

Quality assurance - documentation and diagnostic during interventions

Corrective maintenance seen from the
Technical Infrastructure operation

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Outline

- Introduction to TI operation
- D7i at CERN
- Intervention workflow
- Follow-up of interventions
- Statistical analysis of interventions
- Strong and weak points of our system
- Extended use for the accelerator sector?
- Questions

Technical Infrastructure operation

- 24*365 operation from the CCC
- Monitoring
 - Electricity, cooling, ventilation, safety, access control, heavy handling, control systems, vacuum, cryogenics, ...
- Corrective maintenance
 - Dispatch work orders to maintenance teams
 - Perform first-line interventions (if possible)
 - Help users to follow up requests
 - Statistics and general follow up of maintenance activity
- Tools
 - Laser Alarm screens
 - Electrical Network Supervisor (ENS)
 - Technical Infrastructure Monitoring (TIM)
 - Computer Assisted Maintenance Management (CAMMS) DataStream 7i

Alarms

- Main source of events
- Alarms and alarm system must be correct, complete and reliable
- Quality assurance by procedure

Alarm integration procedure

FF,FM,FC, description
Maintenance object
DAQ details
Cause, consequence, actions

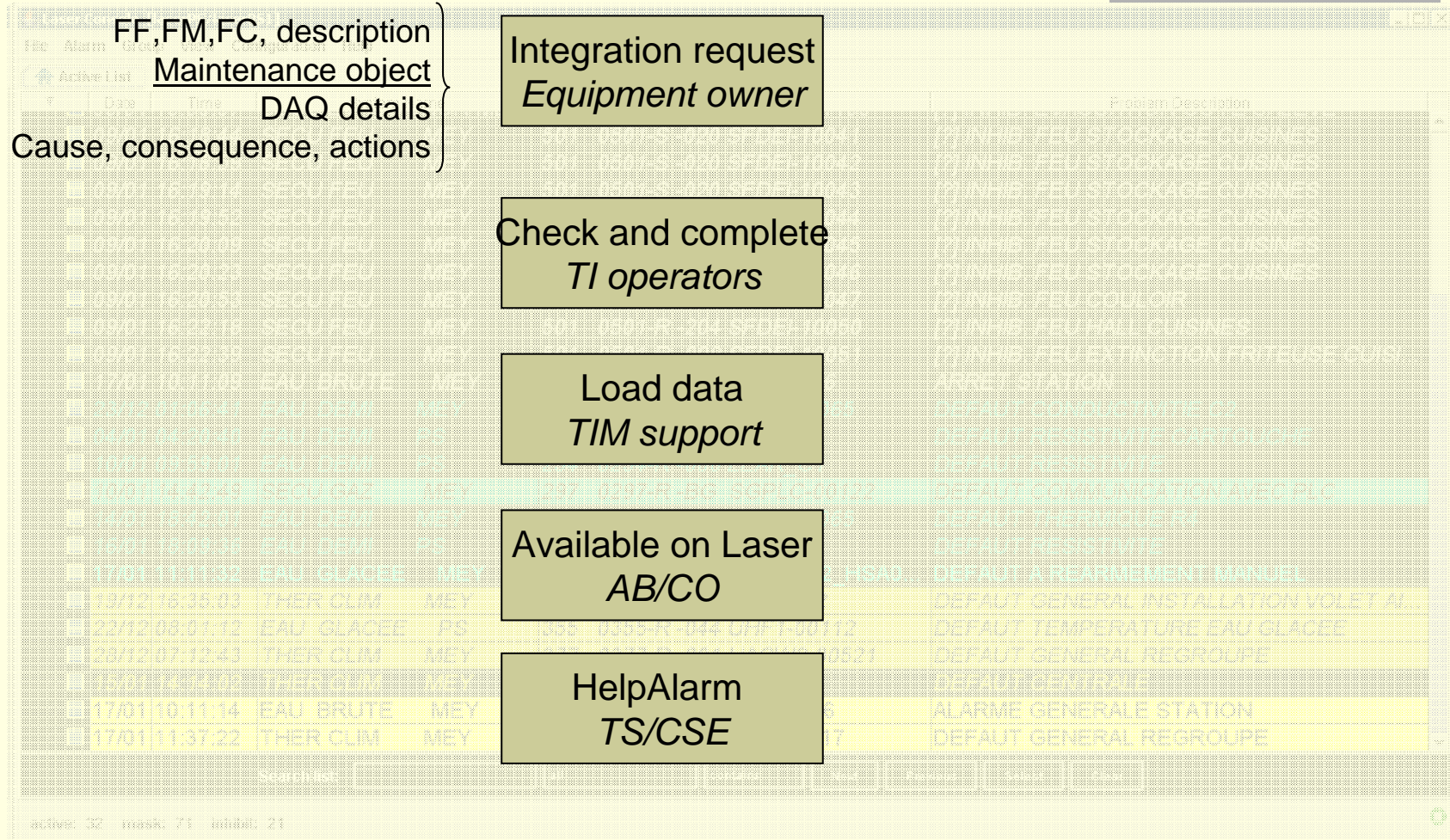
Integration request
Equipment owner

Check and complete
TI operators

Load data
TIM support

Available on Laser
AB/CO

HelpAlarm
TS/CSE



Help Alarm data



Technical Infrastructure Monitoring
HELP ALARM



CERN — European Organization for Nuclear Research

[login](#)

System Name	Identifier	Problem Description	Priority
EAU DEMI MEY	FDED-00054 378 0378--	ALARME LAVEUR DE GAZ	2

Alarm Instructions

From 11-JUL-06 **to** 31-DEC-07
