Overview of Flowdown of Requirements and Related Matters

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Why?

$\$0.5\,\mathrm{B} \Rightarrow \$100\,\mathrm{M/yr} \Rightarrow 300\,\mathrm{FTE/yr}$

300 people cannot be in causal contact

changes in one sub-sub-system affect other parts of the project

Key Questions

How to ensure that: parts made in causally disconnected universes work together?

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- Basic answer is to
  - work out a design that can achieve the science goals within cost and other constraints
  - divide it into pieces that can be built acausally according to local requirements
  - build the pieces and test them against requirements
  - assemble the pieces and test them at each level of integration

  all within budget/schedule constraints that rule the universe

Tools

- Science Traceability Matrix
  - Does the entire experiment do what it is supposed to do?
  - Summarizes the science requirements and what it takes to realize them
- Error budgets
  - Dividing the pie
- Requirements
  - What to build?
  - Levels $1 \rightarrow n$, corresponding to the entire system down to subsystems
- Work Breakdown Structure
  - Who builds it?

Schedule

- CMB-S4 is still in the preliminary design phase. Things can and will change.
- CD-2 (TBC) marks "ready to build". Change is expensive, and risky.
- A more detailed and fine-grained schedule will be available soon.

A Few Things

- "Good enough" is! "Better" costs more!
- Requirements on facilities?
- Quality assurance?
- Documentation?
- Design-driving science and "free" science
- STM

Science goals → simulations → Measurement req's → simulations → Instrument req's → simulations → Mission req's

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