Organizational Structure and Spares Policy of the XFEL Accelerator Operation

Riko Wichmann
XFEL accelerator operation, MXL
Administration of the XFEL accelerator operation

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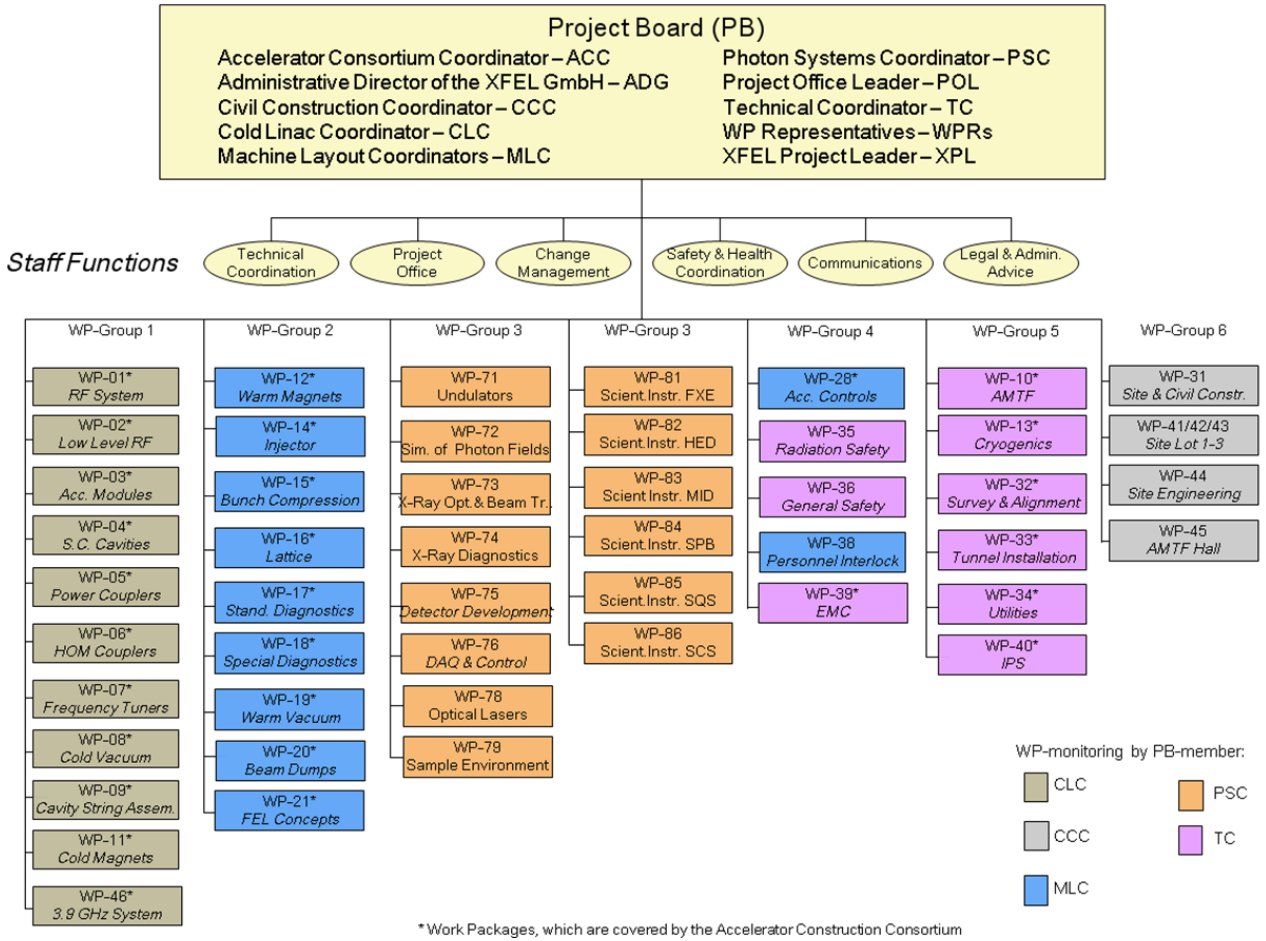
Accelerator Operation Structure

Reminder: Structure of the XFEL Construction Project (@DESY)



- Project was organized in work packages (WPs)
  - Each WP lead by a WP leader
  - Responsible for
    - ▶ WP organization
    - ▶ Technical execution
    - ▶ Schedule & budget control
- Project Management supported by
  - Technical Coordinator (system integration)
  - WP Coordinators
  - Project Office

(Special) Relationship of DESY and XFEL.EU

XFEL Convention, Article 1:

(3) The Company and DESY in Hamburg will collaborate on construction, commissioning and operation of the XFEL on the basis of a long-term agreement.

