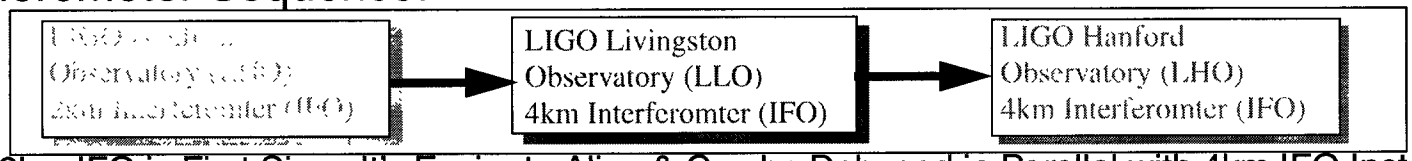
Detector Installation Plan

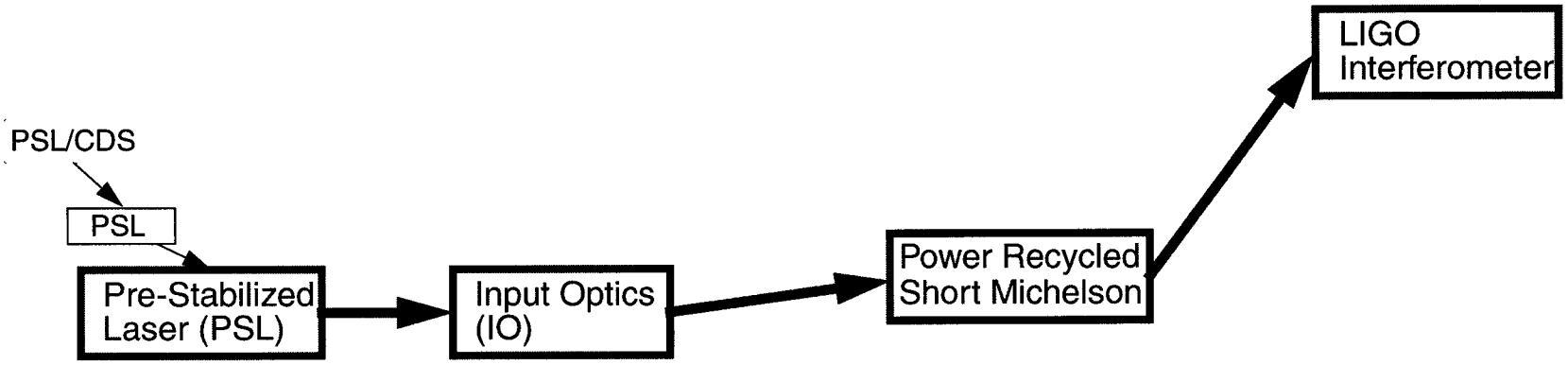
- Plan
- Management
- Schedule
- Staffing