source S. Deval **Shift** All

Consigne Pour les interventions pendant les heures ouvrables, contactez Nalco au 74175.

En cas de non réponse, le contractant pour l'opération et maintenance TS-CV (actuellement Cofathec) sera appelé ainsi que Daniel Gros/160992 ou Guillaume Tranchant/75586.
En dehors des heures ouvrables, le piquet contractant pour l'opération et maintenance TS-CV sera contacté.

[Add a consigne](#)

[Ins](#)

Action Details

[Edit](#)

Working Hours Task: Creation bon GMAO

Outside Working Hours Task: (1) Intervention operateur Creation bon GMAO
(2) Appel piquet Creation bon GMAO

Cause Details

Description : défaut ventilation ou probleme de configuration de vannes

[Edit](#)

Consequence Details

Description : perte de l' extraction gaz local de stockage

[Edit](#)

Responsible

LastName : GROS

FirstName : DANIEL

CAMMS / Datastream7i

- Used at CERN since ~20 years
- Maintenance management
 - Corrective, Preventive
 - TS groups
 - LHC cryo (being implemented)
 - ~350'000 maintenance objects
- Manufacturing
 - LHC project
 - ~500'000 objects

D7i continued

- Objects
 - identifiers e.f. SFDEI-00234
 - Maintenance responsible (MRC)
 - Structured in Systems, Locations and equipment
- Work orders
 - Concern specific objects and MRCs
 - Have state
 - “launched” → accepted → finished
 - Comments inserted along with state changes

D7i – Forms user interface

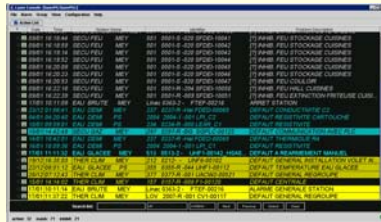
The screenshot displays the D7i Asset Management and Maintenance System interface, showing multiple overlapping windows. The top window is titled "Datastream 7i Asset Management and Maintenance System" and shows a search for "Problem codes [ONRECO] - ?+*X". Below it, a list of codes and descriptions is visible:

Code	Description
*ALA	ALARME
*MF	MAUVAIS
*PF	PAS DE I
*TBF	TESTER
CE45	DEMAND
CSAP	APPEL P
EEER	PANNE E
EEFT	PANNE F
EETL	TUBE LU
EQCH	MANQUE
EQEC	MANQUE
EQPC	MANQUE
EXXX	AUTRE F
FAG	ALARME
FAP	APPEL P
FCE	ALARME

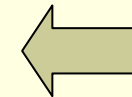
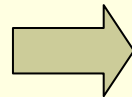
The middle window shows a search for "Action codes [ONACCO] - ?+*X". The bottom window shows a search for "Failure codes [ONFACO] - ?+*X" and displays a list of codes and descriptions:

Code	Description	General
CP29	PROBLEME DE DISTRIBUTION	
CP30	PROBLEME DE CONNEXION	
CP32	PROBLEME INTERFACES	
CP33	PROBLEME REGLETTE DE COUPURE	
CP34	PROBLEME PROGRAMMATION	
CP35	PROBLEME SUR LA LIGNE	
CPHA	DEFAULT HORLOGE	
CPHB	DEFAULT HORLOGE MERE	
CPRA	DEFAULT SUR EMETTEUR	
CPRB	DEFAULT SUR AMPLI HF	
CPRC	DEFAULT SUR ANTENNE, CABLE RAYONNANT	
CPRD	DEFAULT SUR RECEPTEUR	
CPTA	MAUVAISE UTILISATION OU COMPREHENSION	
CPUA	DEFAULT SUR POSTE (Station, pupitre)	
CPUB	DEFAULT SUR LIAISON SPECIALISEE	
CPUC	DEFAULT SUR CENTRAL	

Workflow for on-site interventions



Alarms
~10⁵



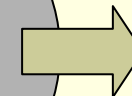
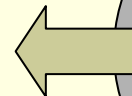
Telephone calls
~25000 (2006)



CAMMS, D7i

Work order
8240 (2006)

TI first-line
323 (2006)
1120 (2004)



Contractor &
CERN
interventions

Preparing requests with D7i

The screenshot displays the 'Datastream 7i Asset Management and Maintenance System' interface. The browser window title is 'Rapid work order/request entry [WMFLOG] - ?+*'. The address bar shows the URL 'Rapid work order/request entry [WMFLOG] - ?+*' with a 'Go' button and an 'Action' dropdown. The main content area has tabs for 'List view', 'Record view', 'Comments', and 'Custom fields'. The 'Record view' tab is active, showing a form for a work order with the following details:

- Work order: 1245323
- Class: []
- Priority: H
- WO type: Correctif Depannage
- Status: Lance
- Equipment: EBD3*71
- Location: 35
- Department: ERM
- Target date: 07-06-2006
- Problem code: []
- First activity trade: []
- Project: []
- Cost code: ETSO#ST-TFM-EL
- Assigned to: []
- Requested by: 1222
- Entered by: TCR
- Shift: []
- Date/time reported: 07-06-2006 11:27

- OR, request created automatically from alarm
 - Object, MRC, text pre-filled
 - Operator completes if necessary and sends

