

MICE The French JWST/MIRI Centre of Expertise Development Plan 2015 - 2019

Reference :	MIRI-CE-00022-CEA
Issue :	0.4
Date :	24/04/2015

<i>Prepared by:</i>	Patrice Bouchet	<i>Date:</i>	29/11/09
<i>Approved by:</i>	Pierre-Olivier Lagage MIRI co-PI	<i>Date:</i>	
<i>Authorised by:</i>	Pierre-Olivier Lagage MIRI co-PI	<i>Date:</i>	

Document Changes Record

Issue	Date	Chapter/page	Change
0.1	16/10/2009		
0.2	29/11/2009	6/10	Add Science Verification
0.3	02/12/2009	Whole Document	Revisited
0.4	24/04/2015	Whole Document	Updated

DRAFT



JWST MIRI IMAGER

Doc. : MICE Development Plan
Ref. : MIRI-CE-00022-CEA
Iss. : 0.4
Date : 24/04/2015

Page : 3/12

Table of Contents

REFERENCE :	1
ISSUE :	1
DATE :	1
1 INTRODUCTION	4
1.1 Scope.....	4
1.2 Acronyms	4
1.3 Documents.....	4
2 REQUIREMENTS AND ACTIONS	6
3 ROADMAP	7
3.1 Tests & Calibration: Definition – Simulations (4Q2015 – 2Q2016)	7
3.2 Pre-launch Engineering & Science Support (3Q2016 – 2Q2018)	8
3.3 Launch, Commissioning and Verification (3Q2018 – 1Q2019)	8
3.4 Routine Operations (2Q2019 – 4Q2019)	9
4 DATA RATE - ARCHIVING - PIPELINE	10
4.1 Data Rate.....	10
4.2 Archiving	10
5 SOFTWARE OVERVIEW	10
5.1 The Pipe Line	10
5.2 High Level Data Analysis Tools.....	11
5.3 Other Considerations	11
6 ROADMAP SUMMARY	12

1 Introduction

1.1 Scope

The document MIRI-CE-00011-CEA presents the scientific requirements that will rule such Centre. The present document is an updated version of MIRI-CE-00002. It defines how MICE intends to meet those requirements during the period 2015 – 2019. It describes the various support tasks that must be fulfilled out by MICE if the community is to obtain maximum scientific benefit from the investment in MIRI.

1.2 Acronyms

Here below the acronyms used in the document

AIM: Astrophysique et Interactions Multi-échelles
CNES: Centre National d'Études Spatiales
CV : Cryo-Vacuum Tests at GSFC
CWG: Coronagraphs Working Group at STScI
DHAS: Data Handling and Analysis Software
EC: European Consortium for MIRI
EU: European Union
ESA: European Space Agency
FM: Flight Model
GSFC: NASA Goddard Space Flight Center
GTO: Guarantee Time Observations
IAP: Institut d'Astrophysique de Paris
IAS: Institut d'Astrophysique Spatiale
IR: Infrared
JWST: James Web Space Telescope
KP : Key programme
LAM: Laboratoire d'Astrophysique de Marseille
LESIA: Laboratoire d'Études Spatiales et d'Instrumentation Associée
MICE: MIRI Centre of Expertise
PI: Principal Investigator
PTCT: Performance Tests & Calibration Team
RAL: Rutherford Appleton Laboratory
RTV: Real Time Viewer
STScI: Space Telescope Science Institute

1.3 Documents

1.3.1 Applicable

MIRI-PL-00024-ATC
MIRI-CE-00011-CEA

Johns A. et al ., 2008, JWST : L2 communications for science data processing ; Observatory Operations: Strategies, Processes, and Systems II. Edited by Brissenden, Roger J.; Silva, David R. Proceedings of the SPIE, Volume 7016, article id. 70161D, 7 pp.

