

# **Deliverables, Cost, Manpower, Schedule & Maintenance**

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**CSC Readout Replacement CDR  
Oct/8/2012**

# Deliverables and Hardware Cost

## Production system (FY14):

| Components                            | System | Spares | Unit cost (K\$) | Sum cost (K\$)            |
|---------------------------------------|--------|--------|-----------------|---------------------------|
| COB                                   | 5      | 4      | 9,760           | 87,840                    |
| CSC RTM (FEX)                         | 4      | 4      | 3,330           | 26,640                    |
| SFP RTM (Formatter)                   | 1      | 2      | 1,200           | 3,600                     |
| ATCA Shelf (crate+PSU)                | 1      | 1      | 5,500           | 11,000                    |
| TDAQ control server                   | 1      | 1      | 4,000           | 8,000                     |
| Miscellaneous cables                  |        |        |                 | 1,000                     |
| <b>Total</b><br>(include 9% overhead) |        |        |                 | 138,080<br><b>150,510</b> |

## Prototype and test stands (FY13):

- 2\*(COB + RTM) (25 k\$)
- CERN test stand shelf + server (10K\$)
- Need to increase 2\*(COB+RTM) at SLAC ?

# Manpower

| Personnel                       | FY12        | FY13        | FY14        |
|---------------------------------|-------------|-------------|-------------|
| Mike Huffer                     | 0.10        | 0.40        | 0.30        |
| Ric Claus                       | 0.20        | 0.80        | 0.60        |
| Jim Russell                     |             | 0.30        | 0.15        |
| SLAC engineer + tech support    | 0.05        | 0.10        |             |
| Raul Murillo Garcia             | 0.20        | 1.00        | 1.00        |
| <b>Total (US ATLAS M&amp;O)</b> | <b>0.65</b> | <b>2.80</b> | <b>2.05</b> |

- SLAC RCE core effort supported by R&D funds for COB+RTM hardware and core firmware are not charged to US ATLAS. Only CSC specific implementation manpower are listed in table above.
- Additional Physicist resources:
  - Nicoletta Garelli (SLAC project scientist) [SLAC research budget]
  - Michael Schernau (UCI project scientist) [US ATLAS M&O]
  - Andy Nelson (UCI postdoc) [UCI research budget]
  - Anthony DiFranzo (UCI grad student) [UCI research budget]
- There will be manpower needs for FY15 commissioning with first beam beyond the regular asymptotic operations, but assumed that will be operations M&O after construction, to be addressed later.

