

**Questionnaire concerning realization schedule of PANDA sub-systems**

The questionnaire has two parts.

We request a response time until April 19 for questions 1-8, compiled in part 1. For the rest of the questions, part 2 of the questionnaire, we ask a response until May 9.

This questionnaire has been worked out by the scrutiny group appointed to review the project status and make physics-driven suggestions for a possibly stretched installation schedule towards the full PANDA detector. This includes an understanding of the current status and progress of the detector as given by all sub-detector components.

Please understand the following:

- Depending on the progress you have achieved (with e.g. a TDR as an important turning point where a lot of information is compiled), some of the questions may appear obsolete and some of the answers may appear evident. This may not apply to projects different from yours, so please just briefly explain why your answer may be as it is.
- None of the following questions is intended to question your expertise. On the contrary we trust and rely on your qualified response. If any of the wording is not to your liking, take our sincere apologies. The questions are meant and designed to scrutinize the progress of PANDA.
- You may not feel like answering all questions because sometimes several questions may touch upon the same issue as you understand it. In these cases, just indicate briefly where you put the information.
- While some of the questions may be perceived as very demanding by your group, we feel that most information is not different from what you might provide with a TDR, a funding application or the like. If you think that something is not necessary, just say so, perhaps including a short explanation of your views.

Thank you for the cooperation and your valued input to the process needed to consolidate PANDA.

## Part 1

(Sub-)system name:

(Sub-)system manager:

1. On which other PANDA system(s) does your (sub-)system depend w.r.t.:
  - mechanical/electrical/cooling etc.
  - baseline reconstruction
2. List the research groups collaborating to realize your (sub-)system?
  - cooperations within PANDA
  - cooperations within or outside of FAIR
  - cooperations with industry
3. Where can technical information for your detector project be found?
  - detector relevant theses for PANDA
  - detector relevant papers for PANDA
  - contributions to specialized conferences (e.g. IEEE)
  - availability (e.g. PANDA wiki) of internal (technical) reports (PANDA notes)
  -
4. Have you exploited synergies to achieve the most efficient progress?
  - On which level have you sought synergy with other PANDA sub-systems in the R&D phase?  
*Example: joint screening, joint test beams.*
  - On which level can you envisage synergy with other PANDA sub-systems in the construction/operation phase?  
*Example: joint production of parts and electronics modules.*
  - On which level have you sought synergy with other FAIR systems?  
*Example: joint developments of ASICs or electronics modules*
5. Are you involved in tasks, which are relevant for other PANDA systems?
  - To what level of detail has your system been made available in the PANDA simulation framework?
  - To what level of detail has the reconstruction code for your (sub-)system been developed?
  - Have you simulated the effect of your (sub-)system on neighboring detectors and vice versa?  
*Example: (EMCendcap –DiscDIRC) How does the extra material affect the EMC performance? What is the forward showering into the EMC and the backplash received from the EMC.*
  - Have you investigated possible cost and manpower savings if using common types of equipment, e.g. cables, connectors?
  - Do you engage in the planning of common cooling systems?
  - How many persons (FTE) are engaged in simulation tasks for your system / for general tasks in PANDA?

6. Financing of manpower and investments:
  - What is the total budgeted amount for your (sub-)system:
    - amount (% of needed) money already spent by 1.1.2014
    - amount (% of needed) money available to be spent now
    - amount (% of needed) money secured by firm commitments (define "firm")
    - amount (% of needed) money applied for at which agency
    - amount (% of needed) money intended to be asked from which agency?
    - possible sources of additional funding needed
  - Please attach a graph of the funding profile (2014-2019).
  - Please attach a graph of the manpower profile (2014-2019).
  
7. Status of TDR for your (sub-)system:
  - Is the TDR available – submitted – reviewed?
  - If available:
    - Is an update needed of your TDR because of major design changes?
  - If not yet submitted:
    - When do you expect a draft for your TDR?
    - Are the basic prototype test results available for your TDR?
  - Do you plan additional reports beyond the TDR (e.g. technical readiness report)?
  
8. Availability of key components:
  - Has the technology of key components for your system been developed to satisfy your needs?
    - What is the schedule for additional developments?
  - Is there a (at least 1) manufacturer who can deliver?
    - Are you in contact with alternative manufacturers?
  - What may be possible risks of delivery?
  - What may be possible risks of the production quality?
  - What is the delivery rate agreed upon with the main manufacturer compared to the scheduled use in the project?
  - Do you have fallback solutions in case of delivery failure, or if necessary additional developments will not succeed or will not be finished in time?

## Part 2 (deadline May 9)

(Sub-)system name:

(Sub-)system manager:

9. Give an estimate of the criticality of items from the different fields for your sub-detector using a scale from 0 (simple, solved) to 5 (very critical). Use the additional field to detail and explain if needed.

