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# Preparation for installations

## (how we constructed the second target station at ISIS)

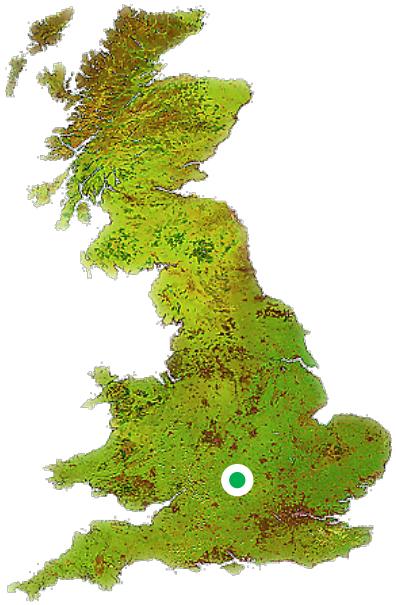
Matt Fletcher

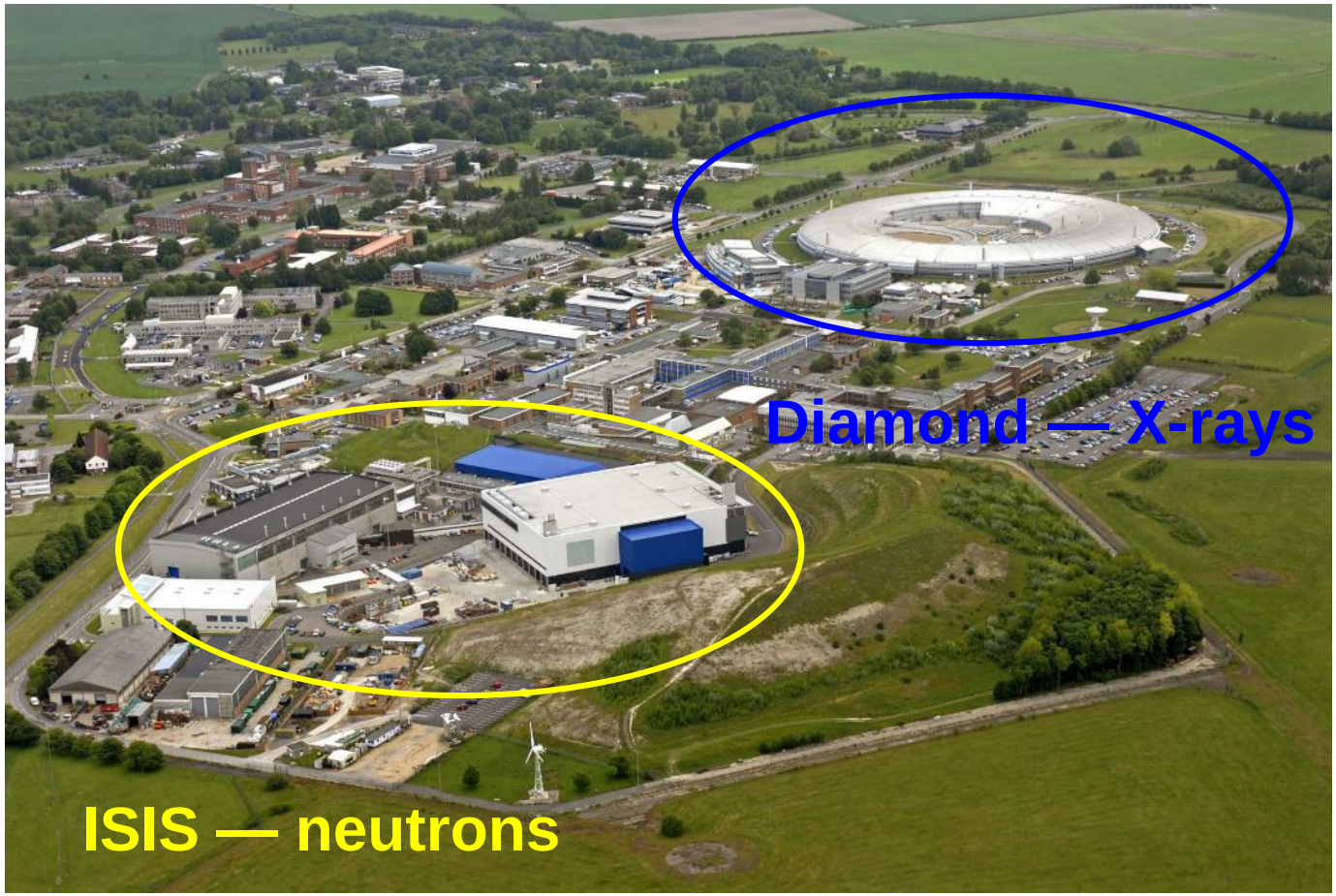
ISIS Design Division Head

13/6/17

# Talk outline

- Brief introduction of ISIS
- Overview of the TS2 project
