MODIS
SCIENCE DATA SUPPORT TEAM
PRESENTATION

February 12, 1993

AGENDA

ACTION ITEMS:

06/12/92 [LLOYD CARPENTER]. Due Date: 02/12/93. Implement Microsoft Project for managing and scheduling MODIS SDST activities, including Level-1A and -1B schedules, Level-2 shell schedule, sizing of computer resource requirements, and overview. (An updated version of the schedule from Microsoft Project is included in the handout.) STATUS: Open.

12/22/92 [LLOYD CARPENTER]. Due Date: 03/01/93. Survey the MODIS science team members to determine computer storage and processing requirements for Level-2 processing. STATUS Open.

1/22/93 [CARL SOLOMON]. Due Date: 2/12/93. Develop configuration management concepts suitable for application for MODIS Level-1 (etc.) software development; prepare alternatives and "cost/benefit" analyses. STATUS: Open.

1/22/93 [JIM STOREY]. Due Date: 2/22/93. Meet with EDOS, AM platform, and other groups; develop "cost/benefit" analyses; and provide recommendations for treatment of platform ancillary data (e.g., position, attitude). For example, do we incorporate position/attitude data into the Level-1A product or assign a pointer to it? Do we recommend that platform ancillary data be included in the MODIS instrument Level-0 data stream? STATUS Open.

1/22/93 [LLOYD CARPENTER/TOM GOFF]. Develop SDST-final draft of Level-1 requirements/assumptions. Due Date: (Initial draft due 2/15/93; iterate until 2/26/93; mail draft to MODIS, EOSDIS, and other parties for review by 3/1/93). STATUS: Open.

1/22/93 [PAUL HUBANKS/CARROLL HOOD]. Due Date: 2/19/93. Develop concepts for improving completeness of MAS metadata (anticipate the questions scientists might ask prior to ordering the data; e.g., identify clouds, snow/ice, etc.). STATUS: Open.

MODIS Airborne Simulator (MAS) Status

Paul A. Hubanks
Progress through 11 February 1993

There are four major steps to MAS Metadata enhancement:

- Determine additional categorization parameters that would be useful to scientists using MAS data. These parameters could, potentially, be determined to the nearest 25% (i.e.; not, partly, half, mostly, or completely covered).
- Determine whether this categorization process needs to be automated through the use of algorithms or subjectively determined though a set of written procedures. (I have reservations about using algorithms to make categorical determination, not only would development and testing of algorithms be time intensive, it seems very close to doing "science".)
- Develop and test written procedures or algorithms
- Determine the optimum format and location to store this supplementary data.

Currently there are three supplementary products for the MAS, for each flight (a single data day, multiple straight-line flight tracks):

- A file containing straight-line flight track summary information. Each line contains information for each straight-line track and includes: "start and end" times, latitude/longitudes, and solar azimuth/zenith angles. Also included are the start scan "counter number", and total number of scan lines for each straight-line track.
- A latitude/longitude based complete flight-track and coastline image (GIF format).
- A sub-sampled (every 4th line/pixel), gray-scale stretched, visible and infrared window channel "quicklook" image (GIF format) for each straight-line track.

I have heard from Michael King and Yoram Kaufman about specific items they would like to see added to the MAS Metadata. A consensus list of additional parameters that would be useful for selection of particular straight-line flight tracks for study are :

A. Atmospheric Condition:
    1. Thick Clouds (opaque, low to mid-level)
    2. Cirrus Clouds
    3. Clear
B. Surface Type:
    1. Land
        a. Snow
        b. "Open" Land
    2. Ocean
        a. Sea Ice
        b. "Open" Ocean

There are several other parameters that could also be included in a Metadata enhancement that would be (typically) constant for a particular experiment. These are:

- spectral band availability
- noise estimates for selected (or all) channels

I spoke with Lola Olesen of the EOS Distributed Active Archive Center (EOS DAAC) about the possible inclusion of the MAS Metadata in the NSSDC Master Directory. Lola informed me that the Master Directory does not have the ability to hold information at the level of detail that we desire of the MAS Metadata. However, she thought the NASA Climate Data System (NCDS) might. (The NCDS exists under the "umbrella" of the DAAC). I spoke with Frank Corprew (user support of the EOS DAAC) he said that the NCDS has fixed categories and additional categories could not be added. (For example, Frank did not think there was a category for snow). He gave me access to a guest account to more fully explore currently available categories.

Another simpler option would be to create a summary flight-track categorization table on the LTP system which could be stored along with the processed data and also sent by electronic mail to members of the MAS Science Team. It would be fairly straightforward to create a preliminary categorization table and begin categorizing the "fully-processed" FIRE data from stored visible and infrared quicklook images. This table could then be electronically mailed to selected MAS Science Team members for comments and suggestions.

The 14 fully-processed data tapes from the FIRE experiment were left with Lola Olesen for duplication and future distribution. Lola will also make copies of the MAS Data Users Guide for distribution to MAS data users. The MAS Data Users Guide is also being distributed to a number of scientists and support people.

