Installation and Commissioning Plans

Volker Mertens, 3rd LHC-CP Workshop, 21. 3. 2002

Outline:

Layouts
- Overall
- LSS4 Extraction + TT40
- TI 8

Planning
- Framework
- Details

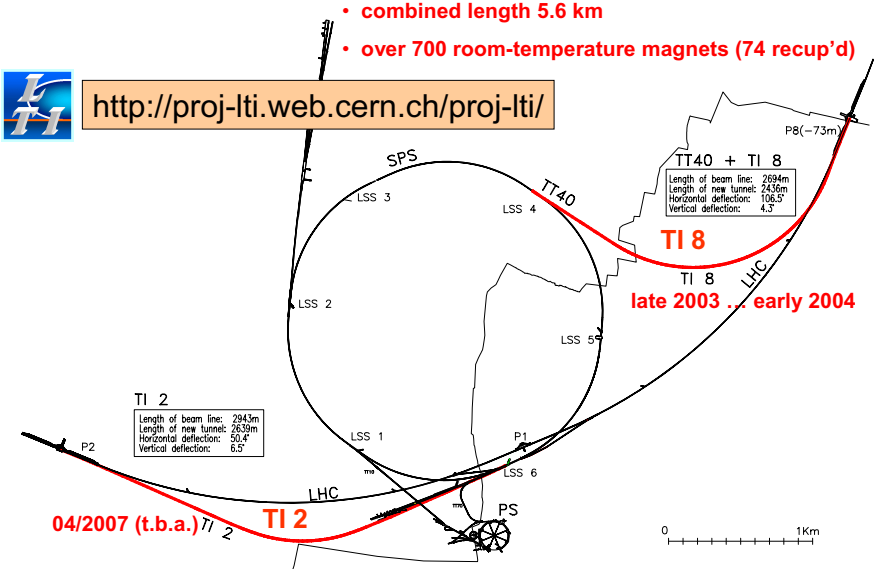
(Commissioning scenarios + SW req'ts)

Summary

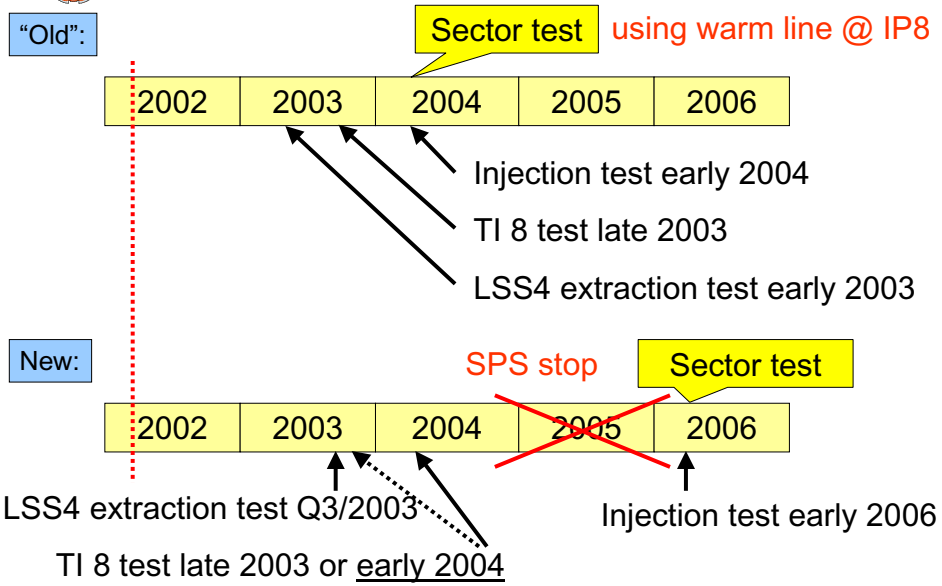
TI 2 / TI 8 overall layout, main milestones

- **combined length 5.6 km**
- **over 700 room-temperature magnets (74 recup'd)**