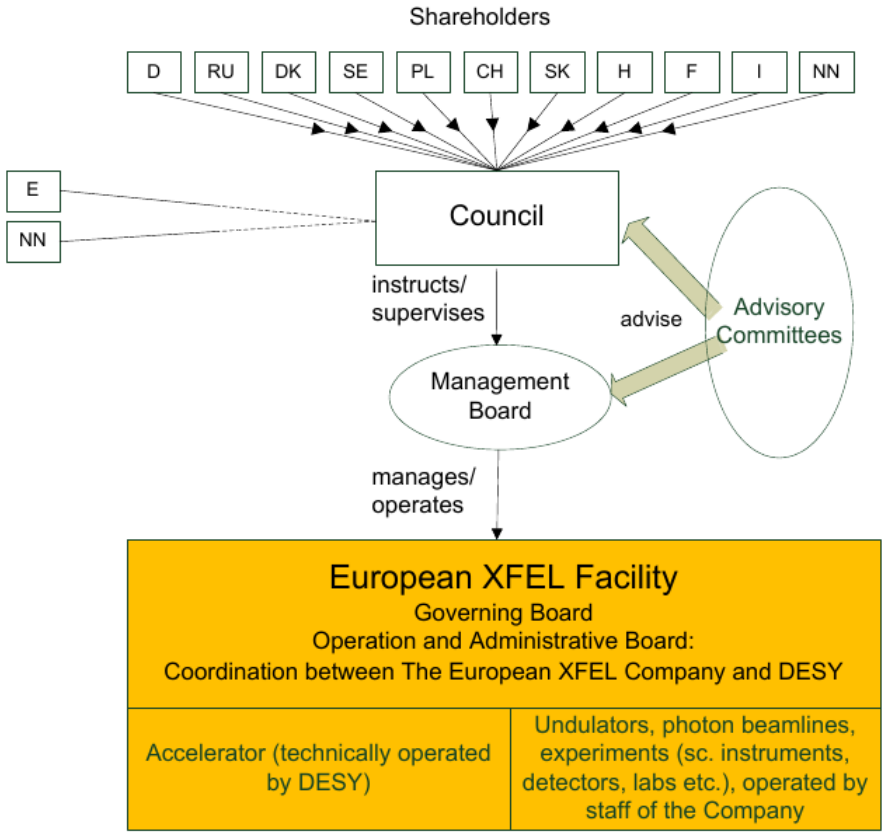
XFEL Operation Agreement, Acticle 2:

2.2 In addition to the radiation protection, DESY assumes for the European XFEL GmbH the technical operation of the accelerator along with the aim of scientific and technological refinement of the accelerator. To this end, DESY particularly assumes the tasks listed in Articles 3-8.

2.3 The concrete performance of tasks assumed and the internal organization remain the corporate responsibility of DESY. As a matter of principle DESY performs its tasks using its own employees, but third parties may be engaged if necessary.

European XFEL Operation Model:

joint operation of the facility by European XFEL GmbH and DESY



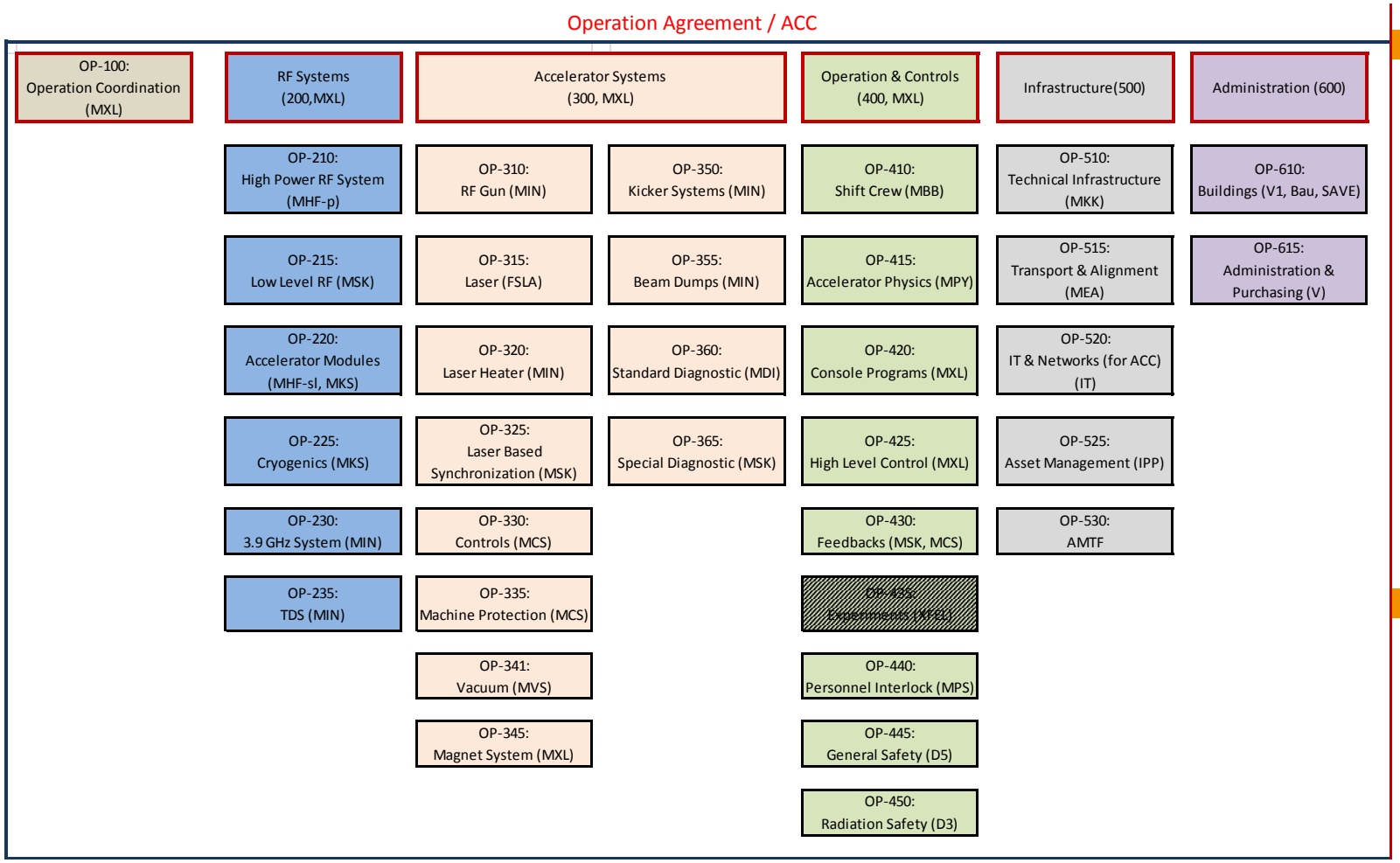
Governing Framework / Contract: Operation Agreement (OPA)

- " […] DESY acts upon the mandate of the European XFEL GmbH […] as independent economic and organizational representative for the technical operation of the accelerator […] "
- Operation Agreement (OPA) and its annex regulate the Operation Model:
  - Roles of XFEL.EU and DESY
  - Tasks of DESY
  - Scope of accelerator operation and DESY services
  - Radiation and general safety aspects
  - Organization and joint committees
  - Decision making authority
  - Costs and renumeration
  - …

Considerations for an XFEL acc operation structure (@DESY)

- Operation of XFEL accelerator different from other DESY accelerators
  - 1st and only accelerator DESY operates **not on its own account**
  - Operation cost borne by XFEL.EU
  - Other / additional steering groups
  - Final responsibility lies with XFEL.EU
- Coordination Team at **DESY** responsible for the accelerator **operation for XFEL.EU** management
  - Requires more “administrative” tasks handled by the operation team
- Transparent handling of accelerator operation cost:
  - Planning (personnel, recurrent and investment cost)
  - Spending and invoicing
- Need a structure **satisfying technical and financial aspects**

