



Final Report on WP6: MICE Transnational Access (TA)

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¹ Retired as of July 2011, but continue to look after WP6 for EuCARD-1

MICE

- MICE = Muon Ionisation Cooling Experiment
- The investigation of ionisation cooling is a key step for a possible future neutrino factory and/or μ -collider.
- MICE is an international collaboration: includes a large fraction of the international community of experimental physicists interested in ionisation cooling. (Bulgaria, China, Italy, Japan, Netherlands, Russia, Switzerland, UK, USA. <http://mice.iit.edu>)
- So MICE collaboration \approx User Community for ionisation cooling.

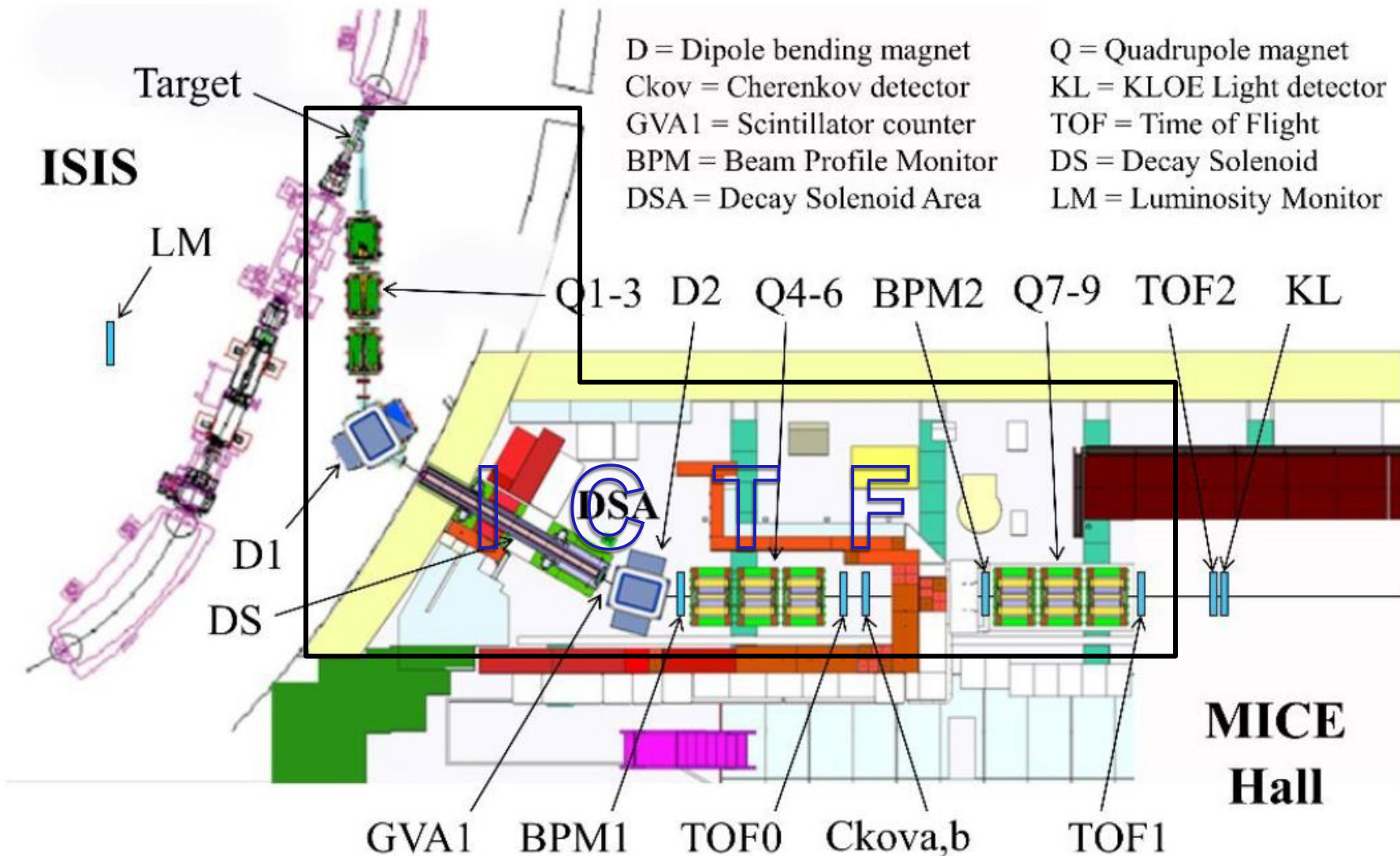
ICTF

- MICE is installed at the Ionisation Cooling Test Facility (ICTF) at STFC's Rutherford Appleton Laboratory.
- The ICTF comprises a specially developed target and beam-line at the ISIS proton synchrotron (800 MeV).
- The beam-line provides μ , p , π , e at 100 MeV/c to 400 MeV/c. It has been operational for several years, though intensity continues to increase.
- In addition there is infrastructure to support MICE: radio-frequency (RF) power, cryo-engineering, Liquid Hydrogen (LH) absorber.

