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# Critical Issues Facing the Detector Characterization Working Group

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# Brief Status (details on Thursday)

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- Commissioning produces initial IFO characterization
- Online Diagnostics Test Tool working well (D. Sigg)
- Environmental monitoring underway at both sites
- Offline Data Monitoring Tool (DMT) working well
  - » Infrastructure nearly complete, already comprehensive(J. Zweizig)
  - » Some LSC members have delivered DMT packages
  - » More on the way
- Data set reduction partially available
- Data set simulation well advanced
  - » Parameterized simulation
  - » End-to-End Model



## Status (cont.)

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- Successful engineering run in April
  - » Many LSC members participated in data taking
  - » Many LSC members analyzing the data (see session reports)
- LDAS mock data challenge planned for February to test integration of detector characterization into data conditioning API
  - » Test line removal, cross-channel regression, time interval vetoes
  - » Leader: L.S. Finn
  - » DC group contributors: S. Klimenko, E. Mauceli, A. Ottewill



# Critical Issue I

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- Better integration of Detector Characterization group into LIGO science at the sites
  - » Problems I see:
    - Many persons writing / delivering code for DMT, but much of it unused
    - Software not tailored to operator use
    - Authors not on site to educate operators
    - Authors too detached from IFO operation (in general)
    - Some authors not delivering at all
    - Too few scientists on site looking at available data



# Critical Issue I (cont.)

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- » How to do better?
  - As a minimum, software writers should provide ample documentation, sample programs & makefiles.
  - Better: Tutorials to persons on site.
  - Much better: Extended site visits to shake down code and make it truly useful for data quality monitoring.
  - Even better: Take responsibility for monitoring and regularly reporting on interferometer subsystem.
  - Software writers who promise but don't actually write (*i.e.*, deliver code) should be held accountable:
    - MOU renewal
    - LSC membership review
  
- » Need scientific monitoring shifts in parallel with operator shifts



# Scientific Monitoring Shifts

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- LIGO will run 24/7 operator shifts (day/eve/owl)
- LIGO Lab operators will keep IFO running:
  - » Adjust gains, as needed
  - » Monitor alarms, fix problems
  - » Run calibrations, as needed
  - » Update electronic log
- In addition, need scientific data quality monitoring:
  - » Review daily logs of IFO performance & detected transients
  - » Check stability of calibrations
  - » Manual entries to meta-database
  - » Maintain DMT processes
  - » Feedback to DMT software writers



# Scientific Monitoring Shifts

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- At least 1 scientific monitoring shift per day, perhaps more, especially at beginning
  - » Manned by Lab and non-Lab LSC physicists
  - » Pool of experts on call for consultation
  - » Training necessary -- Practice shifts with experienced physicist one possible scheme
  - » Expect duties to evolve (toward greater efficiency, one hopes!)
  - » Want stable shift system in place and experienced pool of shift takers by start of first science run
  - » Use upcoming engineering runs / daq shakedowns as warmups



# Upcoming Engineering Runs

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- 1-2 week data acquisition and data monitoring shakedown at Hanford this fall (October/November)
  - » Exercise DAQ and tape writing in extended 24/7 operation
  - » Exercise Data Monitor Tool in 24/7 operation, including real-time scientific review of results
  - » Shakedown to include 1-2 day engineering run with 2-km IFO (Goal: Locked 2-arm, recycled Michelson)
- 1-2 day engineering run with partial 4-km IFO at Livingston in late fall / early winter
  - » Recycled Michelson without arms (?)





# Upcoming Engineering Runs

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- LSC turnout at April engineering was good first step
- Want to do even better at upcoming events:
  - » 1-2 double-manned shifts each day
  - » Experienced / inexperienced IFO persons paired for training
  - » LSC groups urged to sign up when schedule ironed out

Round table discussion on increasing LSC participation  
in on-site science this afternoon in DC session



# Critical Issue II

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- Working group needs eventual reorganization
  - » Present subgroups organized to provide tools:
    - Transient Analysis (chair: F. Raab)
    - Performance Characterization (unofficial)
    - Data Set Reduction (chair: J. Brau)
    - Data Set Simulation (chair: L.S. Finn)
  
  - » This scheme is fine at outset for building software infrastructure
  
  - » More natural: subgroups focussed on detector subsystems
    - More accountability (responsibility to monitor & report on performance)
    - Better integration of Lab & non-Lab efforts
    - Discussions begun with LIGO/LSC management to see what makes most sense as commissioning ends



# Non-Critical Issue

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Too little joint gathering of the DC group and the advanced detector groups at LSC meetings

- Real effort was made to avoid overlap at this meeting, but only one DC session (Thur 10:45-12:00) will have many advanced detector physicists present
  - » Thursday morning talks selected accordingly
  - » But other DC talks would have been appropriate too
  - » More important, DC group missing benefit of expertise from experienced instrument builders in many discussions



# Non-Critical Issue

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- Possible solutions:
  - » Lengthen LSC meetings (3.0 → 3.5/4.0 days)?
  - » Hold meetings more often?
  - » Make more use of teleconferences between meetings?
  - » Hold meetings of alternating focus (LIGO I vs LIGO II)?
- For reference, HEP collaborations at a comparable phase (construction ending, data taking imminent) typically hold 5-day meetings every three months
- Discussed this issue at last meeting and decided to try to do better at next meeting

**Are we satisfied with the improvement?**