MODIS Level-2 Processing Shell Design and Development

J. J. Pan
MODIS Science Data Support Team
(301) 982-3700

Date: February 4 - February 11, 1993

2. Algorithm Dependency Diagram and Data Products

After several trials to connect with Team Members for corrections of their data products, we have received responses from most of them. However, I am still waiting for the responses from Drs. Esaias, Justice, King, and Muller. In particular, the required input for the Photosynthetical Active Radiation (PAR) product in the Ocean group is not clear at this moment. This information is very critical to the data flow in the algorithm dependency diagram. Currently I am preparing a new diagram (Ver. 6.0) in which the product numbers will be replaced by the product names.

1. Computer Storage and Processing Requirements for Level-2 Processing

Lloyd, Ruiming, and I have discussed how to get required information to estimate the data storage and processing requirements. One possible way is to ask the Team Members to provide the programmers' names, so we can contact these programmers and acquire the prototype of their codes as early as possible. It will also be useful for us to get familiar with the their coding style.

After a preliminary study of C source codes received from Dr. Strahler group, we are trying to design a survey table that could be used to evaluate the storage and processing requirements for each algorithm. Attached is a draft of this survey table and we will continue to work on this task in the next few weeks.

MODIS LEVEL-2 ALGORITHM VARIABLE AND STORAGE SURVEY

INVESTIGATOR: KING, MENZEL
ALGORITHM: CLOUD JOINT PROBABILITY DENSITY FUNCTION
ID: 514
OPERATION SYSTEM:
LANGUAGE: FORTRAN
VERSION: V 1.0

I/O	VARIABLE NAME	DIMENSION	DATA TYPE	CONSTANT	CURRENT VALUE	MIN VALUE	MAX VALUE
INPUT	CAR	1*1	LOG*1	NO			
INPUT	MAS	1*1	LOG*1	NO			
INPUT	MCR	1*1	LOG*1	NO			
INPUT	AGW(NWL)	1*3	REAL*4	NO			
INPUT	ATMCOR(NWL)	1*3	REAL*4	NO			
INPUT	FLUX(NWL)	1*3	REAL*4	NO			
INPUT	RFIX	1*1	REAL*4	NO			
INPUT	KPX	1*1	INT*2	YES	179		
INPUT	KPY	1*1	INT*2	YES	50		
INPUT	LIMBL	1*1	INT*2	NO			
INPUT	LIMSN	1*1	INT*2	NO			
INPUT	LUR	1*1	INT*2	NO			
INPUT	LUWB	1*1	INT*2	NO			
INPUT	LUWT	1*1	INT*2	NO			
INPUT	MDA	1*1	INT*2	NO			
INPUT	MDX	1*1	INT*2	NO			
INPUT	MDY	1*1	INT*2	NO			
INPUT	MST	1*1	INT*2	NO			
INPUT	MCHL(NWL)	1*3	INT*2	NO			
INPUT	NWL	1*1	INT*2	YES	3		
OUTPUT	IDT(KPX*KVA)	179*7	INT*2	NO			

