

TREC - A TOOL TO TRACE **R**ADIOACTIVE **E**QUIPMENT AT **CERN**

DEVELOPMENT STRATEGIES AND MAIN FUNCTIONALITIES

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EDMS 1326296

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Outline

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□ Motivation

- Rationale to **extend** the existing CERN traceability systems to trace radioactive equipment.

□ Development strategy

- “**Vision**” of TREC at CERN
- **History** of development
- A posteriori **Key factors for the success**

□ Functionalities

- **Overview** of the key functionalities
- **Statistics** gathered in 2013
- Possible **improvements**

Why TREC ?

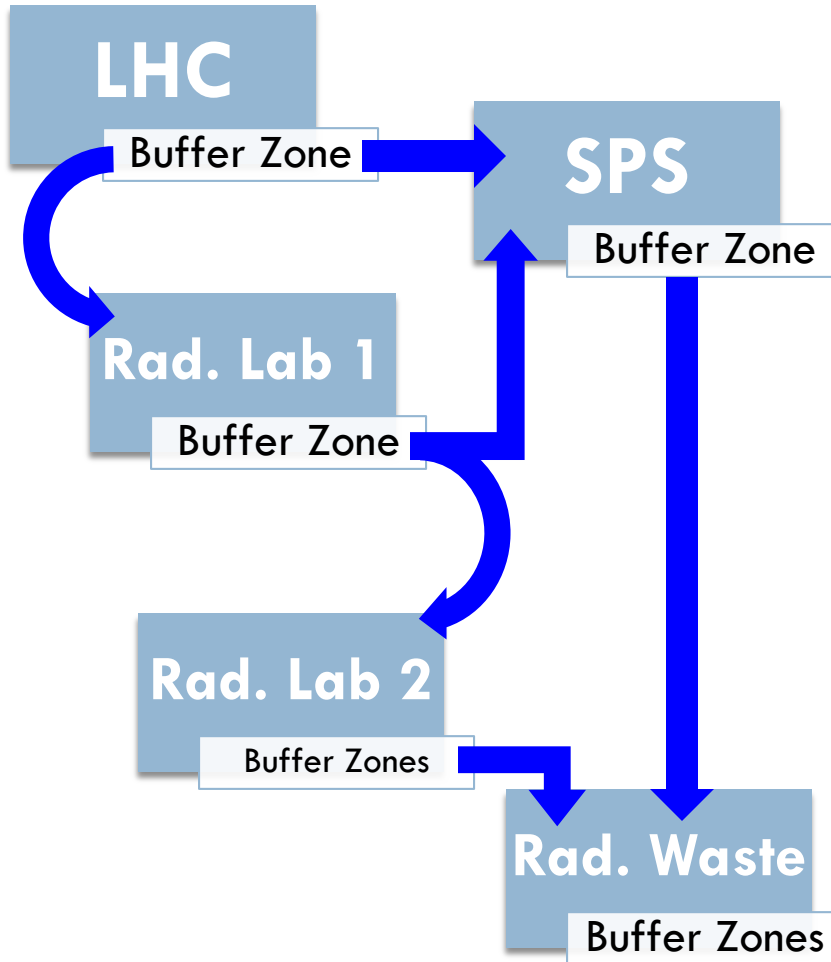
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- **CERN Safety Officers findings, June 2009**
 - ▣ “The existing traceability systems are **too resource consuming**.”
 - ▣ “**Present documentation systems are not integrated**: as an example, it is not easy to retrieve radiological checks (e.g. dose rate measurements...) of a traced piece of equipment.”

- **« Visite de contrôle » of the French and Swiss Authorities, June 2010**
 - ▣ “Je vous demande de bien vouloir harmoniser les procédures concernant la sortie du matériel radioactif de zones contrôlées pour tous les accélérateurs et salles expérimentales du CERN (**et pas uniquement pour le LHC**) et **mettre en place un système informatique** permettant la gestion de tous les matériels sortants de ce zones.”

TREC - The vision

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- How we can manage the risk of dissemination of radioactive equipment:
 - Provide with a buffer zone all major facilities; cover the rest by a mobile device;
 - Intercept rad.material **at the exit** of each facility;
 - Trace transports of radioactive items **between** facilities;
 - Do not trace movements of radioactive items **inside** a facility.

Development strategy

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① **Think BIG**

Write an ambitious functional specification ("user requirements") gaining the collaboration/approval of all stakeholders.