- Decisions for Installation
- Lessons we learnt



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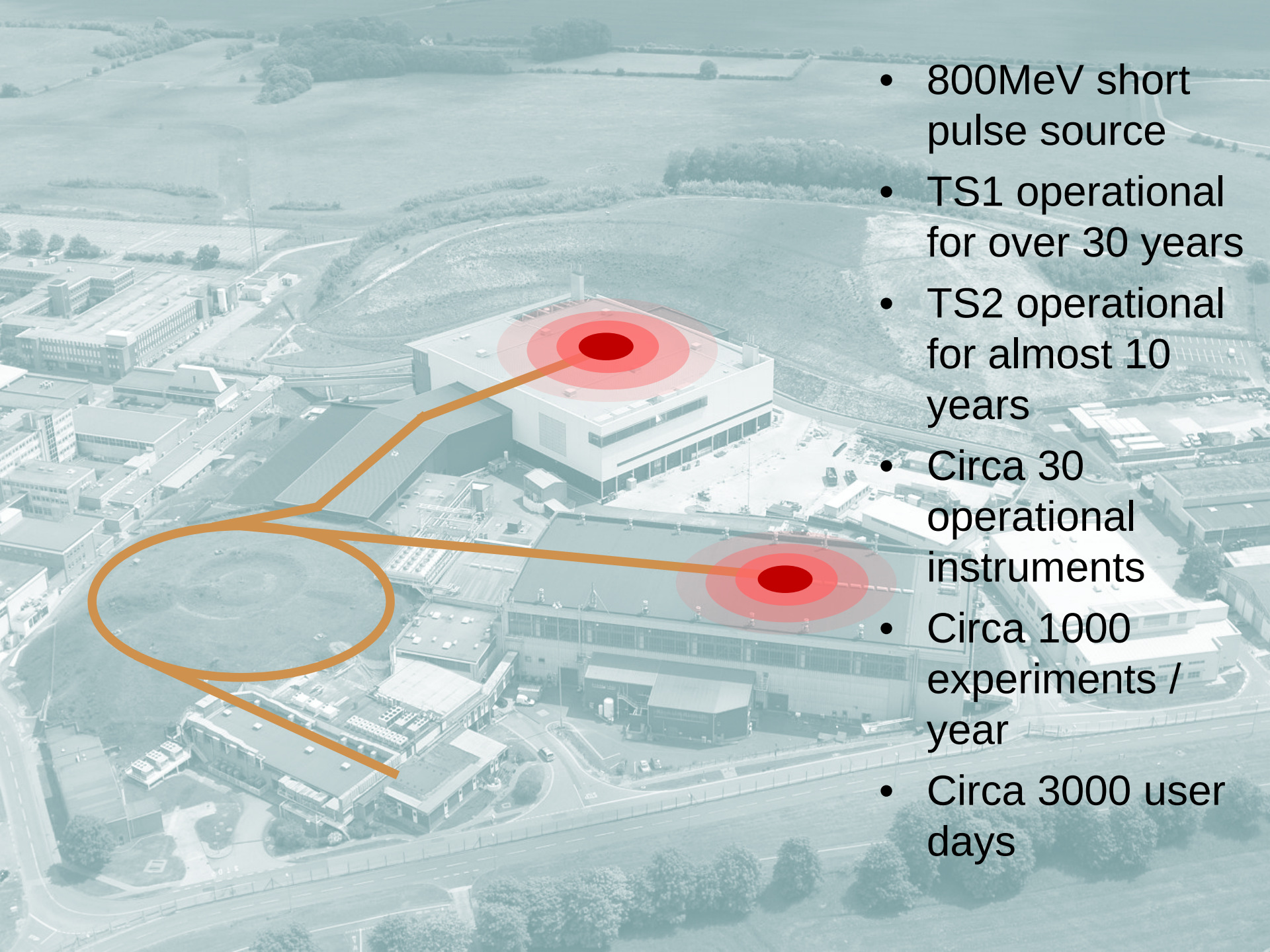
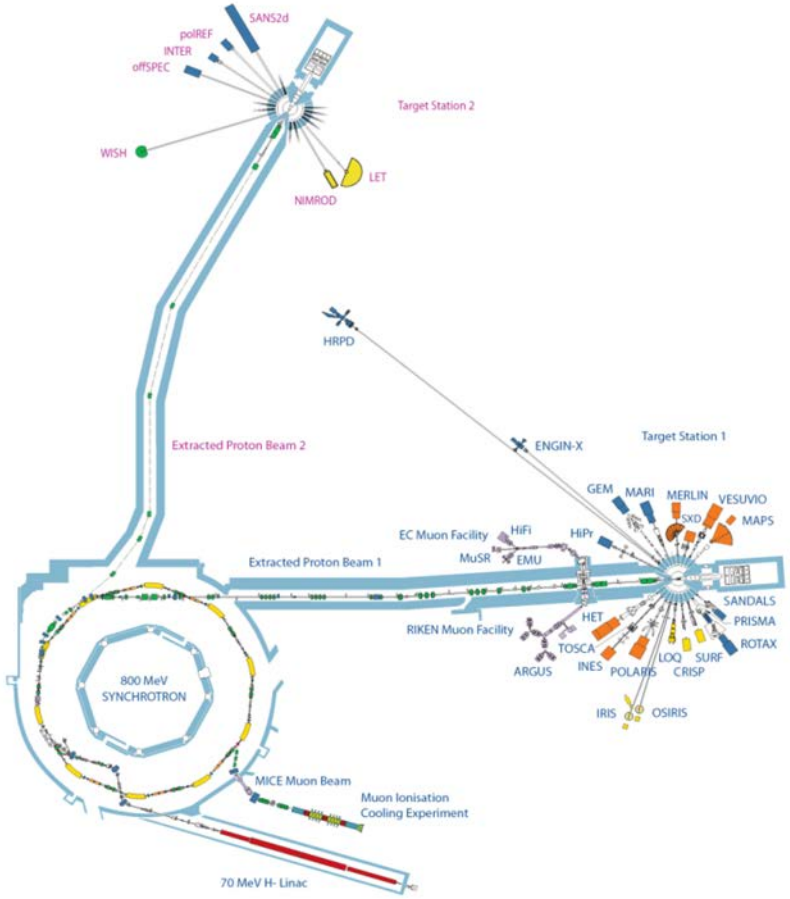


