QDS in the HiLumi era

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Intro

- LHC's QDS system had seen quite some updates since its initial commissioning in 2008
- Quench detectors known to be not radiation tolerant had been replaced by tolerant ones in the last years
- Firmware updates mitigated R2E issues on the basic dipole QDS system
- QDS located in UJ areas around P1 and P5 had been relocated to non-rad zones

Current state

- Since YETS 2015/2016 QDS system reached nominal state in terms of R2E measures
- Ca. 10k interlocking boards in radiation
- No R2E related triggers observed in 2016 !
- Total system availability in 2016 so far: 99.5%

QDS for HiLumi magnets

- New Nb3Sn based magnets require new QDS systems running on tight margins
- Most of the systems to be located in the new UR galleries which should be radiation free
- 11T dipole magnets around P7 have to be protected with dedicated QDS system to be located in RR73 and RR77
- Electronics development has started based on IGLOO2 and isolated ADC channels

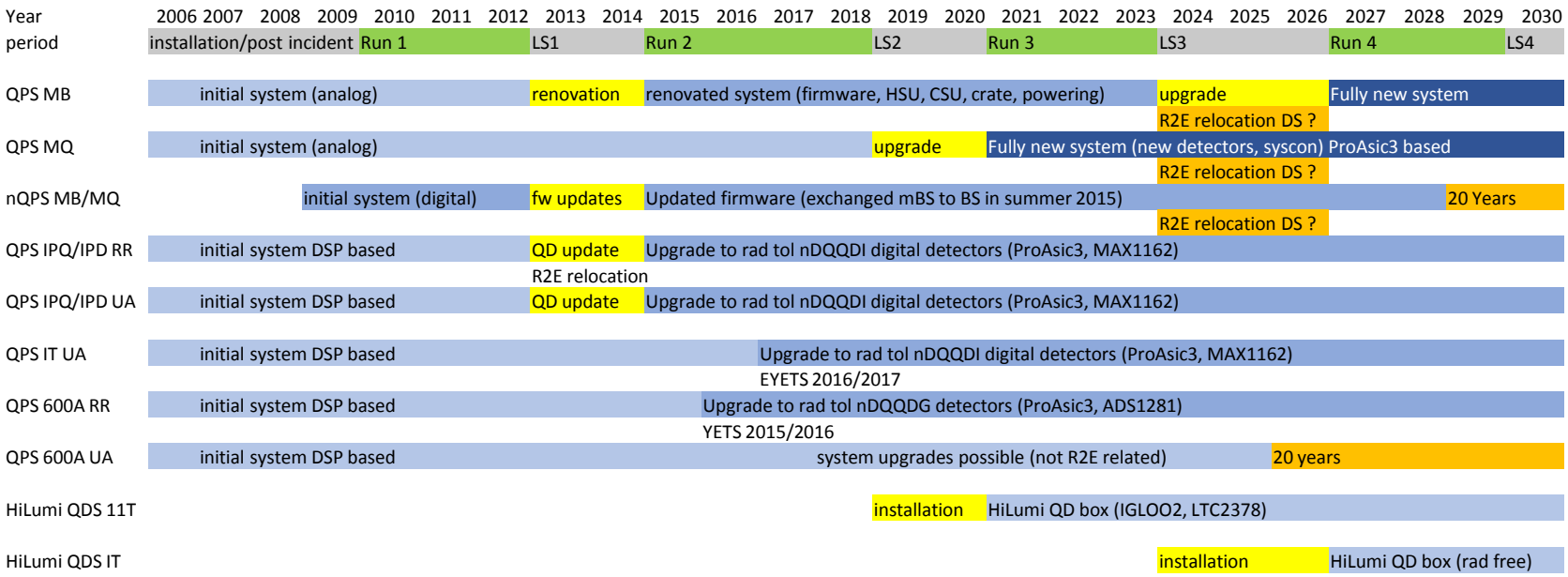
R2E strategy HiLumi QDS

- RR73 and RR77 are the only places where HiLumi QDS system is exposed to radiation
- Electronics based on rad-tested COTS
- Current baseline: Igloo2 + LTC2378 (ADC)
- Baseline ~1Gy/a
- Predictions about radiation in RR73/RR77 welcome !

Classic QDS in HiLumi aera

- After LS3 all QDS systems (except nQPS) have gotten a round of renovation (current baseline)
- iQPS for main quads to be renovated in LS2
  - New quench detectors (ProAsic3 + MAX11100)
  - New System Controllers (ProAsic3 + MAX11100)
  - New Crate and power supplies
- Eventual relocations of tunnel systems from the DS (Cell 8..10 → 12)

QDS status overview



- Quite some effort in LS1 and YETS 2015/2016
- Next big upgrade in LS2
  - Quadrupoles (tunnel 8..34)
  - 11T dipole (RR73/RR77)
- R2E relocations in tunnel LS2 LS3 ?

Summary

- Excellent year in terms of R2E and availability
- Quite loaded schedule for upgrades (LS2, LS3)
- Radiation levels in RR and DS tunnel areas determine further actions
- Predictions of radiation levels (pp and Ions) are essential!
- Most complex detection systems for HiLumi outside radiation