

TCR Remote Monitoring for the LHC Technical Infrastructure

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- Purpose
- Procedure
- Clients and project organization
- Integration lifecycle
- Problems and solutions
- Conclusion

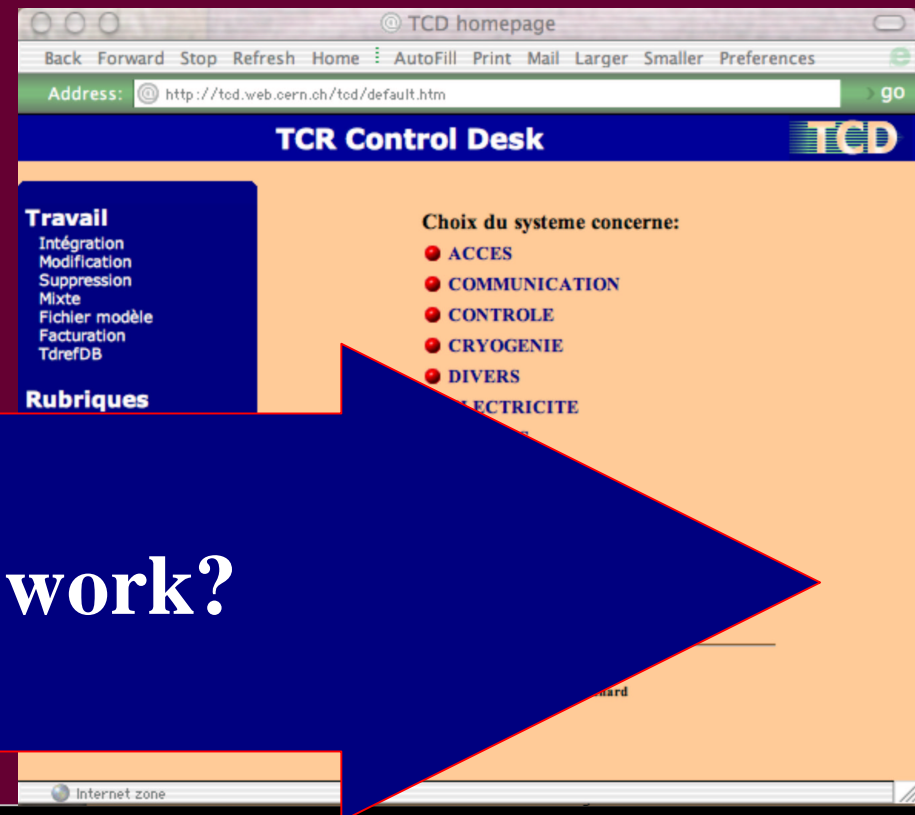
- **Equipment**
 - local installation and responsibility
 - operational 24h/day -> monitoring needed

**Communication
(technical)**

**Communication
(human)**

- **TCR**
 - common control room to monitor equipment from different groups
 - first line intervention by TCR (outside working hours)
 - troubleshooting by the equipment groups

- Easy procedure = TCR Control Desk (TCD)
 - exists since 2000
 - approved procedure (used more than 600 times)
 - covers both:
 - projects
 - operation/maintenance



Equipment Group

TCR and ST/MA/IN

**Announce equipment
installation or change**

Define linkmen (Equipment expert and TCR operator)

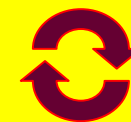
Establish planning

Define data (alarms, signals, mimic diagrams, tools, ...)

Equipment installation

Data integration

**Test
Reception**



Operation and Maintenance Phase

- **ST/EL**
 - **ENS integration**
- **ST/CV**
 - **Water 2000**
 - **LHC ventilation**
 - **Computer centre ventilation**
 - ...
- **ST/MA/AS**
 - **Fire detection**
 - **Gaz detection**
- **Others (mainly for GTPM)**
 - **Vacuum**
 - **Access Control**
 - ...