Detector Installation Plan Overview

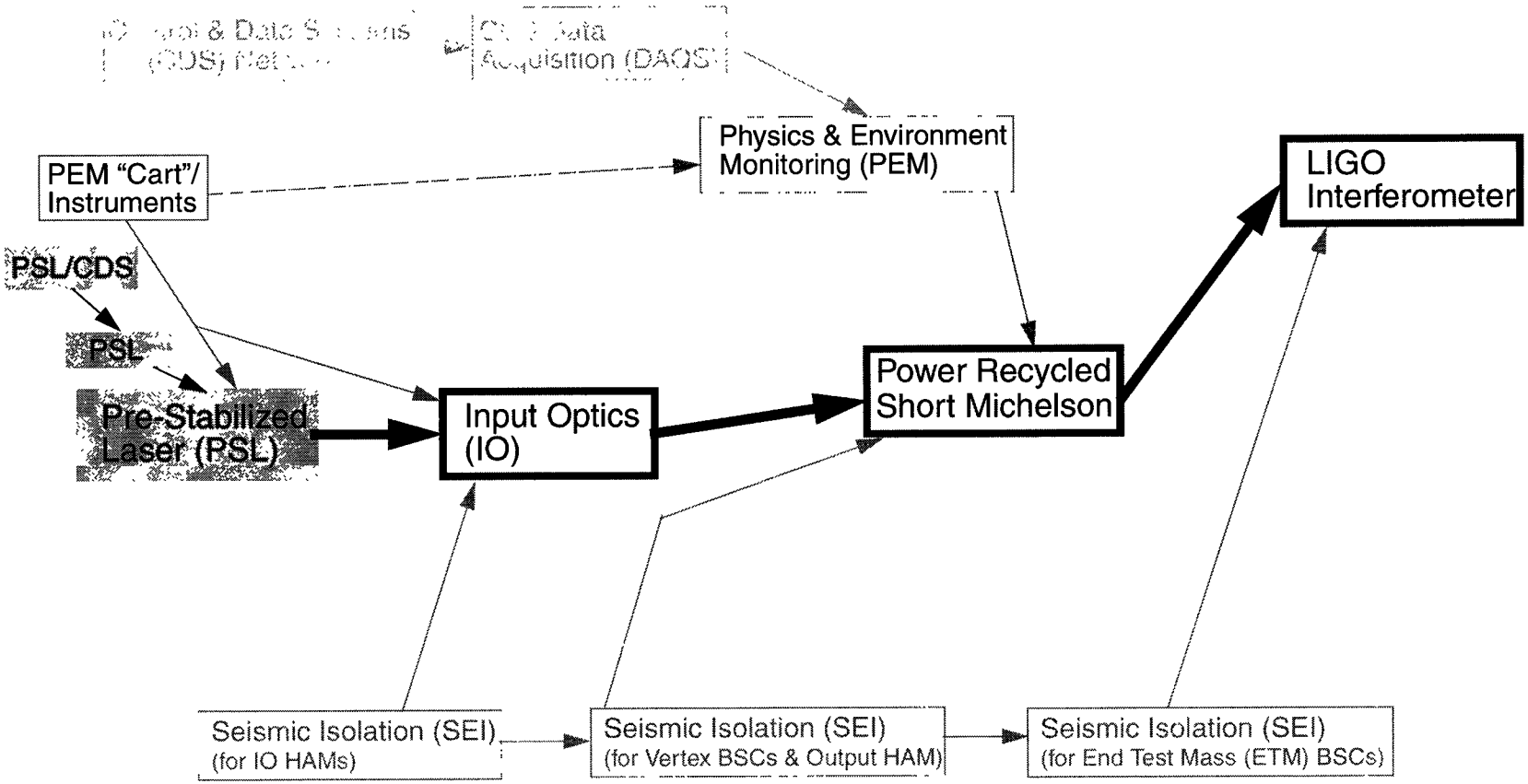
- Interferometer Sequence:
  - 

  - 2km IFO is First Since It's Easier to Align & Can be Debuged in Parallel with 4km IFO Installation
  - LLO 4km IFO is Second Since Facility and Staff are Available
  - 2nd and 3rd IFOs benefit from Debug/Commissioning on the Earlier IFOs
- Boundary Conditions:
  - Management Plan:
    - Initiate Inteferometer Installation 07/98
    - First Coincidence Run ($h < 10^{-20}$) 12/00
    - Design Sensitivity ($h < 10^{-21}$) 11/01
  - Vacuum Equipment Completion Dates (as of 2/28/98):
    - LIGO Hanford Observatory (LHO) 7/30/98
    - LIGO Livingston Observatory (LLO) 1/7/99
  - Detector Subsystem Delivery Dates
  - No reliance upon the BT Availability (due to BT bakeout) for alignment of Core Optics
- Guidelines:
  - Need ~12 months for Debug & Commissioning of Interferometers (Operations Proposal)
  - Use Observatory Staff as Much as Possible
  - Team Approach