MODIS LEVEL-2 ALGORITHM VARIABLE AND STORAGE SURVEY

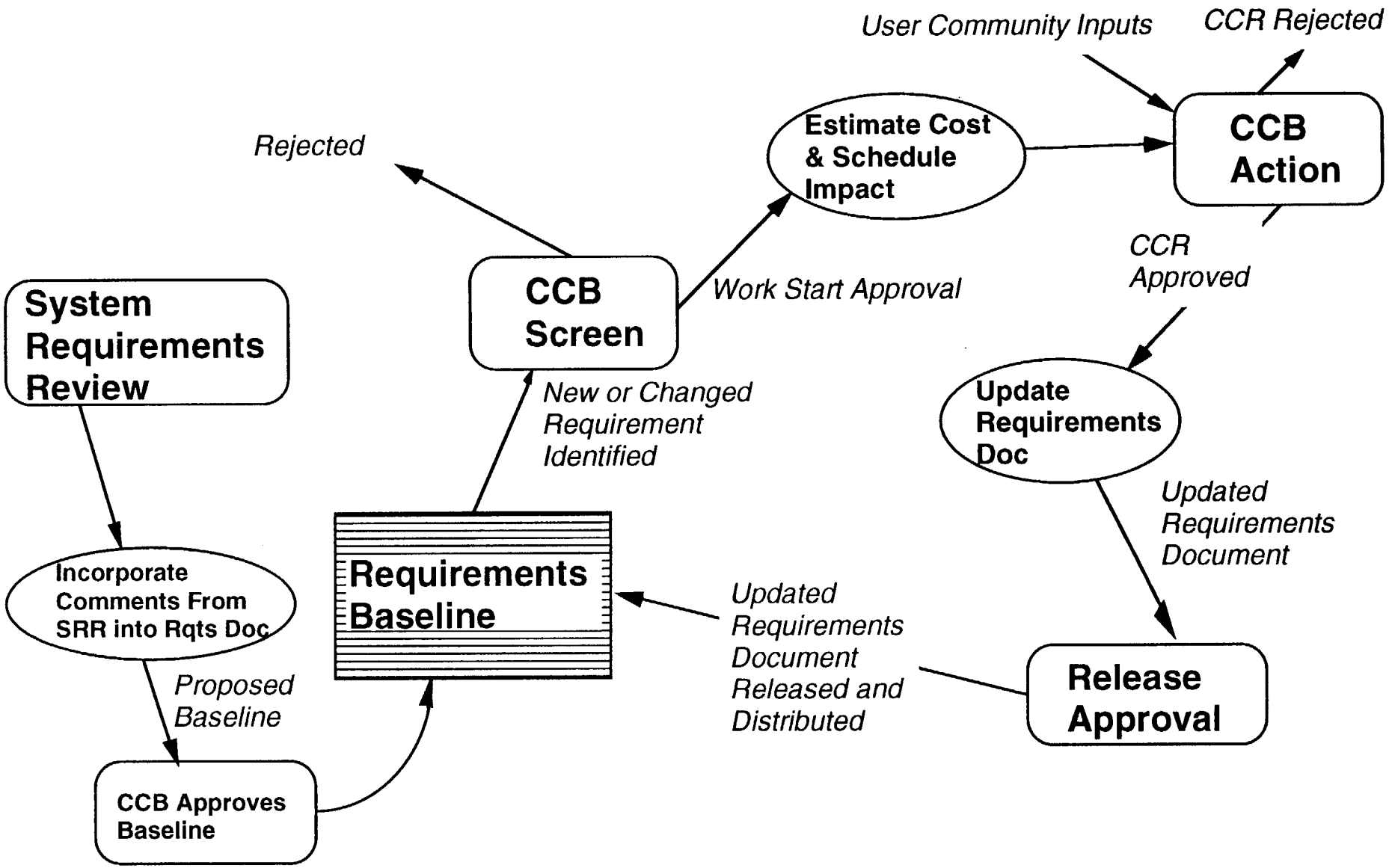
INVESTIGATOR: KING, MENZEL
ALGORITHM: CLOUD JOINT PROBABILITY DENSITY FUNCTION
ID: 514
OPERATION SYSTEM:
LANGUAGE: FORTRAN
VERSION: V 1.0

I/O	VARIABLE NAME	DIMENSION	DATA TYPE	CONSTANT	CURRENT VALUE	MIN VALUE	MAX VALUE
OUTPUT	ID(20)	1*20	INT*2	NO			
OUTPUT	KVA	1*1	INT*2	YES	7		
OUTPUT	PHI(KPX,KPY)	179*50	REAL*4	NO			
OUTPUT	THETAO(KPY)	1*50	REAL*4	NO			
INTERNAL	DAT(KPX,KPY, NWL)	179*50*3	REAL*4	NO			
INTERNAL	ERR	1*10	CHAR*1	NO			
INTERNAL	IND	1*1	INT*2	NO			
INTERNAL	IPRNT	1*1	INT*2	NO			
INTERNAL	ISTAT	1*1	INT*2	NO			
INTERNAL	NPXL(KPY)	1*50	INT*2	NO			
INTERNAL	NSCN	1*1	INT*2	NO			