Note: Long process where "savoir être" is at least as important as "savoir faire".

② **Implement by small steps**

Refrain from writing a comprehensive detailed technical specification. Start with the minimum core of functionalities and then add new features in close releases. Use prototyping as development methodology.

Note: The initial users' enthusiasm can be very poor. It is a years' long process of regular meetings, with patches and new features following the users' requests. Fast reactivity to new requirements and close follow up with the clients is an essential key to success.

TREC Development

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- ❑ Functional specification released (EDMS 1012291)
- ❑ Definition of the driving design scenarios and of the baseline procedure to trace radioactive equipment
- ❑ Choice of the hardware and software tools
- ❑ Pilot users from BE-ABP-SU, EN-STI and TE-CRG
- ❑ Pilot tests in one LHC buffer zone with on site support
- ❑ Systematic use for ALL material in transit in two LHC buffer zones
- ❑ Deployment all over the LHC machine
- ❑ Deployment all over the SPS machine
- ❑ Deployment all over the PS Complex (in progress)

Today's traceability at CERN

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□ Software

- <http://trec.web.cern.ch>
(simpler, type „trec“ in the browser address if you are at CERN);
- InforEAM Oracle Database & Oracle Application Express (APEX)
- Functionality to create CERN electronic documents by TREC, avoiding entering the data twice.

□ Hardware

- Generic, unique, unambiguous traceability labels;
- Buffer zones equipped with a PC & 2D barcode reader;
- Mobile devices (iPad, smartphones)

□ Support

- Trec.support@cern.ch
- Web-based course

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The tools 1/2

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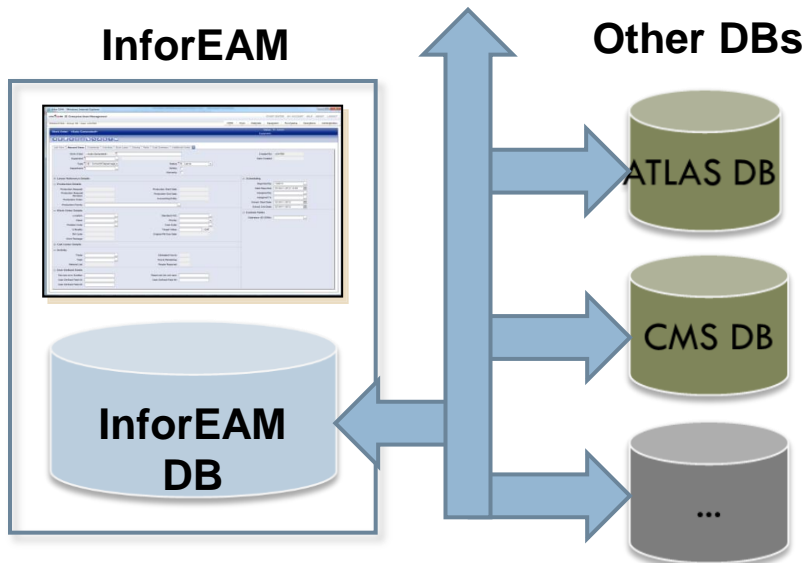


InforEAM

- ❑ **The official and centrally supported tool** used to manage and monitor the maintenance and asset tracking at CERN.
- ❑ **Integration with CMMS tools.** TREC integrates directly with InforEAM's Oracle database.

Advantages

- ❑ No data duplication, no synchronization needed.
- ❑ From the system point of view the RP Measurement is treated as any other maintenance operation.
- ❑ TREC also communicates with other equipment databases used by CERN biggest experiments.



The tools 2/2

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TREC Traceability of Radioactive Equipment at CERN

SEARCH EQUIPMENT LOCATION DETAILS REQUEST CONFIRM

CR-013000 - Equipment details

Identifier CR-013000

Other Identifier ISB-126

*Description Converter

*Responsible Name and Surname

Comments

Help
Please fill all the information related to the equipment.
You can use the magnifier button to fill some of the fields.

1) The "Other Identifier" is an alternative equipment identifier and is optional.
2) The "Description" allows you to enter the description of your equipment in up to 80 characters.
3) The "Responsible" specifies the

Cancel Previous

TREC - Traceability of Radioactive Equip



APEX

- ❑ InforEAM provides functionality and interfaces far too complicated to be used without proper training.
- ❑ There was a strong demand for a simplified and specialized user interface.
- ❑ Oracle Application Express (APEX) is used to develop the TREC user interface.