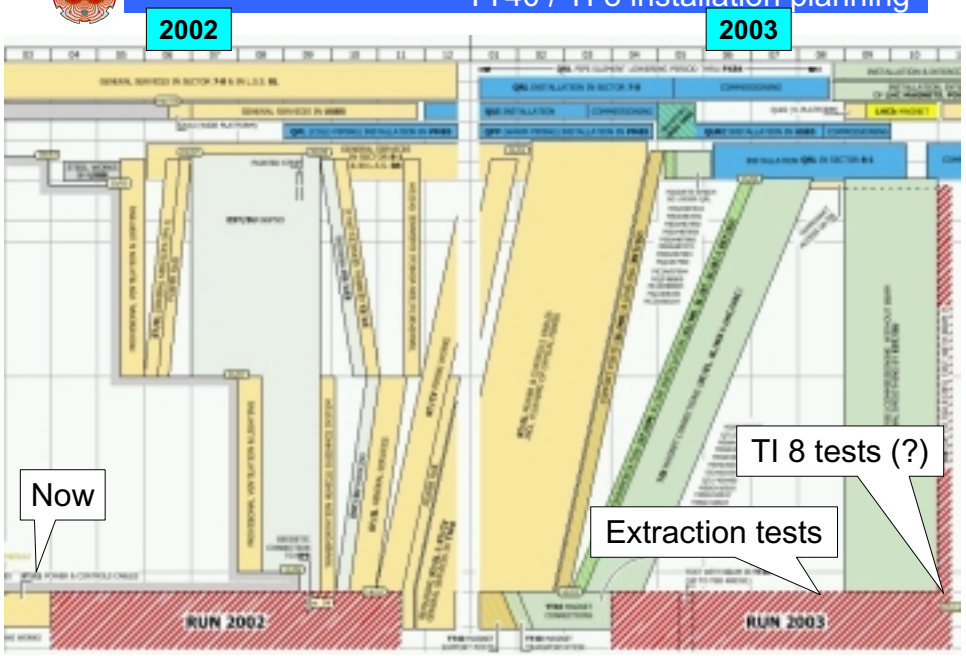
http://proj-lti.web.cern.ch/proj-lti/



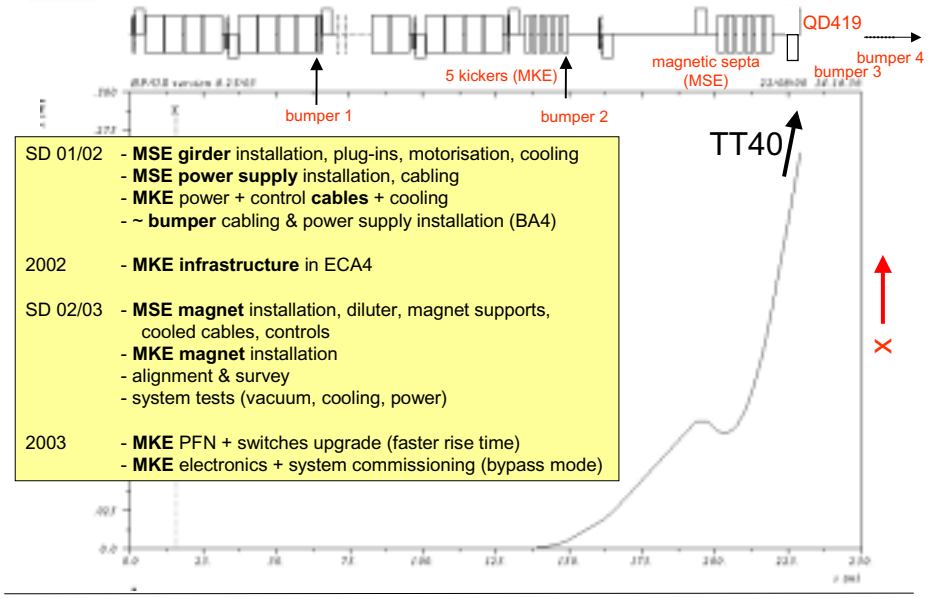
Planning Framework



TT40 / TI 8 installation planning

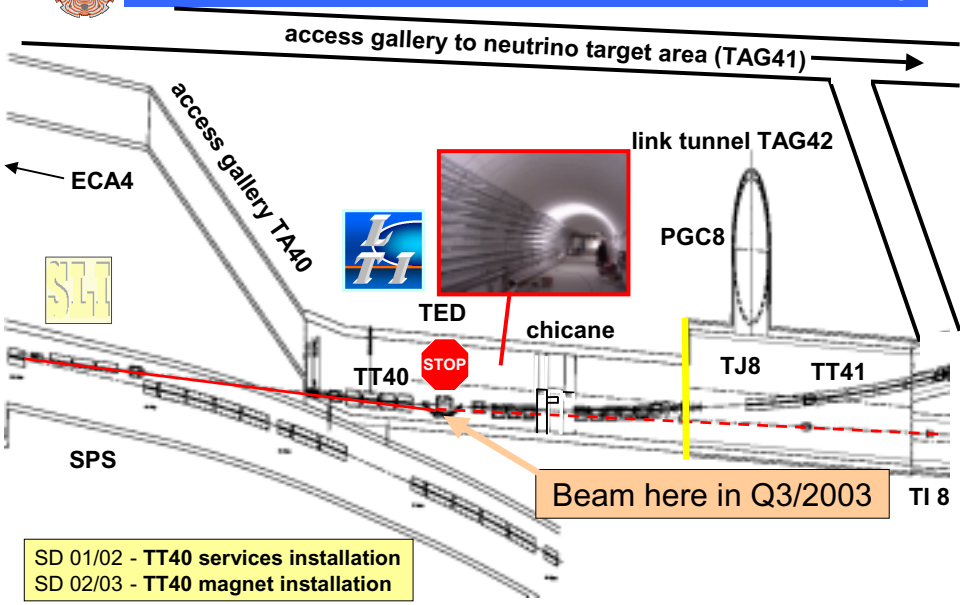


New fast extraction in SPS LSS4 towards TT40

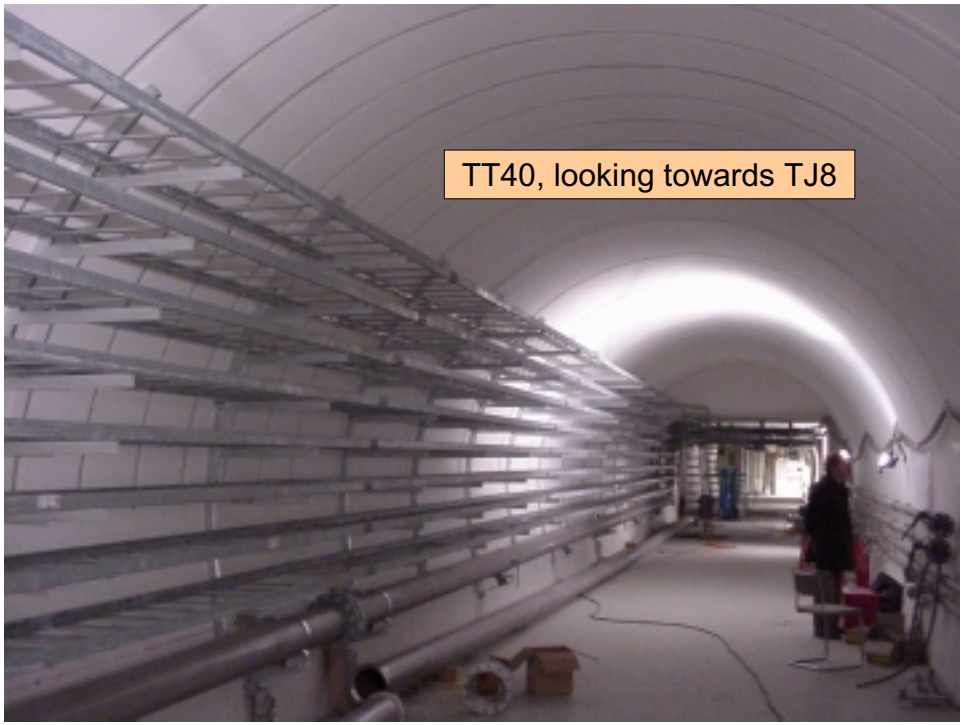


SD 01/02	- **MSE girder** installation, plug-ins, motorisation, cooling - **MSE power supply** installation, cabling - **MKE** power + control **cables** + cooling - ~ **bumper** cabling & power supply installation (BA4)