Requirements Change Control Process

HUGHES

HUGHES STX CORPORATION



Requirements Traceability

HUGHES

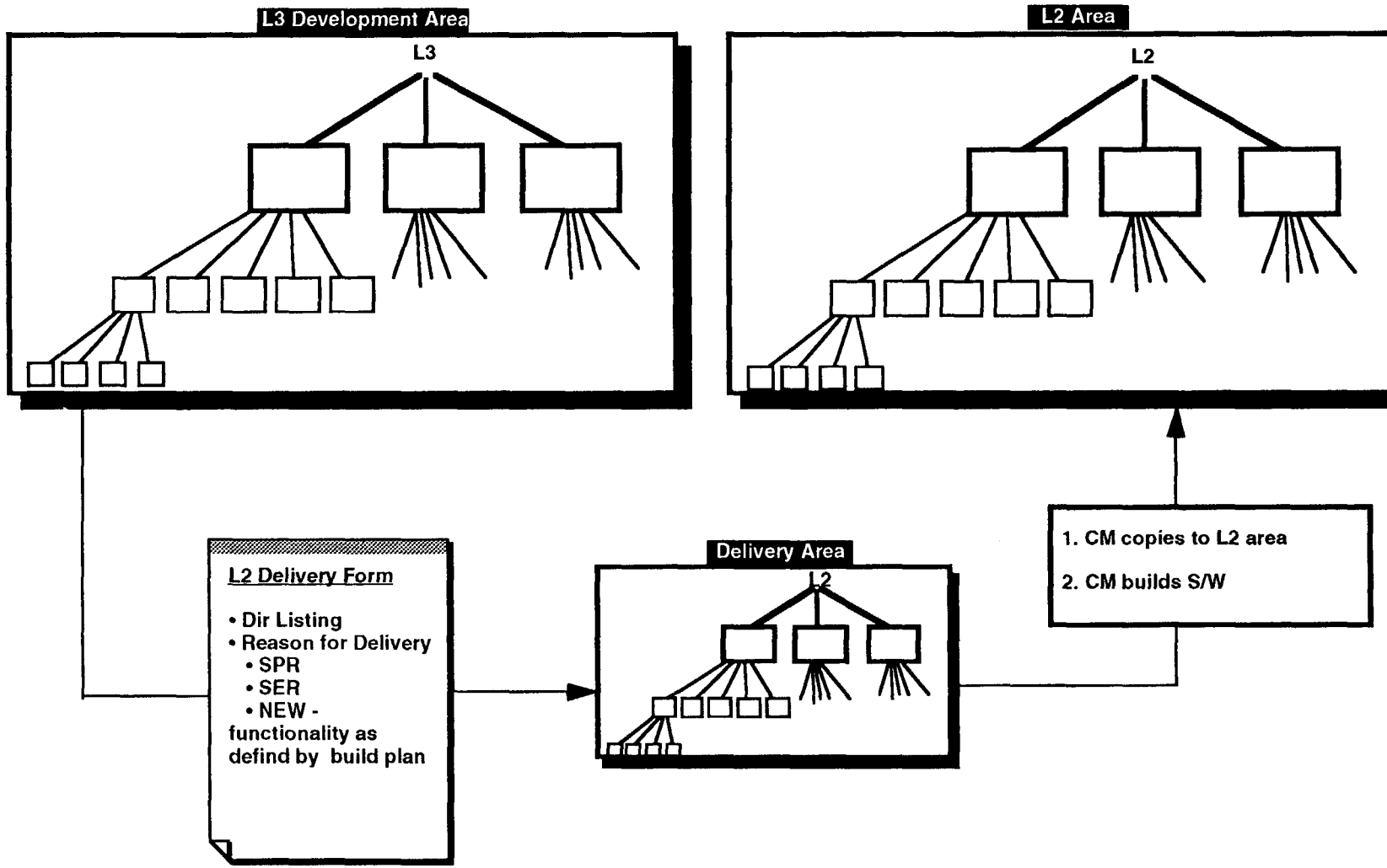
HUGHES STX CORPORATION

- **Develop list of requirements**
- **Use RQT to load requirements list into CADRE Teamwork**
- **Use RQT to trace requirements to targets**
- **Use RQT to provide reports**

MODIS SDST Software CM

HUGHES STX CORPORATION

L1	Operational	(used as stable baseline for I&T or Mission Operations)	CM controlled - Major Builds
L2	Testing	(used for Build Level testing & freezing Incremental Builds)	CM controlled - Minor Builds
L3	Development	(used for Developer Integration, latest & greatest, first level of CM)	Developer controlled



