Effort costing models

1) Bottom-up guesstimate of needs:

- Management/Admin: 8
- Controls Infrastructure Software Developers: 25
- Electronics Design Engineers: 7
- Integration/Commissioning Engineers: 5
- Controls Software Applications Engineers (~3 per technical group): 30
- Technicians: 15
- System admins: 2
- Database admins: 2
- Network engineer:
- Computer security expert: 1
- Equipment tracking: 2

Total staffing (heads): 97
Total for 7yr construction: 679 FTE-yrs

Note: the consensus from the telecom was that this number is too low.

2) Top-down guesstimate:

- By "rule of thumb," controls is 5-10% of total technical systems cost.
- Per Barish pie-chart from Snowmass, Controls total cost is $400M.
- Assume effort is 45% of the total Controls cost
- Assume one FTE costs $180K/yr
- Then the total FTE-yrs would be: 1000
- Total heads over 7-yr construction would be: 142

Separately, we need to consider effort for relay rack assembly, integration, test, commissioning (~2500 racks over 7yrs)