Alarm screens

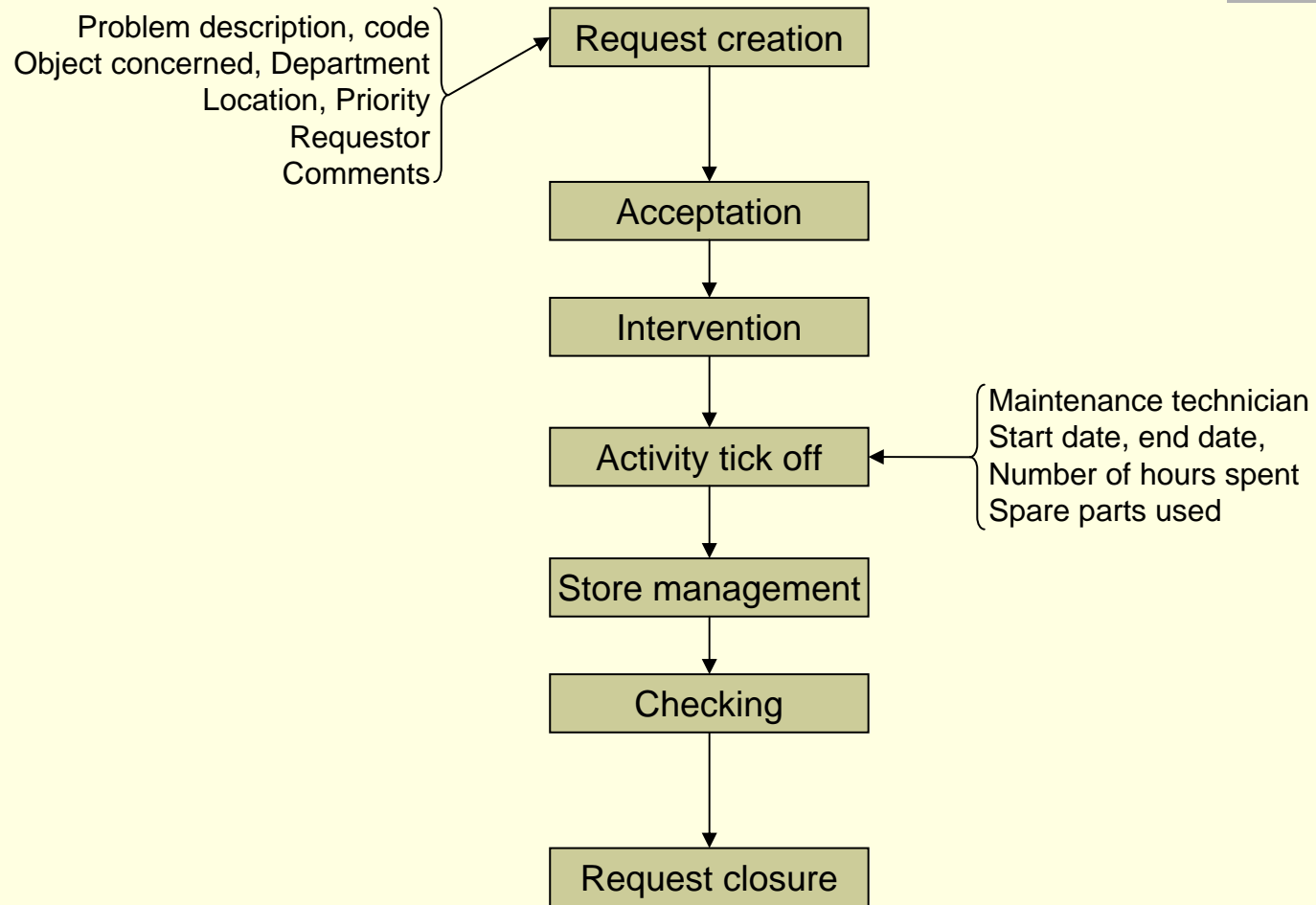
The screenshot shows an alarm screen with a table of alarm entries. A context menu is open over the entry 'REJET LHC UX65 2628- - FPAA'. The menu items are:

- Acknowledge (Ctrl-K)
- Highlight (Ctrl-L)
- Mask (Ctrl-M)
- Inhibit (Ctrl-I)
- Highlight & klaxon (Ctrl-J)
- History (Ctrl-H)
- Details (Ctrl-D)
- Timestamps
- Comment
- Multiplicity children
- Active multiplicity children
- Node children
- Active node children
- Help in web browser
- Make ODM
- Export alarms
- Test action

The background table contains the following visible entries:

Alarm ID	Location	Alarm Description	Priority/Status
DEMI	LHC	UW25 2229-SS- FSED-02229	
BRUTE	LHC	UW45 2429-R - FUC	
FEU	LHC	SU5 3580-R -hal SFD	
REJET	LHC	UX65 2628- - FPAA	
BRUTE	LHC	UX45 2428-R - FPAA	
BRUTE	LHC	UW45 2429-R - FUC	
DEMI	LHC	UW45 2429-R - FSE	
ER VENT	CNG	TSG4 1120-R - UAC	
ER VENT	CNG	TSG4 1120-R - UAC	
ER VENT	LHC	SHM18 3177-RC- UA	

Work order flow



Follow-up of work orders

Datastream 7i Asset Management and Maintenance System

File Edit View Favorites Options Navigate Help Window

Work orders [WM1DE] - ?+*

Address Work orders [WM1DE] - ?+* Go Action Report on work comp...