Next Steps

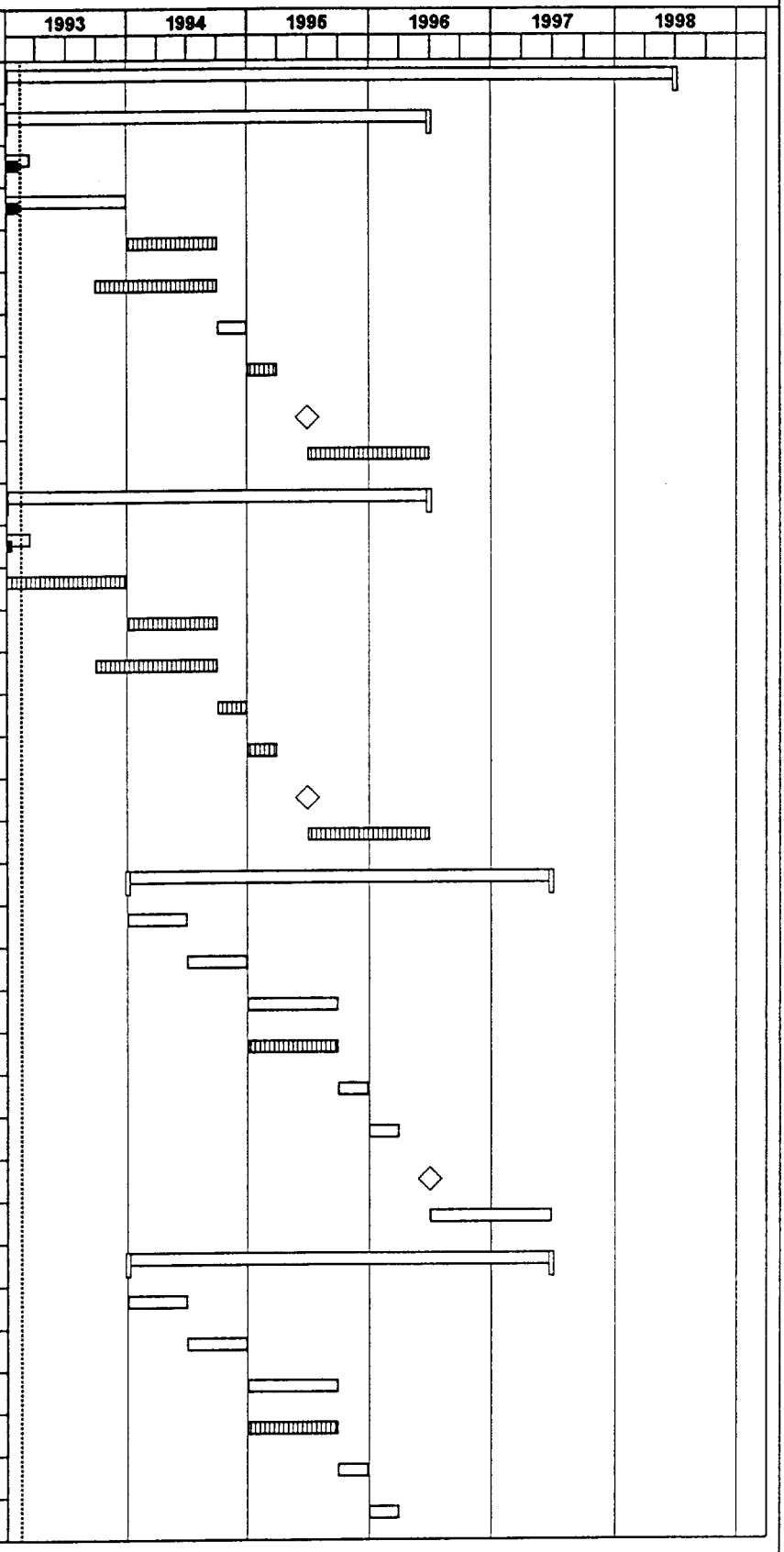
HUGHES

HUGHES STX CORPORATION

- **Address Budget Issues** (Rqt + Training)
- **Convert assumptions list to requirements list**
- **Acquire Beta of latest RqT**
- **Start loading requirements**

MODIS SDST OVERVIEW

ID	Name	Duration
1	MODIS Level-1	1422d
2	Level-1A, Beta Version	901d
3	Develop Requirements	49d
4	Develop Design	251d
5	Develop Code	195d
6	Develop Test	260d
7	Perform Internal Tests	65d
8	Test with Beta Toolkit	65d
9	Deliver to ECS	0d
10	Test on PGS	260d
11	Level-1B, Beta Version	901d
12	Develop Requirements	49d
13	Develop Design	251d
14	Develop Code	195d
15	Develop Test	260d
16	Perform Internal Tests	65d
17	Test with Beta Toolkit	65d
18	Deliver to ECS	0d
19	Test on PGS	260d
20	Level-1A, Version 1	910d
21	Update Requirements	129d
22	Update Design	131d
23	Develop Code	195d
24	Develop Test	195d
25	Perform Internal Tests	65d
26	Test with V1 Toolkit	65d
27	Deliver to ECS	0d
28	Test on PGS	260d
29	Level-1B, Version 1	910d
30	Update Requirements	129d
31	Update Design	131d
32	Develop Code	195d
33	Develop Test	195d
34	Perform Internal Tests	65d
35	Test with V1 Toolkit	65d