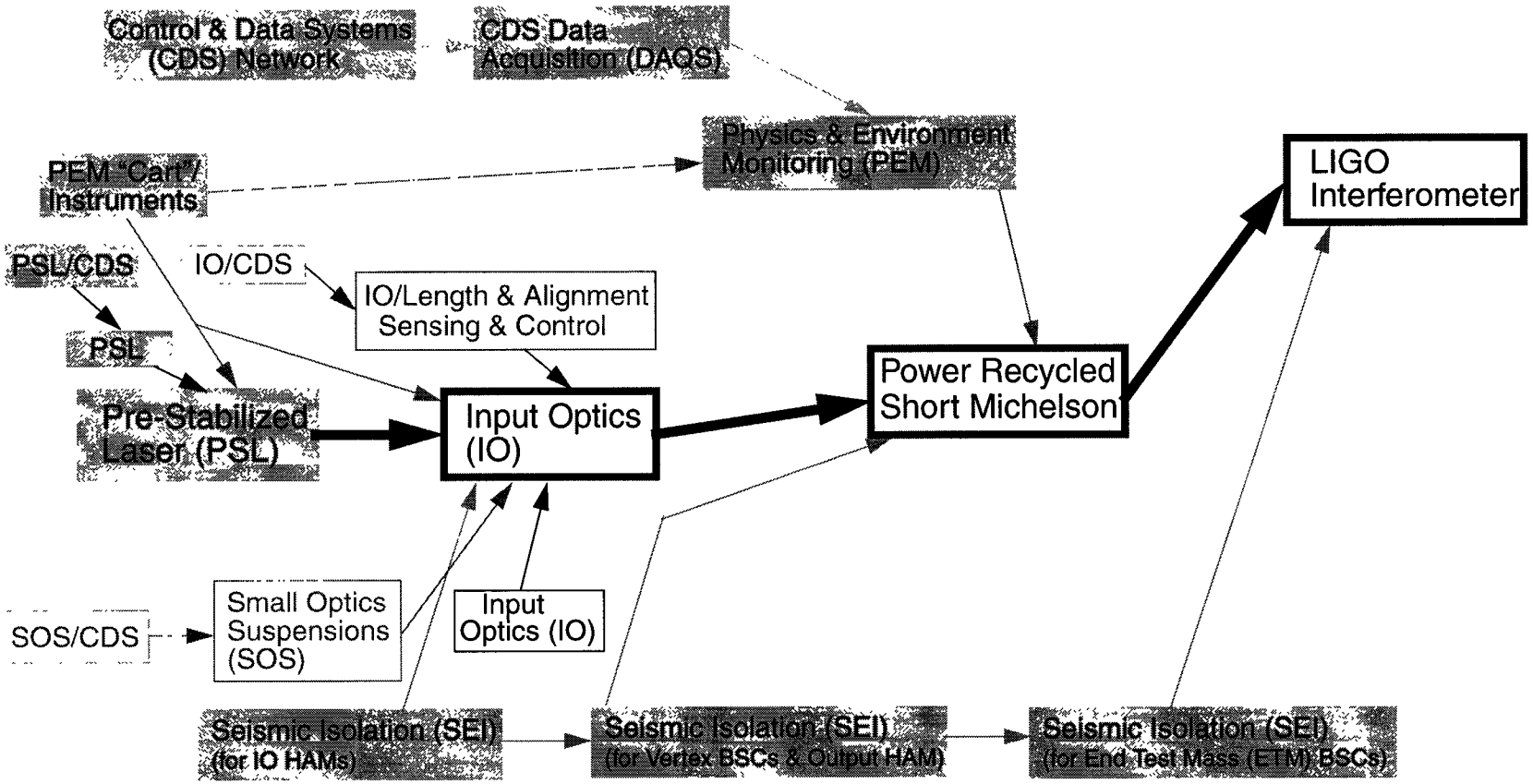
Detector Installation Sequence
Core Thread