2002	- **MKE infrastructure** in ECA4
SD 02/03	- **MSE magnet** installation, diluter, magnet supports, cooled cables, controls - **MKE magnet** installation - alignment & survey - system tests (vacuum, cooling, power)
2003	- **MKE** PFN + switches upgrade (faster rise time) - **MKE** electronics + system commissioning (bypass mode)

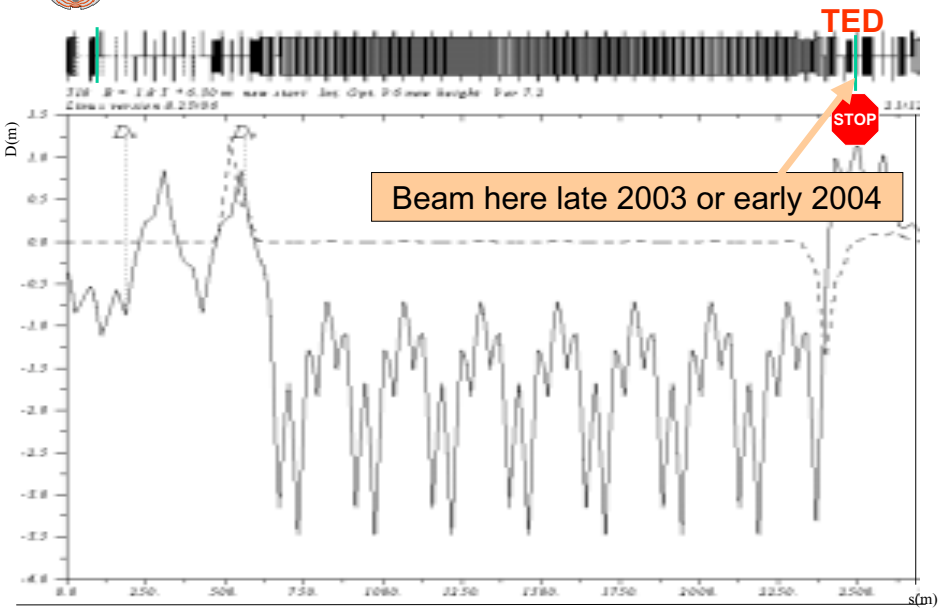
TT40



SD 01/02 - **TT40 services installation**
SD 02/03 - **TT40 magnet installation**