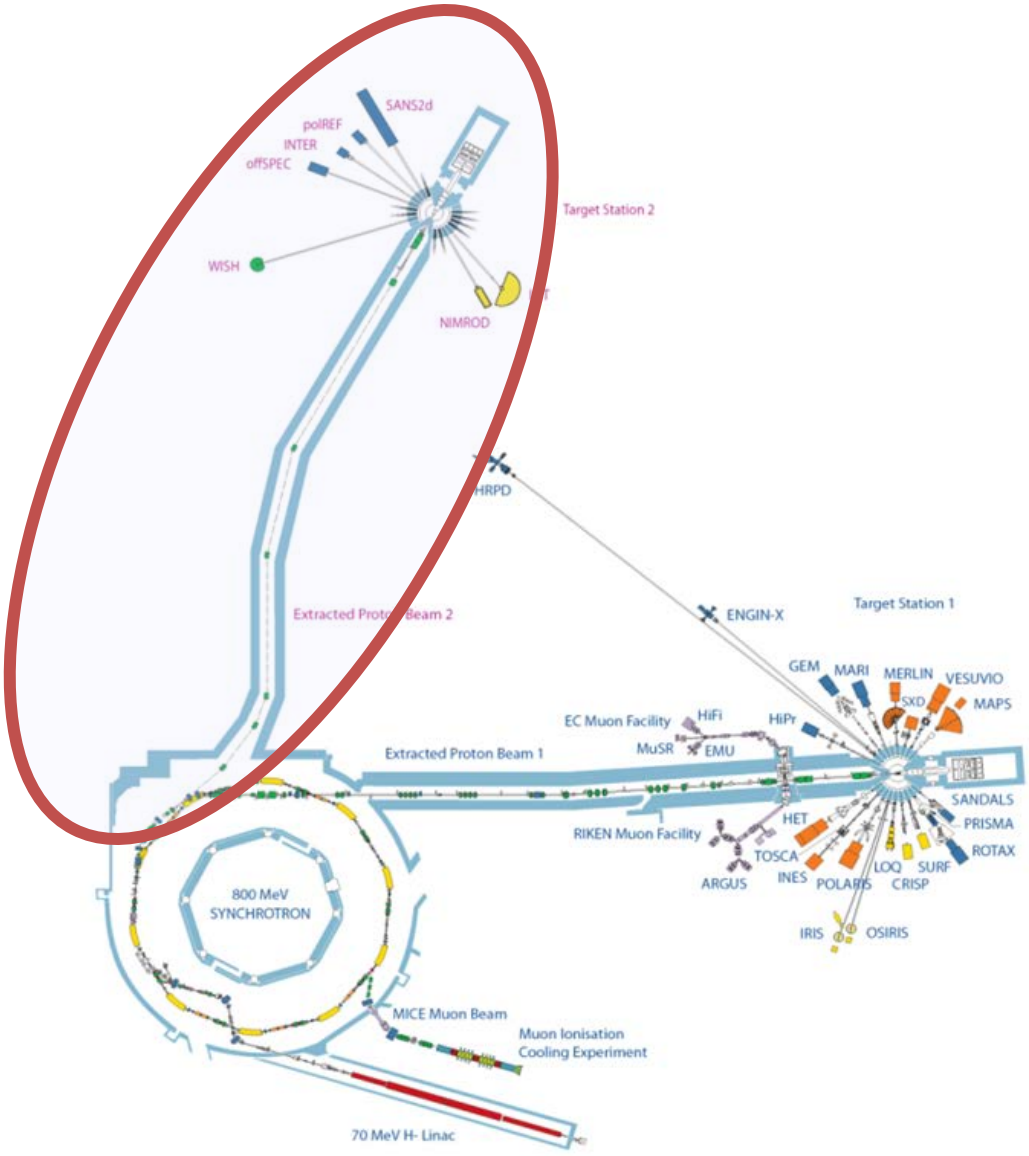
- 800MeV short pulse source
- TS1 operational for over 30 years
- TS2 operational for almost 10 years
- Circa 30 operational instruments
- Circa 1000 experiments / year
- Circa 3000 user days