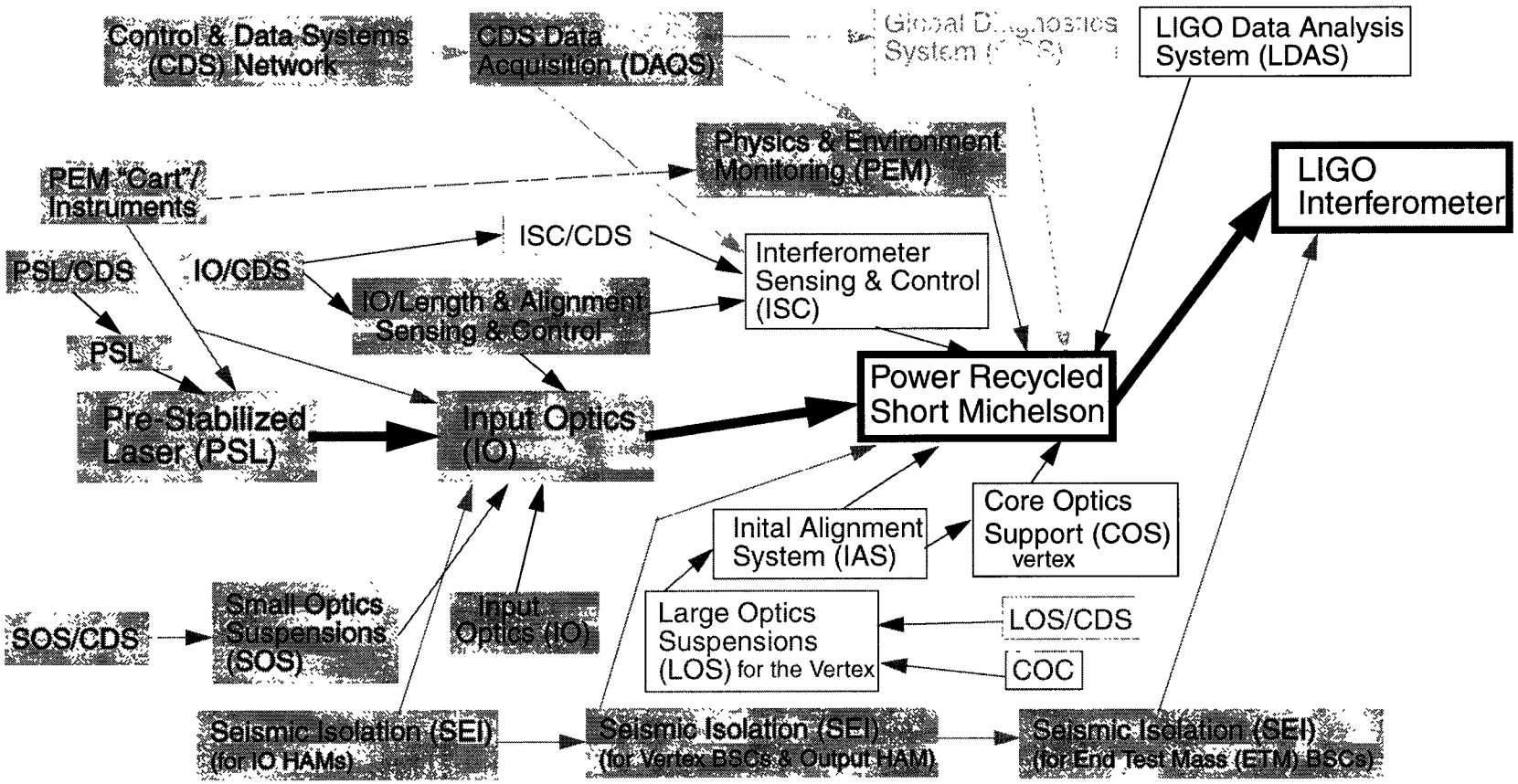
Detector Installation Sequence
Infrastructure Threads



