

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002
		Issue 1
		Date: 21.06.00
		Page: 1 of 29

INSTRUMENTATION DIVISION

HARPS

Statement of Work

Document Number : **3M6-SOW-ESO-33100-0002**

Document Issue: **1.0**

Date of Issue : **21-Jun-00**

Prepared by :	Name J-L. BECKERS G. RUPPRECHT	Date	Signature
Approved by :	Name S. D'ODORICO	Date	Signature
Released by :	Name G. MONNET	Date	Signature

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue: 1 Date: 21.06.00 Page: 2 of 29
------------	--	--

CHANGE RECORD

ISSUE	DATE	SECTION AFFECTED	REASON/INITIATION DOCUMENTS/REMARKS
1	21.06.00	-	First issue

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002
		Issue 1
		Date: 21.06.00
		Page: 3 of 29

TABLE OF CONTENTS

0. SCOPE	5
1. DOCUMENTATION	6
1.1. APPLICABLE DOCUMENTS	6
1.2. REFERENCE DOCUMENTS	6
2. REQUIREMENTS	7
2.1. PROJECT DEFINITION	7
2.1.1. <i>Item Definition</i>	7
2.1.2. <i>Project Phase Definition</i>	7
2.1.2.1. Preliminary Design Phase	7
2.1.2.2. Optics Final Design Phase.....	7
2.1.2.3. Detailed Design Phase.....	8
2.1.2.4. Manufacturing, Assembly, Integration and Test (MAIT) Phase in Europe	8
2.1.2.5. Transport to the La Silla Observatory	8
2.1.2.6. Installation and Commissioning	8
2.1.2.7. Guarantee Period.....	8
2.1.2.8. Instrument Lifetime.....	9
2.1.3. <i>Project Milestones</i>	9
2.1.4. <i>Deliverable Documents List (DDL)</i>	9
2.1.5. <i>Deliverable Component, Hardware and Software List</i>	13
2.1.6. <i>ESO Deliverables</i>	14
2.1.6.1. ESO documents	14
2.1.6.2. ESO Deliverable Component, Hardware and Software List.....	14
2.2. WORK DESCRIPTION	15
2.3. TASKS APPLICABLE TO ALL PROJECT PHASES.....	15
2.3.1. <i>Project Management & Control</i>	15
2.3.1.1. Project Management.....	15
2.3.1.2. Project Plan & Schedule.....	15
2.3.1.3. Project Reporting	16
2.3.1.4. Progress Meetings (PM).....	16
2.3.1.5. Project Reviews (PR).....	16
2.3.2. <i>Configuration Control and Data Management</i>	16
2.3.2.1. Drawing List (CIDL) / As Built Data File (ABDL)	16
2.3.2.2. Interface Control Document (ICD)	16
2.3.2.3. Change procedures	16
2.3.2.4. Document Format.....	17
2.3.3. <i>Product Assurance Plan and Safety Compliance Assessment</i>	17
2.3.4. <i>Travel, Accommodation and Services Provided by ESO at La Silla</i>	17
2.4. TASKS RELATED TO SPECIFIC PROJECT PHASES.....	18
2.4.1. <i>Phase 1: Preliminary Design Phase</i>	18
2.4.2. <i>Phase 2: Final Design Phase</i>	18
2.4.3. <i>Phase 3: Manufacture, Assembly and Test</i>	20
2.4.4. <i>Phase 4: Packing and Transport to the 3.6-m Telescope Facility</i>	20
2.4.5. <i>Phase 5: Installation & Commissioning</i>	20
2.4.6. <i>Phase 6: Guarantee Period</i>	21
3. APPENDIX	22
3.1. DOCUMENT REQUIREMENT DESCRIPTION'S (DRD'S)	22
3.2. DOCUMENT CODE	29
3.2.1. <i>Correspondence</i> :	29
3.2.2. <i>Documents</i>	29

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 4 of 29
------------	--	---

LIST OF ABBREVIATIONS

ABDL	As Built Data List
AD	Applicable Document
AUS	AUSTRALIS Consortium
CIDL	Configured Item Data List
DRD	Document Requirement Description
EM	Electro-mechanical Assembly of the GIRAFFE Spectrograph
ESO	European Southern Observatory
FIR	Final Interface Review
FLAMES	Fibre Large Area Multi-Element Spectrography
FP	Fibre Positioner
FS	GIRAFFE Fibre Systems (include IFU, ARGUS, UVES and MEDUSA Fibres)
GIRAFFE	High and Intermediate Resolution Spectrograph
ICD	Interface Control Document
IFU	Integral Field Unit
MAIT	Manufacturing, Assembly, Integration and Test
FP	Fibre Positioner
PA	Product Assurance
PAC	Provisional Acceptance in Chile
PAE	Preliminary Acceptance in Europe
PDR	Preliminary Design Review
OGLE	Observatoire de Geneve / Institut d'Astrophysique de l'Universite de Lausanne
OP	Observatoire de Paris
QA	Quality Assurance
RD	Reference Document
SOW	Statement of Work
STC	Science Technical Committee
TBC	To Be Confirmed
TBD	To Be Defined
VLT	Very Large Telescope
VLTO	VLT Observatory at Paranal
WBS	Work Breakdown Structure
WP	Work Package

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 5 of 29
------------	--	---

0. Scope

The HARPS Project (High Accuracy Radial Velocity Planetary Search) has been identified as an essential component to ensure a continuing strong European presence in the strategic and competitive field of Extra-Solar Planets search by means of radial-velocity (RV) variations. The HARPS Instrument is slated for the La Silla 3.6-m telescope where a large fraction of the observing time will be reserved for this project over the next 5 years.

The present Statement of Work is applicable to the Conceptual Design, Detailed Design, Manufacturing, Integration, Test and Commissioning of the HARPS Instrument, including the following components :

1. The Spectrograph
 - *Optics*
 - *Mechanics*
2. The Detector Unit
3. The Vacuum Vessel
4. The HARPS Enclosure
5. The Optical Fibre Link and Image Scrambler
6. The Coude Fibre Adapter (CFA)
7. The Instrument Control Hardware
8. The Instrument Software
 - *Instrument Control Software (ICS) / Observation Software (OS)*
 - *Observer Support Software (OSS)*
 - *Data Reduction Software (DRS)*
 - *Data Flow Software (DFS)*

The preparation of this document is based on the HARPS Proposal [RD 1], submitted by a Consortium composed of the *Observatoire de Genève, Observatoire de Haute-Provence, Universität Bern* and *Service d'Aéronomie du CNRS*, and on the recommendations of ESO, summarized in the ESO Review of HARPS Proposal [RD 2].