Acc. Operation organized in Operation Packages



- Operation Packages (OPs)
  - Lead by OPLeader
  - Responsible for
    - ► Task organization within DESY
    - ► Technical execution
    - ► Budget control
    - ► OP related shutdown plans
  - Needs often services of several DESY groups
- Coordination Team Operation (OP-100)
  - Overall acc operation coordination (Winni)
  - Technical coordination (Dirk)
  - Administration & Controlling (Riko)

The M Matrix

Groups / Homepages		Accelerators and Projects								
		FLASH	DORIS	DESY II	LINAC II / PIA	PETRA III	REGAE	PITZ	XFEL	ILC
	Leader	Schreiber	Brinker	Ehrlichmann	Hüning	Wanzenberg	Flöttmann	Stephan	Weise	Walker
D3	Tesch	●	●	●	●	●	●	●	●	
MBB	Bieler	●	●	●	●	●	●			
MCS	Bacher	●	●	●	●	●	●	●	●	●
MDI	Wittenburg	●	●	●	●	●	●	●	●	
MEA	Körfer	●	●	●	●	●	●	●	●	●
MHF-e	Ebert	●	●	●		●			●	
MHF-sl	Möller	●					●		●	●
MHF-p	Choroba	●						●	●	●
MIN	Hüning	●	●	●	●	●	●		●	●
MKK	Jensen	●	●	●	●	●	●	●	●	
MKS	Petersen	●						●	●	●
MSK	Schlarb	●	●	●		●	●	●	●	●
MVS	Lilje	●	●	●	●	●	●	●	●	
MPL	Singer	●				●			●	●
MPS	Racky	●	●	●	●	●	●	●	●	
MPY	Balewski	●	●	●		●	●	●	●	●

- Also XFEL is operated in the M Matrix
- XFEL OP structure:
  - Maintain **system view** of the facility
  - Large systems operated by several groups
    - ► e.g. OP-210: HP RF:
      - MHF-P, MKK
    - ► e.g. OP-345: Magnet System
      - MXL, MEA, MKK.

Aside: Accounting

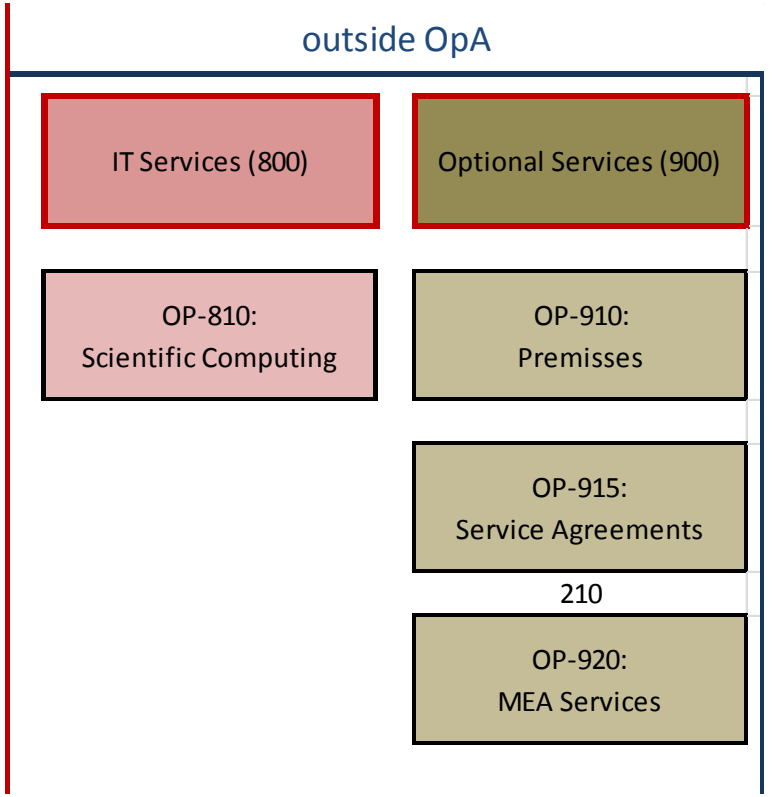
- OP structure is folded into (one of more) cost centers
  - "Talking" cost centers, e.g. 7921010617