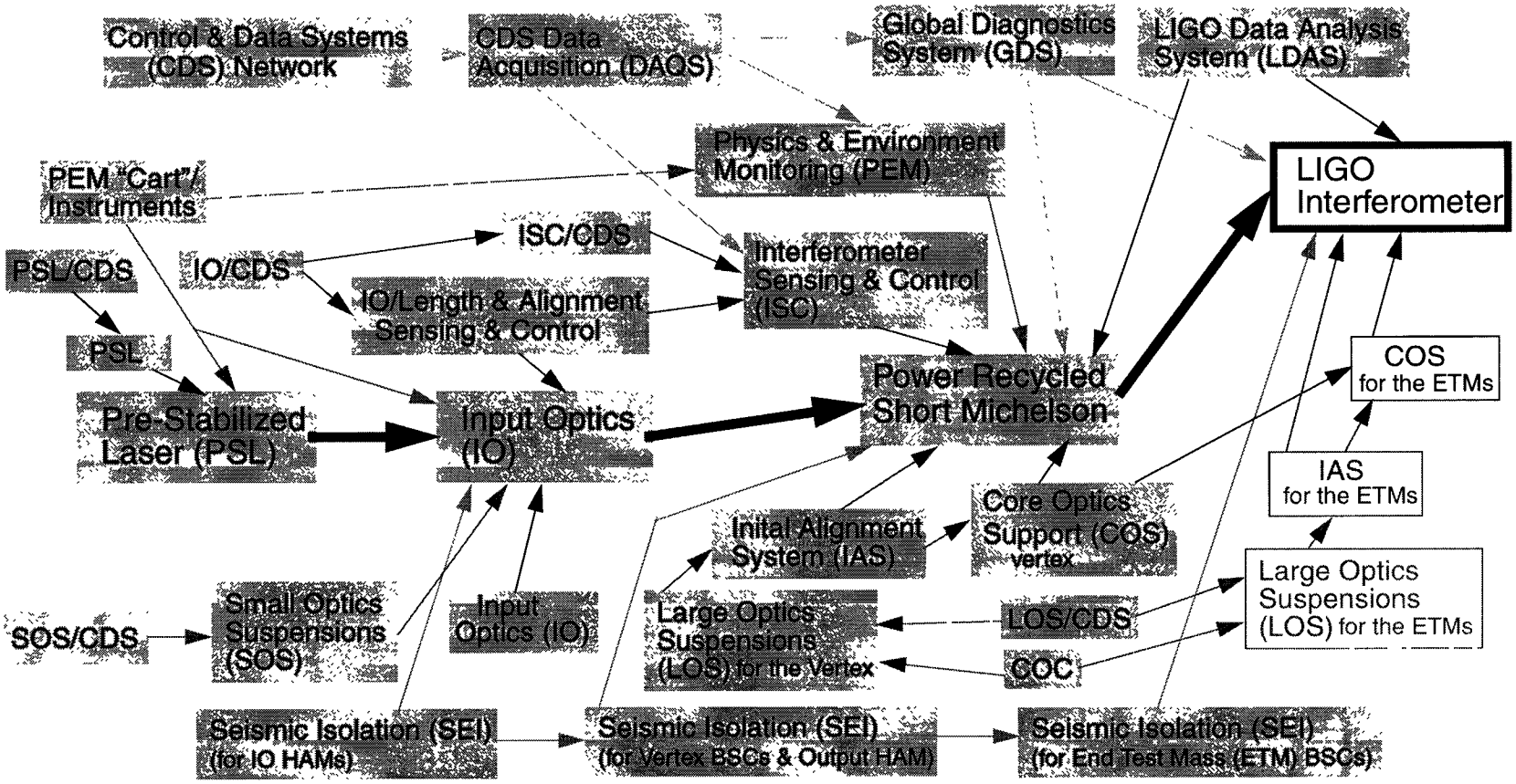
Detector Installation Sequence
Input Optics Threads



Detector Installation Sequence
Short Michelson Threads



Detector Installation Plan Sequence Threads



Management

- Detector Integration and Test Organization
  - The Detector Group Manages to the Deliverable Definition & Schedule (Detector's "interface" with Integration)
  - Detector Integration is "Observatory-Centric"
    - EXECUTION:
      Day-to-Day On-Site Staff Direction & Tracking (per the installation plan) is the Observatory Director's Responsibility (F. Raab & M. Coles)
    - PLANNING/COORDINATION:
      Detector Chief Engineer/Integration Manager's Responsibility (D. Coyne):
      - Work-Around Planning
      - Technical/Scientific Integration Support Staff Coordination
- Support to Detector Integration and Test
  - Detector Design Staff Migrates to Support the Integration Effort
    - During Integration peaks, ~1/2 the Detector Staff will be on-site at the observatories
    - Detector Staff Continues to Support the Detector Design, Fabrication, Assembly & Test
  - Subsystem Teams (with Observatory Site members) Execute the Installation
    - Teaming Helps Technology Transfer & Training of Observatory Staff
    - Teaming Helps Relieve Travel burden of University-based Detector Staff