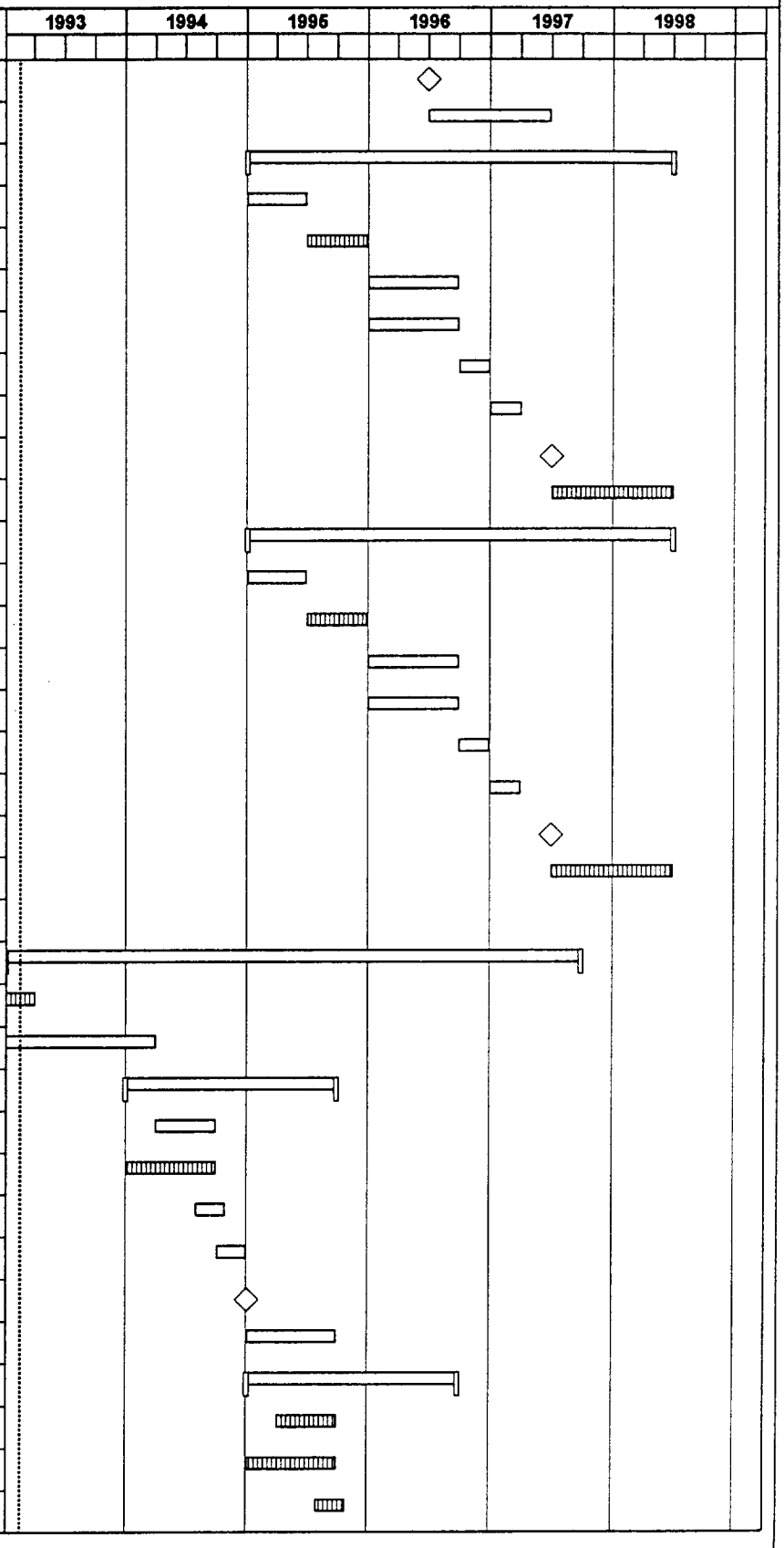


Project: Overview
File: OVERVIEW.MPP
Printed: 2/11/93, 2:58 pm

Critical — Progress — Summary
Noncritical — Milestone — Rolled Up

MODIS SDST OVERVIEW

ID	Name	Duration
36	Deliver to ECS	0d
37	Test on PGS	260d
38	Level-1A, Version 2	911d
39	Update Requirements	130d
40	Update Design	130d
41	Develop Code	195d
42	Develop Test	196d
43	Perform Internal Tests	65d
44	Test with V2 Toolkit	65d
45	Deliver to ECS	0d
46	Test on PGS	260d
47	Level-1B, Version 2	911d
48	Update Requirements	130d
49	Update Design	130d
50	Develop Code	196d
51	Develop Test	196d
52	Perform Internal Tests	65d
53	Test with V2 Toolkit	65d
54	Deliver to ECS	0d
55	Test on PGS	260d
56		
57	Higher Level Processing Shell	1227d
58	Develop Requirements	62d
59	Develop Design	315d
60	Beta Version	456d
61	Develop Code	131d
62	Develop Test	196d
63	Perform Internal Tests	65d
64	Test with Beta Toolkit	65d
65	Deliver to ECS	0d
66	Test on PGS	195d
67	Version 1	455d
68	Develop Code	130d
69	Develop Test	195d
70	Perform Internal Tests	64d