Project leader

Technical expert

Group linkman

ST/MA linkman

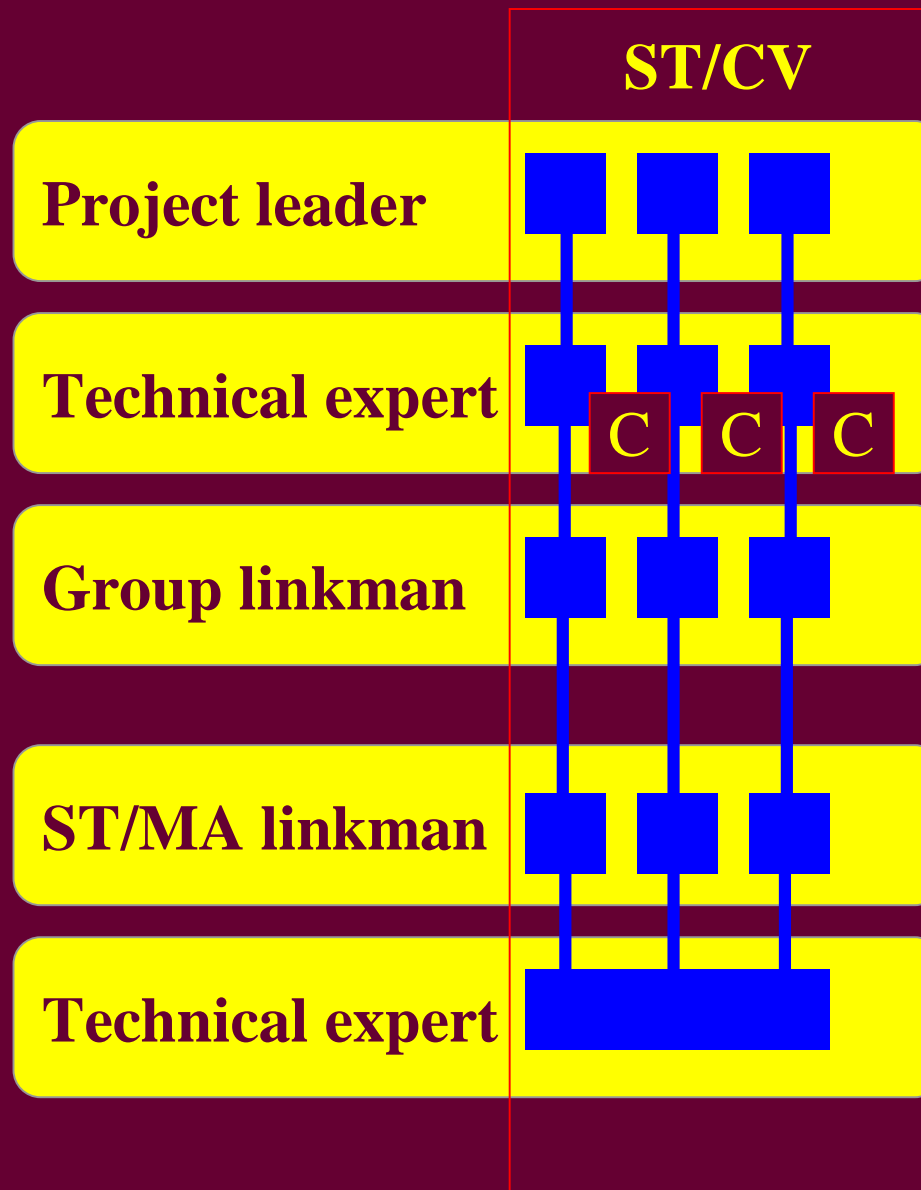
Technical expert

ST/EL Organization



- ST/EL (ENS)
 - One linkman (EL and TCR) for all problems
 - Single data exchange interface (GATEX), one contractor
 - No change from project start to operation phase since 3 years

