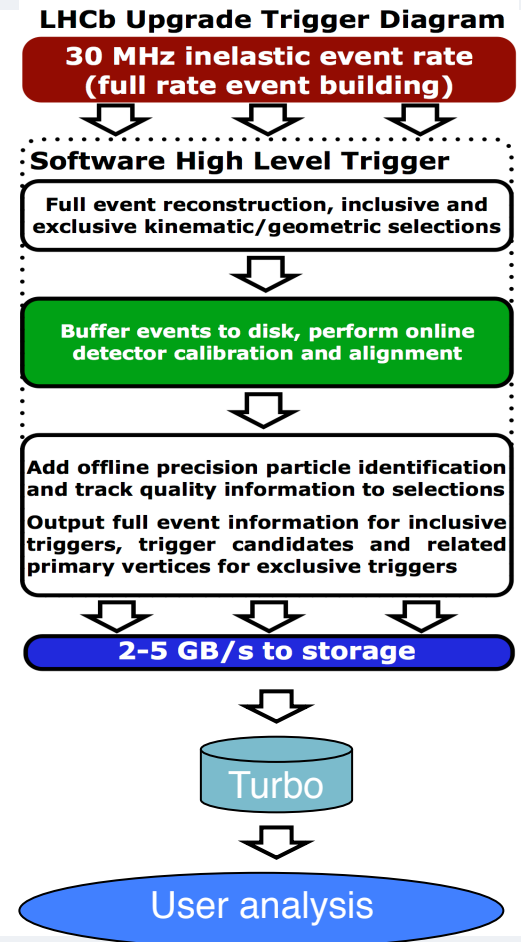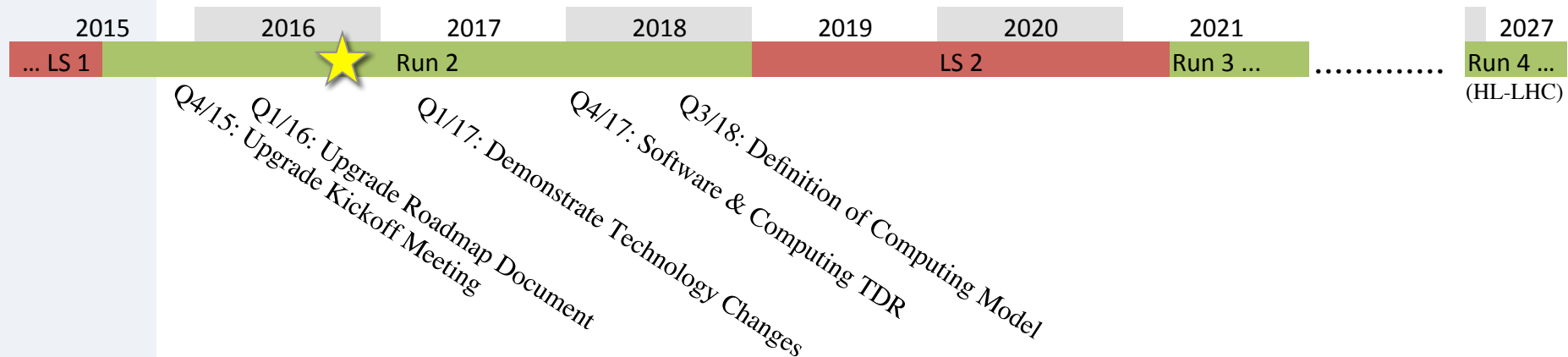# Software and computing in the LHCb Upgrade era

- The concepts deployed for Run2 will be further exploited for the Run3 Upgrade
  - HLT split into two parts
  - Turbo stream
    - ★ final reconstructed physics objects in MDST format
    - ★ RAW information not kept on offline storage
- 30 MHz events triggered in software
  - Strain on <u>CPU efficiency of the trigger software</u>
  - Trigger only signal events, 100% retention
    - ★ event selection becomes classification
    - ★ <u>offline storage costs driven by HLT output rate</u>
- HLT output rate O(GB/s), all Turbo
  - Smaller event size, more events, format in a range between MDST and DST
  - <u>Very little offline data processing</u>
- Signal proportional to MC needed
  - <u>Work for simulation explodes</u>

G. Raven, Track 1, Monday

LHCb Upgrade Trigger Diagram

30 MHz inelastic event rate (full rate event building)

Software High Level Trigger

Full event reconstruction, inclusive and exclusive kinematic/geometric selections

Buffer events to disk, perform online detector calibration and alignment

Add offline precision particle identification and track quality information to selections

Output full event information for inclusive triggers, trigger candidates and related primary vertices for exclusive triggers

2-5 GB/s to storage

Turbo

User analysis

Outlook

2015	2016	2017	2018	2019	2020	2021	2027
... LS 1	Run 2			LS 2		Run 3 ...	Run 4 ... (HL-LHC)

Q4/15: Upgrade Kickoff Meeting

Q1/16: Upgrade Roadmap Document

Q1/17: Demonstrate Technology Changes

Q4/17: Software & Computing TDR

Q3/18: Definition of Computing Model

- o **High level milestones towards software and computing upgrade of Run 3**

- o **Clear division into "revolutionary" and "evolutionary" parts**
  - ❑ **Very tight schedule for architectural work on task-based framework / algorithm vectorization / new event model / conditions / hardware**
    - ✩ **"demonstrators" by Q1/17**
  - ❑ **Run 2 as testbed in several other areas (simulation, analysis model…)**