

Schedule Overview

Ian Pain

SPIRE BSM Development plan

- **Last released 4.0 This review - Version 5.0 release**

Doc Pack Sec.8

- **Contents:**

- **Constraints**

- Work flow
- Calendar
- Risk Analysis

- **Model Philosophy**

- Model description
- Design phase description
- Verification plan (as spec)
- GSE

- **Calendar**

- **Deliverables**

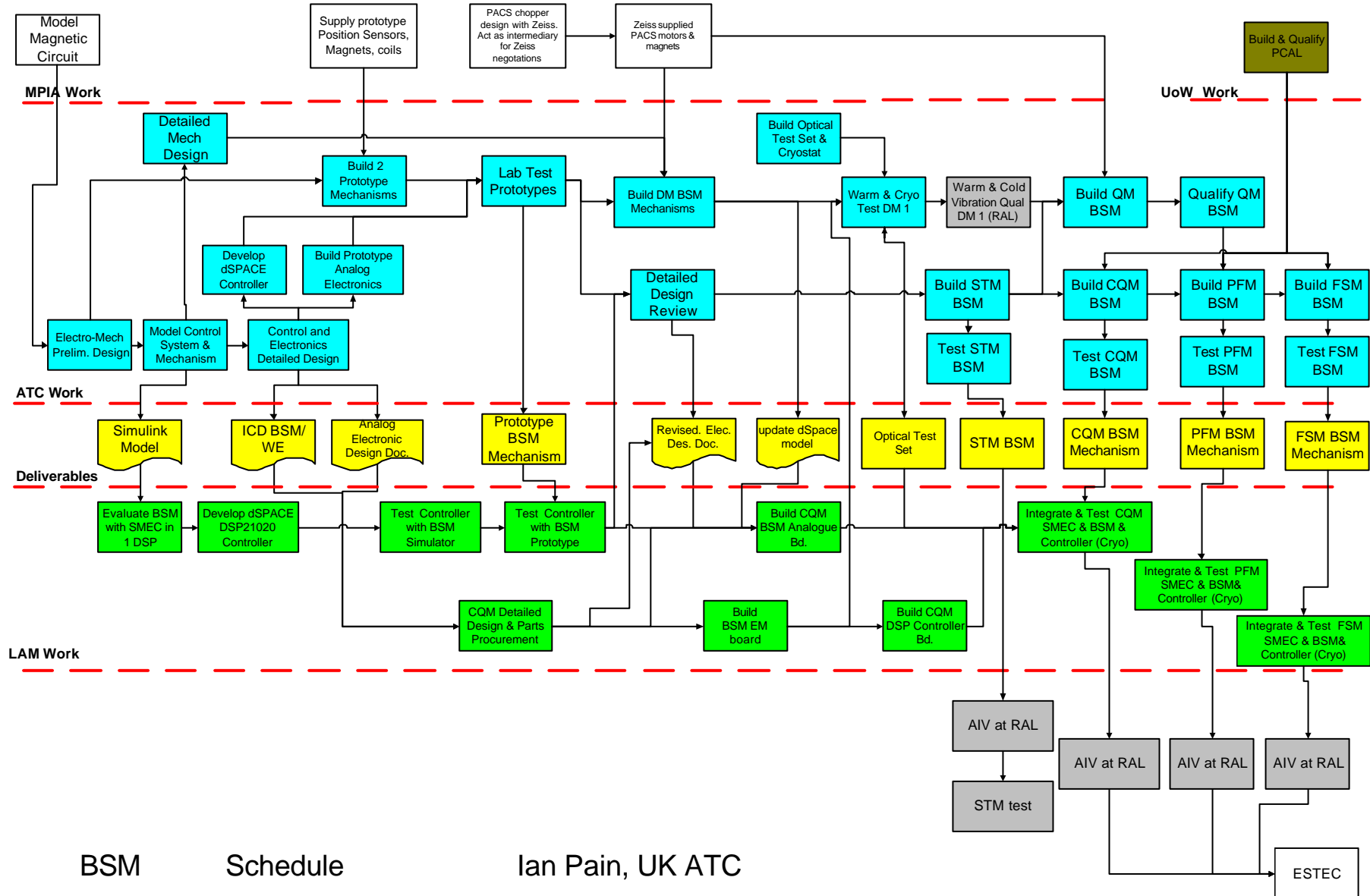
SPIRE BSM Detailed Design Review

30th July 2001



BSM Development Work Flow v2.0
16.7.01

Work-flow



BSM

Schedule

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Model Philosophy Summary

Model	Abbrev.	Quantity	Delivered to	Purpose
Single axis prototype	-	1	ATC	Initial proof of concept work
Two Axis prototype	-	1	ATC	Detailed cryogenic, vibration and cross talk tests. Refinement of design.
Development Model	DM	1 (or 2)	ATC, LAM	Detailed engineering development. Tests of LAM electronics with ATC hardware
Structural & Thermal Model	STM	1	ATC, RAL	Mass and thermal model. Representative vibration load on structure to obtain qualification loads. May also serve as the BSM alignment fixture.
Qualification Model	QM	1 (refurb DM)	ATC	Full verification of survivability, performance, life tests.
Cryogenic Qualification Model	CQM	1	RAL, ESA	Science performance of SPIRE at cryogenic temperature.
Proto-Flight Model	PFM	1	RAL, ESA	Flight Hardware.
Flight Spare Model	FSM	1	RAL, ESA	Flight spare if required (TBC). May be refurbished from CQM,STM,QM (TBD)