ST/CV Organization



- **ST/CV**

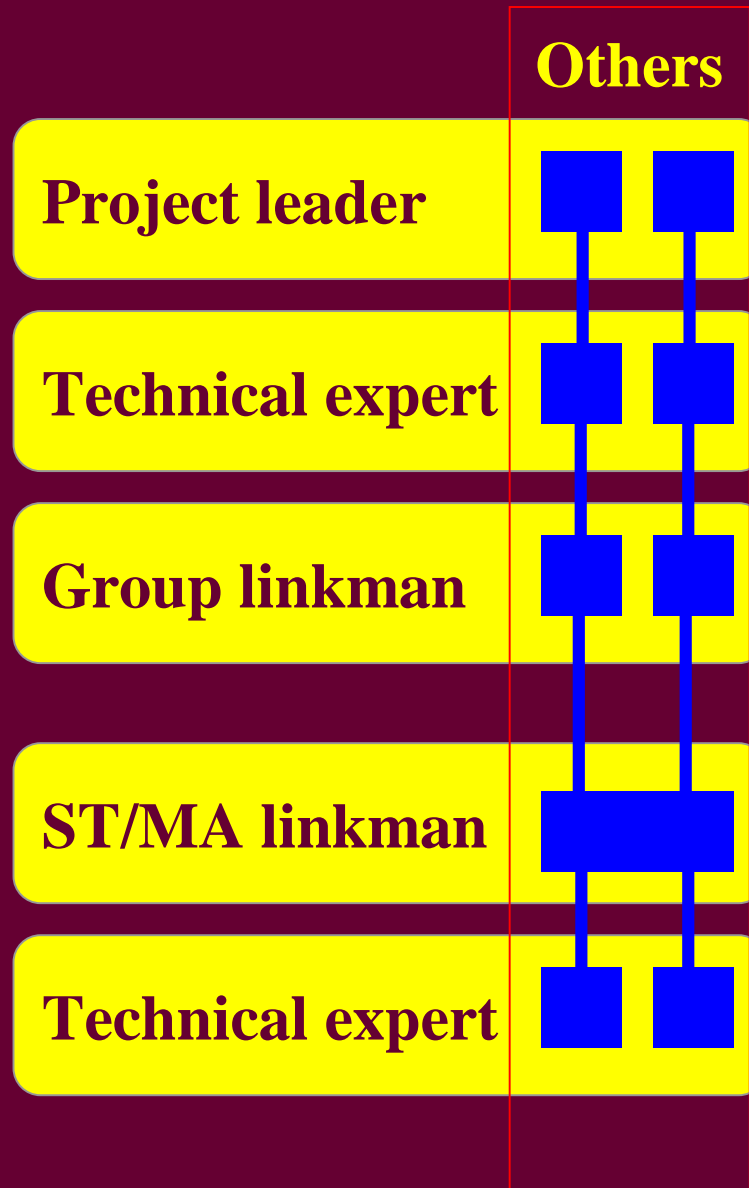
- Linkman per project (CV and TCR)
- 2 data exchange interfaces of 2 different contractors (SCADA-ECs) + direct PLC access (Dsec)
- Project and operation done by different teams