Advantages

- ❑ Easy-to-use and user-friendly interface adapted to not trained people;
- ❑ Accessible from any web browser and also on mobile devices as iPads;
- ❑ Thanks to TREC terminals installed in the buffer zones, most of the work can be done directly on place
- ❑ 100% customizable to TREC needs;

Some numbers

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TREC Statistics - LHC accelerator Jan - Oct 2013

- TREC usage:
 - RP Measurements requested: **18816**
 - RP Measurements closed: **16748**
- Support requests
 - Open/in progress: **9**
 - Closed: **143**
- Material measured
 - Total volume [m3]: **18803**
 - Total weight [ton]: **1546**
- Radioactive material identified
 - Total volume [m3]: **16972**
 - Total weight [ton]: **1417**
- Radioactive waste
 - Total volume [m3]: **1077**
 - Total weight [ton]: **272**

Remarks

- The system has been validated by extensive use.
- The system is robust and easy to use: users have requested help in **<1%** of the cases.
- The system can provide useful statistics
 - Waiting time for measurement to be done (buffer zone): **<1 day**
 - Waiting time for equipment to be fetched (buffer zone): **~7 days**

The system can be installed for routine use in other CERN buffer zones.

→ Contact trec.support@cern.ch

Work to come ?

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Identification des déchets

Créé par **Timothee SCHMITTLER (D)**

Détails personnels

Fiche remplie par
Date d'expédition souhaitée
Expédition

Articles

Note. Vous
Désignation
Provenance
Composition
Historique

Attention pertinente

FICHE DE TRANSFERT / TRANSFERT SLIP

N° EDH* _____

Lieu de départ _____

Departure point _____

Lieu de destination _____

Arrival point _____

Expéditeur / Sender _____

Destinataire / Consignee _____

Mesures débit de dose max véhicule / Dose rate max vehicle (µSv/h)*

Cabine _____ Contact _____ 2 m

Quantité _____

Désignation du matériel _____

Description of goods _____

Numéro de série* _____

Serial number _____

Contrôle RP

Débit de dose max (µSv/h)

Contact _____ 10 cm _____ 1 m*

GAMMA SPECTROMETRY - RADIOPROTECTION

Gamma analysis

----- CNGS 359 -----

Sample Description 1 : Eau Pousse TCV4

Sample Description 2 : C:Troncel

Sample Size : 2.500E-001 L

Demandeur : C:Troncel

Sample Title : Gel CNGS liq.

Sample Type : CNL

Sample Geometry : GEL-250ml-D0

Detector Name : GE1

File Name : Z:\Gel_U_CNL\CNL13502_CNP

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 32 - 8192

Peak Area Range (in channels) : 32 - 8192

Identification Energy Tolerance : 0.700 KeV

Live Time : 10000.0 seconds

Real Time : 10001.3 seconds

Report Generated On : 7/10/13 10:41:40 AM

Activity reported : 7/1/13 8:00:00 AM

Acquisition Started : 7/1/13 8:55:42 AM

Energy Calib. Used Done On : 7/1/13

Efficiency Calib. Used Done On : 3/12/08

Background File : X:\BKGFILES\G00d01b.cmf

Contamination table(s) out non

Valeurs max mesurées en : c/s (sur début) c/s

Contrôlé par / Checked by _____

Date _____

Signature _____

RADIOACTIVE

Port transférés pour l'usage officiel de l'organisation, and are transferred for the official use of the organization.

Signature _____

=====
 ## ATTENTION, nous consulter pour éviter toute ##
 ## erreur d'interprétation ##
 ## Rapport détaillé/officialiel fourni à la demande ##
 =====
 La décision de l'élimination du matériel
 (en tant que déchet conventionnel ou radioactif)
 appartient au donneur d'ordre

=====
 == Analyse par : A. EL GARGES
 == Vu et vérifié par : _____
 =====

-----COMMENTAIRES-----
 RAS C Cf. PDA

Planned work...

- ❑ Use TREC to identify newly produced radioactive waste items avoiding duplication of data ("RW Identification Form").
- ❑ Provide an electronic documentation equivalent to today's yellow transfer slip for radioactive items.
- ❑ Trace advanced RP measurements (spectrometries, total gamma measurements,...).

... and possible developments

- ❑ Link TREC to the radioactive waste database (ISRAM).
- ❑ Link TREC to CERN Radiation Areas database (RAISIN)
- ❑ Manage risks other than radiological ? (e.g. presence of chemical risk)

Summary

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▣ TREC Software status

- TREC has been **extensively and successfully** used at CERN during the last two years for the maintenance and upgrade of the Large Hadron Collider and Super Proton Synchrotron.