All requirements of the present SOW shall be applicable to the Consortium, namely :

1. *Observatoire de Genève (OG)*,
2. *Observatoire de Haute-Provence(OHP)*,
3. *The Physics Institute of Universität Bern (UB)*, and,
4. *Service d'Aéronomie du CNRS (CNRS)*,

as well as to Lower-Tier Sub-Contractors. Hardware and Software items from other manufacturers shall be produced according to the relevant technical and quality/safety related requirements.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002
		Issue 1
		Date: 21.06.00
		Page: 6 of 29

1. Documentation

The following documents of the exact issue shown form a part of this SOW to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this SOW, the contents of the SOW shall be considered a superseding requirement.

1.1. Applicable documents

No.	Document title	Reference	Issue	Date
AD 1	HARPS Technical Requirement Specifications	3M6-SPE-HAR-33100-0002	1	21.06.00
AD 2	HARPS Project Plan & Schedule	3M6-PLA-HAR-33100-0001	1	21.06.00
AD 3	Requirements for Safety Analyses	VLT-TRE-ESO-00000-0467	1	27.07.93
AD 4	General Safety Requirements for Scientific Instrumentation	VLT-SPE-ESO-10000-0017	2	16.09.92
AD 5	Configuration Control Plan	VLT-PLA-ESO-00000-0002	1	25.04.91
AD 6	Interface Management Plan	VLT-PLA-ESO-00000-0003	1	11.05.91
AD 7	Documentation Plan	VLT-PLA-ESO-00000-0005	1.A	15.04.91
AD 8	Definition of Preliminary Design Phase PDR Data Package, Preliminary Design Review	VLT-TRE-ESO-00000-0280	1	25.07.92
AD 9	Definition of Detailed Design Phase FDR Data Package, Final Design Review	VLT-TRE-ESO-00000-0397	1	18.02.93
AD 10	VLT Software Management Plan	VLT-PLA-ESO-00000-0006	2	21.05.92
AD 11	VLT Software Configuration Control Plan	VLT-PLA-ESO-00000-0004	1	20.12.91

1.2. Reference documents

RD 1	HARPS Scientific / Technical Proposal	HARPS-Sys-Prop-ObsGe-0101/0102	1	29.01.99
RD 2	ESO Review of the HARPS Proposal	ESO/STC-257	1	14.04.99
RD 3	Quality Management and Quality System Elements – Guidelines	DIN ISO 9004	1	1.5.90

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 7 of 29
------------	--	---

2. Requirements

2.1. Project Definition

2.1.1. Item Definition

The items covered by the present Statement of Work are :

- The HARPS Instrument including :
 - *Spectrograph optics*
 - *Spectrograph mechanics*
 - *The Optical Detector System*
 - *The Vacuum Vessel*
 - *The HARPS Enclosure*
 - *The Optical Fibre Link and Image Scrambler*
 - *The Coude Fibre Adapter (CFA)*
 - *The Instrument Control Hardware*
- The Instrument Control & Operation Software including :
 - *Instrument Control Software (ICS) / Observation Software (OS)*
 - *Observation Support Software (OSS)*
 - *Data Reduction Software (DRS)*
 - *Data Flow Software (DFS)*
- All necessary test, maintenance and handling equipment
- All necessary transportation containers / boxes
- The supporting Documentation
 - *The development, manufacturing, integration and test documentation*
 - *The installation and commissioning documentation*
 - *All operations, maintenance and safety documentation*
- The spare parts

2.1.2. Project Phase Definition

The following definitions are applicable for each phase of the HARPS Project.

2.1.2.1. Preliminary Design Phase

This phase starts with the Kick-Off meeting involving all the Consortium members. Its purpose is to identify and to study all the technical solutions which can meet the specified requirements. It involves in-depth design trade-offs based on a sound review of the requirements and on analysis. It ends up with the Preliminary Design Review (PDR) where consolidated design(s) trade-off(s) of the instrument and all of its sub-systems is(are) presented.

2.1.2.2. Optics Final Design Phase

Because the procurement of some optical components is on the critical path of the project, this phase is aimed at performing and freezing the detailed design of the optical system early in the project for tendering. This phase starts after the project Kick-off and ends up with Optical Final Design Review (OFDR) which takes place before the Preliminary Design Review (PDR).

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 8 of 29
------------	--	---

2.1.2.3. Detailed Design Phase

The main objective of this phase is two-fold : 1) finalize the demonstration of the compliance of the design with the specified requirements through relevant simulations, analysis and/or prototype tests, 2) produce the detailed design of the instrument, down to the components level. As a result of this intense engineering activity, the manufacturing drawings and MAIT Plans shall be available at the end of the phase, which ends up at the Final Design Review (FDR).

2.1.2.4. Manufacturing, Assembly, Integration and Test (MAIT) Phase in Europe

During this phase, the Consortium shall procure commercial components, manufacture the parts of all instrument components and sub-systems, assemble, integrate and test them, respectively at sub-system and instrument levels. All required tests shall be performed, i.e. in accordance with the Verification Matrix. The Consortium shall assess the results in relation with the Technical Specifications, identify the non-conformities, evaluate the impact on the project, and, eventually, prepare and execute an optimisation plan to meet the specifications.

Finally, the final acceptance tests will be performed at Consortium's premises in presence of ESO during the Preliminary Acceptance in Europe (PAE). Based on the successful outcomes of these tests, ESO will grant "Preliminary Acceptance in Europe" of the Instrument.

2.1.2.5. Transport to the La Silla Observatory

After PAE, the Consortium shall pack the Instrument for transportation to the La Silla Observatory. ESO will organize and pay the transportation, and will handle formalities, including insurances.

2.1.2.6. Installation and Commissioning

ESO will provide the infrastructure and support at La Silla needed for the re-integration and commissioning of HARPS at the 3.6m Telescope, and provide travel board and lodging to the agreed Consortium's staff. ESO will fully collaborate with the Consortium during this phase.

The instrument will be re-assembled on site in an integration facility (TBD). After successful completion of the tests which do not require the light from the telescope, the instrument will be connected to the telescope and the commissioning will start. The Consortium will be responsible for the Commissioning and the full scientific performance evolution of HARPS at the 3.6m telescope. He shall also verify the operational and maintenance concepts including the data reduction process. During these observations, the Consortium will provide scientific and technical staff as agreed with ESO.

The Commissioning activities will be performed in two periods of two weeks each, with an intermission period of about 8 weeks. The exact scheme shall be agreed with ESO at FDR, as part of the Commissioning Plan. The intermission period will be used to analyse the results of the first commissioning run and to make any necessary modifications on the instrument hardware and/or software. Before the second commissioning run, ESO shall receive the document revisions corresponding to the changes. Provided that the requirements laid out in the *Technical Specifications* [AD 1] are fulfilled (including all waivers and/or non-conformances agreed with ESO), ESO will declare Provisional Acceptance in Chile (PAC).