MIRI-DD-00001-CEA-Calimage3-Master-issue1

MIRI-DD-00002-CEA-Calimage2-Master-issue1

MIRI-DD-00003-CEA-Calcoron3-Master-issue1

MIRI-MN-00006-CEA

1.3.2 References

MIRI-PL-00009-ATC

DRAFT

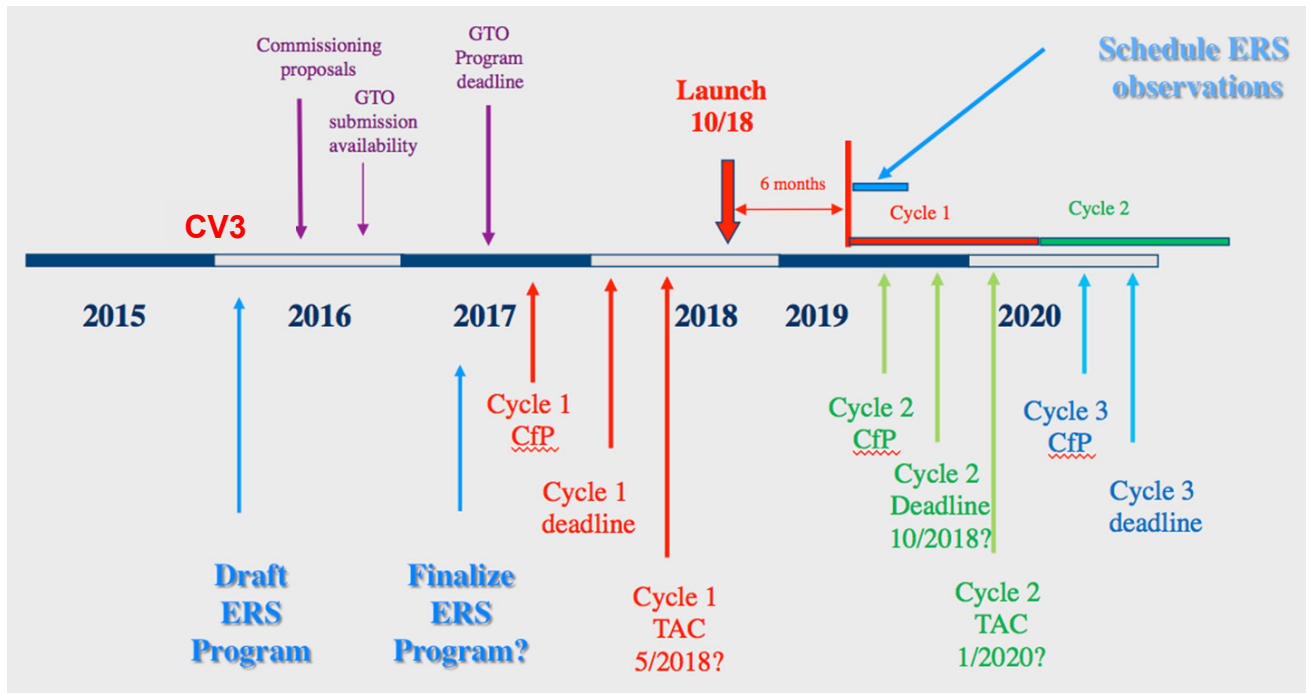
2 Requirements and Actions

MICE will be naturally specialized in the imager and the coronagraphs. The specific expertise for the medium resolution spectrograph will be provided by other groups (ATC, UK Edinburgh and Leiden, NL) within the European consortium. **The technical expertise that is acquired must be exploited by being placed at the service of the preparation and realization of the scientific programmes.**

Requirements	Actions
Acquaintance to the instrument	Tests and analysis tools.
Interactive Analysis	MICE closely integrated in the PTCT
Sharing of expertise	<ul style="list-style-type: none"> Regular meetings and teleconferences Webpage Up-to-date documentation Users documentation Visitors for data handling Training at Saclay
To prepare candidates for STScI	Potential candidates involved in MICE activities.
User Information	Seminars in institutes all over the country and abroad.
User Support	Dedicated helpdesk system
Data processing	<ul style="list-style-type: none"> High level tools for the imager and coronagraphs Definition of the pipe line for the imager. Up-to-date and enhanced version of the general pipe line.
Simulations	Simulations of GTO programs
Access to the data	TBD
Scientific Conferences	Yearly conferences « Science with MIRI »
Users Reception	On-site facilities for users and availability of the data analysis software.
Outreach activities	Conferences for the public at large & articles in popular magazines.