▣ Main results

- Its application has **reduced** the maximum **waiting time** for a radiological control to 1 day and **support requests** to the RP officers by approximately 80%.

▣ On-going work

- The system **is being systematically extended to the whole of CERN** and will cover all accelerators as well as experimental halls.

ADDITIONAL SLIDES



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MTF extension: The “safety” chapter

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Component Identifier: CR-000325
Other Identifier: None
Description: Cuve compresseur

Main Made of Equipment data Manufacturing Operation Documents History Map

Actions : Edit | View summary

Physical

Manufacturer			
Resp. Technique	EL KOUACHE KHALID 7XXXX		
Status	Installed		
Other Identifier			
Parent Equipment			
Parent Slot			
Location	<u>SD1/R-501</u>		
State	Good	MRC	RPM

Safety

RP Classification	Non radioactive
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Comments

MTF extension: the “RP measurement”

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Main Made of Equipment data Manufacturing **Operation** Documents History Map

Actions : [Back to list](#) | [Edit](#) | [Attach results doc](#) | [View job card](#)

Job Data

Job Id	17165708	Type	RP Measurement
Description	After irradiation in CNGS		
Status	Accepted	Result	
Responsible	Penacoba	Executed by	Tromel Ch.

Location

Location	TCV4 (1112=CHAMBRE DE VENTILATION TN4)
Location Details	CNGS ECA4

Comments

En attente des résultats de spectrométrie gamma.

Yielded Properties

Property	Nominal Value	Value	Unit
Measurement tool		AD6	
Radiation Measured		1.5	
Units		µSv/h	
Distance		Contact	
Future Intended Usage	To be repaired/modified (destr. test)		
Specific Associated Risks	None		
Last Location/Civil Work	TSG45		
Radiation Classification			
Handling requirement		Self-transport authorized	

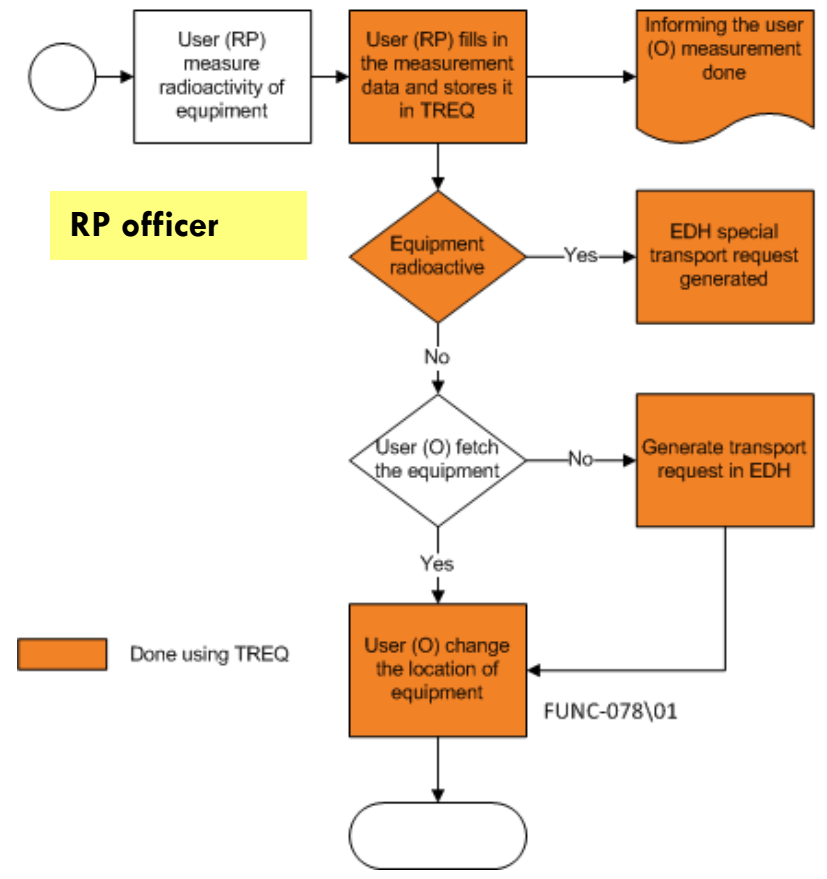
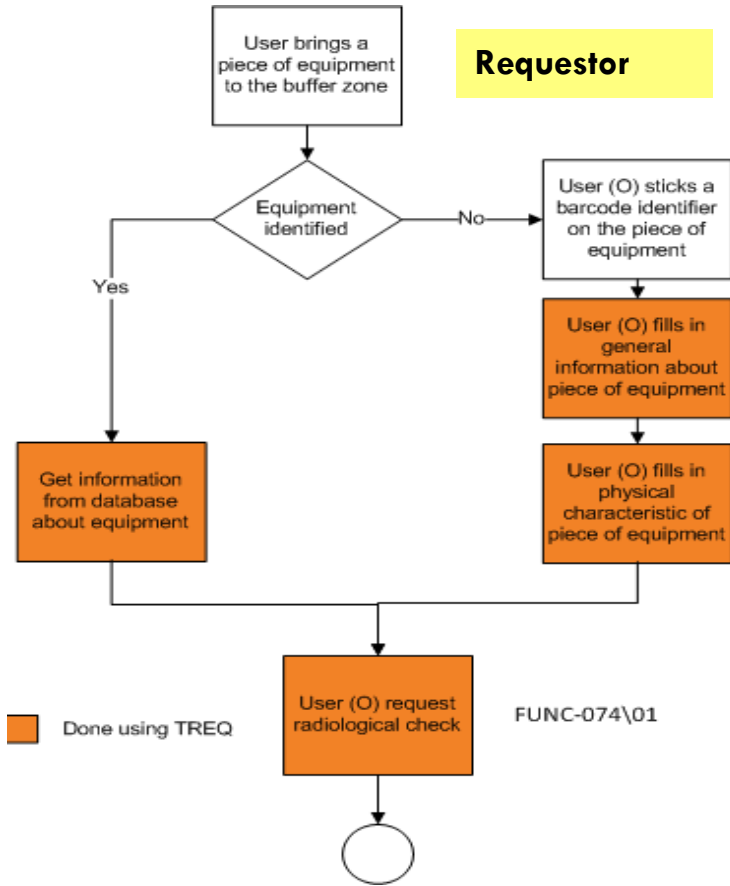
By RP (green box around AD6, 1.5, µSv/h, Contact)