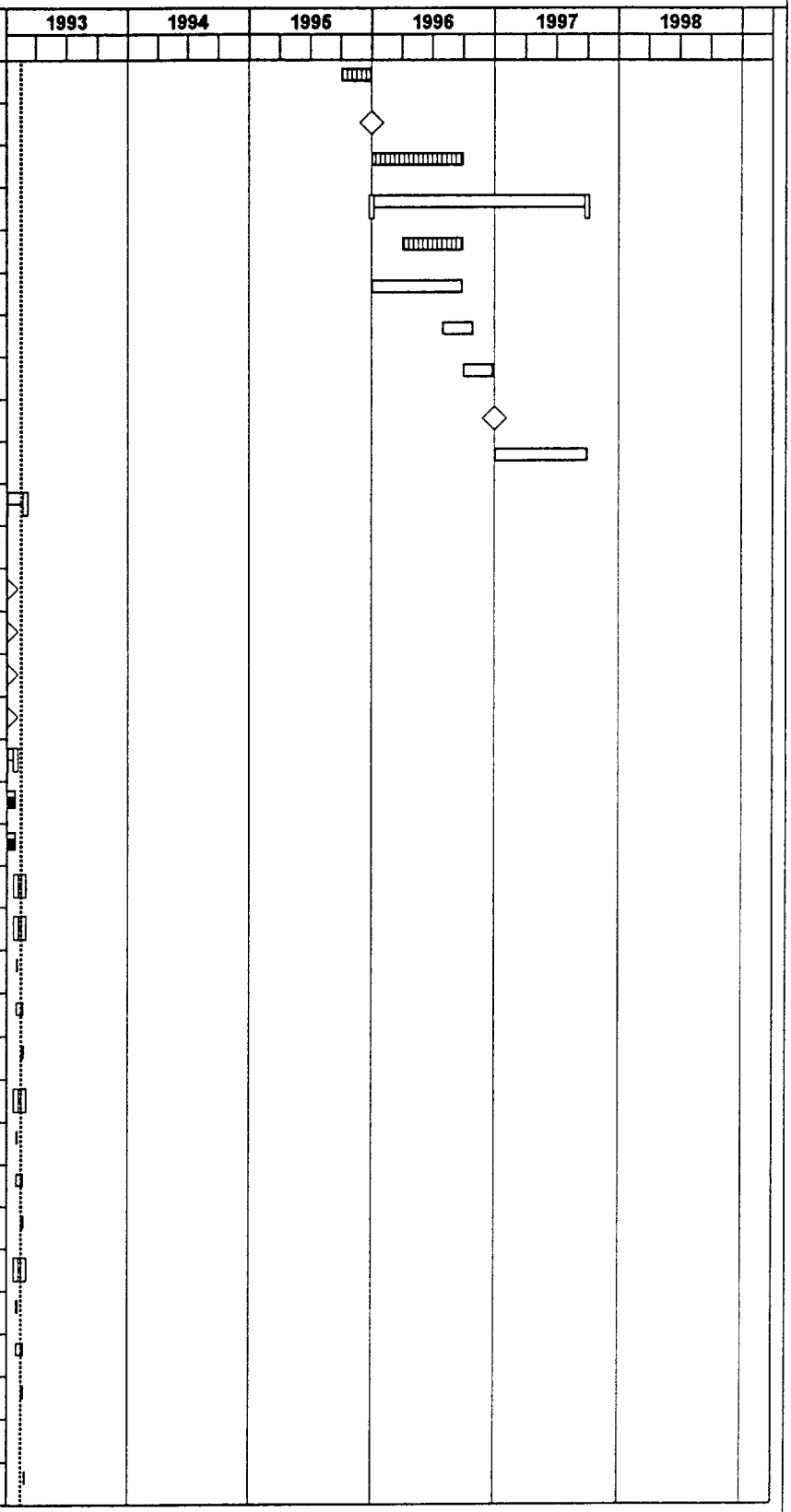


Project: Overview
File: OVERVIEW.MPP
Printed: 2/11/93, 2:58 pm

Critical
Noncritical
Progress
Milestone
Summary
Rolled Up

MODIS SDST OVERVIEW

ID	Name	Duration
71	Test with Beta Toolkit	64d
72	Deliver to ECS	0d
73	Test on PGS	194d
74	Version 2	456d
75	Develop Code	129d
76	Develop Test	195d
77	Perform Internal Tests	64d
78	Test with Beta Toolkit	64d
79	Deliver to ECS	0d
80	Test on PGS	194d
81	Computer Resource Requirements	39d
82	Level-1A Computer Resources	0d
83	Quantify MODIS data packets	0d
84	Quantify ancillary data	0d
85	Describe Level-1A Data Structur	0d
86	Compute Resource Requirement	0d
87	Level-1B Computer Resources	19d
88	Describe Level-1B Data Structur	19d
89	Compute Resource Requirement	19d
90	Higher-Level Computer Resources	17d
91	Land Products	17d
92	Prepare Questions for TMs	8.33d
93	Gather Info. from TMs	15d
94	Compute Resource Req.	7d
95	Ocean Products	17d
96	Prepare Questions for TMs	5d
97	Gather Info. from TMs	15d
98	Compute Resource Req.	7d
99	Atmosphere Products	17d
100	Prepare Questions for TMs	5d
101	Gather Info. from TMs	15d
102	Compute Resource Req.	7d
103	Combine Requirements	1d
104	Prepare Report	2d

