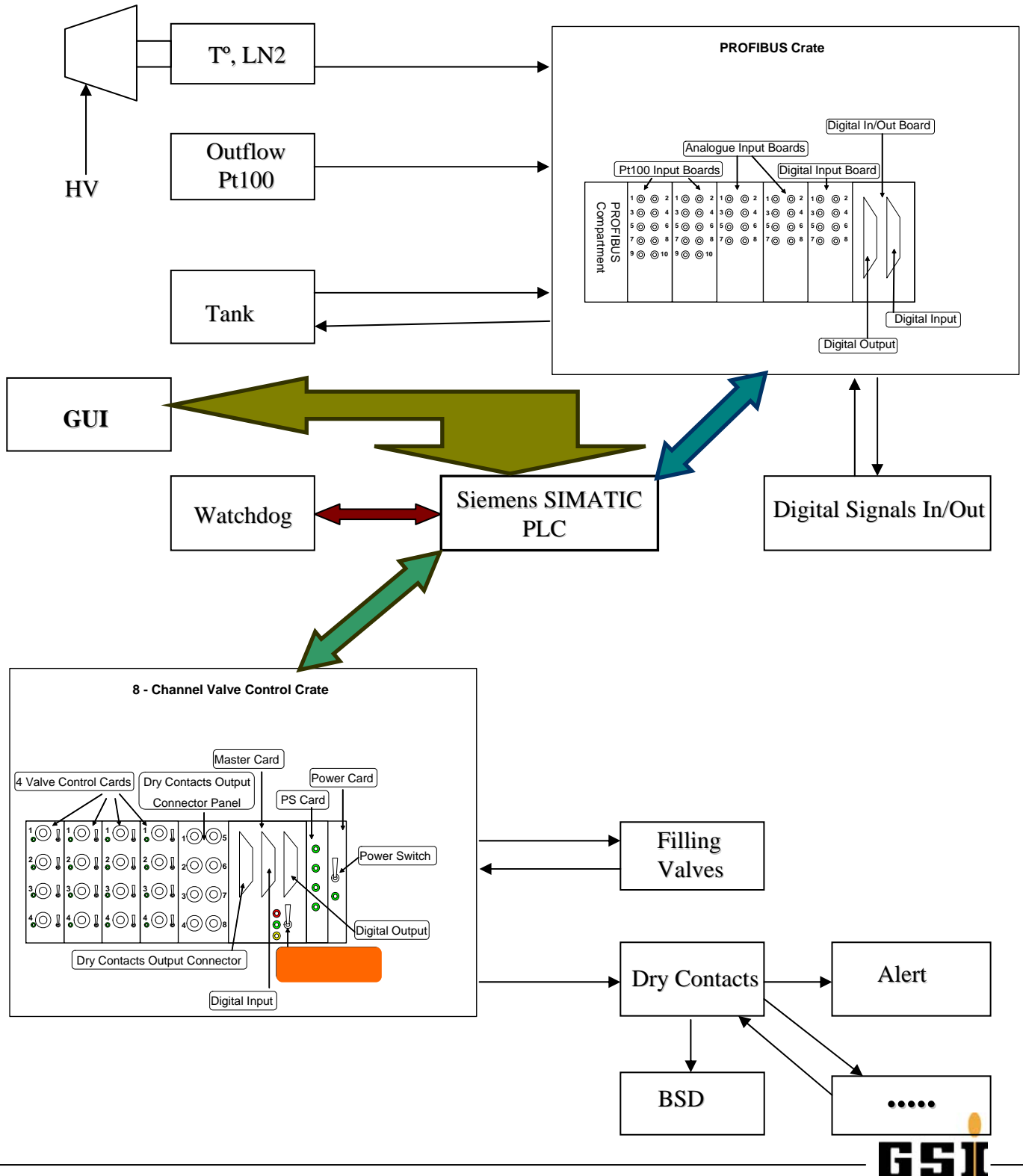




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## Structure of the Autofill System

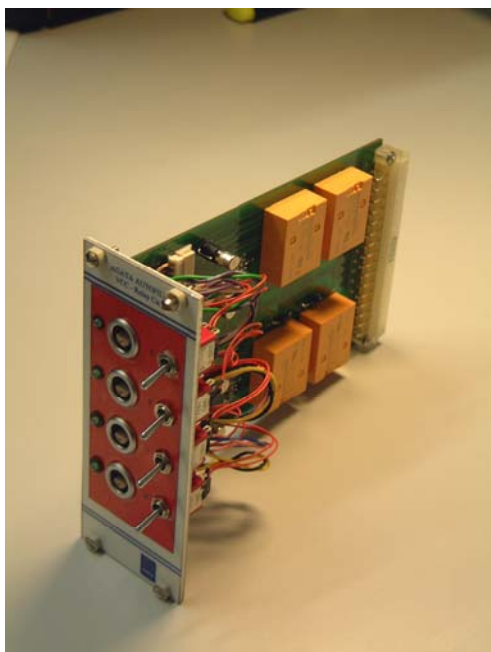


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## Status of the development

- PROFIBUS crate is ready and in operation.  
Minor changes needed
- Valve Control crate is ready, to be  
commissioned beginning of April 2009 at LNL
- Similar system is in operation at GSI for test and development purpose



**Valve Control Card**



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Thank you

