Linac2 and Linac3

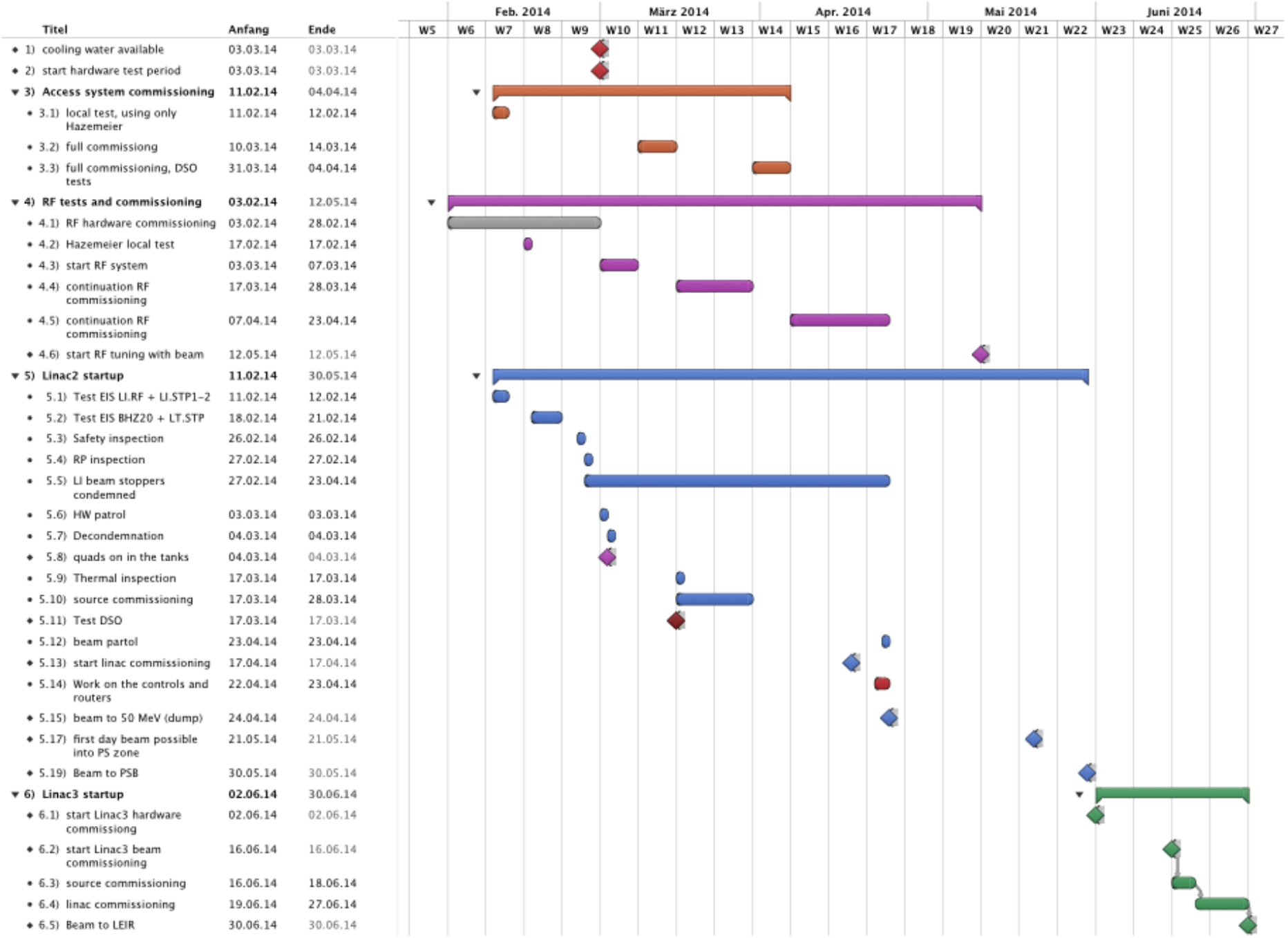
D. Küchler for the linac team

Planning

- first preparative meeting for the start-up of Linac2 in June 2013
  - this early kick-off useful as there were many open questions to solve
  - this early kick-off was problematic as some people were not interested that early in time or already forget the schedule when actual work had to start
- linac specialists and representatives of the different equipment groups invited (not all showed up)
- Linac3 only briefly mentioned, as it was only second priority (not a lead beam for physics)

Planning

- schedule fixed in December 2013
- some fine tuning was needed later on to adapt to external requests (e.g. access system commissioning)
- start-up of Linac2 and Linac3 staggered as many people had to work on both machines
- as the linacs are the first machines to start the availability of water, electricity, access and the controls define a hard edge



