Alarms Configuration Management at CERN
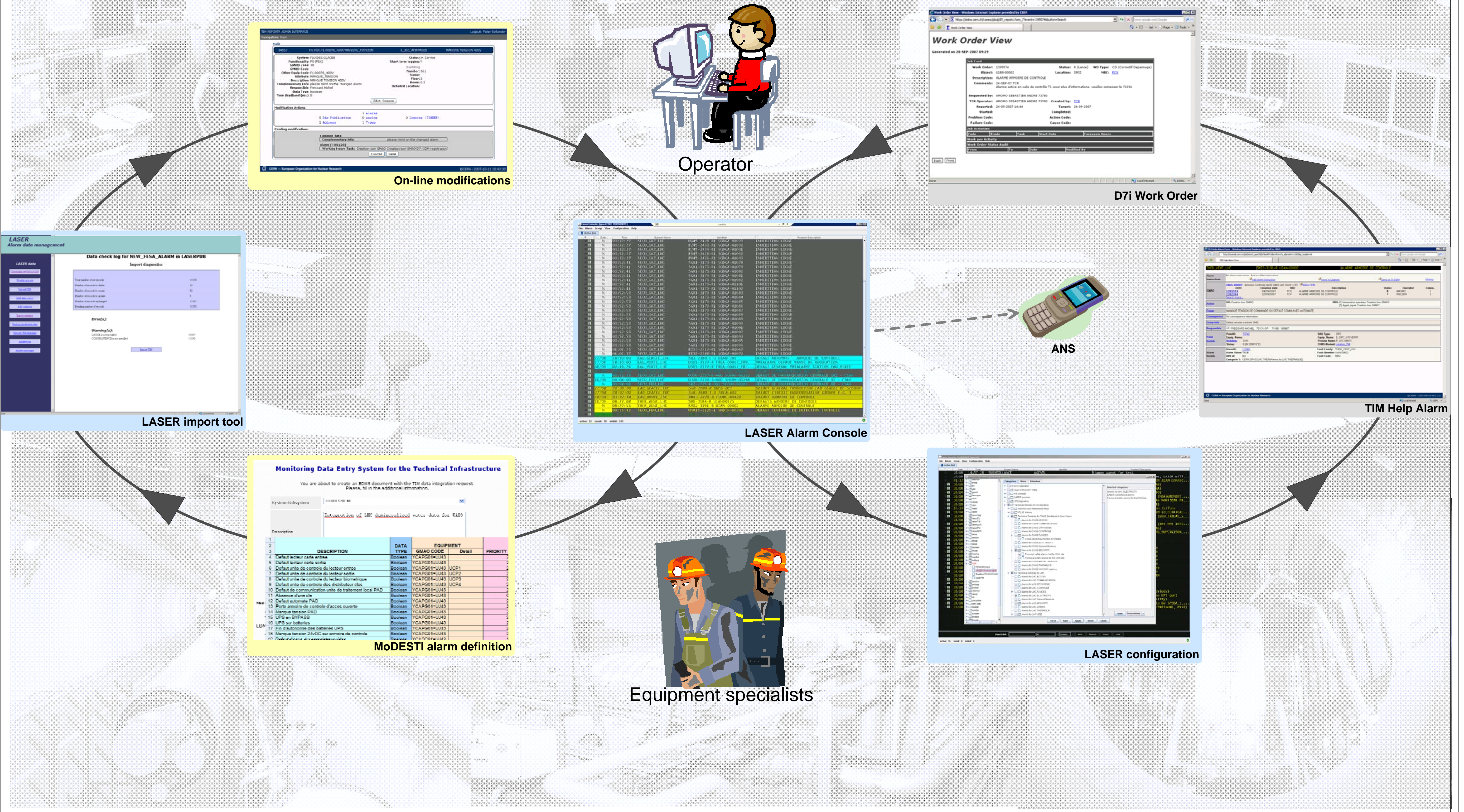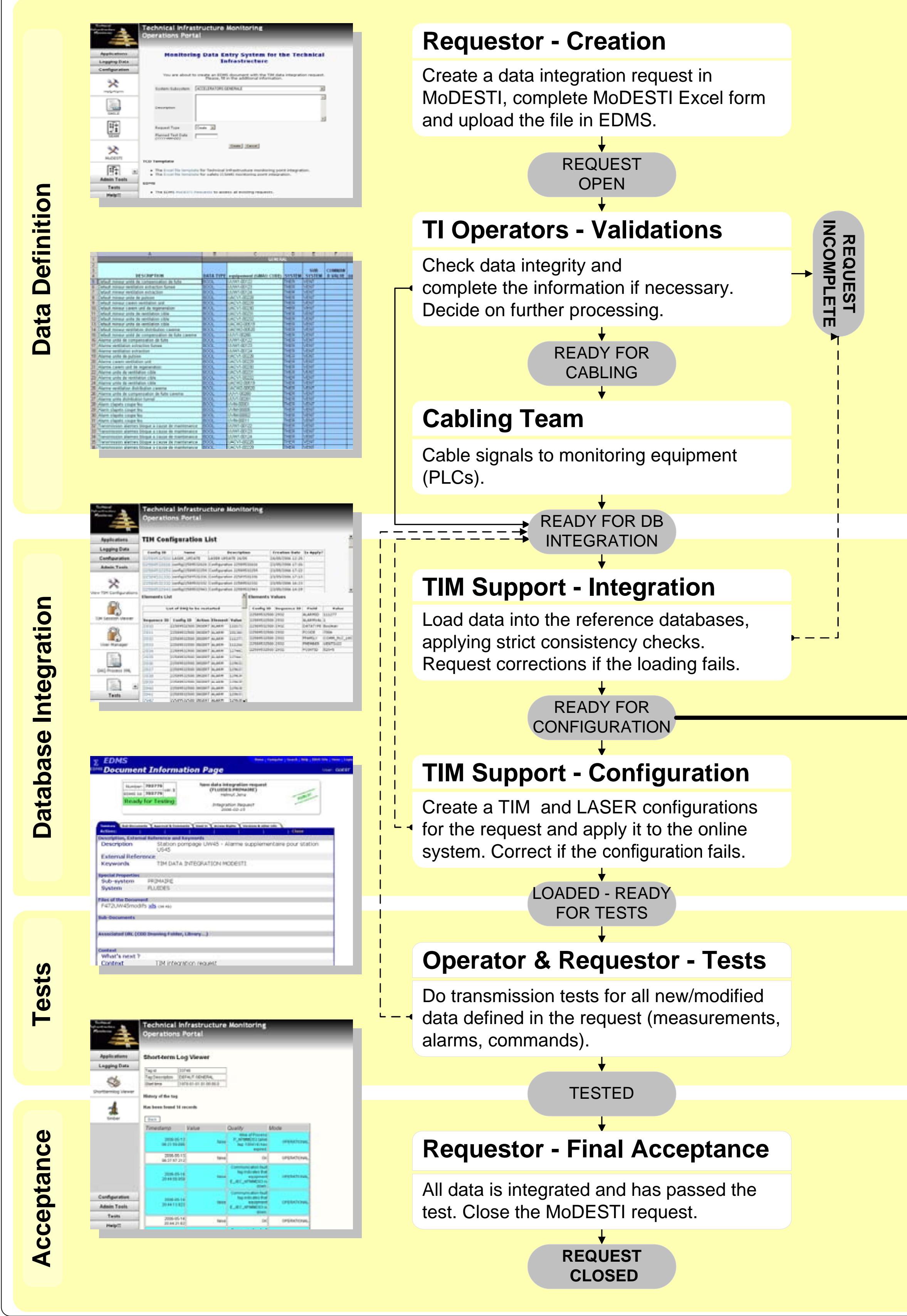
At CERN, there is a constant evolution in technology and equipment. Hundreds of alarm changes are declared every month. This shows how CERN manages the definition, treatment and effective response to alarms.