# Condensed history




- 1985 – ISIS first operated
- Increased instrument suite on TS1
- 2002 – Second Target station project started
- 2008 TS2 starts operation
- 2010 Approval for 4 new TS2 instruments
- Constant upgrades
  (machine + instruments + facilities)

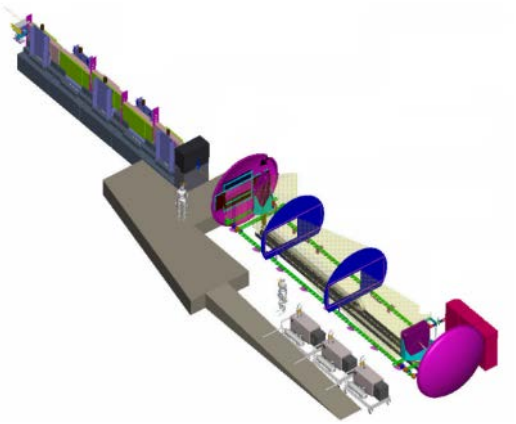
# TS2 project 2002-2008

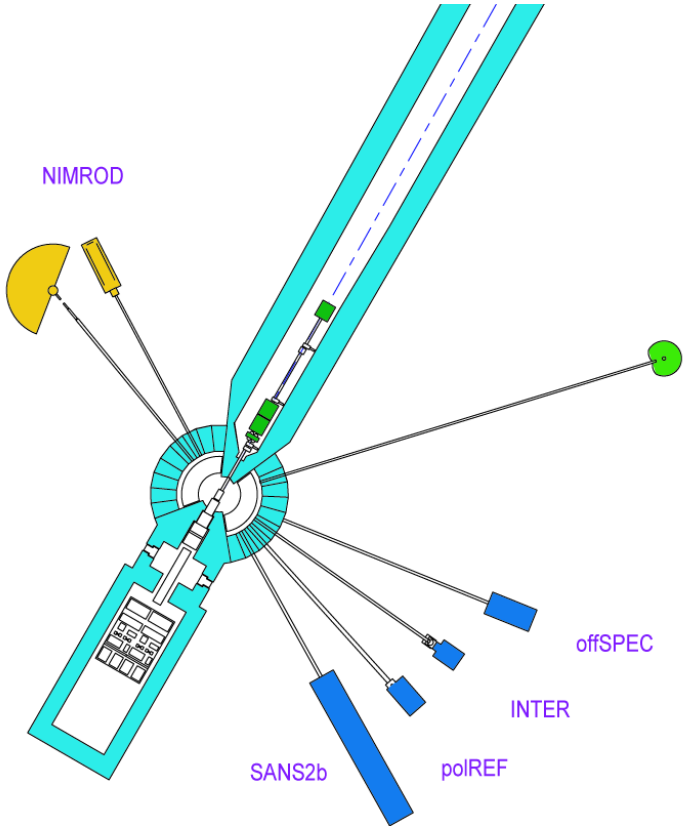


# TS-2 Phase One Instruments

## Dynamics

**LET** High-resolution measurement of material energy scales



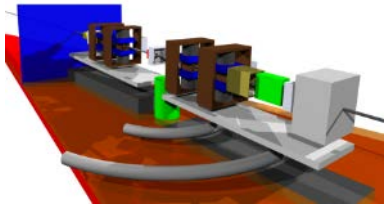



## Structures

**NIMROD** Intermediate range order in liquids

**WISH** High-resolution magnetic structure

**SANS2D** Large molecule structure in multi-component systems

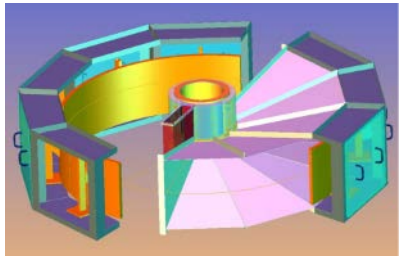


## Reflectometry

**INTER** Air/ liquid/ solid interface interactions

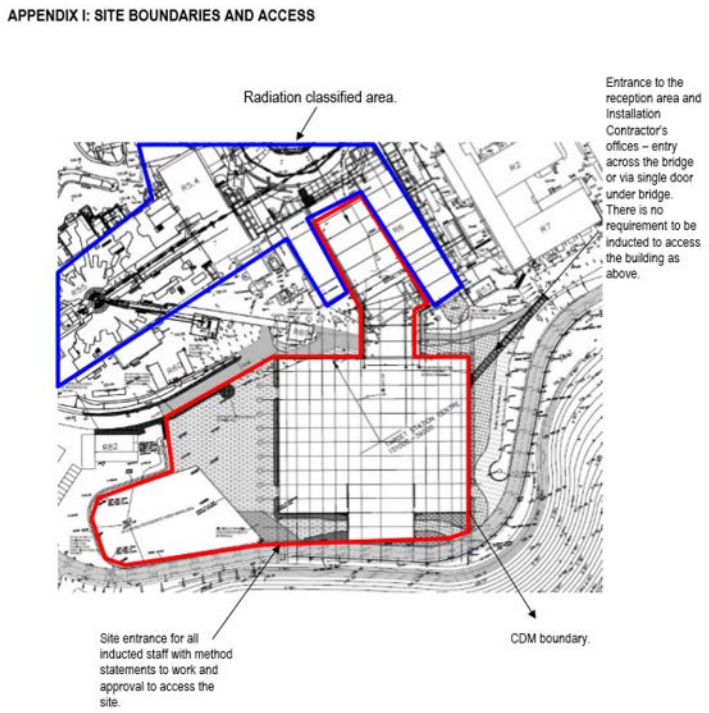
**OFFSPEC** Structures of membrane, protein and liquid interfaces