ST/MA/AS Organization



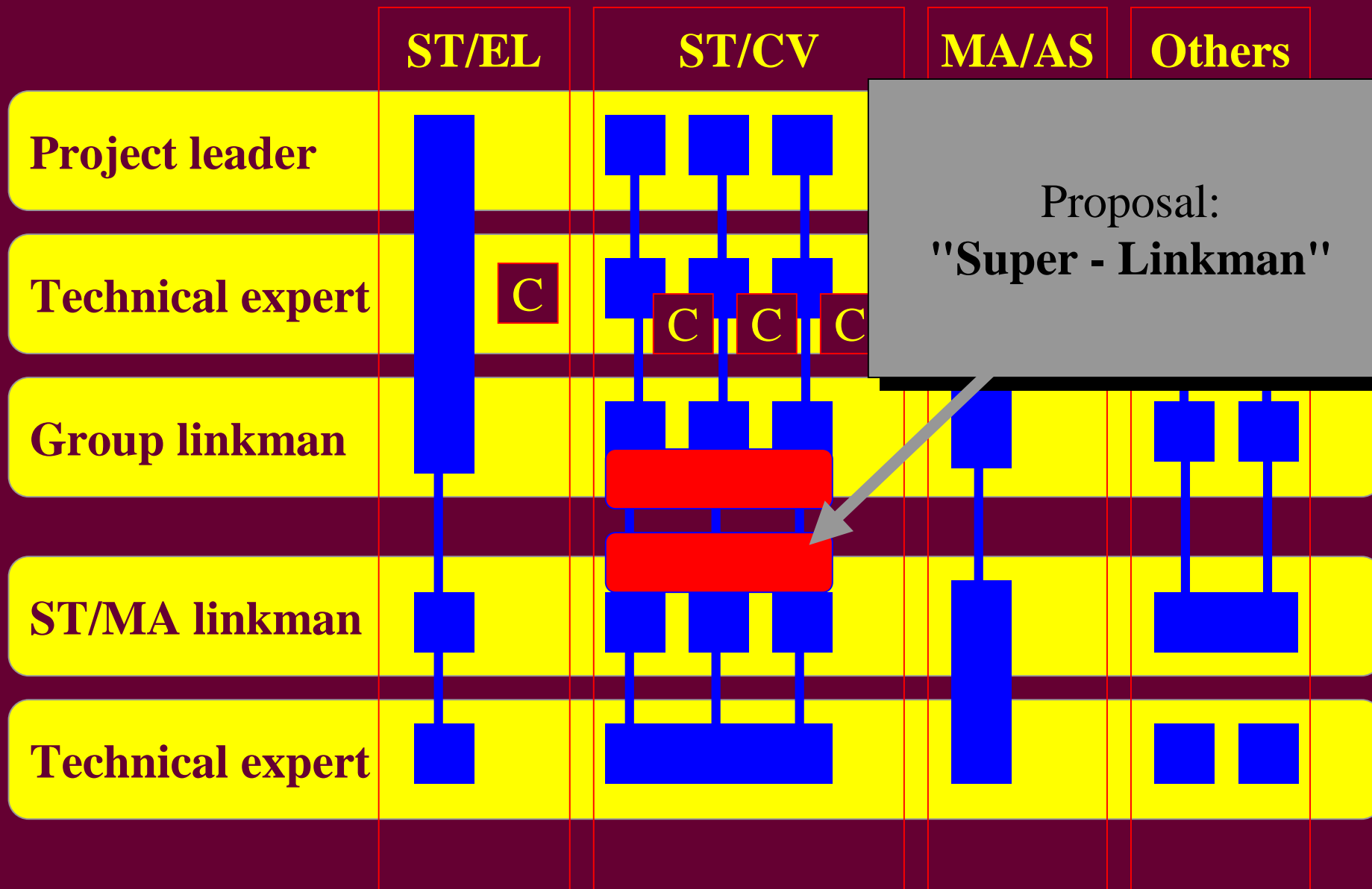
- ST/MA/AS (Fire- and Gaz Detection)
 - One linkman
 - One data exchange interface (PLC, Dsec)
 - Installation, maintenance and upgrades done by ST/MA/IN