R. Martini,   K. Sigerud,
P. Sollander,   N. Stapley,
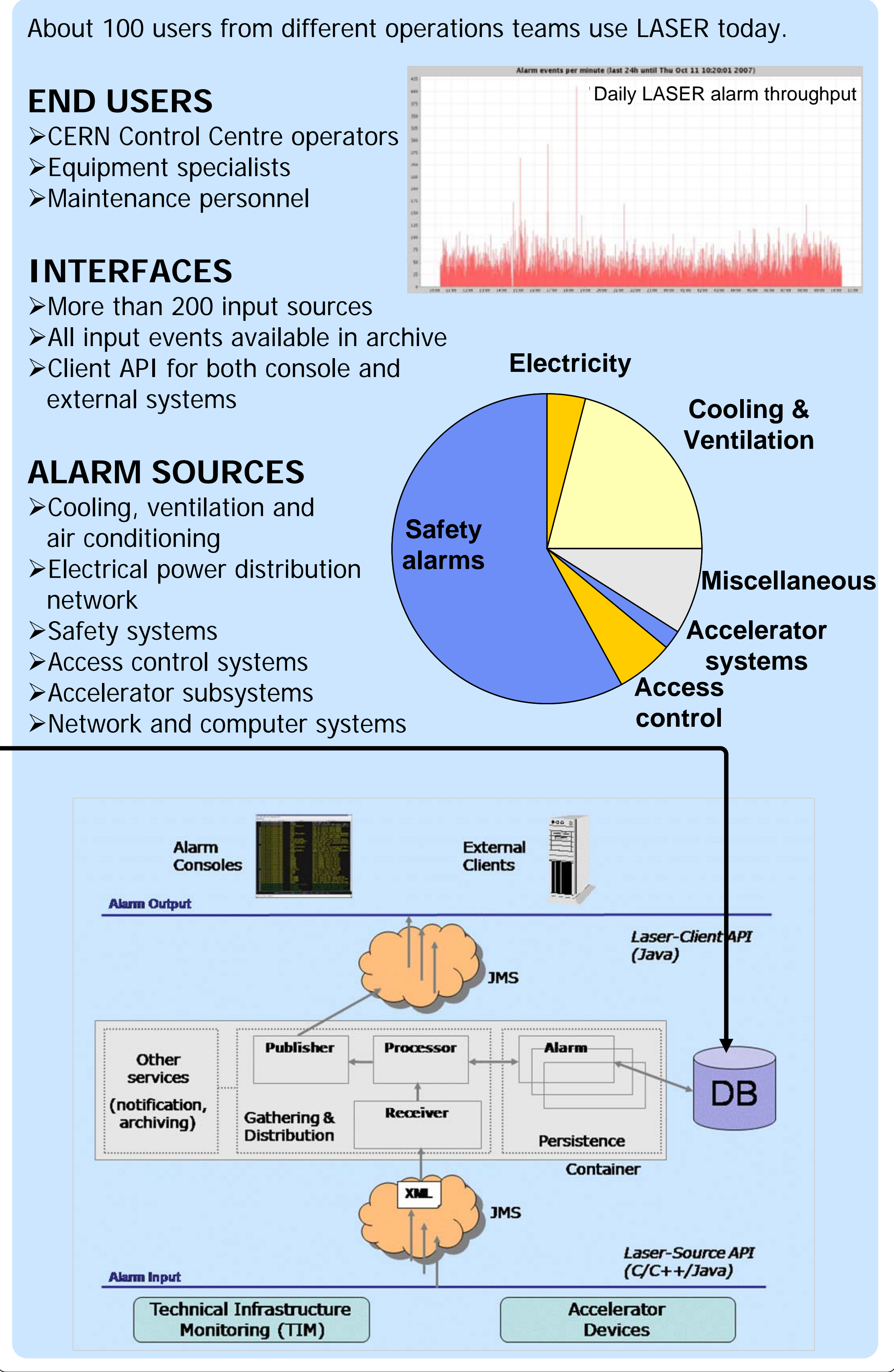A. Suwalska,

CERN, Geneva, Switzerland

Alarm lifecycle

CERN CONTROL CENTRE

- On-line modifications
- Operator
- D7i Work Order
- LASER import tool
- LASER Alarm Console
- ANS
- TIM Help Alarm
- MoDESTI alarm definition
- Equipment specialists
- LASER configuration

Monitoring Data Entry System for TIM (MoDESTI)

Data Definition

Requestor - Creation
Create a data integration request in MoDESTI, complete MoDESTI Excel form and upload the file in EDMS.

REQUEST OPEN

TI Operators - Validations
Check data integrity and complete the information if necessary. Decide on further processing.

REQUEST INCOMPLETE

READY FOR CABLING

Cabling Team
Cable signals to monitoring equipment (PLCs).

Database Integration

READY FOR DB INTEGRATION

TIM Support - Integration
Load data into the reference databases, applying strict consistency checks. Request corrections if the loading fails.

READY FOR CONFIGURATION

TIM Support - Configuration
Create a TIM and LASER configurations for the request and apply it to the online system. Correct if the configuration fails.

LOADED - READY FOR TESTS

Tests

Operator & Requestor - Tests
Do transmission tests for all new/modified data defined in the request (measurements, alarms, commands).

TESTED

Acceptance

Requestor - Final Acceptance
All data is integrated and has passed the test. Close the MoDESTI request.

REQUEST CLOSED

LHC Alarm Service

About 100 users from different operations teams use LASER today.

END USERS
- CERN Control Centre operators
- Equipment specialists
- Maintenance personnel

INTERFACES
- More than 200 input sources
- All input events available in archive
- Client API for both console and external systems

ALARM SOURCES
- Cooling, ventilation and air conditioning
- Electrical power distribution network
- Safety systems
- Access control systems
- Accelerator subsystems
- Network and computer systems

Daily LASER alarm throughput

Pie chart categories: Electricity, Cooling & Ventilation, Safety alarms, Miscellaneous, Accelerator systems, Access control

Alarm Output: Alarm Consoles, External Clients
Laser-Client API (Java)
JMS
Other services (notification, archiving), Publisher, Processor, Alarm
Gathering & Distribution, Receiver, Persistence
DB
Container
XML
JMS
Laser-Source API (C/C++/Java)
Alarm Input: Technical Infrastructure Monitoring (TIM), Accelerator Devices

Tools

Alarm Help
Complete alarm information
Link to CAMMS
Link to alarm instructions
On-line updates

CAMMS
CERN asset management system
Automatically generate work orders
Around 120 per week
Equipment maintenance history

Alarm Notification System
Automatic calls to any phone
Used for call-out teams
Call escalation on failure
Voice, SMS and e-mail messages
Calendar scheduling

Laser Console
Displays alarms
Acknowledge, high-light and mask
Alarm history, archive
Alarm definition search

Alarm Configuration
Categories: subsets of alarms
Changes display behaviour
Filters for priority and systems

Laser import tool
Imports data from external systems
Final verification data correct for LASER
Makes reduction links
Ensures dependent alarms in coherent categories