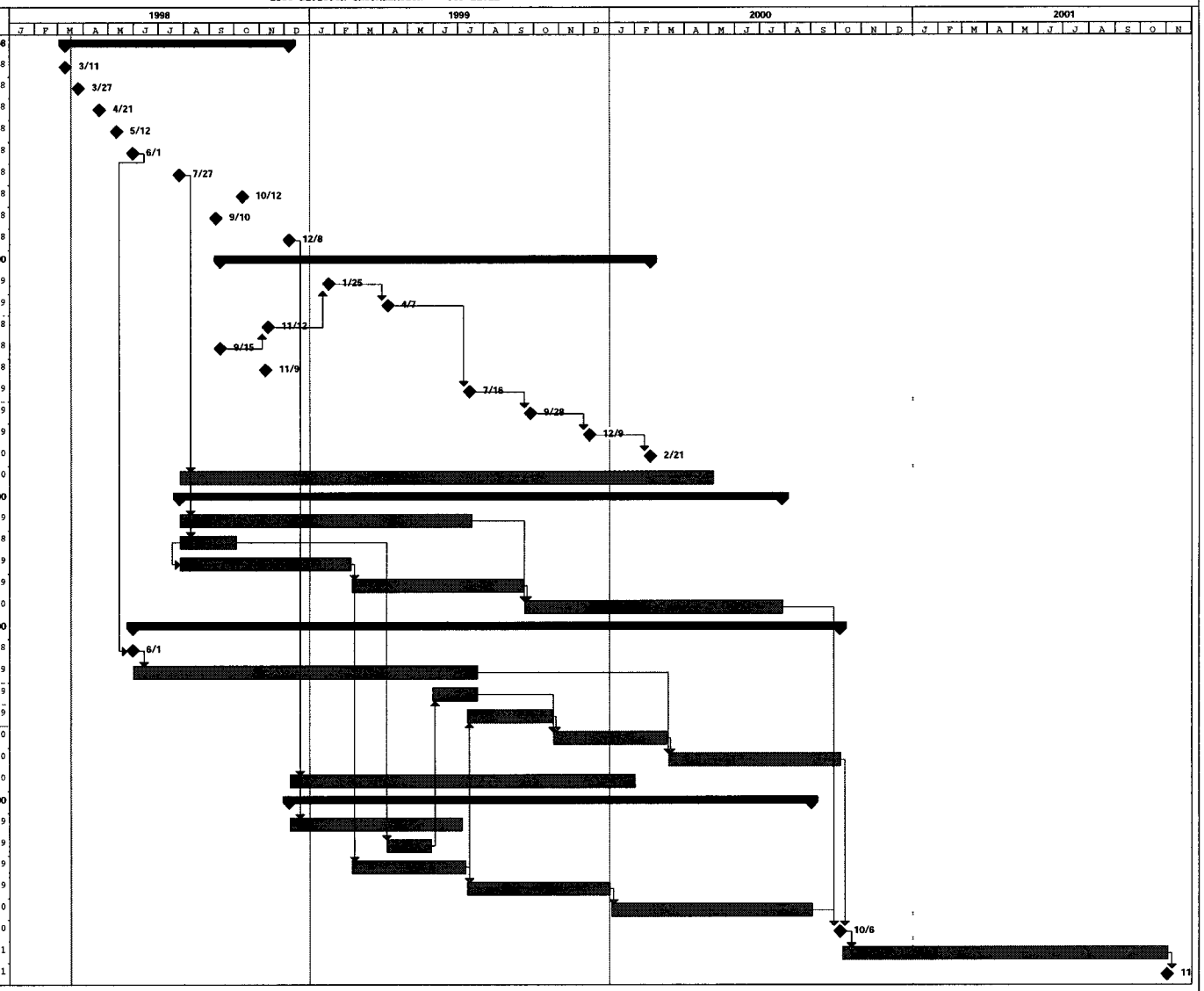
Detector Integration

- Configuration Management
  - Document Change Notice (DCN) Process
  - Material Review Board (MRB)
  - Configuration Control Board (CCB)
  - Technical Review Board (TRB)
- Interface Control
  - Interface Documents for Major Project Subsystems
  - Interfaces Addressed in Each Detector Subsystem Requirements Document
  - Integrated Layout Drawings
    - Optomechanical
    - Equipment Arrangement
- Conflict Resolution
  - LIGO Management has a Demonstrated Ability (in Facility Construction) to Resolve Inevitable Conflicts /Problems which will Arise During Installation & Commissioning
  - Detector Team Involved with Design and Fabrication are also Responsible for the Installation and Integration

3/17/98, 1 41 PM

LIGO DETECTOR INSTALLATION -- TOP LEVEL

ID	Task Name	Duration	Start	Finish
1	**VE Completion**	**194d**	**3/11/98**	**12/8/98**
2	WA Y-mid Station	0d	3/11/98	3/11/98
3	WA Y-end Station	0d	3/27/98	3/27/98
4	WA X-mid Station	0d	4/21/98	4/21/98
5	WA X-end Station	0d	5/12/98	5/12/98
6	WA Vertex section	0d	6/1/98	6/1/98
7	**WA Diagonal section**	0d	7/27/98	7/27/98
8	LA Y-end Station	0d	10/12/98	10/12/98
9	LA X-end Station	0d	9/10/98	9/10/98
10	**LA Corner Station**	0d	12/8/98	12/8/98
11	**BT Bake Out**	**374d**	**9/15/98**	**2/21/00**
12	WA X1 Module	0d	1/25/99	1/25/99
13	WA X2 Module	0d	4/7/99	4/7/99
14	WA Y1 Module	0d	11/12/98	11/12/98
15	WA Y2 Module	0d	9/15/98	9/15/98