Documents | Comments* | Custom fields*

List view Record view Comments Custom fields Activities Permits Child work orders Repair parts

Work order 1245323 manque tension sur le depart * ...

Equipment EBD3*71 P TGBT Sous Station 71 *

Project Department ERM ...

WO type Correctif Depannage Status Lance

WO details Equipment Schedule Service request Closing

Class Priority H ...

Problem code Parent work order ...

Standard WO Dependent

Requested by 1222 PRIMA DEI GIACOMO 73166 PM

Shift Work package

Print

Follow-up with in-house tools

ODM detail - Microsoft Internet Explorer provided by CERN

File Edit View Favorites Tools Help

Google Links

ODM number: 1243157 Status: T. (Termine)

Object: UAMT-01451 Type: CD. (Correctif Depannage) date: 28-05-2006 MRC: [FC02](#)

Description: DEFAULT CLIMATISATION Location: SR2 Standart:

Comments:
 Alarme active en salle de contrôle TI, pour plus d'informations, veuillez composer le 72231
 Fusible HS sur moteur pulsion. Remplacement. Isolement OK. Relancé moteur. Intensité = 63A.

Demandeur: VILLETON PACHOT PATRICK 73780
 TCR Operator: VILLETON PACHOT PATRICK 73780
 Target date: 28-05-2006 Duration: 1
 Creator: [TCR](#) Reported: 28-05-2006 05:55 Start: 29-05-2006 08:00 Completed: 29-05-2006 09:00
 Cause: [*CIN](#) Action: Panne: [FFAE](#) Evenement:

Activities

Code:	5	Trade:	FEM	Task:		Startdate:	05-28-2006	Hours forseen:	0
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Work per activities

Act:	5	Trade:	FEM	MRC:	FC02	Person:	THIELAND CEDRIC DANIEL 7XXXXX 163318		
Hours:	0	Rate:	0	Cost:	0	Entered date:	29-MAY-06	Start date:	28-MAY-06

Audit

From:	R	To:	RA	Date:	29-05-2006 08:24	Modified by:	ACHAUMAY
From:	RA	To:	T	Date:	29-05-2006 14:47	Modified by:	AUTELLET