2.1.2.7. Guarantee Period

The guarantee period for the HARPS instrument is 5 years. This period starts when the Provisional Acceptance in Chile (PAC) is granted by ESO. The responsibilities of the Consortium and of ESO during this period are given in the Contract. At the end of the guarantee period, provided that the Consortium has fulfilled all of its obligations described in the contract, ESO will declare the Final Acceptance in Chile (FAC) of HARPS.

ESO	HARPS Statement of Work	Doc:	3M6-SOW-ESO-33100-0002
		Issue	1
		Date:	21.06.00
		Page:	9 of 29

2.1.2.8. Instrument Lifetime

The Consortium shall keep its documents and archives related to the HARPS project for the entire HARPS lifetime (i.e. 10 years following PAC).

2.1.3. Project Milestones

The project Milestones are given in Table 1 below :

#	Milestones	From Kick-off	Planned Date
1	Project Kick-off	To	Feb-00
2	OFDR	To + 2 months	Apr-00
3	PDR	To + 5 months	Jul-00
4	FDR-Spectro / FDR-La Silla PDR-SW	To + 11 months	Jan-01
5	FDR-SW	To + 16 months	Jun-01
6	PAE	To + 25 months	Mar-02
7	PAC	To + 33 months	Nov-02
8	FAC	PAC + 5 years	Nov-04

Table 1 Project Milestones

2.1.4. Deliverable Documents List (DDL)

During the project phases, the documentation shown in Table 2 shall be delivered to ESO. This table describes the document name and issue number which eventually evolves with the project phases.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 10 of 29
------------	--	--

PAGE INTENTIONNALLY LEFT BLANK

ESO	HARPS Statement of Work	Doc: 3M6-ESO-33100-0002 Issue: 1 Date: 21.06.00 Page: 11 of 29
------------	--	---

Document	Type (1)	KO	OFDR	PDR	FDR-Spectro FDR-La Silla PDR-SW	FDR SW	PAE	PAC
DRD 1 Project Management Plan	a	(2)						
DRD 2 Project Plan and Schedule	a	(2)		(3)	(3)			
DRD 3 Product Assurance Plan	a			1				
DRD 4 Safety Analysis and Compliance Assessment	a			1	2		(4)	
DRD 5 Design, Analysis and Performance Report	a		<i>Optics Only</i>	1	2			
DRD 6 Software Users Requirements and Design Report	a			1				
DRD 6 Software Users Requirements and Design Report	a				1	2		
DRD 7 MAIT and Alignment Plan	r				1			
DRD 8 Operations, Calibration and Maintenance Plan	a			<i>Draft</i>	1		2	
DRD 9 Commissioning Plan	a				1		2	
DRD 10 Test Reports	a						1	2
DRD 11 Users & Maintenance Manuals	a						1	2
DRD 12 Software Users & Maintenance Manuals	a						1	2
DRD 13 CIDL	r			1	2		3	
DRD 14 Drawing Set	a			as-design	as-mfg		as-built	
DRD 15 ABDP	a							as-built

Table 2 Deliverable Document List

- (1) Document to be submitted to ESO for approval (a) or for review (r).
- (2) Updates of proposal documents with Issue 2.
- (3) Project Schedule update only.
- (4) Safety Compliance Assessment only.

ESO	HARPS Statement of Work	Doc: 3M6-ESO-33100-0002 Issue: 1 Date: 21.06.00 Page: 12 of 29
------------	--	---

PAGE INTENTIONNALLY LEFT BLANK

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 13 of 29
------------	--	--

2.1.5. Deliverable Component, Hardware and Software List.

The list of Component, Hardware and Software, to be delivered by the Consortium to ESO is given in Table 3 below:

Ref.	Item	Comments
1	HARPS Spectrograph and Fibre Link	Fully integrated and tested as specified in the Technical Specifications [AD 1].
1.1	• Optics	
1.2	• Mechanics	
1.3	• Optical Detector System	
1.4	• Image Scrambler	
1.5	• System Hardware	
1.6	• Vacuum Vessel	
1.7	• HARPS Enclosure	
2	System Software	Fully integrated and tested as specified in the Technical Specifications [AD 1].
2.1	• Observing Preparation Software	
2.2	• User Interface Software	
2.3	• Data Reduction Software	
2.4	• Data Flow Software	
3	Documentation	As required in the Deliverable Documents List (DDL) (see 2.1.4)
4	Spare Parts	The establishment of the Spare Parts list is under Consortium's responsibility. They shall be tested and packed in their container(s) for storage.
5	Tools and Support Equipment	These are tools for integration, alignment and maintenance. Only those especially developed for the HARPS project are deliverable.
6	Test Set-Up and Test Equipment	The number of equipment is restricted to those especially purchased or developed in the scope of the HARPS Project.
7	Handling & transportation Equipment	
8	Containers	Container(s) foreseen for the transportation of all deliverables to La Silla under safe conditions.
9	ESO Equipment	All ESO property or loaned equipment provided to the Consortium during the phases of the Project.

Table 3 Deliverable Components Hardware & Software List

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002
		Issue 1
		Date: 21.06.00
		Page: 14 of 29

2.1.6. ESO Deliverables

2.1.6.1. ESO documents

All the applicable (AD) documents listed in Section 1.1 of this SOW shall be delivered to the Consortium immediately after Signature of the Contract. During the development phases, the different updates or upgrades of the applicable documents will be sent to the Consortium. In addition to the applicable documentation, all the ESO documents listed in Table 4 below, will be made available to the Consortium by ESO according to the indicated milestones.

Item	Document	KO	PDR	FDR La Silla	PAE	PAC
1	Design Reports (CFA, Coude Room)		1	2		
2	3.6-m Telescope Adaptation Report		1	2		
3	CCD System Design & Performance Report			1	2	
4	FIERA CCD Control - Software Manual	1				
5	Test Reports				1	2
6	User's and Maintenance Manuals				1	2
7	Drawing Set	as-	design	design	built	built

Table 4 ESO Deliverable Document List

2.1.6.2. ESO Deliverable Component, Hardware and Software List.

The list of Component, Hardware and Software to be delivered by ESO is given in Table 4 below:

Ref.	Item	Comments
	Optical Detector System <ul style="list-style-type: none"> • CCD's • Dewar • Thermal Control • Control Electronics 	To be delivered by ESO-Garching, fully integrated and tested as specified in the <i>Technical Specifications</i> [AD 1].
	Cassegrain Fibre Adapter <ul style="list-style-type: none"> • Opto-mechanics • Calibration Unit (inc. Fibres) • Control Hardware • Control Software (OS/ICS) • Assembled Fibre Link (CFA to Scrambler and from Scrambler to Spectrograph). 	To be delivered by ESO-La Silla, fully integrated and tested as specified in the <i>Technical Specifications</i> [AD 1]. The hardware cost of the Fibre Link is covered by the Consortium.
	Coude Room Adaptation	Adaptation of the Coude Room of the Telescope will be achieved by ESO-La Silla in compliance with the specific HARPS requirements presented in the <i>Technical Specifications</i> [AD 1].