3 Roadmap

Activities closely related to the agenda of the mission:



4 periods must be considered:

4Q2015 – 2Q2016	Cryo-Vacuum (CV3) at GSFC & detector tests at JPL:
3Q2016 – 2Q2018	Pre-Launch Science & Engineering Support
3Q2018 – 1Q2019	Commissioning, calibration, science verification
2Q2019 – 4Q2019	Routine Operations

The activities will evolve with time, from a mostly technical involvement to a purely scientific support to the community, with the setting-up of the operations and the commissioning and verification phases in between.

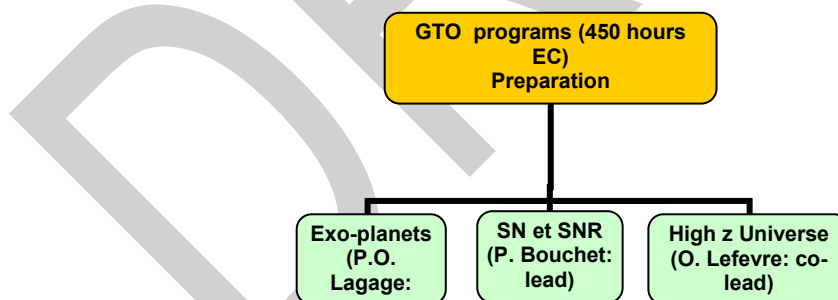
3.1 Tests & Calibration: Definition – Simulations (4Q2015 – 2Q2016)

- Define performance tests and calibrations to be carried out during CV3.
- Set-up, in coordination with the PTC, the database of the instrument calibration.
- Produce calibration files for pipeline from ground calibration.
- Produce high level data analysis tools.

- Write the section for the Imager of the Users & Data Handbooks, and collaborate to the section for the coronagraphs with the CWG at STScI, to be delivered to the PTCT; collaborate with the PTCT in the writing of those documents as a whole.
- Support the definition of the on-orbit commissioning program (in collaboration with the PTCT).
- Ensure communication and outreach

3.2 Pre-launch Engineering & Science Support (3Q2016 – 2Q2018)

- Ground calibration campaign, and assessment of the ISIM & Observatory level testing of MIRI.
- In-orbit calibrations plans.
- In-orbit commissioning program.
- Data reduction (algorithms).
- Exposure time calculators (with STScI).
- Users & Data Handbooks section relative to the imager and the coronagraphs by time of the 1st call for proposals; review of the other sections of those documents.
- Calibration files for initial use in pipeline.
- Instrument operations developments.
- Simulations for the operations.
- Training candidates for STScI.
- Ensuring proper information to the European community.
- Support and advises to the European community: “help-desk” system
- Observations preparation set-up tools.
- Communication and outreach
- **GTO programme: simulations of observations.**



3.3 Launch, Commissioning and Verification (3Q2018 – 1Q2019)

- On-orbit commissioning programme.
- Calibration files for the pipeline.
- Error budgets to provide reliable uncertainties in the data products.
- Improved data reduction algorithms.
- In-place support of the scientists who would like to come to Saclay
- Communication and outreach activities.

3.4 Routine Operations (2Q2019 – 4Q2019)

- Point of contact for and towards STScI for all issues related to the imager and in a lesser extent to the coronagraphs.
- Support the French community for the use of MIRI in all the operation modes, and to support the European community for the use of the imager and of the coronagraphs.
- Up-to-date outreach activities. Seminars about MIRI and JWST in the French astronomical centres and institutions.