**POLREF** Interface measurements in magnetic sensor devices



# TS2 project set-up

- ISIS is operating TS1
- TS2 project is a separate team disconnected from Operations deliberately to protect the operation
- Project Manager H Jones
  - Hugely experienced with ISIS engineering (accelerator, target, instruments)
- Project Sponsor T Broome
  - ISIS Target Division head – hugely experienced

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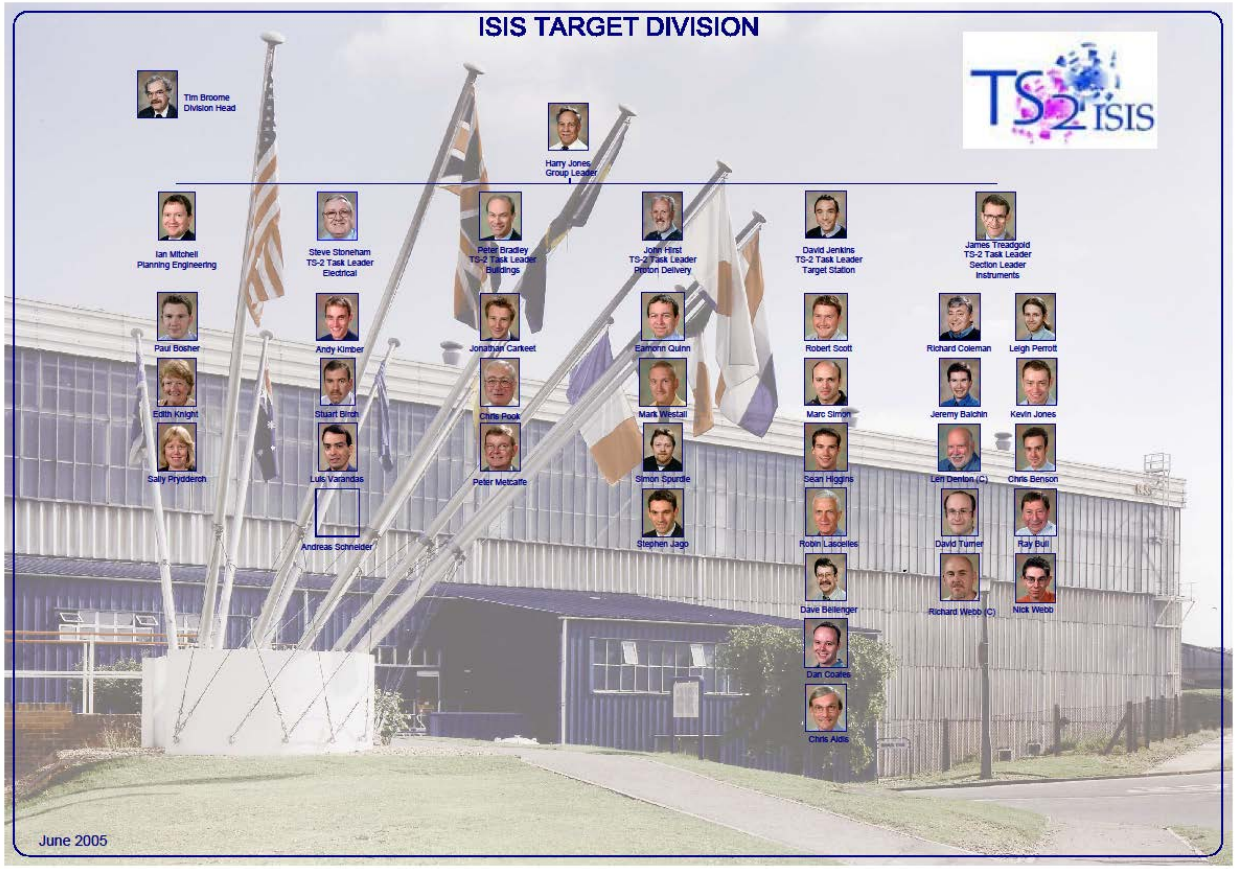
# June 05