Table 5 ESO Deliverable Hardware List

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 15 of 29
------------	--	--

2.2. Work Description

The **Work Break Down Structure** and description of each Work Component is detailed in TBD.

2.3. Tasks Applicable to all Project Phases

This Chapter defines the basic tasks that are common to all project phases.

2.3.1. Project Management & Control

2.3.1.1. Project Management

The Consortium shall establish and maintain an effective project management organization, conducted by a **Project Management Office**, in order to accomplish the objectives of the Contract. The management organisation shall be separated from other project and operations to the extent necessary to prevent interference with the effective and timely completion of this Contract.

The Project Management Office shall co-ordinate and controls all technical, commercial and contractual activities, project resources and manage all disciplines required to successfully complete the Contract.

Project management organisation and the project rules shall ensure at all levels of the project the implementation, enforcement, and control of the methods and procedures covering the schedule control, configuration control, and product assurance including the safety and reliability aspects.

The key personnel of the project shall consist of people with experience in the specific technologies and/or domains required by the scope of work. Exchange of key personnel during the execution of the Contract shall be agreed with ESO in due time.

The Consortium shall assign a **Project Responsible** respectively with full authority over all personnel and resources of the project organisation including those of other members of his team. He shall be assigned full authority to negotiate and conclude with ESO and their Sub-Contractors/suppliers all issues related to the Contract and shall be the single point of contact with the ESO's Work Package Manager for all formal matters. In case of administrative, financial and contractual matters, the responsible shall address directly to the Contract Officer in charge of the Project at ESO with copy to the ESO Work Package Manager.

In order to facilitate and speed up the technical communications with ESO staff, the Consortium staff might contact directly ESO counterparts by e-mail or telephone but shall always keep the Consortium Project Responsible and the ESO Work Package Manager informed (e-mail copy or telephone minutes).

An **Instrument Science Team** (IST) for HARPS will be set-up. Its objective is to review and advise on scientific objectives of the complete instrument along its development. The Project Responsible shall report to the IST on the status of the project. This will happen approximately twice a year.

If events occur which could impact on the project milestones, eg. technical problems or changes requests initiated by ESO or by himself, the Consortium shall evaluate every possible solution to avoid or limit the impact on the schedule, including utilisation of additional manpower and facilities.

2.3.1.2. Project Plan & Schedule

The Consortium shall submit the *Project Plan and Schedule* at the start of the Contract. This plan shall comply with the project milestones defined in the present SOW and in the Contract. Modifications and

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 16 of 29
------------	--	--

updates of the plan shall be communicated to ESO. Major schedule, cost or technical modifications will follow the rules described in Section 2.3.2.3 (Change Procedures).

2.3.1.3. Project Reporting

- Monthly Progress Report

The Consortium shall submit to ESO every 2 months Progress Reports as defined in [DRD 16].

- Red Flag Report

Independently of and in addition to the regular Progress Reports, the Consortium shall report any event with potential implications on Schedule, Design or Cost. The Consortium shall issue a Red Flag Report within 24 hours after occurrence of a major problem jeopardising punctual delivery, the achievement of the Contract milestones, or achievement of technical performance and requiring the immediate attention of ESO. This reporting shall apply to problems at all project levels.

2.3.1.4. Progress Meetings (PM)

Some of the PM's (target: 3 per year) will be held with Representatives of the Consortium either at ESO or at the Consortium's premises on a case-by-case basis. All meetings shall take place the week following the reception by ESO of the Progress Report. The purpose of these PM's is to review the progress of the work, to highlight and discuss detected and reported problems or concerns, and to determine corrective measures to be taken. The frequency of the meetings can be changed as the project evolves. The agenda and the list of participants shall be described in the Minutes of Meeting.

2.3.1.5. Project Reviews (PR)

ESO shall plan and prepare the project reviews as listed in Section 2.1.3. As a general rule, completion of reviews is defined as the achievement of all action items as per the minutes of the review meeting.

2.3.2. Configuration Control and Data Management

The Consortium shall prepare the Configuration Item Data List (CIDL) of the HARPS Spectrometer and Fibre Link as requested in Section 2.1.4 "Deliverable Documents List (DDL)". The Consortium will integrate in the CIDL the necessary inputs from ESO related to its deliverable items.

2.3.2.1. Drawing List (CIDL) / As Built Data File (ABDL)

For each Configured Item in the project, a list of drawings identifying the configured item shall be established, and this will be the prime Control Document establishing the configured item Identification during its life cycle. The document and drawings shall be listed by number, title, and issue status.

2.3.2.2. Interface Control Document (ICD)

The ICD shall be established by ESO to control all the interfaces between the HARPS Spectrometer and Fibre Link and the 3.6-m Telescope Facility. The ICD shall be composed of form sheets per interface.

2.3.2.3. Change procedures

Both parties (ESO and the Consortium) may at any time initiate a change which may affect:

- Contractual Conditions
- Technical Specifications
- Statement of work
- Documentation
- Interfaces
- Schedule

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 17 of 29
------------	--	--

In response to any *Request for Change* initiated by ESO (reasonable and justified with respect to cost, schedule and manpower), the Consortium shall return the change proposal to ESO within 4 weeks, and, if agreed by the Consortium, implement the change defined in the *Request for Change*. ESO may involve third parties as deemed necessary.

The Consortium may also submit to ESO a *Request for Change or Waiver* (DRD 17). ESO has no obligation to accept the proposed *Request for Change or Waiver*. ESO will however provide a reply to such requests within 4 weeks. Implementation of the proposed changes shall not start prior to written authorisation or approval in accordance with Contract requirements. A granted *Waiver* does not lead to changes of any approved and released contractual documents, while an approved *Change Proposal* is to be reflected in the contractual documents e.g. by new issues or Contract Amendment(s).

Each proposed change or waiver must be identified by an individual and unique number, which shall be used by all subsequent correspondence as reference. The Consortium shall keep a record with all initiated changes with their status (approved, rejected, pending, closed) and provide an updated status together with the *Progress Reports*.

2.3.2.4. Document Format

The Consortium shall operate a centralised documentation system to fulfil the information requirements of the project. This system shall be capable of providing up-to-date information on all aspects of the project at all times including sub-contractors. The documentation system shall, in particular, serve as a reference for technical interfaces and for introducing and executing all project modifications. The Consortium shall maintain documentation lists of all documents generated or received. He shall supply ESO with updated document lists as part of his progress reports. All written documentation and information issued by ESO will be forwarded to the Consortium's Project Office for further distribution within the Consortium's organisation as necessary. All written documentation exchanged between ESO and the Consortium shall comply with the numbering system described in Section 3.2.