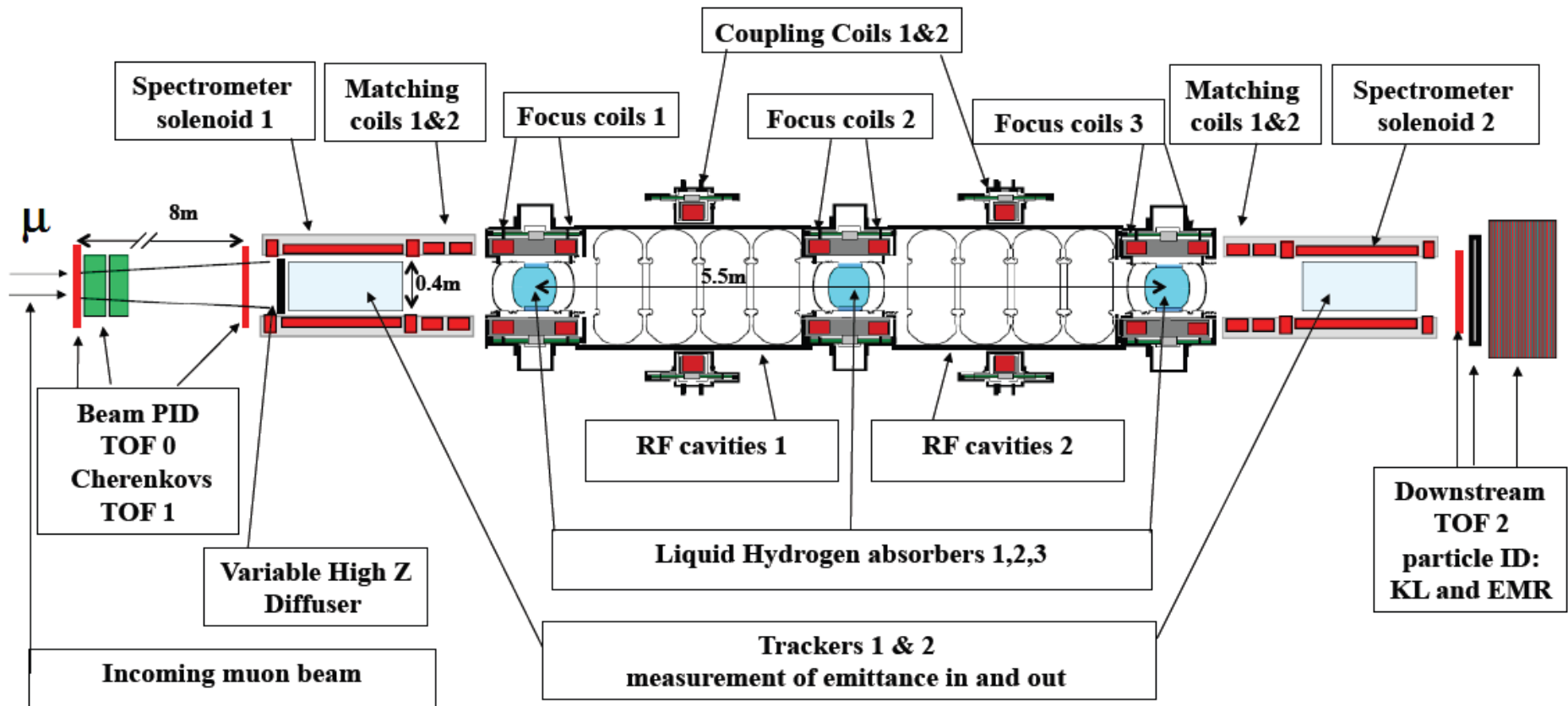


ISIS

MICE Hall
R5.2

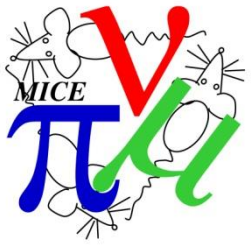


MICE : Muon Ionization Cooling Experiment

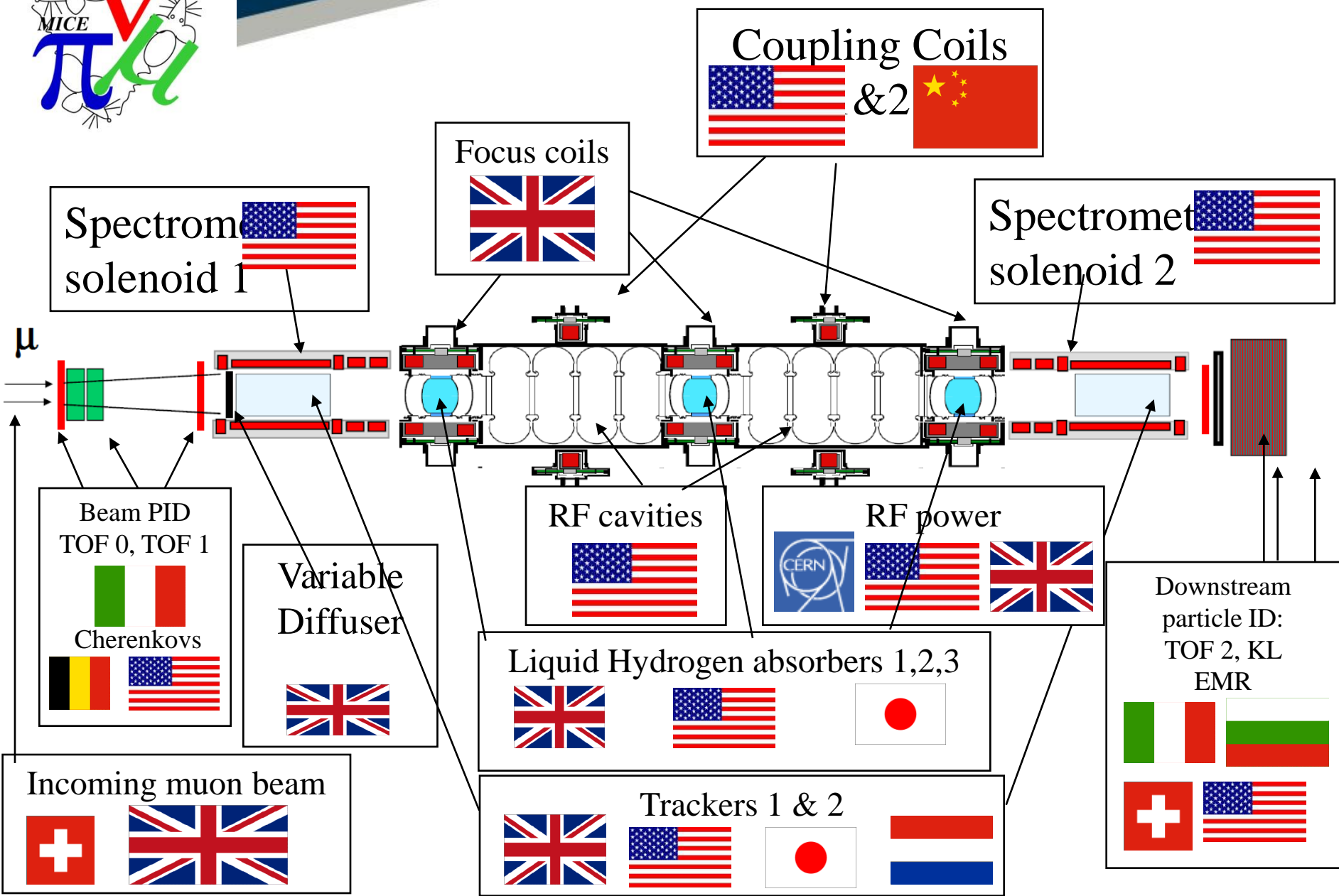


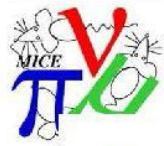
Particle by particle measurement $\rightarrow \Delta[(\varepsilon^{\text{in}} - \varepsilon^{\text{out}}) / \varepsilon^{\text{in}}] = 10^{-3}$

MICE Collaboration across the planet



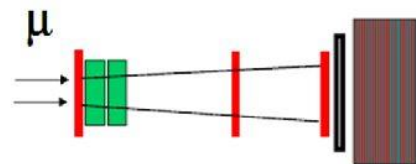
Technology





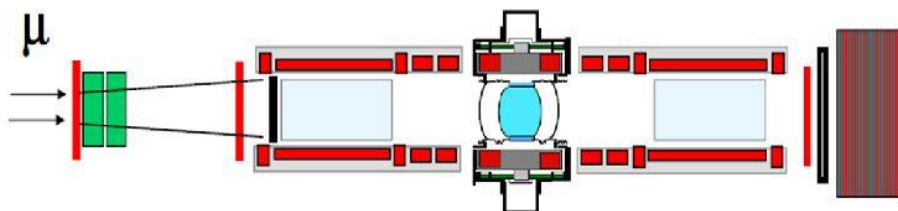
Provisional MICE SCHEDULE
update: May 2013

Run date:



STEP I

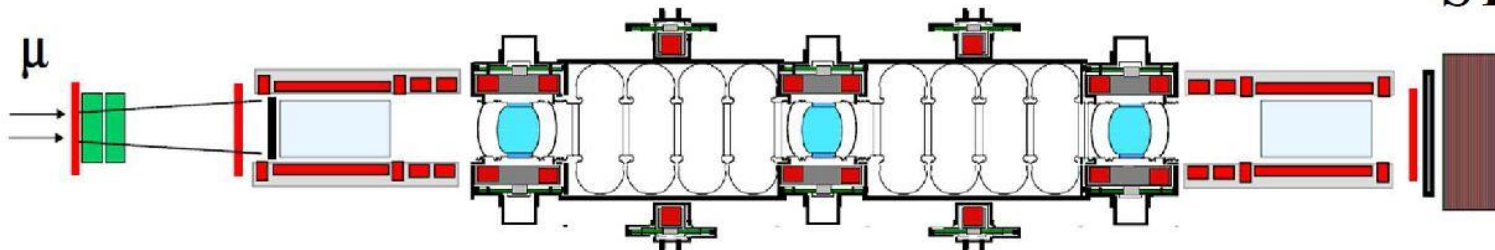
EMR run July 2013



STEP IV

(Q2 2014,
no field)
Q1 2015
to 2016

Under construction:



STEP VI

Possible Step V run Q4 2017
Step VI 2019

- The aim of TA is to support (travel and subsistence) access to European facilities by “eligible researchers”, i.e. those employed at European institutes, excluding ‘host’ (UK in this case).
- The MICE TA award to STFC was 222k€ (Euro), of which 180k€ was for funding TA directly and the rest was a contribution to the management and associated costs of the scheme.
- Scheme runs for 52 months to end July 2013.
- TA funding is to be used to support:
 - detector commissioning, data-taking and analysis of the MICE experiment itself;
 - testing detectors using the MICE low-energy beam; and
 - development of new ideas for particle cooling.

- The rules for TA awards are set (largely) by the EU:
 - Applications assessed by an independent panel: *Steve Geer (FNAL)*, *Ken Peach (Oxford, Chair)*, *Francesco Terranova (INFN)*, plus technical (MICE/ICTF) and administrative (STFC) input on request.
 - Regular calls for applications (we had two per year), advertised via MICE collaboration, STFC facilities page, EuCARD page and email.
 - Panel advises TA co-ordinator (= N McCubbin, STFC).
- Panel met several times during 2009-2012, making a series of awards, and extensions and adjustments to awards.
- Final round of awards made in February 2012.

TA awards (1)

- TA Awards have been made to groups from:
 - INFN Milano Bicocca/Pavia /Roma Tre
 - University Insubria (not a member of MICE collaboration)
 - University of Sofia
 - University of Geneva
- Total awards: ~150 visits and 1400 “visitor-days”. (to end July 2013)
- (This translates into nearly 6000 “access units”, which is well in excess of the minimum of 3384 access units specified in the FP7/EuCARD Annex I.)
- As of February 2013, ~123 visits and ~1058 v-days have been used.

Achievements.

- These awards have supported in particular work for the Electron Muon Ranger (EMR), Particle Identification and TOF systems for MICE.
- Scientific and technical output includes:
 - Commissioning of MICE DAQ and online resolution systems;
 - TOF resolution of ~ 50 picoseconds;
 - First determination of full beam profiles and 6D emittance, exploiting space and time resolution of TOF counters;
 - Determination of pion contamination in muon beam;
 - Commissioning of first planes of EMR
- Details have been given in the EuCARD Period 1 and Semester 4 reports, in the EuCARD Newsletter #9 (June 2011), and in the Period 2 report.
- The TA-supported work has figured prominently in >20 MICE conference proceedings and publications.

TA in EuCARD-2

- EuCARD-1:
 - The TA programme has been extremely beneficial in supporting access to the ICTF at RAL, furthering excellent pan-European collaboration.
 - Without this TA support the access to ICTF would have been much more constrained, or, in some cases, not even possible.
- EuCARD-2
 - We are pleased to have secured ~200k Euro for continuation in EuCARD-2.
 - During the EuCARD-2 period the facility will reach its full potential, and we will seek to widen the usage as much as possible.
 - Roy Preece (STFC, PPD) will take over from me for EuCARD-2. He is at CERN this week and will give a talk on Thursday afternoon.

And finally...

- As my own association with the EuCARD project comes to an end, I would like to thank:
 - Colleagues at STFC in administration and finance;
 - And especially Rose Hayes (STFC);
 - ICTF scientists and engineers;
 - Members of the MICE collaboration;
 - The independent TA assessment panel;
 - Colleagues at CERN for their overall co-ordination and management of EuCARD;
 - And especially Jean-Pierre, Kate, Merethe, and Svet.
- It has been a pleasure to work with all of you! 😊