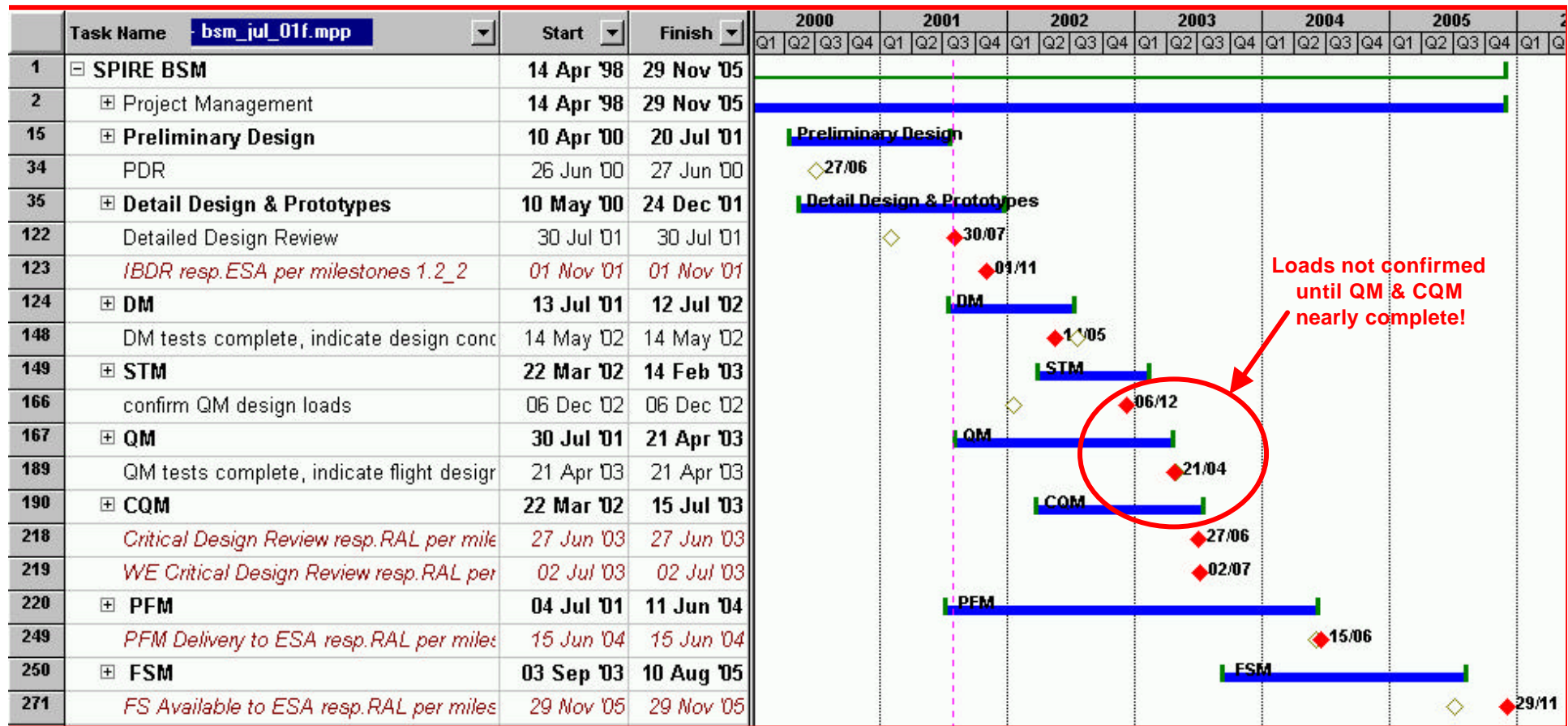
Development Calendar

Activity	Start	End
Preliminary Design	10 Apr '00	13 Feb '01
PDR	26 Jun '00	27 Jun '00
Detail Design & Prototypes	10 May '00	27 Aug '01
Detailed Design Review	19 Jun '01	30 Jul '01
DM	22 Mar '01	22 Mar '02
DM tests complete, indicate design concept valid	22 Mar '02	22 Mar '02
STM	04 Feb '02	09 Oct '02
confirm QM design loads	09 Oct '02	09 Oct '02
QM	22 Jun '01	27 Feb '03
QM tests complete, indicate flight design valid	27 Feb '03	27 Feb '03
CQM	04 Feb '02	05 Jun '03
Critical Design Review	02 Apr '03	04 Apr '03
PFM	13 Mar '01	20 May '04
Deliver FPU PFM to ESA	29 Oct '04	01 Nov '04
FSM	18 Apr '03	13 Dec '04
Deliver FPU FSM to ESA	19 Apr '05	21 Apr '05