All documentation to be delivered to ESO by the Consortium shall be:

- Delivered in **1** copies
- In English language
- In A4 format for the written part
- Suitable for accommodation in loose leaf binders (standard 2 holes)
- Suitable for standard reproduction (can be stapled but not bound with spirals, glue or other means)
- Larger documents (drawings etc.) shall be folded to A4 size
- When appropriate, documents shall be delivered also in electronic form
- Numbered according to Section 3.2

2.3.3. Product Assurance Plan and Safety Compliance Assessment

The approach and procedures implemented to fulfil all specified Reliability and Product Assurance requirements shall be described in the *Product Assurance Plan* [DRD 3].

The Safety approach shall be compliant with [AD 3] and [AD 4]. In addition to the specified safety requirements and where not explicitly stated otherwise, the Consortium shall also fulfil all national safety laws and legislation applicable to the design, development, manufacturing, installation and operation of the Contracted Deliverable Items.

2.3.4. Travel, Accommodation and Services Provided by ESO at La Silla

ESO will provide the necessary infrastructure at La Silla needed for the assembly, re-integration and Commissioning of HARPS at the 3.6m Telescope, and provide travel, board and lodging to Consortium's staff as agreed in the Terms of the Contract.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 18 of 29
------------	--	--

2.4. Tasks related to specific Project Phases

2.4.1. Phase 1: Preliminary Design Phase

1. Production of the Final Optical Design with optical CAD simulations and of the Preliminary Opto-mechanical Design. Generate 3-D drawings of the instrument and 2-D drawings of the main assemblies.
2. Performance of all Sensitivity/Stability Analysis (mechanical, optical, thermal). The results from these analysis can be used to produce Lower-Level Specifications for the procurement of the optics. Specific studies to be carried out are the finite element analysis (FEM) of HARPS, and the error budget, including thermal analysis, for the global stability of the spectrograph.
3. Present the **Global Performance Budget** of the proposed concept for HARPS, including the spectrograph hardware and data reduction software in view of reaching the high accuracy radial velocity capability.
4. Summary of results of points 1, 2 and 3 in the *Design, Analysis and Performance Report* [DRD 5] and in the *Software Users Requirements and Design Report* [DRD 6]. In particular, these documents have to be approved by ESO.
5. Verify **Interface (ICD)** compatibility of HARPS with ESO deliverables and facilities (i.e. the Cassegrain Fibre Adapter, the Telescope Coude Room and the Optical Detector System) and provide ESO with the necessary Interface Specifications to update the ICD.
6. Assessment of **Critical Items** of HARPS (both with respect to technical risk or commercial availability).
7. Selection of "off-the-shelf" components. Compliance of such items with the requirements shall be verified by design, analysis or test as required in the *Technical Specifications* [AD 1].
8. Development and tests of the necessary prototypes and tests of critical items.
9. Provision of a complete *Data Package* for the PDR/OFDR in compliance with [AD 8].
10. Implementation of a suitable **Product Assurance** approach compliant with all specified reliability requirements. This shall be outlined in the *Product Assurance Plan* [DRD 3].
11. Verification of **Safety** provisions [AD 3]/[AD 4] in the form of a Preliminary Hazard List, Preliminary Hazard Analysis and Preliminary Safety Compliance Assessment. These shall be summarized in the first issue of the *Safety Analysis and Compliance Assessment* [DRD 4].
12. Present the approach envisaged for operations, calibration and maintenance of the complete instrument, and summarize it in a draft issue of the *Operations, Calibration and Maintenance Plan* [DRD 8].
13. Produce the Preliminary Design Review *Data Package* [AD 8].
14. Deliver the As-Designed *CIDL* [DRD 13] and *Drawing Set* [DRD 14].
15. Perform the PDR.

Important Notes :

- The specifications of the Optical Detector System, while delivered by ESO, remains under the overall responsibility of the Consortium, which will provide ESO with the necessary interface specifications.
- ESO-Garching will support the Consortium in the design and procurement and testing of the optics of the HARPS Spectrograph, as agreed at Project Kick-Off.

2.4.2. Phase 2: Final Design Phase

During this phase, the Final Design is established such:

- To allow the analytical evaluation of the ability of the design approach to meet specified requirements and enable the development and manufacture of experimental / test hardware and computer software,
- To guarantee that the manufacturing, test and installation risks (on technical, cost and schedule basis) can be evaluated with a high degree of confidence,
- To allow the clear identification of the operational cost (manpower, spare parts, etc.),

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 19 of 29
------------	--	--

- To schedule manufacturing.

The Consortium work shall be reflected in the FDR Data Package, the content of which shall be compliant with [AD 9]. The Software detailed design phase is defined in Section 3.1.5 of [AD 10]. Explicit tasks required by ESO are:

1. Consolidate and detail the Design of the spectrometer hardware (opto-mechanics, control electronics, vacuum and cryogenics). Update the Drawing Set to the pre-manufacturing level.
2. Update and complete all analysis (e.g. mechanical stability analysis based on thermo-mechanical FEM).
3. Update the *Design, Analysis and Performance Report* [DRD 5] with the outcomes of points 1 and 2.
4. Proceed with writing the Software Specifications after approval of the Software Requirements by ESO and comments by the IST. The updated *Software Users Requirements and Design Report* [DRD 6] shall include a first draft of the user interface panels to be presented at the FDR.
5. Prepare all manufacturing, integration, alignment and test procedures summarized in the *MAIT and Alignment Plan* [DRD 7]. This plan shall include all necessary inspection procedures.
6. Prepare all operations, calibration and maintenance procedures for the complete instrument summarized in the first issue of the *Operations, Calibration and Maintenance Plan* [DRD 8].
7. Prepare the *Instrument Commissioning Plan* [DRD 9] including *on-site* assembly plans.
8. Perform the necessary prototype tests and test campaigns of the critical items as identified and required. Prepare the relevant *Test Reports* [DRD 10].
9. Update the *Safety Analysis and Compliance Assessment* [DRD 4]. In particular, complete the following product assurance tasks :
 - Hazard Analysis for the entire HARPS instrument,
 - Reliability Analysis based on the detailed design.
10. Define and design all integration, service, maintenance and test equipment.
11. Define and design the shipment boxes and containers for the safe transport of HARPS from the Consortium's premises to the 3.6-m site.
12. The Spare Part List shall be prepared.
13. Deliver the As-Design *CIDL* [DRD 13] and *Drawing Set* [DRD 14].
14. Produce the Final Design Review *Data Package* [AD 9].
15. Perform the FDR.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 20 of 29
------------	--	--

2.4.3. Phase 3: Manufacture, Assembly and Test

During the Manufacturing, Assembly and Integration Phase, the Consortium shall:

1. Manufacture and test the instrument in accordance with the Manufacturing and Assembly Plan.
2. Fulfil the following Product Assurance tasks:
 - Review of parts and materials procurement documents and definition of inspection criteria
 - Preparation of Acceptance Test Procedures and Reports (to be submitted to ESO for approval)
 - Review the quality, reliability and safety aspects of Changes and Waivers
 - Report, analyse and correct failures
3. Prepare the Preliminary Acceptance Test which shall comprise:
 - Functional tests of hardware and software
 - Performance tests of the entire system, of subsystems etc.
 - Testing of emergency and safety functions.
4. Update the *Operations, Calibration and Maintenance Plan* [DRD 8]] for ESO's approval.
5. Update the *Commissioning Plan* [DRD 9] for ESO's approval.
6. Prepare the *Users & Maintenance Manuals* [DRD 11].
7. Prepare the *Software Users & Maintenance Manuals* [DRD 12].
8. Deliver the Safety Compliance Assessment complemented, if necessary, by the reports of safety audits performed by external companies or institutes.
9. Conduct the Preliminary Acceptance Test in presence of ESO in rolling out the Test Procedures. Report the results in the *Test Reports* [DRD 10] and update the Verification Matrix accordingly.
10. Deliver the As-Built *CIDL* [DRD 13] and *Drawing Set* [DRD 14].

This Phase will end with the PAE in Europe of HARPS by ESO at the Consortium's premises.

2.4.4. Phase 4: Packing and Transport to the 3.6-m Telescope Facility

After the successful Provisional Acceptance of HARPS at the Consortium's premises, the Consortium will be responsible for the packing of the HARPS Spectrometer and Optical Fibre Link. ESO will arrange at its own cost and risk the transport of these items to the 3.6-m Telescope Facility in La Silla.

2.4.5. Phase 5: Installation & Commissioning

In this phase the Consortium shall:

1. Re-assemble the Instrument including all auxiliary equipment in the integration facility (TBD) according to the *MAIT and Alignment Plan* [DRD 7],
2. Verify the operability and performance of the Instrument by performing all relevant tests,
3. Train the ESO technical personnel participating in this phase,
4. Record the test results in a *Test Report* [DRD 10]

Once the Instrument is completely re-assembled it shall be brought into an operational condition and interfaced to all associated telescope subsystems. After this there shall be a period of thorough testing of all functions and interfaces including "dry-runs" of observations during daytime. An extensive test of all safety relevant functions shall be performed by the Consortium and the results reported to ESO in the *Test Report* [DRD 10]. In this period ESO technical and scientific personnel shall be thoroughly trained in the installation, operation and maintenance of the instrument and its sub-systems, including all safety aspects. ESO will have personnel available to resolve interface and telescope problems on short notice.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 21 of 29
------------	--	--

Once the Instrument is properly interfaced to the telescope and is in working order, the first part of the astronomical commissioning observations shall begin. The commissioning will follow the *Commissioning Plan* [DRD 9]. Commissioning normally consists of three parts:

- i) Instrument functional tests ensuring that the instrument is responding to all commands and is fully functional in all modes to the extent that this has not been already tested (see above).
- ii) "On-Sky" performance verification by repeating the functional tests and verifying fundamental parameters (signal-to-noise ratio, image quality, flexure, calibrations, etc.) in the 3.6m Telescope operational environment by executing standard observing procedures and calibration procedures.
- iii) Test of DFS/DRS.

Parts i) and ii) are prepared by the Consortium's Instrument team ([DRD 9] submitted for approval by ESO) and will be executed under its responsibility with the support and assistance of ESO.

These commissioning observations will be followed by an 8-week intermission period. In this period a detailed analysis of the test results will take place. Based on these results, the Consortium shall correct all problems found in the hardware or operations procedures, and update the concerned documents.

Similarly, the Software Packages (e.g. DRS, DFS, OPS) shall be debugged and documentation updated.

Commissioning period 2 shall be started as soon as all important corrections to the Instrument and its sub-systems based on the results of period 1 have been executed and ESO has formally agreed.

Following commissioning period 2 the Consortium shall prepare and deliver the *Provisional Acceptance Data Package* (including a Commissioning Report) mainly consisting in the ABDP [DRD 15] including the final versions of all software Data Packages and Manuals.

After this period ESO will assess the results of the commissioning runs. If the results are found to be compliant with the SOW and the *Technical Specifications* [AD 1], ESO will declare *Provisional Acceptance*. ESO reserves the right to release the Instrument for astronomical observations before *Provisional Acceptance*.

2.4.6. Phase 6: Guarantee Period

During the period of 5 years from the date of Provisional Acceptance (cf. Article "Guarantee" of the Contract) The Consortium shall execute all necessary repairs and modifications of the Instrument which are required to achieve or maintain the performance in accordance with the Technical Specifications. The Consortium shall, within available project funds, replace components which failed during normal operation or need to be replaced because of modification. In any of these cases, ESO shall organise and pay for transport, travel and lodging of the Consortium's personnel.

In case major modifications are required to maintain the performance of the Instrument during the guarantee period, The Consortium shall update all relevant documentation and software.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 22 of 29
------------	--	--

3. Appendix

3.1. Document Requirement Description's (DRD's)

DRD 1 Project Management Plan

The Project Management Plan shall:

- describe the organizational structure of the project
- contain an organization chart which summarises the lines of authority including subcontractors
- describe the responsibilities of each function in the chart (job descriptions for key functions)
- describe the interrelation among the different functions in the organisation
- describe the management approach implemented by the Consortium to control the project
- describe where and how the control of the Sub-contractors is established in the project organisation.
- contain key personnel identification and experience.

DRD 2 Project Plan and Schedule

The *Project Plan and Schedule* is the major project control document for ESO and the Consortium. It shall include:

1. **Master Plan** : This plan shall schematically describe the programme logic, main phases, development, manufacturing, integration, verification, installation and commissioning steps.
2. **Work Breakdown Structure (WBS)** : Matrix identifying the different project activities as Work Packages (WP) sorted by phases, skills (optics, electronics, mechanics, etc) or according to the Product Tree.
3. **Work Package Description (WPD)** : derived from the WBS and containing for each WP at least:
 - a reference number
 - the title of the Work Package
 - the individual or organization responsible for the Work Package
 - the input(s) necessary to complete the Work Package activities
 - the description of the task(s) to be performed under the Work Package
 - an evaluation of the resources required to be perform the Work Package
 - the output(s) or deliverable(s) of the Work Package
 - the duration of the Work Package
4. **Schedule Chart** containing:
 - a detailed bar chart, based e.g. on the WBS activities
 - if specifically required by ESO, a master network (PERT) displaying logic and time characteristics of the programme's major activities or WBS (not to exceed a single A4 sheet)

ESO may ask for detailed plans for critical areas at any time of the programme.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 23 of 29
------------	--	--