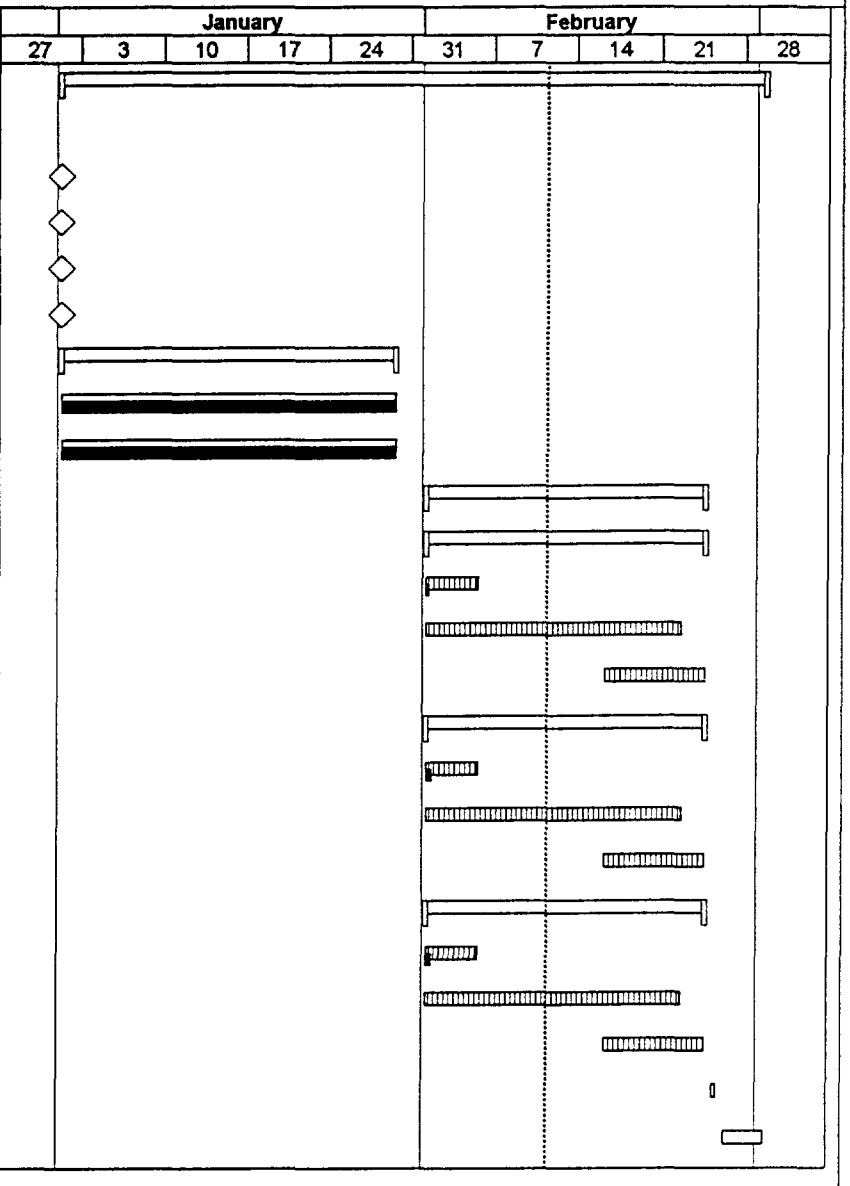


Project: Overview
File: OVERVIEW.MPP
Printed: 2/11/93, 2:58 pm

Critical — Progress — Summary
Noncritical — Milestone ◇ — Rolled Up ⇧

MODIS SDST OVERVIEW

ID	Name	Duration
81	Computer Resource Requirements	39d
82	Level-1A Computer Resources	0d
83	Quantify MODIS data packets	0d
84	Quantify ancillary data	0d
85	Describe Level-1A Data Structur	0d
86	Compute Resource Requirement	0d
87	Level-1B Computer Resources	19d
88	Describe Level-1B Data Structur	19d
89	Compute Resource Requirement	19d
90	Higher-Level Computer Resources	17d
91	Land Products	17d
92	Prepare Questions for TMs	8.33d
93	Gather Info. from TMs	15d
94	Compute Resource Req.	7d
95	Ocean Products	17d
96	Prepare Questions for TMs	5d
97	Gather Info. from TMs	15d
98	Compute Resource Req.	7d
99	Atmosphere Products	17d
100	Prepare Questions for TMs	5d
101	Gather Info. from TMs	15d
102	Compute Resource Req.	7d
103	Combine Requirements	1d
104	Prepare Report	2d



Project: Overview
File: OVERVIEW.MPP
Printed: 2/11/93, 2:52 pm

Critical
Noncritical
Progress
Milestone
Summary
Rolled Up

The ASTER Team Member Algorithm Software Development Guidelines (Version 1.0, Charles Voge and Steve Larson, dated October 29, 1992) and the ASTER Production Software Development Plans and Schedules (Charles Voge, February, 1993) contain some information and structure which will be considered for the next version of the MODIS Software and Data Management Plan. For example:

Spell out specifically the roles and responsibilities of the science team leader, team members, SDST, MCST, etc.

Consider having an algorithm test team.

Discuss the algorithm acceptance process, the deliverables, and the software life cycle in more detail.

Identify and describe the various reviews.

Provide sample outlines of the required documentation.

Define the key terminology used.

Include a list of acronyms.