Titel	Anfang	Ende
1) cooling water available	03.03.14	03.03.14
2) start hardware test period	03.03.14	03.03.14
3) Access system commissioning	**11.02.14**	04.04.14
3.1) local test, using only Hazemeier	11.02.14	12.02.14
3.2) full commissiong	10.03.14	14.03.14
3.3) full commissioning, DSO tests	31.03.14	04.04.14
4) RF tests and commissioning	**03.02.14**	12.05.14
4.1) RF hardware commissioning	03.02.14	28.02.14
4.2) Hazemeier local test	17.02.14	17.02.14
4.3) start RF system	03.03.14	07.03.14
4.4) continuation RF commissioning	17.03.14	28.03.14
4.5) continuation RF commissioning	07.04.14	23.04.14
4.6) start RF tuning with beam	12.05.14	12.05.14
5) Linac2 startup	**11.02.14**	30.05.14
5.1) Test EIS LI.RF + LI.STP1-2	11.02.14	12.02.14
5.2) Test EIS BHZ20 + LT.STP	18.02.14	21.02.14
5.3) Safety inspection	26.02.14	26.02.14
5.4) RP inspection	27.02.14	27.02.14
5.5) LI beam stoppers condemned	27.02.14	23.04.14
5.6) HW patrol	03.03.14	03.03.14
5.7) Decondemnation	04.03.14	04.03.14
5.8) quads on in the tanks	04.03.14	04.03.14
5.9) Thermal inspection	17.03.14	17.03.14
5.10) source commissioning	17.03.14	28.03.14
5.11) Test DSO	17.03.14	17.03.14
5.12) beam partol	23.04.14	23.04.14
5.13) start linac commissioning	17.04.14	17.04.14
5.14) Work on the controls and routers	22.04.14	23.04.14
5.15) beam to 50 MeV (dump)	24.04.14	24.04.14
5.17) first day beam possible into PS zone	21.05.14	21.05.14
5.19) Beam to PSB	30.05.14	30.05.14
6) Linac3 startup	**02.06.14**	30.06.14
6.1) start Linac3 hardware commissiong	02.06.14	02.06.14
6.2) start Linac3 beam commissioning	16.06.14	16.06.14
6.3) source commissioning	16.06.14	18.06.14
6.4) linac commissioning	19.06.14	27.06.14
6.5) Beam to LEIR	30.06.14	30.06.14

Coordination

- by the technical coordinator for the hardware phase in cooperation with the equipment groups and there local coordination
- by the machine coordinator for the commissioning and the start-up with beam
- sometimes it seemed that the global schedule defined by us was not integrated in the local schedule of the equipment groups

Commissioning

- during the commissioning short meetings every Monday morning to discuss the status
- meetings for the dry run preparation and debriefing
- the commissioning was done by the linac specialists with the help of some of the equipment specialists
- a check list was prepared but hardly used
- informations were exchanged verbally or by email
- (nearly) all the progress was tracked in the elogbook

Commissioning

- hardware commissioning period is only lightly coordinated for safety specific points – so for example TE-EPC are given the full period to test power convertors, but this is not planned in detail except for EIS devices
- RF commissioning impacted by its definition as an EIS-M (and newly included into the Access System)
  - dramatic reduction on the amount of testing time available
  - now much tighter co-ordination and higher flexibility from the RF personnel needed

Commissioning

- most beam diagnostic systems (hardware, controls software and applications) could only undergo limited testing before the beam was available – hence a lot of the beam commissioning time was spent on the diagnostics
- procedure for the change between operation modes out of date, short addendum written to have some base
- procedure has to be re-written based on the experiences gained after LS1
- the CCC enters the game when the beam is handed over to PSB respectively LEIR

Tests

- many vertical tests during the dry runs
- as the linacs are the first machines during the start-up a lot of basic control tests had to be done (working sets, knobs, applications …) to find and remove general bugs
- dedicated test for the SIS watchdog and for the interlock chassis (written procedure available)

The bad bits

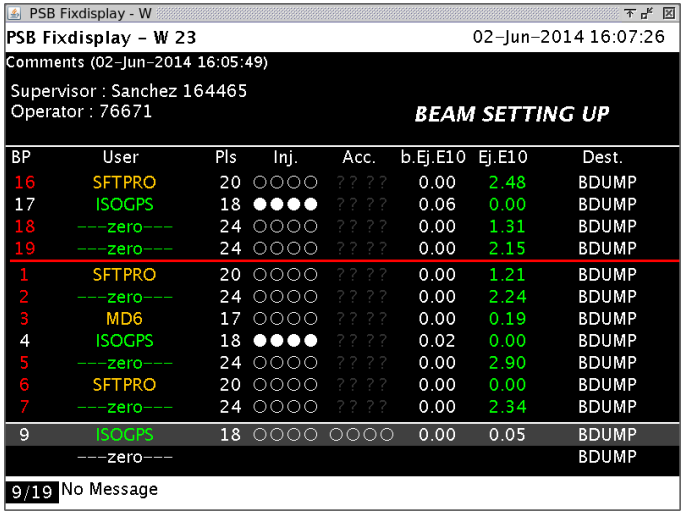
- equipment groups did not request test time for renovated equipment before the start (which was needed as seen later)
- responsibilities between operation, equipment specialists and controls was not always clear
- development of some software components started very late (RF FESA class), inability to control the machine remotely led to lost time
- BCT settings were designed overcomplicated, much time lost to get the set-up properly and to have a working ppm copy method (BCT’s needed for the watchdog)

The bad bits

- the scheduling of the access system commissioning should have been done from the beginning with the input from OP (would have avoided some confusion)
- the conditions for handover from Shutdown to Operation were discussed too late (e.g. who would “sign off” that EIS were ready, that shielding was reinstalled correctly, …?)

The good bits

- good support of CO within the ACCOR project
- dry runs where not always successful but very useful to make some progress (all specialists at one place at the same time)
- We made it nearly in time!



Conclusion

The essential element is ***communication*** between all the partners all the time to be able to define and follow a schedule that works including all the necessary steps from the availability of the central services until the delivery of the beam.