

SCUBA-2 FTS Project Office

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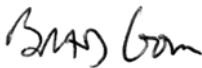
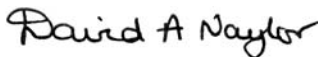

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Document Title: SCUBA-2 Fourier Transform Spectrometer Risk Assessment

Document Number: SC2/FTS/PM500/001

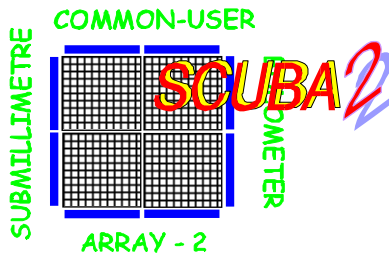
Issue: Version 1.0

Date: 25 June 2003

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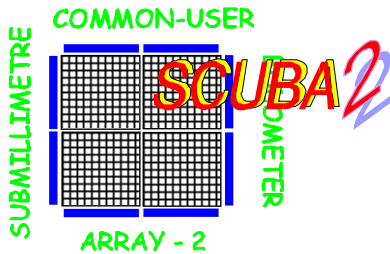


Doc No:	SC2_FTS_PM500_001
Vers:	1.0
Category	Management
Doc Type:	WORD
State:	Released
Author:	B. Gom
Date:	25/06/2003

Change Record

Issue	Date	Section(s) Affected	Description of Change/Change Request Reference/Remarks
0.1	23/06/03	All	Initial document
0.2	25/06/03	Risk assessments	Changed the assigned probability and severity of some items. Added blackbody to the list.
1.0	16/07/03	All	First release document





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Introduction

The Fourier Transform Spectrometer (FTS) for SCUBA-2 is a medium-risk, high-reward project. This project has a limited and fixed budget and an inflexible delivery date, which is not ideal for a project with such a degree of technical development and risk.

After the initial review of the instrument requirements, projects typically start with a high level of risk that is then reduced by the implementation of mitigation steps within the project plan, changing the requirements or developing a better understanding of the engineering/programmatic challenges.

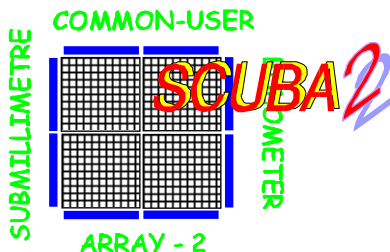
To help manage risk the project management team has adopted the standard UK ATC risk management strategy which:

- a) identifies the key risks in the project
- b) assigns a hazard (severity) level to each risk on a scale of 1 to 5 (5 is very high severity and would be terminal to the project if it occurred - infinite schedule delay).
- c) assigns a probability of occurrence of the risk (0 to 4) (5 is > 50% probability),¹
- d) multiplies the two numbers to come up with the risk level (Impact)
- e) tracks, with regular updates, all risks with a level of 6 or higher (9 is regarded as high risk)
- f) assigns cost and schedule impact to all tracked risks
- g) puts in place risk mitigation steps designed to bring the risk down to the acceptable level, estimates the risk level after the implemented steps and forecasts the date when the risk will reach the acceptable level and is eliminated

Although successful to date, it is entirely possible that some extremely difficult technical problem might yet be uncovered that would put the delivery date too far back or require large amounts of new funds to overcome. The risks applicable to the Fourier Transform Spectrometer will be tracked separately and are described in the following tables.

¹ If probability of occurrence is higher, than 0.5, the risk will be treated as certainty and be part of the development plan

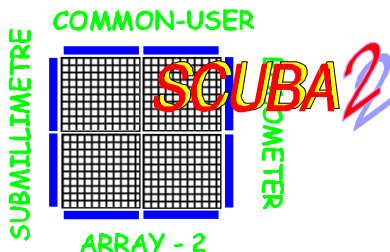




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Risk Number	FTS/1		Status	Live
Date Logged	June 2003		Date Cleared	
On Critical Path	Yes		WBS Ref. No.	x.x
Owner	DN			
Original Risk Factor	Prob: 2	Severity: 4	Impact (P*I) = 8	Cat = High
Mitigated Risk Factor	Prob: 1	Severity: 4	Impact = 4	Cat = Low
Date when risk is forecast to be passed:	September 2005			
<u>Description of risk:</u>				
Manufacture of large (>300mm) beam-splitter hasn't been demonstrated before, may not perform to the original specifications the first time.				
<u>Impact on project cost, schedule or quality if risk realised without mitigation:</u>				
Potential for delays in work-packages due to re-work of beam-splitter.				
Schedule Delay: 3 months				
Cost: \$US 60,000				
<u>Mitigation action:</u>				
1. Use extensive modelling of manufacturing process				
2. Run trial manufacture ahead of schedule				
3. Plan for 2 batches of beam splitters with potential rework.				
Hence the re-assessment is that the Probability and Impact have been reduced by 50%.				
<u>Impact on project cost, schedule or quality if risk realised with mitigation action:</u>				
Schedule Delay: 3.0 months				
Cost: \$US 20,000				