DRAFT

4 Data Rate - Archiving – Pipeline

4.1 Data Rate

- JWST will have one 4-hour contact per day for communication and ranging.
- Data will be transmitted to Earth in an uncompressed format.
- 26 Tb of MIRI data will arrive to Earth during the first two years of the mission

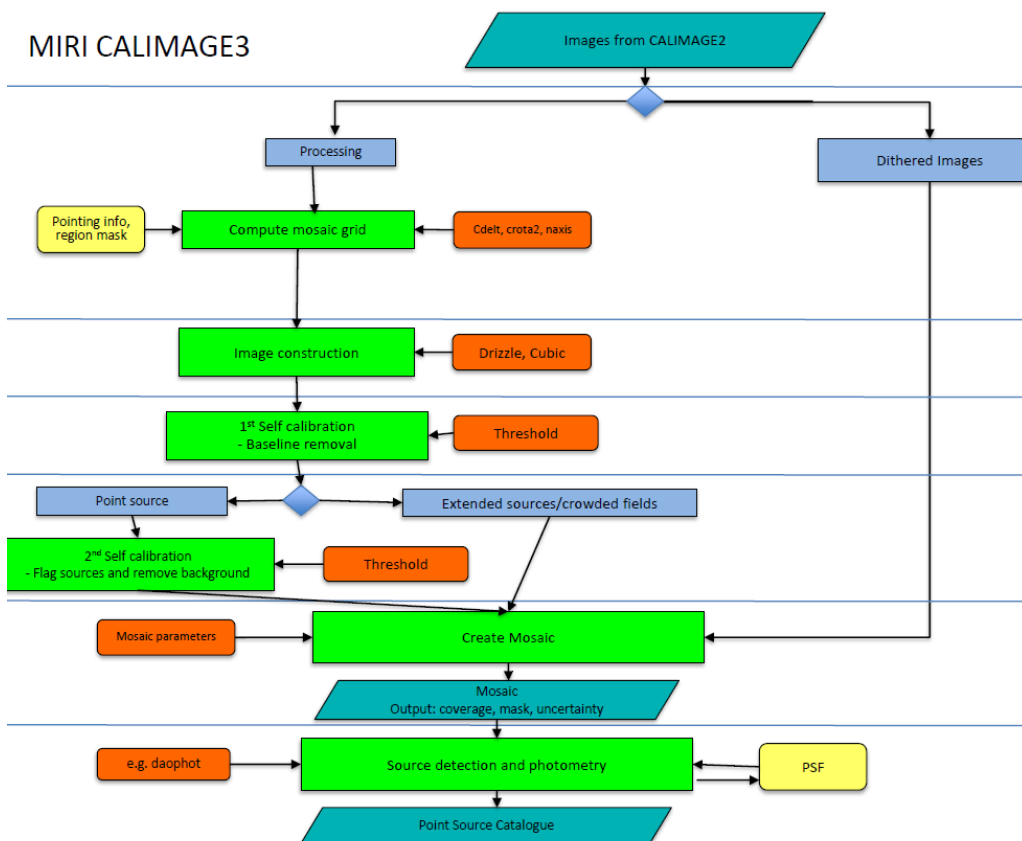
4.2 Archiving

- 100 Tb disk for data archiving.
- Reprocess them as the pipe line developed at STScI evolves: 32 to 54 Gb of RAM
- Linux Based Big multinode server array Software Overview

4.3 The Pipe Line

- Pipe Line architecture to STScI (P. Bouchet leads the Imager Working Group) for Python coding.
- Algorithms