Others - Organization

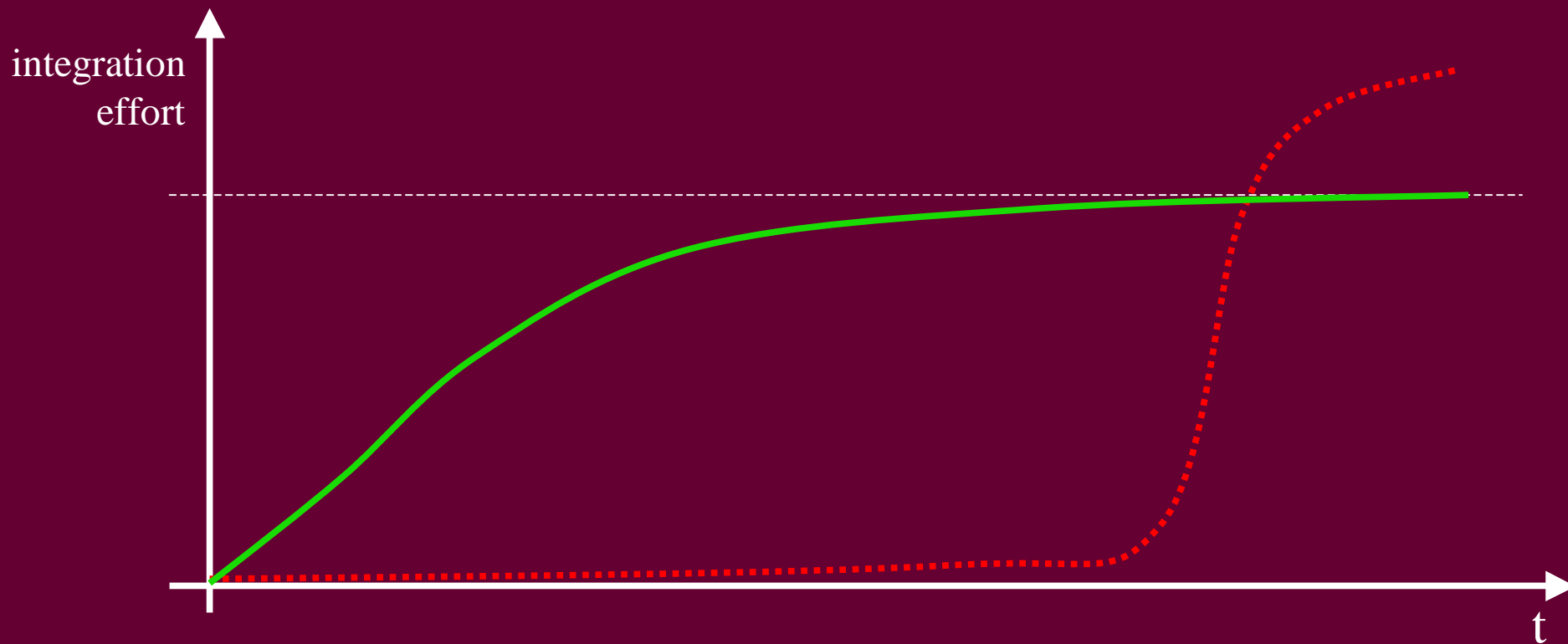
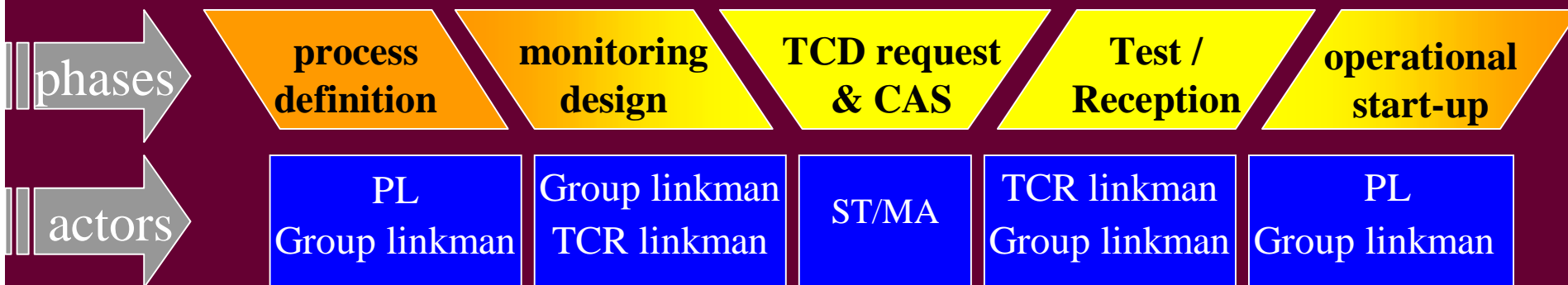


- Others (Vacuum, Access Control, ...)
 - Linkman per group
 - different data exchange interfaces, maintained by ST/MA/IN
 - not critical for operation
 - Alarms handled directly with AB/CO (CAS)
 - Mimic diagrams often delivered by groups