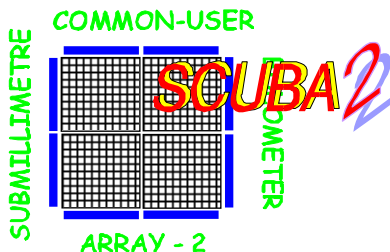




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Risk Number	FTS/2		Status	Live
Date Logged	June 2003		Date Cleared	
On Critical Path	Yes		WBS Ref. No.	x.x
Owner	BG			
Original Risk Factor	Prob: 3	Severity: 2	Impact = 6	Cat = High
Mitigated Risk Factor	Prob: 2	Severity: 2	Impact = 4	Cat = Low
Date when risk is forecast to be passed:	September 2004			
<u>Description of risk:</u>				
Single source for beam splitter won't deliver on time				
<u>Impact on project cost, schedule or quality if risk realised without mitigation:</u>				
The beam splitters can only be sourced by one shop, which has many commitments. Other priorities may delay the delivery of prototypes, seriously impacting FTS development schedules.				
Schedule Delay: 3 months				
Cost: \$US 60,000				
<u>Mitigation action:</u>				
1. Get early commitment for timely delivery				
2. Keep close contact with supplier.				
3. Use different beam splitter (from other source) for prototype development				
Hence the re-assessment is that the probability has been reduced by 33%				
<u>Impact on project cost, schedule or quality if risk realised with mitigation action:</u>				
Schedule Delay: 2.0 months				
Cost: \$US 40,000				

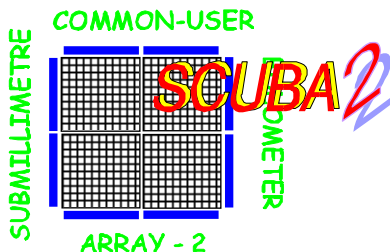




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Risk Number	FTS/3		Status	Live
Date Logged	May 2003		Date Cleared	
On Critical Path	Yes		WBS Ref. No.	x.x
Owner	DN			
Original Risk Factor	Prob: 3	Severity: 3	Impact = 9	Cat = High
Mitigated Risk Factor	Prob: 1	Severity: 1	Impact = 1	Cat = low
Date when risk is forecast to be passed:	April 2004 (First system completely debugged)			
<u>Description of risk:</u>				
High mass of moving mirrors in the FTS may lead to N1 mirror’s misalignment during operation				
<u>Impact on project cost, schedule or quality if risk realised without mitigation:</u>				
Without proper design observing modes can be limited, leading to unrealised potential for SCUBA2				
Schedule Delay: none				
Cost: none				
<u>Mitigation actions:</u>				
1. Reduce mass of moving mirrors as much as feasible				
2. Limit observation modes, constrain FTS mirror acceleration				
Hence the re-assessment is that the impact has been reduced to a minimal level				
<u>Impact on project cost, schedule or quality if risk realised with mitigation action:</u>				
Schedule Delay: 2.0 month				
Cost: \$US 30,000				

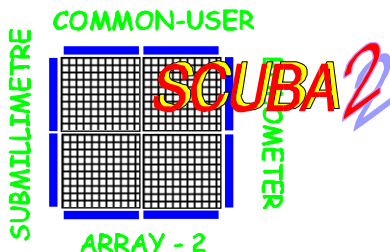




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Risk Number	FTS/4		Status	Live
Date Logged	June 2003		Date Cleared	
On Critical Path	Yes		WBS Ref. No.	x.x
Owner	DN			
Original Risk Factor	Prob: 3	Severity: 3	Impact = 9	Cat = High
Mitigated Risk Factor	Prob: 3	Severity: 1	Impact = 3	Cat = low
Date when risk is forecast to be passed:	May 2005			
<u>Description of risk:</u>				
Dynamic load blackbody cannot be realised, thus signal swings during FTS scans cannot be nulled.				
<u>Impact on project cost, schedule or quality if risk realised without mitigation:</u>				
Without signal nulling the scan speed is limited due to the flux jumping in the SQUID feedback loops.				
Schedule Delay: none				
Cost: none				
<u>Mitigation actions:</u>				
1. Limit observation modes, constrain FTS mirror velocities				
Hence the re-assessment is that the probability remains significant, but the severity has been reduced to a minimal level				
<u>Impact on project cost, schedule or quality if risk realised with mitigation action:</u>				
Schedule Delay: 2.0 month				
Cost: \$US 30,000				





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Risk Number	FTS/5		Status	Live
Date Logged	June 2003		Date Cleared	
On Critical Path	Yes		WBS Ref. No.	n/a
Owners	DN			
Original Risk Factor	Prob: 2	Severity: 5	Impact = 10	Cat = High
Mitigated Risk Factor	Prob: 1	Severity: 4	Impact = 4	Cat = Medium
Date when risk is forecast to be passed:	December 2005			
<u>Description of risk:</u>				
Critical staff leaves the project				
<u>Impact on project cost, schedule or quality if risk realised without mitigation:</u>				
Design complexity requires extensive and long learning curve for new staff to get up to speed. Worst case scenario would be if critical staff left at the start of module test and system integration				
Schedule Delay: 5 months Cost: \$US 100,000				
<u>Mitigation action:</u>				
1. Create stable and rewarding work environment. 2. Minimise work overload and eliminate burn-out. 3. Demand detailed and clear design documentation at every stage of the design 4. Store all design information in clearly structured and easy to use secure database 5. Duplicate responsibilities				
<u>Impact on project cost, schedule or quality if risk realised with mitigation action:</u>				
Schedule Delay: 2 month Cost: \$US 40,000				