MIRI CALIMAGE3



5.2 High Level Data Analysis Tools

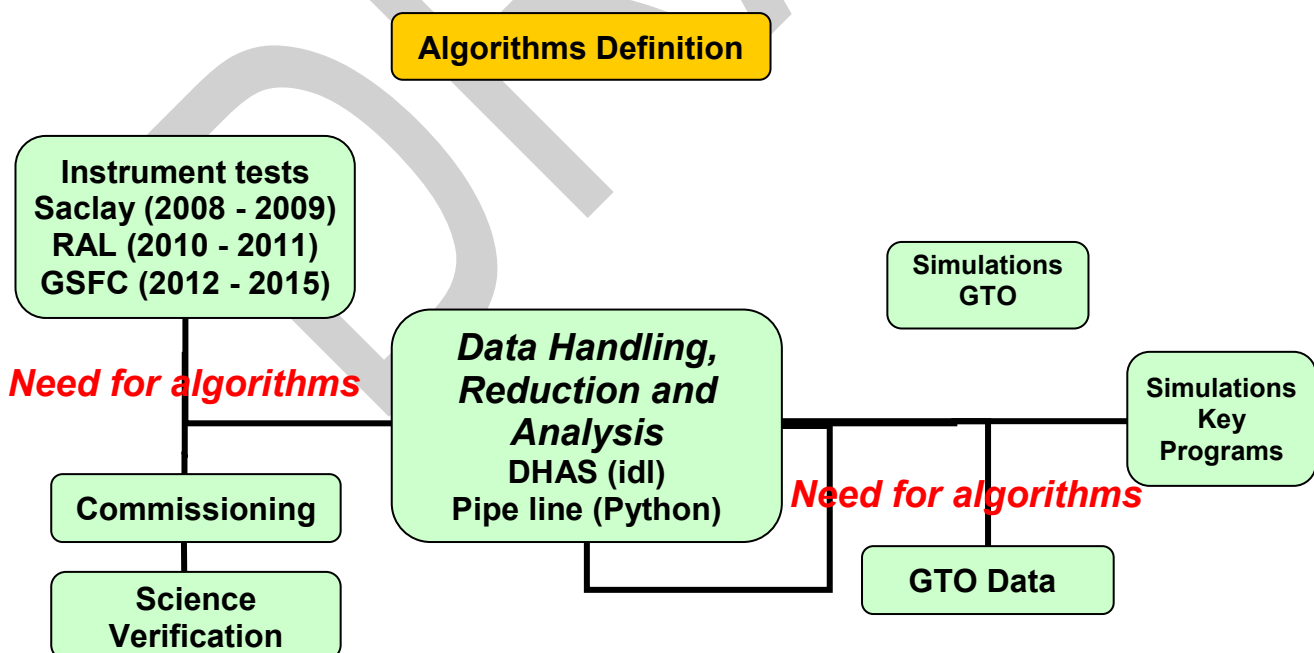
- Need to be built from a combination of the instrument design plus the results of test data analysis.
- Only mature once test data had been fully analyzed.
- Keep track of the developments of the various software pieces
- Understand their functionality and interconnection.

Specific work packages:

- Derivation of parameters for ghosts in the imager data
- Analysis and modeling of the flat field structure in the imager and in the low resolution spectrometer
- Study of the background subtraction
- Astrometry

5.3 Other Considerations

- Parallelization necessary for running Astro-Drizzle.
- Distribution of the data by the STScI to the users not yet well defined: most probably be of the ESO/Archiving kind, although with the sending of a CD containing data and an executable version of the pipe line: to be decided how MICE will proceed in that respect when data will be re-processed.
- VO compatible archiving system (not yet envisaged by STScI).



5 Roadmap Summary

	4Q2015	3Q2016	3Q2018	2Q2019
	CV3	Before Launch	Commissioning	Science Operations
CV3 Tests and Analysis				
Data Base Calibration for Pipeline				
In-Orbit Calibration Plan				
Draft Instrument Users & Data Handbooks				
Commissioning Program Definition				
Simulations : Operations				
Simulations: GTO				
Simulations: KP				
Pipe Line Level 3				
High Level Data Analysis Tools				
Exposure Time Calculator				
Target Acquisition				
Commissioning Program Update - Calibration Files				
Support to Users: Proposals				
Support to Users: Data Reduction				
JWST/MIRI Users Desk				
Scientific Conferences				
Outreach				

Scientific Activities

STScI Driven

Users Support

Documentation

Tests