	Detection principle	Electronics	Mechanics	Prototyping Results

*Explanation:* This matrix is intended to locate bottlenecks; e.g. “mechanics” can be an issue, if you have no drawing office available, or if you need to place material in front of other detectors. Your answers to this question will not be sufficient to solve the problem, but will be of great help for us to make suggestions for finding solutions.

10. Timelines of work packages for your (sub-)system:

- Please provide the resource loaded schedule (cf. attached example).
- What are the shortcomings on FTE or other non-invest resources?
- Which time-consuming part could be shortened by distributing work, e.g. to companies (added expenses?)?
- Which time-consuming work package could be accelerated with additional money?

*Explanation:* Please provide the tables as an attachment. An example for a toy project is attached. If you feel that any of the suggested ways of compiling these tables are too fine or too coarse (e.g. the time bins), please use your project’s native granularity!

11. Status and performance of front-end electronics to data concentrator:

- Is the design of the readout available?
- Have you presented successful tests of the readout?
- What is the expected data rate at the data concentrator for the full sub-detector setup at nominal luminosity?
- Is the fabrication of required electronics secured (money, manufacturers and/or in-house manpower)?
- Is your readout design scalable (e.g. discrete ADC multiplexed at small luminosity)?
- In which way could you envisage an upgrade?
- Are synergies realized or potentially available?

12. Technical feasibility of the (sub-)system:

- Is sufficient lab equipment available for system evaluation?
- Are workshops available for prototype construction?
- Are results available from prototype studies? (attach key results)
- Do you have a drawing office available for detector design?
- What is the manpower available for system tests at FZJ in 2015/16?
- Will you be able to construct your (sub-)system until 1.1.2018? (or until when?)
  - Which companies are involved?
  - Which research labs are involved?
- What is the manpower available for the detector commissioning in 2018?

13. Is the integration with neighboring and central/common systems settled? (Part of a proof could e.g. be that the system is free of overlaps in the GEANT representation of the PANDA MC.)

- Do you have an accepted (by TB) plan for cable and pipe routing?
- Do you have an estimate of the power and cooling capacity?
- What is the rack space needed close to the detector?
- What is the rack space needed in the E-hut?
- Is the (e.g. thermal, RF) shielding of your (sub-)system designed?
- Does the (e.g. thermal, RF) shielding of your (sub-)system interfere with neighboring detectors?
- Do you have collected the complete table of required services?
- How do you intend to calibrate your system?
  - Mechanically (position, alignment)
  - In the data stream
- Does your system require environmental control (vibrations, temperature, humidity) and at what precision? Have you discussed these prerequisites with the TB, the Technical Management, the neighboring systems?

14. Slow control system:

- Is the responsibility for the slow-control of your (sub-)system assigned? (To whom / to which group?)
- Has the slow-control of your (sub-)system been developed according to the PANDA standards?
- Did you investigate and do you exploit synergies with other PANDA systems?

15. Detector simulation/reconstruction status:

- Does a detailed geometry model of your (sub-)detector exist, including cables, supports, pipes, electronics?
- Does a simulation of the front-end electronics, the feature

extraction, and the data processing up to the data concentrator exist?

- How is the detector response handled?
  - in a detailed simulation?
  - in a parameterized way?
- Have the performance data used been extracted from prototype tests?
- Has the reconstruction code, which is relevant for the (sub-)system, been debugged and verified?
- Is your (sub-)system implemented and verified in Panda-Root?
- Has the online data selection been studied?
- What is the expected data rate?
- What is the calibration concept?
- Which other systems are needed for calibration?

16. Do you see an option for simplification [e.g. less granularity]?

- which?
- What would be the expected savings in finances?
- What are the expected consequences for manpower needs?
- What would be the expected penalty
  - in rate performance?
  - in resolution performance?
  - in threshold performance?
- What would be the expected penalty for physics output?

*Explanation: This latter "expectation" would serve as input for the simulations team to substantiate the penalty for certain strategically chosen channels of high interest.*

17. Do you see an option for only partly installing your sub-system on day-1 and a later upgrade?

- Which are the parts that definitely have to be in place on day-1?
- Would this reduced setup lead to savings in finances?
  - How much on day-1?
  - How much on the long run?
- What would be the consequences for manpower resources?
- What would be the expected data rate at the Data Concentrator for the reduced day-1 setup?
- What would be the penalty in rate and resolution performance?
- What would be the penalty in the long run in terms of extra manpower or loss of time?
- What would be the penalty or advantage for your funding situation?

*Explanation: Please quantify "penalty" in terms of % degradation w.r.t. optimum performance.*

18. Risk assessment:

- When were possible risks signaled?
- Which of the risks may prevent a completion before 2018?

- Which measures were already taken to counteract possible risks?  
*Example: Explore alternative manufacturers.*
- Which additional measures are envisaged?  
*Example: Alternative sensor concept.*

*Explanation:* We will make use of risk tables collected by the Technical Management. However, the input here may serve to judge the situation of a particular sub-system as a whole. We need to see the status of the risk evaluation and whether counter-measures have already been initiated.