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| **T-REX TG2 SAD Checklist** |
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|  | **Name** | **Affiliation** |
| **Authors** | T-REX team | FZJ / CNR |
| **Reviewers** | SAD group | ESS |
| **Approver** | NSS management | ESS |

# INTRODUCTION

Scientific Activities Division (SAD) is responsible for the Science Support Systems (SSS) work package. To be able to support the instruments in construction and operation it is important that the instruments are designed to take SAD requirements, ref [1],[2],[3],[4], into account. This checklist is intended to help instruments be aware of these requirements to a sufficient level before starting detailed design. For its scientific exploration an instrument might require certain sample environment equipment and support laboratories. Such needs shall be discussed and agreed on between the instrument team and SAD according to ref [5].

# SCOPE

This checklist cover interfaces between an instrument team and ESS Scientific Activities Division. It encompasses mainly the areas of mechanical interfaces for sample environment, utilities supplies for sample environment, control system for sample environment and sample handling and instrument specific lab space. The checklist also serves to document that needs for sample environment equipment and support laboratories have been discussed between the instrument team and SAD, ref [5]. Actual requirements and specifications for sample environment equipment and support laboratories are tracked elsewhere [6].

The checklist intends to check if an instrument is mature enough from SAD point of view to pass TG2. Instrument teams should check the box that they think best represents the current instrument status for each row.