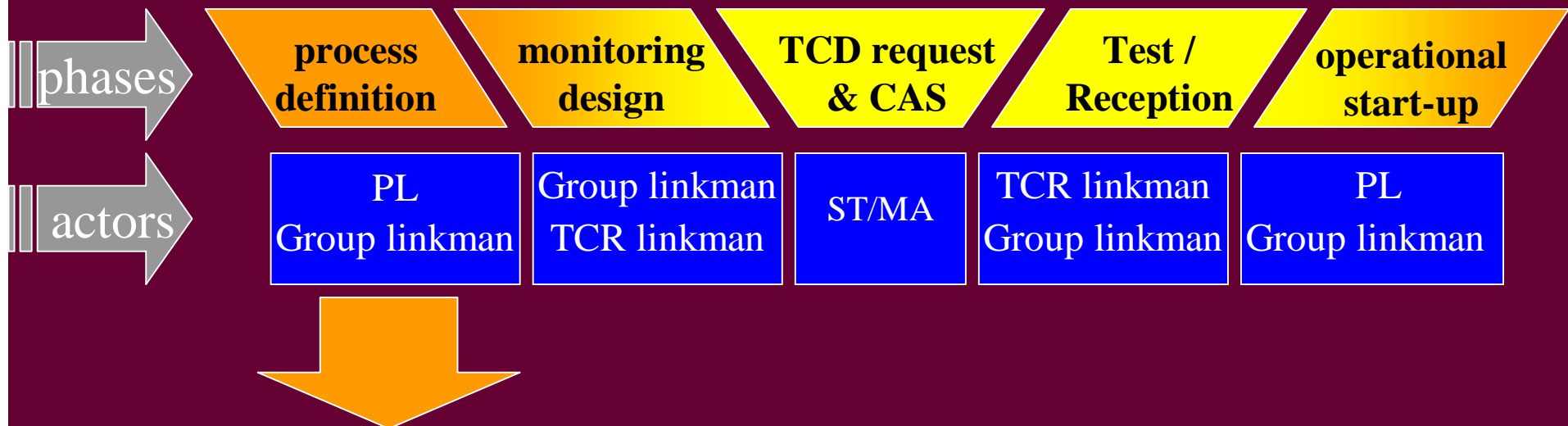
Current Organization



Integration life cycle



Problems and Solutions



- Project launch

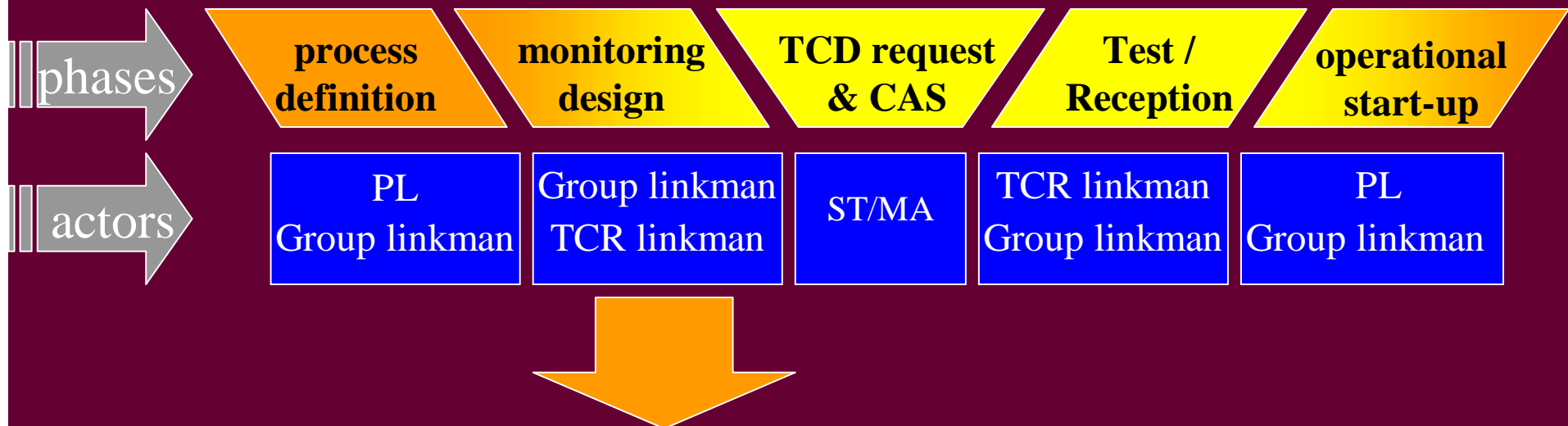
- Planning not always in phase with TCR availability