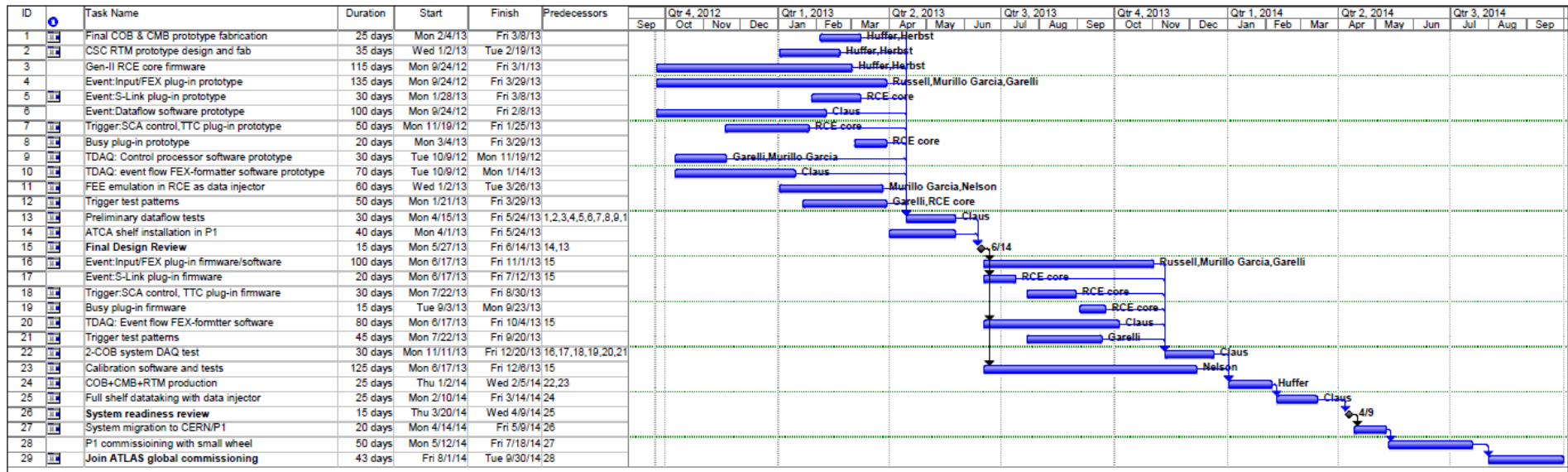
# Maintenance

- Both SLAC and UCI are committed to operate the NRC throughout its operational lifetime, foreseen as 2015-2018/LS2.
- SLAC and UCI will have CERN based experts taking direct responsibilities for hardware maintenance and software updates.
- SLAC based design team will supply operational support which will benefit from a larger base of expertise that's necessary for development and support of RCE applications for other projects.

# Schedule

- **Key dates and milestones of a preliminary schedule:**
  - Oct/8/2012: Conceptual Design Review
  - Mar/8/2013: Fully functional COB+CMB+RTM preproduction hardware and RCE Gen-II core firmware ready for testing.
  - Jun/14/2013: Final Design Review. Prototype firmware and software designs are validated on prototype hardware.
  - Feb/05/2014: Completion of full set of hardware production.
  - Apr/09/2014: System Readiness Review. Full system DAQ operations demonstrated with data injector input emulation.
  - Aug/02/2014: Join ATLAS for combined commissioning.
- **Contingencies to mitigate schedule risks:**
  - All tasks are based on fractional time efforts with key personnel available at a larger fraction of their time if needed.
  - Task to task sequence has some time gaps built-in.
  - System validation with data injectors largely decoupled from availability of CSC detector & P1 infrastructure until May/2014.

# Schedule



- Task durations are not 100% FTE times, but actual working days needed based on fractional FTE efforts.
- "RCE core" refers to the larger RCE core R&D team at SLAC.
- Task resource list is only some names with main responsibility while some common activities such as major tests and reviews will involve almost the entire team.

# Backup

# COB Cost

| Components                 | Multiplicity | Unit Cost (\$) | Summed cost (\$) |
|----------------------------|--------------|----------------|------------------|
| COB PCB & loading          | 1            | 1800           | 1800             |
| COB motherboard components | 1            | 700            | 700              |
| CMB PCB and loading        | 5            | 350            | 1750             |
| CMB components             | 5            | 1050           | 5250             |
| Total cost per COB         |              |                | 9760             |

- Parts are mostly based on existing purchases
- COB PCB cost based on a quote of 10 boards
- CMB PCB cost extrapolated from a 8-board quote of \$475/board
- DTM CMB cost with 1 RCE approximated to be same as 2-RCE DPM
- Production will most likely be joint with at least small requests from other projects



# RTM costs

| Components                    | Multiplicity | Unit Cost (\$) | Summed cost (\$) |
|-------------------------------|--------------|----------------|------------------|
| CSC RTM PCB & loading         | 1            | 350            | 350              |
| CSC RTM MPO transceivers      | 12           | 240            | 2880             |
| CSC RTM other components      |              | 100            | 100              |
| <b>Total cost per CSC RTM</b> |              |                | <b>3330</b>      |
| SFP RTM PCB and loading       | 1            | 350            | 350              |
| SFP RTM transceivers          | 16           | 50             | 800              |
| SFP RTM other components      |              | 50             | 50               |
| <b>Total cost per SFP RTM</b> |              |                | <b>1200</b>      |

- Cost estimates all based on dedicated small volume production