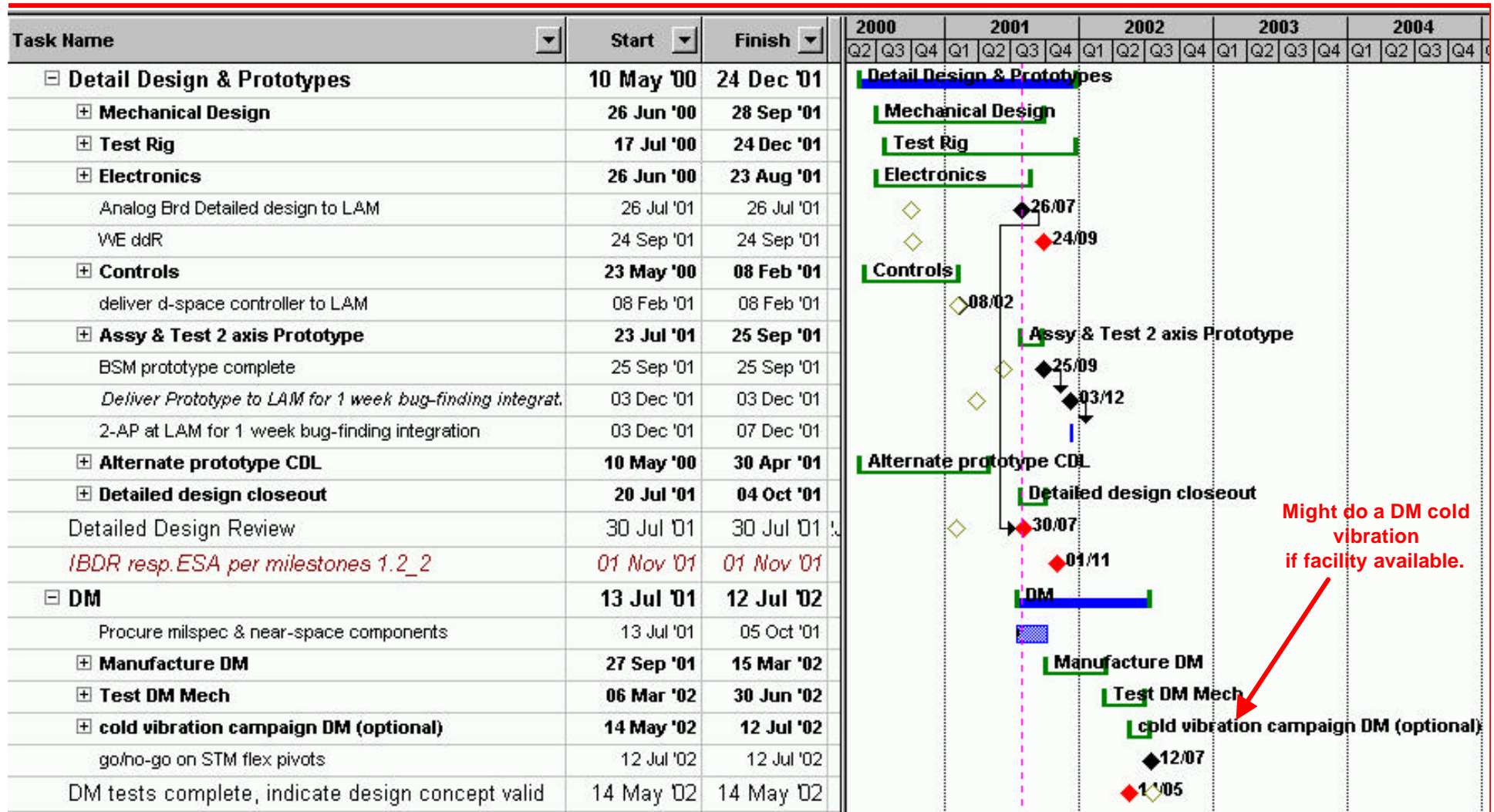
Project Schedule

- **Latest BSM project plan**
 - updated 27.Jul.01
 - reflects progress, updates etc c.f. 17.Jul.01 dates for Dev. Plan v.5.0 in DDR pack
 - includes milestones agreed with LAM and which can now be confirmed with RAL
 - All deliverable milestones met with a margin of 5-20 days
 - However, some compromises due to late availability of cold vibration facility & STM structure.

Overview Project Plan



Design & Development Phase Overview



BSM Schedule issues

- **Problem:**
 - **Cold vibration for BSM models**
 - facility not available before end of DM tests
 - probable clashes for facility when it does exist (ie BSM QM cannot get on because it's probably full of SPIRE CQM at the time).
 - cold vibration too costly to test as often as desired (e.g. 3-4 times)
 - **STM results not available prior to QM or CQM design, manufacture (and most of QM tests!)**
- **Consequence**
 - **BSM will be designed and qualified based entirely on warm vibration data to a theoretical load spectrum.**
- **Risk**
 - **is that we would need to re-qualify after STM (with a 4 month delay to PFM delivery).**
 - **Or that re-tests will result in budget over-run**

BSM Schedule issues

- **Problem: STM functionality is not firmed up**
 - **option 1: mass dummy only**
 - cheap to make
 - but extra design time unless very crude
 - **option 2: as DM,**
 - need to make extra hardware, as DM is required for refurb as CQM thus cannot use as STM. May be able to partly re-use 2 axis prototype if size, materials etc don't change 'too much'.
 - 2A: with cold rated flex pivots
 - if can procure in time (only just)
 - free cold vibration test!
 - Flex pivot survivability only determined by STM test, thus risk to STM programme.
 - 2B: as DM, without flex pivots
 - replace pivots with solid shafts.
 - 2C: as DM, with non-cold flex pivots
 - Could be 'interesting'

Key decision branch points

- **Flex Pivot procurement**
 - based on technical acceptability
 - and on affordability. E.g. may have to collaborate on procurement and take a non-optimum pivot for BSM
 - interaction with motor coil material
- **Motor Coil selection**
 - confirm material
 - absorb minor changes from Zeiss c.f. PACS prototype
- **Launch Lock**
 - required or not? Decide after warm (& cold?) vibration, with and without LL.
- **STM test result availability**
 - re-design BSM for higher launch loads
 - set up QM tests to match STM data