DRD 3 Product Assurance Plan

The Product Assurance Plan shall describe how the Consortium will implement and maintain, through all project phases, a Product Assurance (PA) approach which, ideally, should cover all aspects described in the **ISO 9000 Guidelines** (RD 3) given here for information. In particular, it shall include a description of the procedures and/or approach proposed and implemented for :

- Project Reporting
- Design Control
 - Specifications
 - Design Verification and Acceptance
 - Design Changes and Reviews
- Procurement Control
 - Parts Procurement
 - Purchase Order
 - Subcontract and Acceptance Procedures
- Material and Processes Control
- MAIT Control
 - Manufacturing Inspection
 - AIT Control
- Non-conformance Control
 - Definition
 - Classification
 - Processing and Reporting
- Cleanliness & Contamination Control
- Packing, Handling, Transportation and Storage
- Delivery & Acceptance

DRD 4 Safety Analysis and Compliance Assessment

This document shall be prepared in accordance with the guidelines presented in [AD 3] and [AD 4]. Hazard severity and probability levels shall be identified, as well as safety provisions or alternatives needed to eliminate hazards and reduce their associated risk to a level acceptable to ESO. This safety analysis shall be refined as the project moves to the Final Design Review. At acceptance time, the Consortium shall produce a **Safety Compliance Assessment** certifying that the delivered items are in compliance with the appropriate safety requirements (i.e. imposed contractually or by the applicable national laws).

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 24 of 29
------------	--	--

DRD 5 Design, Analysis and Performance Report

This report shall present the design features and analysis of all the deliverable items under development and shall describe how the requirements of the Technical Specifications are fulfilled (qualitatively and quantitatively).

It may be structured according to the table of contents of Technical Specifications and include, for each individual chapters, the actually achieved value of the correspondent requirement. For each requirement or groups of requirements, a sound analysis shall be performed to demonstrate the correctness of the achieved value.

Alternatively, it may be structured according to the Product Breakdown into different systems (units) and sub-systems (sub-units) for which the requirements can be derived from the Technical Specifications.

It shall contain the following:

- List of Applicable Documents
- Scope of Design & Analysis , description of the contents of the Report
- Design Description
 - Assumptions, as design constraints, environmental conditions other than specified in Technical Specifications, maintenance concept, access concepts, etc.
 - Design Description by systems / units, with regards to every requirements specified,
 - 3-D drawings of the main systems, 2-D drawings of main items, figures, and sketches.
 - Materials used in the design with physical properties as well as chemical behaviour, applicable treatments and their purposes, etc.
 - Open design definitions and problem areas
- Analyses performed to sustain the design:
 - Requirement analysis
 - Functional analysis
 - Performance analysis
 - Interface analysis in operational conditions
 - Further analyses, as appropriate
- Structural Finite Element Analyses of the main units shall be reported in this document.
- All the Finite Element models used for the analyses shall be delivered to ESO in an internationally recognised numerical code , ANSYS is recommended. This report shall describe:
 - Static Analysis, under specified environment
 - Modal Analysis under the specified environment,
 - Dynamic Analysis in operational condition
- Budgets (performance, mass, power, ...) and Errors Budgets,
- Conclusions

DRD 6 Software Users Requirements and Design Report

The Contents of the *Software User Requirements* document shall be derived from the Technical Specifications AD 1, as well as from inputs of the Science and Technical teams during the *Preliminary Design* Phase. It shall cover all the deliverable software packages listed under 2.1.5.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 25 of 29
------------	--	--

DRD 7 MAIT and Alignment Plan

The Manufacturing, Assembly, Integration, Test and Alignment Plan shall be established for all units and sub-units of the Instrument. The Plan shall clearly indicate all the inspections, checks and tests as well as all critical operations to be performed during the assembly process. In particular, the Plan shall describe the sequence of **optical alignment** activities and procedures.

It shall also specify the sequence of the assembly and integration procedures for the on-site activities. A detailed schedule of the on-site assembly work shall be provided including all operations and assembly staff movements. This plan shall furthermore identify and specify the requirements for the On-Site Assembly:

- Handling equipment
- Special assembly tools
- Machine and hand tools
- Measuring and alignment equipment
- Electric power requirements
- Manpower (number, qualifications and categories)
- Office and workshop space

DRD 8 Operations, Calibration and Maintenance Plan

This plan shall include sections for ESO scientific personnel and Visiting Astronomers, and technical sections for operations and maintenance by the technical staff.

The **Scientific** Sections of the *Operation Plan* shall contain, as a minimum, a description of the operational sequences and procedures for all the steps of scientific utilisation of the instrument including:

- Advance preparation of the observation with the aid of software tools such as OSS
- Advance preparation of instrument and telescope set-up
- Initialisation and operation for the actual scientific observing
- Exhaustive description of the **Calibration** procedures as required in the *Technical Specifications* [AD 1].

The **Technical** Sections of the *Operations Plan* shall contain, as a minimum, a description of the operational sequences and procedures as well as time and manpower estimates for all steps which are required to :

- perform preventive maintenance
- perform corrective maintenance (e.g. repairs)

DRD 9 Commissioning Plan

This plan shall describe and define the tests to be performed in the commissioning phase on the telescope. It shall describe the Test Procedures with respect to the objective of the test and the plan to follow during the test. If appropriate, individual test procedures shall be produced for every verification by test required in the **Verification Matrix** which is part of this plan.

Each **Test Procedure** shall contain the following information:

- *Scope of the test* : identification of the item / specifications to be identified,
- *Applicable documents* : list of document referred to in the test procedure,
- *Test conditions* : list of all requirements needed to perform correctly the test (e.g environmental conditions, list of suitable astronomical sources or calibration objects, calibration requirements),
- *Test Procedure* : description of all operations required to perform the test,
- *Test Result Presentation* : procedures to process the raw data for the presentation of the test results.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 26 of 29
------------	--	--

DRD 10 Test Reports

The **Test Reports**, summarising the findings of the tests, shall be completed after the commissioning period. The results shall be processed in such a way that they are directly comparable with the requirements and specifications relevant for the observing mode under test.

A major outcome of this phase will be to update the **Verification Matrix** summarising the actual results in comparison with requirements and specifications. Finally, as a conclusion of the tests, a **Statement of Compliance** concerning the conformance of the test results with the specified requirements specified shall be given.

The Consortium shall request Waiver or Changes in the case non-conformances are identified. ESO has no obligation to grant approval of such request(s).

DRD 11 Users & Maintenance Manuals

The *Users Manual* shall describe in detail all the capabilities and features of the Instrument, and all the procedures needed to operate it correctly and safely by ESO personnel and visiting astronomers. The *Users Manual* shall give a description of the observing software, the observing support software and the data reduction software in a *cook-book type* style. As the *Users Manual* will be circulated widely it is self evident that greatest care shall be taken to ensure that this document is well written, well structured, concise and has an index.