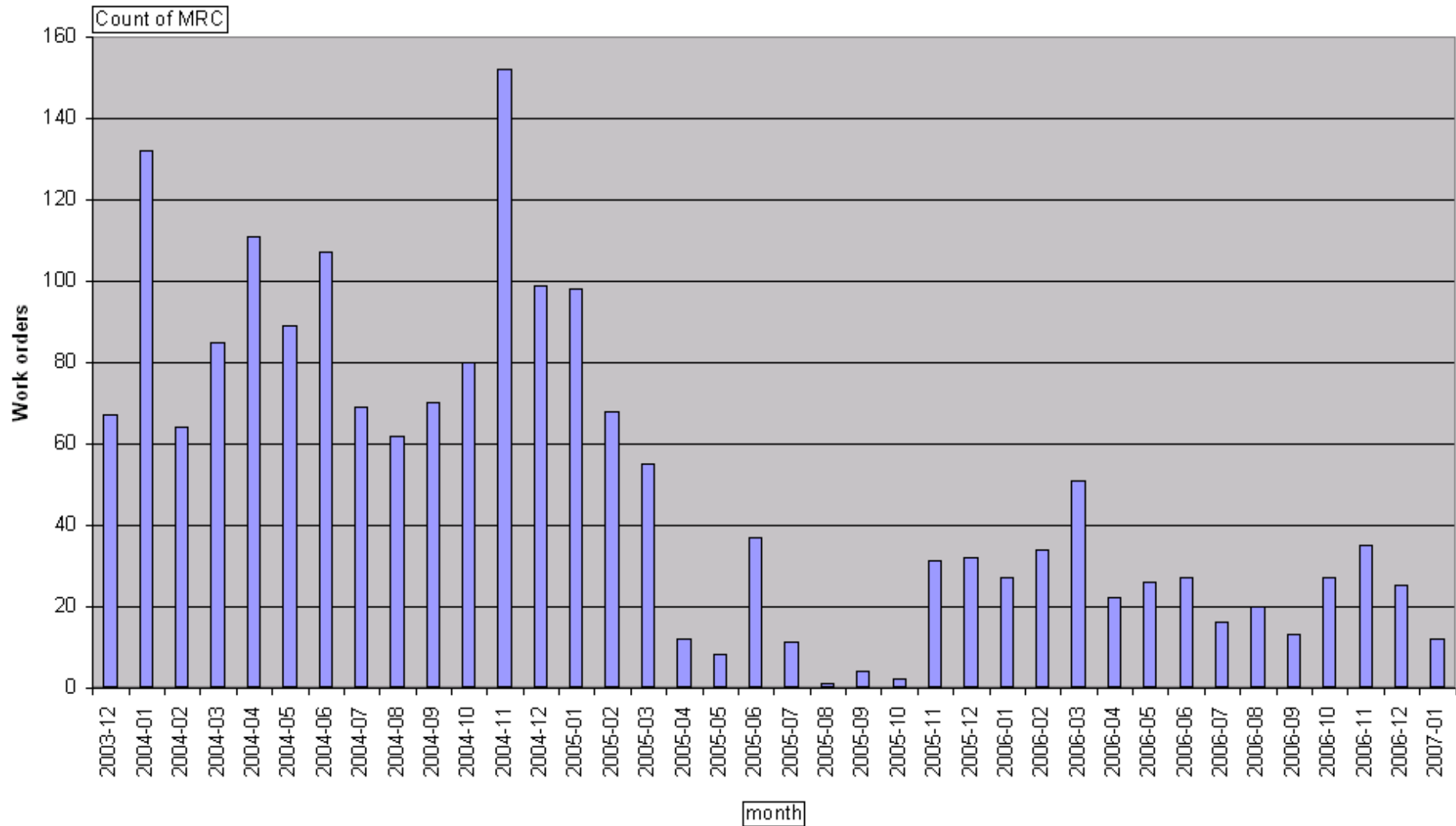
Print

Done

1243158	28/05/2006	UACW2-00522	FCPS	S15	default clim 0515/R- UAPB-005	IP	CD	0
1243162	28/05/2006	F\$FSEG-03585	FCE	SX5	temperature sur eau glacée trop élevé - problème avc l'équipemnt du demandeur.	T	CD	0
Total:								0

Local intranet

Statistics (with TS/CSE web tools)



Benefits of these tools

- For operation
 - State of repair request known
 - History of problems available
 - Past problems and solutions at hand
 - Facility to extract statistics
- For equipment groups
 - State of installations
 - Track maintenance work, delays, repeated repairs, cost, ...
 - Preventive maintenance

Strengths and weaknesses

- Native oracle forms Jinitiator and browser
 - Sometimes slow and sensitive to network perturbations
 - Native forms not always optimised for TI use
 - Equipment-MRC relation not always correct in database
- + Oracle database → open tool
 - + Laser integration
 - + Create work orders from logbook
 - + Web based look-up tools

Extended use?

- LHC cryo will use D7i for maintenance
- IT/CS interested for network equipment
- Accelerators could benefit
- TS/CSE offers a service
 - Available to help setting up the a maintenance database for new clients



Questions?