Transfer line TI 8



3-phase installation + commissioning approach

to disentangle potential problems + build upon previous experience

1. SPS extraction / TT40 (up to TED400353)

Q3/2003

test equipment + tune extraction (basic interlocks in place as from now on)
test extraction performance / check for SPS errors (p-to-p reproducibility, drifts ?)
time sharing with bulk installation (TI 8 + main ring) to be agreed
access system must be capable to handle varying conditions safely + efficiently
obviously beam instrumentation required for beam tests

2. Transfer line TI 8 (up to TED87765)

late 2003 or early 2004

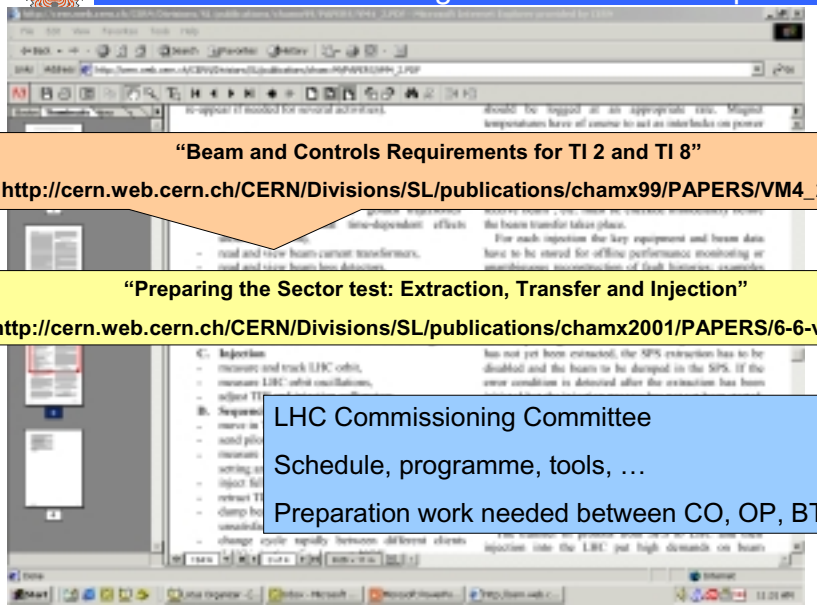
test full-size installation
testbed for new (and all other) electronics
testbed for fresh software (?)
few time available want to concentrate on line – not on SW debugging
investigate behaviour of line (time-dependent effects ?)
set up trajectory correction ← certainly not a one-shot action !
measure optical characteristics (time permitting)

3. LHC injection (in the framework of the sector test)

04/2006

set up injection equipment
test everything before the real thing
seamless link between (SPS,) transfer line, injection and main ring
(injection oscillations, orbit feedback for protection/collimator settings, coherence of instrumentation data, …)
definitive access system fully operational
interlocks primordial (at least at higher intensities)

Commissioning scenarios + SW requirements



"Beam and Controls Requirements for TI 2 and TI 8"

http://cern.web.cern.ch/CERN/Divisions/SL/publications/chamx99/PAPERS/VM4_2.PDF

"Preparing the Sector test: Extraction, Transfer and Injection"

http://cern.web.cern.ch/CERN/Divisions/SL/publications/chamx2001/PAPERS/6-6-vm.pdf

LHC Commissioning Committee

Schedule, programme, tools, …

Preparation work needed between CO, OP, BT, …

Summary

- Installation and commissioning (with beam) in 3 phases:
  - SPS extraction / TT40:**Q3/2003**
  - TI 8: **late 2003 or early 2004**
  - injection elements: **04/2006**
- Planning looks feasible, but not yet "granted" (e.g. extraction kickers very tight).
- Progress + constraints to be closely monitored (equipment + controls HW/SW).
- Interlock solution/planning to be clarified/decided.
- Access requirements/safety chains to be finalized.
- Software requirements to be worked out/agreed.
- A suggestion: try to use TI 8 test as testbed for "final" software.
- SW tools should be ready for equipment tests i.e. several months before the beam tests (pls no "on-line debugging" during MD time).