16	LA BT complete	0d	11/9/98	11/9/98
17	LA X1 Module	0d	7/16/99	7/16/99
18	LA X2 Module	0d	9/28/99	9/28/99
19	LA Y1 Module	0d	12/9/99	12/9/99
20	LA Y2 Module	0d	2/21/00	2/21/00
21	**WA Detector Infrastructure**	93w	7/27/98	5/5/00
22	**WA 2km IFO**	**525d**	**7/27/98**	**7/28/00**
23	Install SEI, SUS, COS, ISC	51w	7/27/98	7/16/99
24	PSL	10w	7/27/98	10/2/98
25	Input Optics	30w	7/27/98	2/19/99
26	PR Near Michelson	30w	2/22/99	9/17/99
27	PR Michelson w/ FP Arms	45w	9/20/99	7/28/00
28	**WA 4km IFO**	**615d**	**6/1/98**	**10/6/00**
29	Start Detector Integration	0d	6/1/98	6/1/98
30	Install SEI, SUS, COS, ISC	60w	6/1/98	7/23/99
31	PSL	8w	5/31/99	7/23/99
32	Input Optics	15w	7/12/99	10/22/99
33	PR Near Michelson	20w	10/25/99	3/10/00
34	PR Michelson w/ FP Arms	30w	3/13/00	10/6/00
35	**LA Detector Infrastructure**	60w	12/8/98	1/31/00
36	**LA 4km IFO**	**454d**	**12/8/98**	**9/1/00**
37	Install SEI, SUS, COS, ISC	30w	12/8/98	7/5/99
38	PSL	8w	4/5/99	5/28/99
39	Input Optics	20w	2/22/99	7/9/99
40	PR Near Michelson	25w	7/12/99	12/31/99
41	PR Michelson w/ FP Arms	35w	1/3/00	9/1/00
42	**Detector Commissioned (h<10^-20)**	0d	10/6/00	10/6/00
43	Observatory Operations & improve	56w	10/9/00	11/2/01
44	**Design Sensitivity (h<10^-21)**	0d	11/2/01	11/2/01



Project top_level_v4
Date 3/17/98

Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

INTEGRATION STAFFING

Physical Integration & Hardware Commissioning Staff
(Does not include LDAS, GDS, Operations)