

Computing

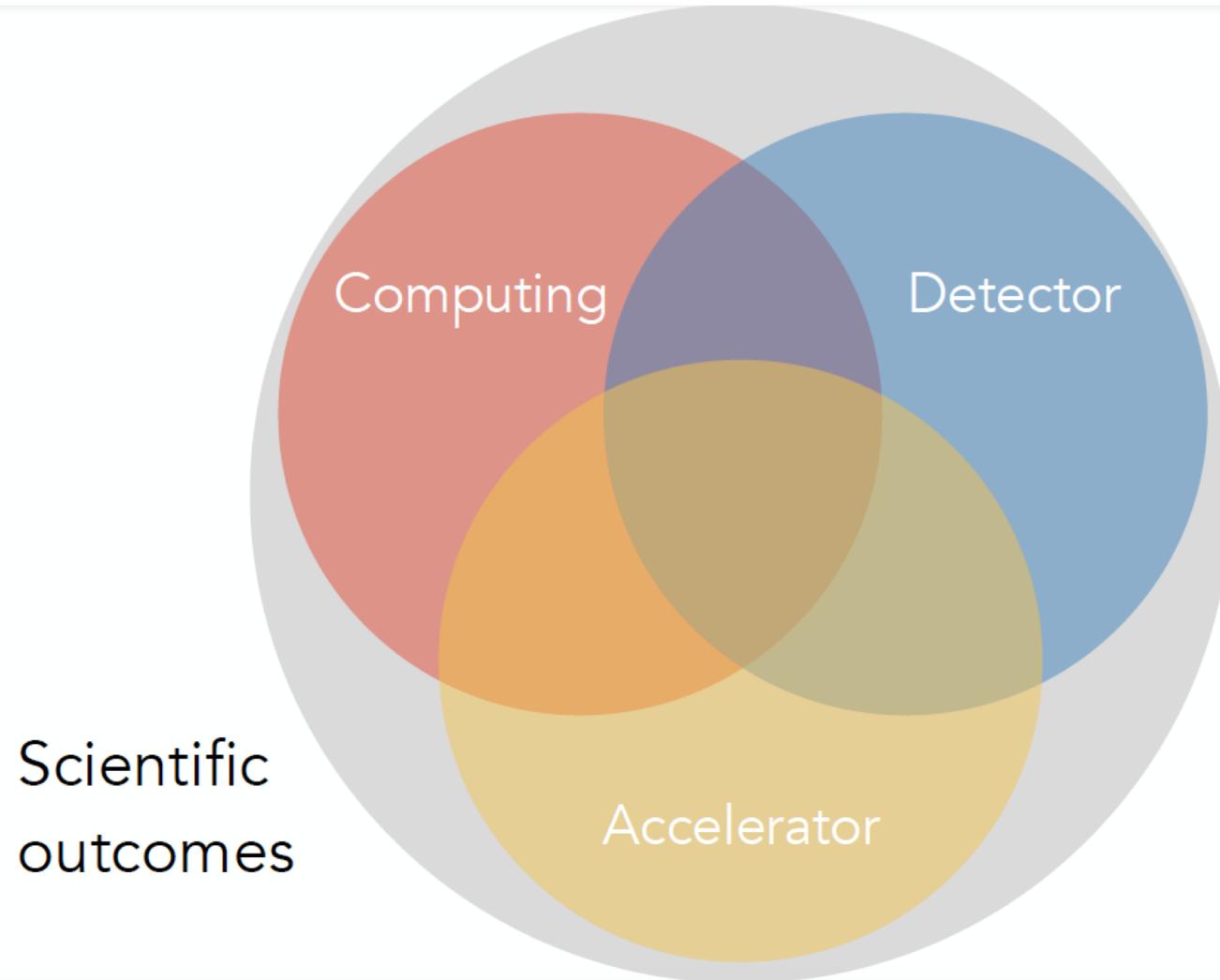
Santiago González de la Hoz

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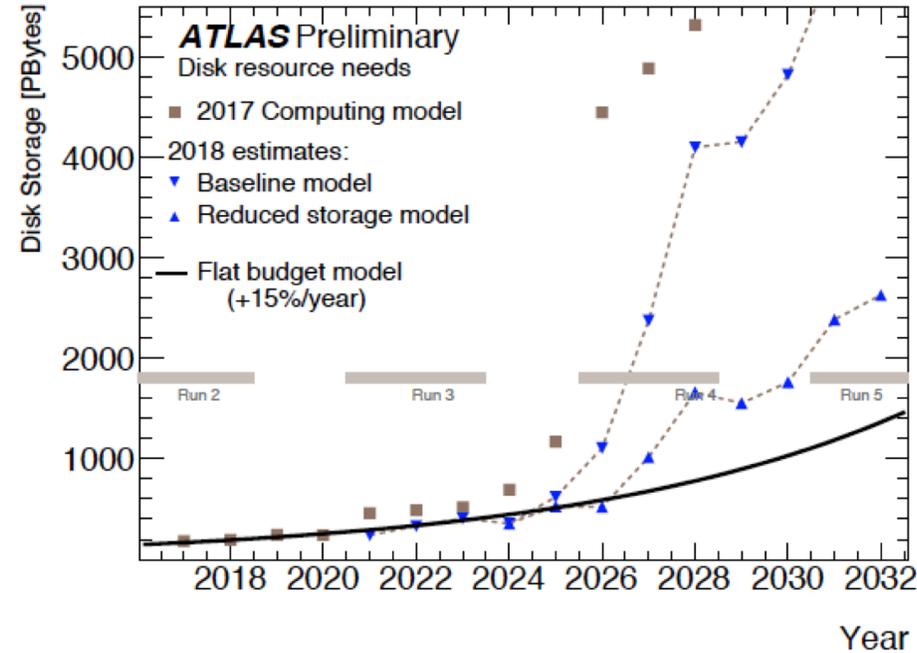
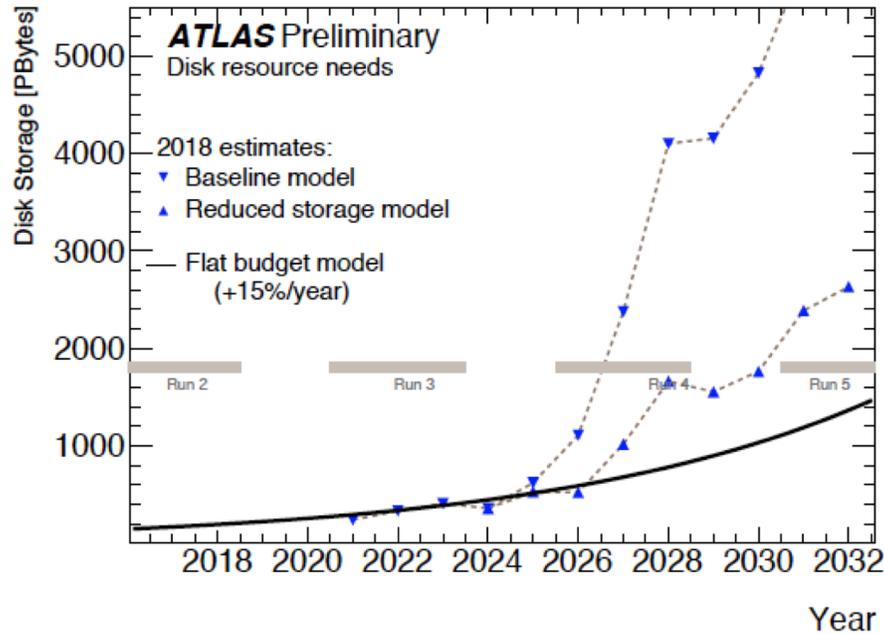
- BIG questions:
 - (a) How should **HEP computing** evolve in order to support future scientific programs and their specific needs?
 - (B) What **R&D activities** must be supported, and how, in order to enable this computing evolution?
- Parallel session summary:
 - HEP computing evolution
 - Coordination of computing-related R&D activities
 - Knowledge preservation, training and career perspectives

Research Ingredients



Computing comments

Bridging the gap between needs vs available resources



- HEP computing evolution required.
- At HL-LHC, may not be able to completely close the gap between needs and resource availabilities, in which case we need to be prepare to either:
 - Increase investment in computing
 - Accept to take decisions that will impact physics capability.

Human factor

- **Special considerations in computing**: Teams working on S&C need to be well-rounded, including physicists and developers.
 - Developers:
 - ▶ Career path exists in industry.
 - ▶ Observed trend that younger professionals have interests in accumulating experiences, changing companies or career areas.
 - ▶ Opportunity for term positions targeted at particular skills at particular times that brings in current relevant skills and approaches in industry without building an unnecessarily large standing army.

- **Computing evolution:**

- **The landscape has shifted significantly** in the last decade (heterogeneity, accelerators, ...):

- ▶ **“Plan for change, and aim to be agile!”**

- ▶ Need to be proactive (e.g. to engage in development of future HPC centres to ensure resources fit our needs).

- Strong desire to **strengthen synergies and collaborations across HEP and with big data experiments for the future** – infrastructure, tools, and software (e.g. via wlcg, HSE, IRIS-HEP in US, etc.)

- **“Bad software is extremely expensive!” and “good and clever software allows much more physics to fit in the budget”**

- ▶ Re-iterate **need for adequate level of investment in skilled developers** → not currently available at the required level.

- Adopt a more holistic approach:
 - By **considering the costs of both detector and computing** together when designing new projects, it is possible to optimize physics for the cost.
 - ▶ Detector design/layout should take into account impact on computing needs.
 - ▶ When possible, aim to bring intelligence as close as possible to detector to mitigate deluge of data.
 - ▶ Computing must be part of and funded, during the design phase of the project.
 - Define ahead of time a complete **data management plan** (data preservation, open access, etc.)
 - Computing costs must be a bigger factor in physics priority planning.