The *Maintenance Manual* shall contain the detailed maintenance procedures with drawings. The *Maintenance Manual* shall describe the maintenance procedures both verbose and inform of a checklist or matrix. The *Maintenance Manual* shall address the following topics:

- General description of the instrument and its internal and external interfaces
- Detailed description of the items to be maintained (including preventive measures)
- Detailed procedures for the identification of faults
- Reference to other maintenance manuals (e.g. for commercial components)
- Type of maintenance, inspection etc.
- Dates (intervals) for maintenance
- Required parts, consumables and tools
- Required major equipment
- An exhaustive set of high quality photographs of the mechanics at all relevant assembly states (including original films), colour (slide) preferred, but black-and-white also acceptable
- Estimated manpower and skill level for each task
- Estimated time required for each task

The *User's & Maintenance Manual* shall encompass all auxilliary equipment delivered with the Instrument.

The *Users & Maintenance Manuals* shall be delivered also in electronic form in an editable format of an established text processing program (DOC or LATEX with ESO approval). User's Manuals shall be in LATEX format for web publishing (HTML with ESO approval). All figures have to be available in postscript format (this includes scanned versions of photographs whereby the normal loss in quality associated with the process will be tolerated by ESO).

DRD 12 Software Users & Maintenance Manuals

It shall describe all the software packages listed in the Technical Specifications, i.e. the Observation Preparation Software (OPS), the Data Reduction Software (DRS) and the Data Flow Software (DFS). It shall also include an attached document to record future updates. This manual shall cover:

- The internal organisation of the software
- The installation procedures including the environment set-up (e.g. Operating System)
- A full description of all non-internal inputs and outputs (FITS headers, Template Signature Files, etc.)
- The check procedures for the installed versions

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 27 of 29
------------	--	--

- The procedures to test the conformity to the specifications
- The design documentation
- The functions not accessible to users (switch-off of the instrument, maintenance mode, etc.)
- The analysis of log files
- The preventive maintenance operations (file clean-up, etc.)

DRD 13 CIDL

The Configuration Item Data List (CIDL) identifies the official and valid documentation of the Project. It supports the Configuration Control process and shall include :

- the valid issue of specifications,
- the list of design reports (e.g. included in Review Data Packages),
- the list of valid drawings (as-designed, as-manufactured or as-built depending on the project phase),
- the list of valid circuit diagrams (idem),
- the list of valid source code (idem),
- the list of valid Interface drawings and documents (e.g. ICD),
- the list of valid test procedures and test reports,
- the list of parts (e.g. corresponding to the product tree),
- the list of valid manuals (e.g. user's, operations, maintenance).

DRD 14 Drawing Set

The *drawing set* shall be defined at **all stages** of the project, in particular at the end of the Detailed Design Phase (“as-designed”), during the Manufacturing, Integration and Tests Phase (“as-manufactured”), and at hardware delivery and acceptance (“as-built”).

The *drawing set* shall be prepared in accordance with DIN standards or equivalent and approved by ESO (document numbering, see section 3.2 Document code). The drawing set shall contain all information necessary to manufacture, assemble and test the product and the necessary support equipment.

Whenever possible the *drawing set* shall be provided also in computer readable form (e.g. on CD-ROM, or as appropriate) in a format compatible either with AUTOCAD or EUCLID.

DRD 15 ABDP

The As-Built Data Package contains all documentation defining requirements, analysis and design status of the Instrument as given in the CIDL plus the manufacturing support data for a the delivered items (hardware and software). For each model or version an ABDP shall be issued and any changes in the documentation relating to this model or version shall be handled through configuration control via revision of the appropriate ABDP.

The ABDL shall contain all documents and drawings which completely define the Instrument. The ABDL released status forms the basis of the verification and acceptance inputs. It shall include :

- **CIDL**
- Analysis & Design Reports
- Safety Compliance Assessment
- As-Built Definition Documentation
 - The **Drawing Set** (in As-Built)
 - Change, Waivers and Non-Conformance Reports with Status
- **MAIT Documentation**
 - AIT Procedures and Test Reports
 - Verification Matrix
 - Log Books
- All **Manuals** (including Commercial Equipment) and **Handling** Procedures.

ESO	HARPS Statement of Work	Doc: 3M6-SOW-ESO-33100-0002 Issue 1 Date: 21.06.00 Page: 28 of 29
------------	--	--

As for the Drawing Set, the ABDP shall be provided in computer readable form (e.g. on CD-ROM or diskettes).

DRD 16 Progress Reports

The Progress Reports shall be based on the detailed planning. The Progress Report summarises the progress of the project over a monthly period. It shall summarise the results achieved in this period including any deviations, description of critical schedule and technical issues arisen during the reporting period and anticipated for the future.

It shall give an account on every problem detected at any level (technical, programmatic, finance,...) of the project during the reporting period and shall address the planned remedial activities.

The Progress Report shall also include the schedule planning with upgrades reflecting the updates versus baseline planning, reassessment of all start and completion dates for all activities and the Action Item List.

The Action Item List shall be agreed by both parties, it shall be reviewed at each progress meeting and it shall list:

- The subject of the action
- The originator
- The actionee(s)
- The due date, current status and the closure date
- Reference of the document(s) containing the basis for the closure action

DRD 17 Request For Waiver (RFW) / Deviation (RFD)

See [AD 5].

DRD 18 Non-Conformity (NC) / Discrepancy Notice Form

See [AD 5].

DRD 19 Change Request (CR) / Change Notice

See [AD 5].

DRD 20 ICD

The Interface Control Document (ICD) shall list all interfaces between the instrument and the telescope or its environment (e.g. mechanical, optical, electronics, software, etc). The two sides (A/Telescope and B/Instrument) of each interface shall be described in detail with the supporting drawings or data sheets when appropriate.

3.2. Document code

3.2.1. Correspondence:

The Consortium can use its own numbering scheme for correspondence.

ESO-Garching correspondence shall use the standard INS numbering scheme :

INS-YY/NNNN

Where: **YY** Year, e.g. 00 for 2000, 01 for 2001, etc.
NNNN is a sequential number

3.2.2. Documents

AAA-BBB-CCC-DEFGH-NNNN

Where : **AAA** is the host telescope, 3M6 in the case of HARPS

BBB is the type of document:

CRE	Change Request
DNO	Discrepancy Notice
LIS	LISt
MAN	MANual
MIN	MINutes of meeting
PLA	PLAn
PRO	PROcedure
RFW	Request For Waiver
SOW	Statement Of Work
SPE	SPEcification
TRE	Technical Report
VER	VERification document

CCC is the originator organization, either ESO or HAR (Consortium)

DEFGH is the product structure code; in our case

DEF	is the product tree code, D=3 for 3M6, E=3 for Instruments, F=1 for HARPS
GH	G=0, H=0

NNNN is a sequential number without institute encoding.