1) The firmware was successfully (and smoothly) updated to a new version. The work started on rampdown. Both firmware was flashed and the new control software comprising the new drivers, FESA class for the ADT signal processing unit and the abort gap cleaning deployed.

2) The operators were instructed to go through a standard nominal cycle to identify potential problems in controls

3) The feedbacks have been re-validated by transfer function measurement and by injection of indiv, train of 12 and train of 96 bunches

4) During the validation a hardware problem on H1B1, not related to the update was discovered. The problem was narrowed down to the communication link between the beam position module and the signal processing module. The faulty unit was removed from service, while gain of the second redundant unit was doubled to compensate for the loss. This unit suffered of a similar problem about 9 months ago, which was finally cleared by a power cycle and never came back again. This time the unit did not survive the restart. Work on this problem cost us about 2 hours, not related to the update. The machine was then able to carry on with two fills, until the problem was finally fixed on night of Monday 1.8.

5) AbortGapCleaning class was significantly modified during the update, therefore all settings local to the class and those from LSA were thoroughly checked before resuming operation. New, updated functions were acquired to LSA. The cleaning was subsequently tested with beam, looking at voltage on the ADT kicker plates. This is the ultimate test to prove the excitation is working to specs. The cleaning buckets and waveforms were working as expected.

6) Validation with 3x3 ramp. Once the functionality at injection was tested, we continued in the cycle. A problem in the main sequencer task was identified. The task driving injection cleaning settings for ramp/physics failed on "switch injection cleaning off" due to JAPC selector. Mic found out that the previous cleaning FESA class was compiled under FESA 1.5, while the updated one under 2.3.3. There is an incompatibility between the FESA versions - the previously used selector "LHCUSER.NON_MULTIPLEX", used in all sequences is not valid anymore. It has to be replaced by "LHC.USER.ALL". This problem will sooner or later show up again with other equipment. As soon they recompile the class, things will fall apart. Caution to the colleagues...

7) I waited until the flat top settings were loaded and then left home.

8) On the next full cycle, on Monday morning, a problem with not-anymore-existing-LSA settings was discovered by the operators. A FESA property in the old cleaning class, which was never used operationally, was removed for the new version. However, some settings were acquired to LSA as a bulk, so LSA was complaining about having no destination to drive the missing property. The settings were not relevant for operation, only the operators were bit stuck with the problem. They have been very kind and did not want to call immediately, as they knew I left only two hours ago and I will be asleep after night shift (thanks!). The most plausible reason why we missed this point was that the first part of the nominal LHC sequence was played already while we were still flashing and updating, while the old FESA class was still active (shortly after the dump). Then we had time for our work and the injection and ramp was done already with all new stuff. Once the operators dumped the first validation fill (3x3), they went through the same sequence with the updated system and discovered the removed piece which slipped through. The problem was fixed by deleting the

obsolete LSA settings.

The update was smooth and thanks to the very well planned thorough validation (in collaboration with MPP), we have discovered small issues here and there, which were fixed on the fly. If I would be able to stay for the second ramp the point 8) could have been avoided, as the fix was rather trivial.