By the requestor (red box around Future Intended Usage, Specific Associated Risks, Last Location/Civil Work)

By RP (green box around Self-transport authorized)

Blue arrow pointing from Handling requirement to Self-transport authorized

TREC Functionalities



Advice to the users

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□ How to best profit from traceability:

- Register your components **as soon as possible**.

Be pro-active: the sooner you register your equipment, the easier it is to trace it (the data will be in the DB already!).

- Register the **type** of your components.

If possible, group your equipment by design type: it will be easier to link material data and assembly drawings.

- Capture the data at the **earliest stage**.

As an example, it is much easier to get the material's data when you buy the material than afterwards.

→ Contact edms.support@cern.ch

Some definitions

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Tracer	Responsible person for the equipment identification and labelling.
Traceability	Ability to trace the history, application or location of an entity by means of recorded identifications [ISO 8402:1994 standard, “Quality management and quality assurance”].
Traceability system	Set of hardware and software tools together with operational procedures allowing traceability.
To Trace	Retrieve data of a traced physical piece of equipment from the traceability database.



Contrôle Radiologique du Matériel

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Tout matériel retiré du TUNNEL LHC doit OBLIGATOIREMENT être contrôlé par DGS-RP (contrôles activation + contamination si nécessaire)

- Déposer le matériel dans la zone tampon
- Renseigner les données du matériel dans TREC
- Informer DGS-RP si réutilisation urgente du matériel



NB: Pour le matériel lourd/encombrant informer DGS-RP avant intervention - Tél: 75252



Contrôle Radiologique du Matériel

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Tout matériel retiré des zones de service (UL/UA/US/UJ) est considéré comme non radioactif

**Par principe de précaution:
contrôle obligatoire du matériel
par le propriétaire à l'aide du PCM**



Attention: tout matériel mesuré radioactif doit IMMEDIATEMENT être déposé dans la zone tampon et signalé à DGS-RP – Tél:75252



Contrôle Radiologique du Matériel

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Tout le matériel des UW doit **OBLIGATOIREMENT** être contrôlé par DGS-RP avant intervention.

RISQUE DE CONTAMINATION

Planifier et signaler votre intervention à DGS-RP
Tél:75252