79				XFEL operation at DESY
79	210			OP-210: HP RF System
79	210	30		Standard operation, e.g. R&D 20
79	210	30	617	DESY group MHFp

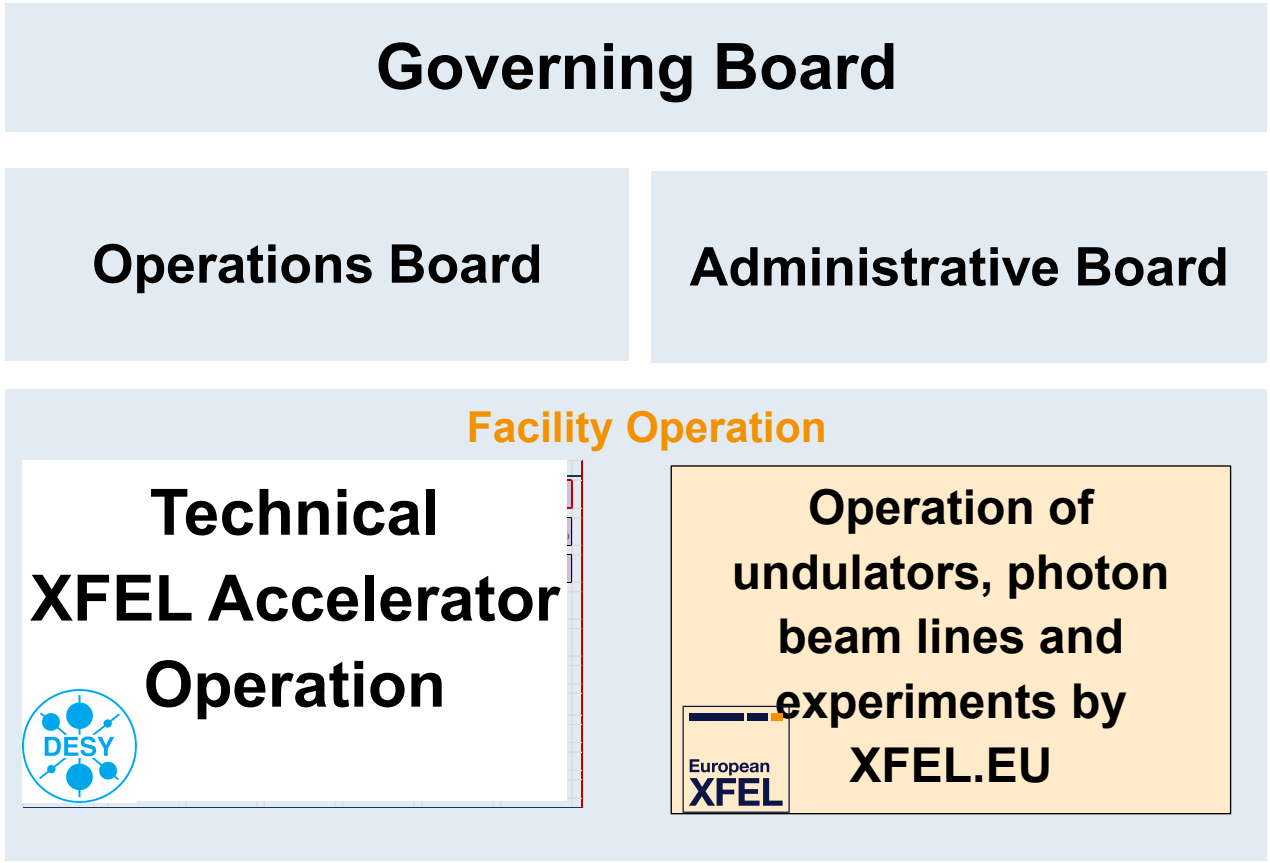
- Incorporates "general" services @DESY: typical infrastructure costs
  - OP-600 Block: Administration
    - ► Building services, purchasing

Optional Services incorporated

- Optional are services outside of OPA which XFEL.EU "orders" from DESY
  - Could be provided by someone else
  - e.g. Scientific computing, service agreements etc
- Optional services can be easily incorporated
  - One accounting and reporting format
- Easily extendible