- define ST/MA linkman from the beginning
 - include TCR integration phase in planning

- TCR tools requirements not known

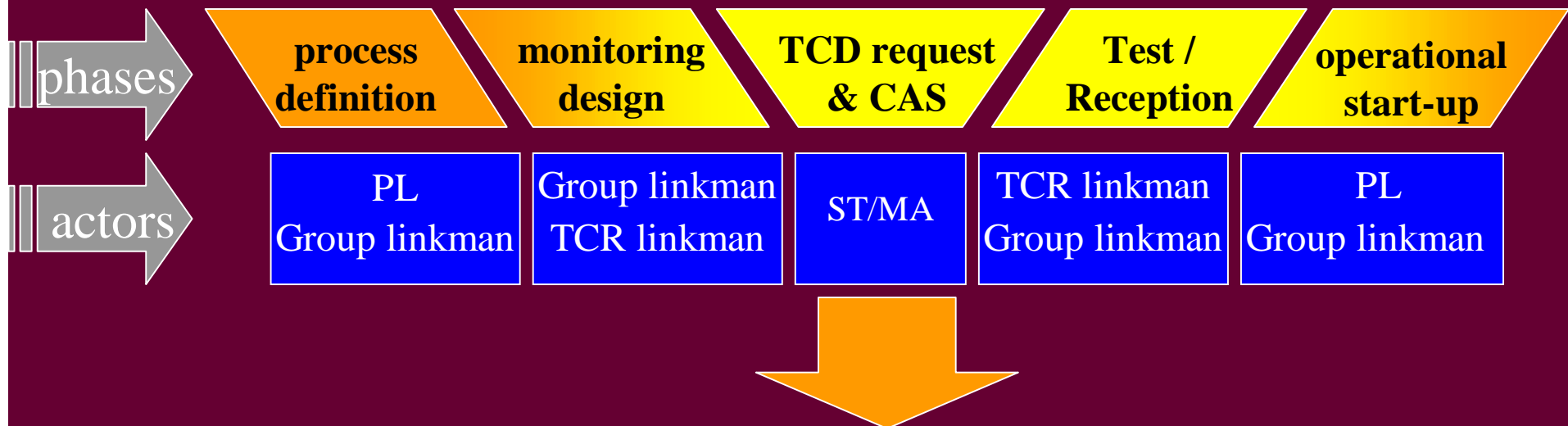
- foresee special development for integration

Problems and Solutions



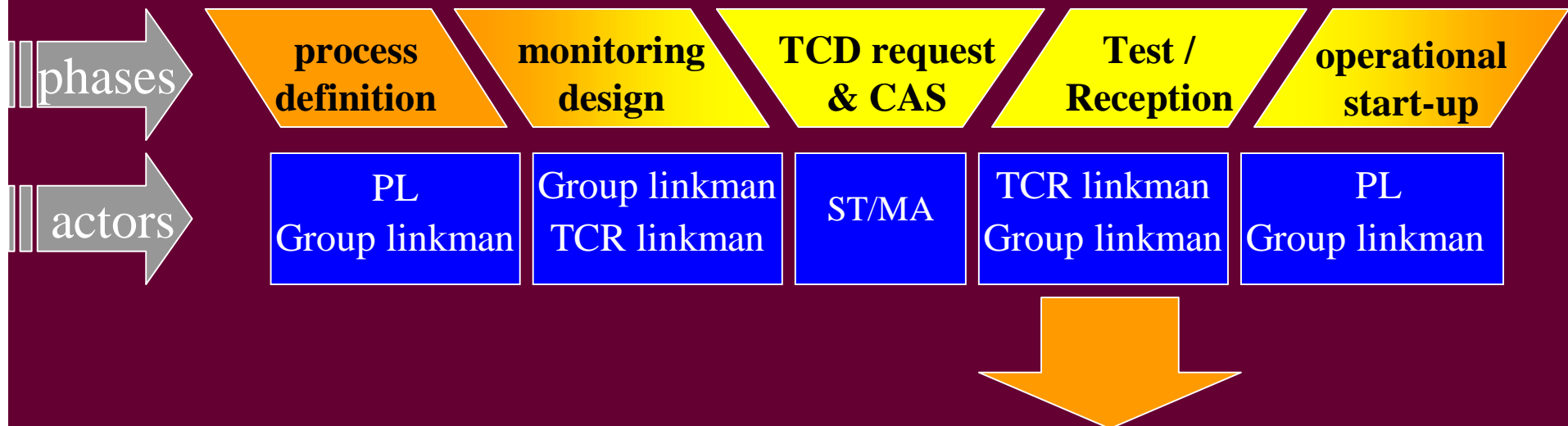
- Operation and Monitoring roles often unclear
 - define monitoring role in early project phase
- Monitoring needs not known
 - invite linkman to all project meetings
 - include this point on the meeting agenda