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| **x** |  |  |  |  |  |
|  |  |  |  |  |  |
| **Item** | **Brief descriptions of areas relevant for SAD at TG2** | **Instrument response** | **SAD TG2 Review comment** | **Team comment** |
| **Not relevant** | **Not yet considered** | **Considered**  | **Cost allocated in inst. budget** |   |  |
|  |  |  |  | **importance** |  |   |  |
|  |  |  |  | **Minor**  | **Major**  |  |   |  |
| **1. Sample Environment Equipment** |  |
| Related doc: ESS-0000960 Science Support Systems Work Package Specification; section 1.4.2 |  |
| **1.1 Instrument specific sample environment equipment:** |   |   |   |   |   |   |  |
|   | Scope budget and timelines for each system adequately defined?  |   |   |   |   |  x |   | The allocated budget includes a cryofurnace, timeline for procurement and readiness defined,Budget is within CNR contribution, budget for integration will be transferred to ESS SAD group during Cold Commissioning, procurement might be done by ESS. Sinergy with MAGIC (vertical cryomagnet) and C-SPEC |
| Responsibilities and interfaces during construction, operation, maintenance adequately agreed and documented?  |   |   |   |  x |   |   |
| Synergies with other instruments and pool sample environment equipment investigated?  |   |   |   |  x |   |   |
| **1.2 Pool sample environment equipment** |   |   |   |   |   |   |  |
|   | Needs adequately expressed? |   |   |   |  x |   |   | ESS pool can be used (XL space requirements and local crane 1t). Table of wishes and priorities defined. |
| Requirements and timelines agreed upon? |   |   |   |  x |   |   | Priorities are defined. |
| **2. Support Laboratories** |   |   |   |   |   |   |  |
| Related doc: ESS-0000960 Science Support Systems Work Package Specification; section 1.4.2 |  |
| **2.1 Instrument specific support user laboratories**  |   |   |   |   |   |   |  |
|  | Scope budget and timelines for each lab adequately defined?  |   |   |   |   |  x |   | The budget for the lab is sufficient to establish a very basic lab, which is useful for preparation of sample stick and filling sample holders in air. Sample storage. |
|  | Responsibilities and interfaces during construction, operation, maintenance adequately defined?  |   |   |   |  x |   |   | Construction budget is within CNR contribution. |
|  | Synergies with other instruments and common user laboratories investigated?  |   |   |  x |   |   |   | Considering the available budget and the location, the lab can be shared with W6 beamline (currently MAGIC) |
| **2.2. Common user laboratories** |   |   |   |   |   |   |  |
|  | Needs adequately expressed? |   |  x |   |   |   |   | We didn’t receive any request so far to define needs/requirements, but we can contribute our list when requested. |
|  | Requirements and timelines agreed upon? |   |   |  x |   |   |   | We need access to common labs during hot commissioning |
| **3. Sample environment: Mechanical Interfaces** |  |
| Related doc: ESS Sample Environment Mechanical Interfaces for Instruments (CHESS reference: ESS-0038078) |  |
| **3.1 Access** |   |   |   |   |   |   |  |
|  | Transport path between instrument and SE lab |   |   |   |  x |   |   | Free path at ground level, local crane 1t with clearance to floor |
|   | Provision of an area within 20m of instrument to prepare SEE |   |   |   |   |  x |   | 2 panels in the budget, 1 will be used to prepare the next experiment close to the cave |
| Area to allow SEE to enter/exit instrument |   |   |   |  x |   |   | Access to the cave from back is large |
| Adequate volume within instrument to accommodate SEE (and ancillary) at the sample position |   |   |   |  x |   |   | The instrument includes the MAGIC PASTIS setup, which is larger than XL SEE |
| **3.2 Sample area** |   |   |   |   |   |   |  |
|  | L/XL support level defined |   |   |   |  x |   |   | MAGIC PASTIS setup that is larger than XL SEE |
|   | Space for SEE  |   |   |   |  x |   |   |
| Standard sample mounts |   |   |   |   |  x |   | The sample positioning system will be constructed by FZJ according to ESS standards |
| Utility supplies |   |   |   |   |  x |   | 2 panels included in the budget, 1 close to the sample area, one in the preparation area |
| Instrument Crane |   |   |   |   |  x |   | 1t load jig crane, 5 m jig, 6m clearance |
| **3.3 Magnetic considerations** |   |   |   |   |   |   |  |
|  | Support level defined |   |   |   |   |  x |   | 2m radius around sample non-magnetic requirement |
| **4. Sample environment: Control system** |   |   |   |   |   |   |  |
| Related document: ESS Sample Environment Control System Reference (CHESS reference: ESS-0038165) |  |
| **4.1 Control system hardware** |   |   |   |   |   |   |  |
|  | Infrastructure for SE control rack (space, cooling water etc) |   |   |   |  x |   |   | The rack can be installed either on the roof of the detector vessel or at floor level |
|  | Patch panel, cables and labyrinths between inside of cave and SE control rack. |   |   |   |  x |   |   | Currently the plan is to install the rack inside the cave, since the connections are outside coming from the roof, chicanes will be realized at the cave wall for cabling etc. |
| **4.2 Control system software** |   |   |   |   |   |   |  |
|  | Potential SE equipment requiring fast data transfer (~ >1 kHz) identified |   |  X |   |   |   |   |  |
|  | Specific SE equipment requiring high accuracy time-stamping of SE data identified |   |  X |   |   |   |   |  |
| **4.3 Integration process of sample environment equipment** |   |   |   |   |   |   |  |
|  | Instrument-specific SE equipment integration support required from SAD identified.  |   |   |   |   |  x |   | Budget is part of CNR contributions, support is requested to SAD, the plan is to integrate the cryofurnace during early cold commissioning |
|   | Complex SE equipment that is expected to require extra integration effort identified. |  x |   |   |   |   |   | No plan for running experiments in parallel or complex assemblies so far |
| **5. Sample environment: Utility Supplies** |   |   |   |   |   |   |  |
| Related doc: ESS Sample Environment Utility Supplies Reference Document for WBS 13.6.X.5.6 (CHESS reference: ESS-0038163) |  |
| **5.1 Utility Supplies** |  |   |   |   |   |   |  |
|  | **Noted the SE requirements for:** |  |   |   |   |   |   |  |
|  | Electrical power |   |   |   |   |  x |   |  2 utilities panels |
| Cooling water |   |   |   |   |  x |   |
| Supply for gases, helium recovery and gaseous exhausts |   |   |   |   |  x |   |
| Data connections |   |   |   |   |  x |   |
| **5.2 Number of required Utility Supplies Setups** |  |   |   |   |   |   |  |
|  | At the sample position |   |   |   |   |  x |   |  |
| At the Area for SEE preparation at the instrument |   |   |   |   |  x |   |  |
| Additional at the cave for Concurrent experiments running |  x |   |   |   |   |   | No plan for running experiments in parallel so far |
| For equipment on mezzanine |  x |   |   |   |   |   |  |
| **5.3 Panels** |  |   |   |   |   |   |  |
|  | Labyrinths considered |  |   |   |  x |   |   | See above |
| **6. Sample Handling and instrument specific lab space** |   |   |   |   |   |  |
| Related document: ESS Safety and Sample Workflow for Instruments Reference Document for WBS 13.6.X.7.1 (CHESS reference: ESS-0040840) |  |
| **6.1 Sample handling** |  |   |   |   |   |   |  |
|  | **Note the requirements to have:** |  |  |  |  |  |   |  |
|  | A sample storage cabinet on the instrument dimensioned according to expected sample size, dimension and expected throughput; cabinet has to be equipped according to hazards (flammable, activation,…) |   |   |   |   |  x |   | Described in budget PBS |
| **6.2 Exhaust line to main stack** |   |   |   |   |   |   |  |
|  | Use of exhaust line that allows to ventilate through the main stack (e.g. for secondary vacuum containment of hazardous samples, for experiments with gas flow,…); If used, HEPA filter and/or liquid trap will be a requirement  |   |   |   |   |   |   |  |
|  **6.3 instrument specific lab** |   |   |   |   |   |   |  |
|  | Use of access to standard fume hood ventilation duct (no activated gases, fumes); usable for hoods, powder boxes, glove boxes, … |   |   |   |   |  x |   | Connection to the ventilation is included in the budget |
|  | Exhaust line that allows to ventilate through the main stack (e.g. for secondary vacuum containment of hazardous samples, for experiments with gas flow,…); If used, HEPA filter and/or liquid trap will be a requirement to avoid particles/liquids from entering the lines  |   |   |   |   |   |   |  |
|  |   |   |   |   |   |   |  |
|  |  |  |  |  |

# SAD CHEcKLIST FOR INSTRUMENT TOLLGATE 2

Please put a mark in the box that best represents the current instrument status.

# REFERENCES

[1] ESS-0038078 ESS Sample Environment Mechanical Interfaces for Instruments – Reference Document for WBS 13.6.X.2.3

[2] ESS-0038165 ESS Sample Environment Software Interfaces - Reference Document for WBS 13.6.X.5.7

[3] ESS-0038163 ESS Sample Environment Utilities Supplies - Reference Document for WBS 13.6.X.5.6

[4] ESS-0040840 1 ESS Safety and Sample Workflow for Instruments - Reference Document for WBS 13.6.X.7.1

[5] ESS-0000960 Science Support Systems Work Package Specification; section 1.4.2

[6] https://ess-ics.atlassian.net/wiki/display/SA/Scientific+Activities+Division