Extended Orga Structure – (formal) Interaction with XFEL.EU



- Operations Board
  - Technical, scientific aspects
- Administrative Board
  - Adm. and financial aspects
  - Common meetings with Operations Board foreseen
- Governing Board
  - DESY DIR and XFEL Management Board

Operations Board *)

- **Coordinates the technical and scientific operation** of the accelerator
  - Under consideration of all safety relevant aspects
- Coordination of **operational and service parameters**
- Coordination of **schedules** for user operation, other operational times, maintenance, and further developments of the facility
- Preliminary coordination of the service catalogue
- Coordination on measures to **adhere to the agreed budget**
- Exchange of experiences and development of proposals for improvement of the facility operation
- Preliminary coordination of the **R&D program** for the accelerator further development

*) translated from the draft of the OPA

Administrative Board *)

- Coordinates the **administrative and financial aspects** of implementing the Operation Agreement
- Preliminary coordination of the contractual budgets
- **Monitoring** of the budget planning, budget implementation and final accounting
- Coordination on **control and reporting** in the context of the agreement
- Quality control of the (OPA related) administrative processes (at DESY and XFEL.EU)
- **Common sessions with Operations Board foreseen for budget discussion**

*) translated from the draft of the OPA

Governing Board *)

- **Coordinates all matters of strategic or otherwise superior significance**
- Composed of members of the **DESY directorate and the XFEL Management Board**
  - Meets at least once per month
- Coordination on the **contractual budgets** and DESY services in connection therewith
- Coordination on **significant changes to the agreed budgets** and / or DESY services therewith
- Coordination on the **R&D program** for the further development of the accelerator

*) translated from the draft of the OPA

Spares Policy

Urgent Spares

- Single point of failures and/or item very long lead times
- Components maybe not available at a later time
- Later fabrication (not with series) may be very expensive
- **Provided as part of DESY IKC Commissioning**
  - Exception: 2 spare modulator already available from advance on operations budget

Urgent Spares

- High power RF system
  - 2 pulse transformers, 7 PT connection modules, (some) wave guides, RF interlock
- LLRF for 1 complete RF station
- Power coupler electronics
- 3.9 GHz system
  - module, modulator, klystron
- Electronics for BPM, toroids, dark current monitors
- Cryogenic spares for compressors, valves, actuators

Spares as Part of the Accelerator Operation Budget

- Budget 2018 = **harmonized budget**
  - Replacement cost distributed evenly over the expected life time or 10 years
- Later budget estimates will include planned spare purchases for that budget year
  - With harmonized approach not too large deviations are expected
- Spares will be purchase **“on stock” within the agreed on operation budget**
  - If actual running cost stay below budget advanced purchasing of spares whenever possible
  - Based on necessity
- Special case: klystron (as consumables)
  - “call order” of a particular number over a few years (currently 9 klystrons over 3 years)
  - **Risk:** since all klystron commissioned and run for same period of time → preventive replacement will be necessary

Already Purchased Spares (from operation budget of commissioning phase)

- All urgent spares as part of DESY IKC
- Additional wave guide components
- Spare components for modulator repair
  - 2 full spare modulators available to “cannibalize”
  - General approach: repair “active” modulator “in-situ”
- “call-order” for klystrons close to be placed
  - Plan: qualify a 3rd vendor
- Commercial “back-up” laser with Gaussian beam profile (transfer DESY → XFEL.EU tbc)
  - “lab ready”
- Assorted other components: vacuum, power supplies etc

Summary

- Accelerator Operation is structured in **Operation Packages** (OPs)
  - **OP Leader** (technically) responsible for the task execution and OP budget
- **OP-100: Overall budget responsibility and control**
  - Within the agreed on accelerator budget of XFEL
    - ► Move funds between OPs if necessary
    - ► Pre-purchase spares if funds are available
- **Urgent spares already available** as DESY Commissioning IKC
  - e.g. RF, LLRF, 3.9 GHz system, electronics (coupler, diagnostics), cryo
- Current (2018) budget: cost for spares harmonized over life-time duration
  - Explicit, planned spare costs enter into budget plans 2019ff
  - high risk on components with limited life-time and commissioned at same time
    - ► Preventive replacement probably necessary