Problems and Solutions



- Alarm and signal definition
 - careful signal and alarm definition to avoid changes during integration phase
- Mimic Diagrams for TCR
 - use of web based mimic diagrams encouraged
 - development by equipment groups based on TCR-HCI conventions

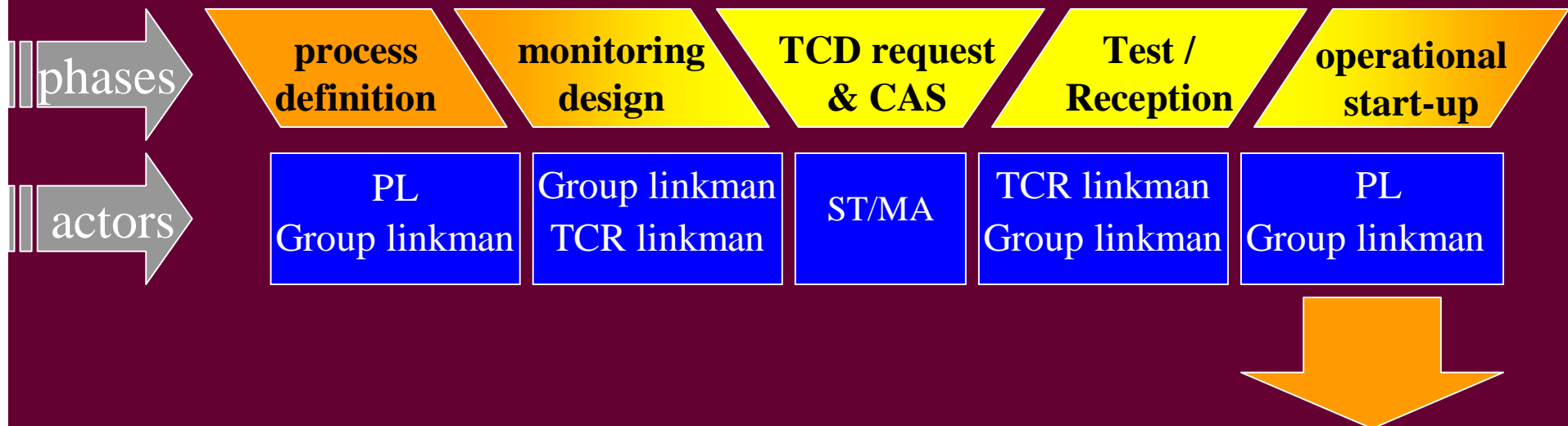
Problems and Solutions



- Reception

- sometimes unclear as equipment runs even if integration tests failed
 - foresee enough time for corrections in case of failed tests
- prepare TCR operator training and clear instructions for troubleshooting

Problems and Solutions



- Operation and maintenance
 - Changes must be coordinated on both sides
 - foresee procedure for changes
 - be prepared for hard- and software evolution (e.g.: OS updates, API changes, ...)

- Technical problems almost solved
- Organizational challenges identified

- Let's do it ...



- Number of linkmen
 - already reduced
 - improvements still possible
- Meetings
 - integration issues now addressed in progress meetings
 - must be included already in design phase
- TCR Mimic Diagrams
 - HCI conventions exist
 - improve common development
- Data Exchange Interfaces
 - Homogenisation envisaged
 - started but not yet finished