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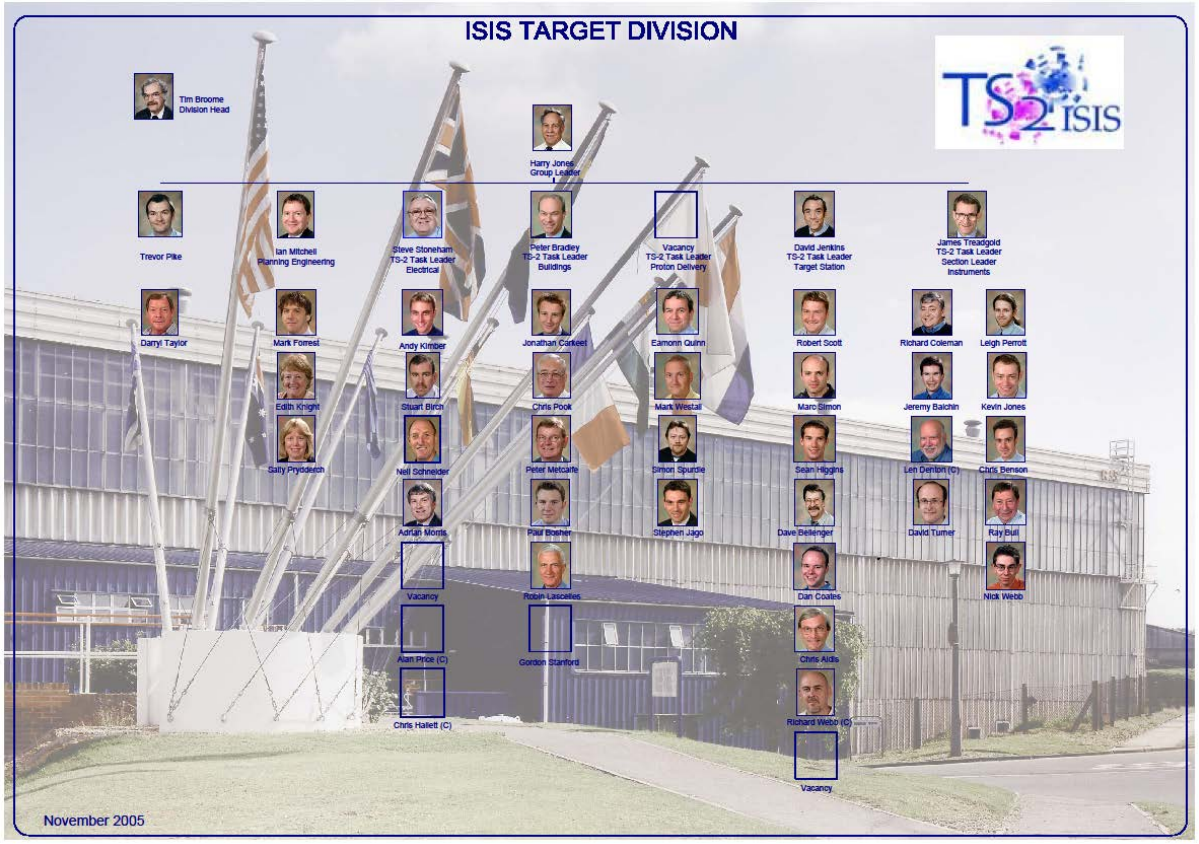
# Nov 05

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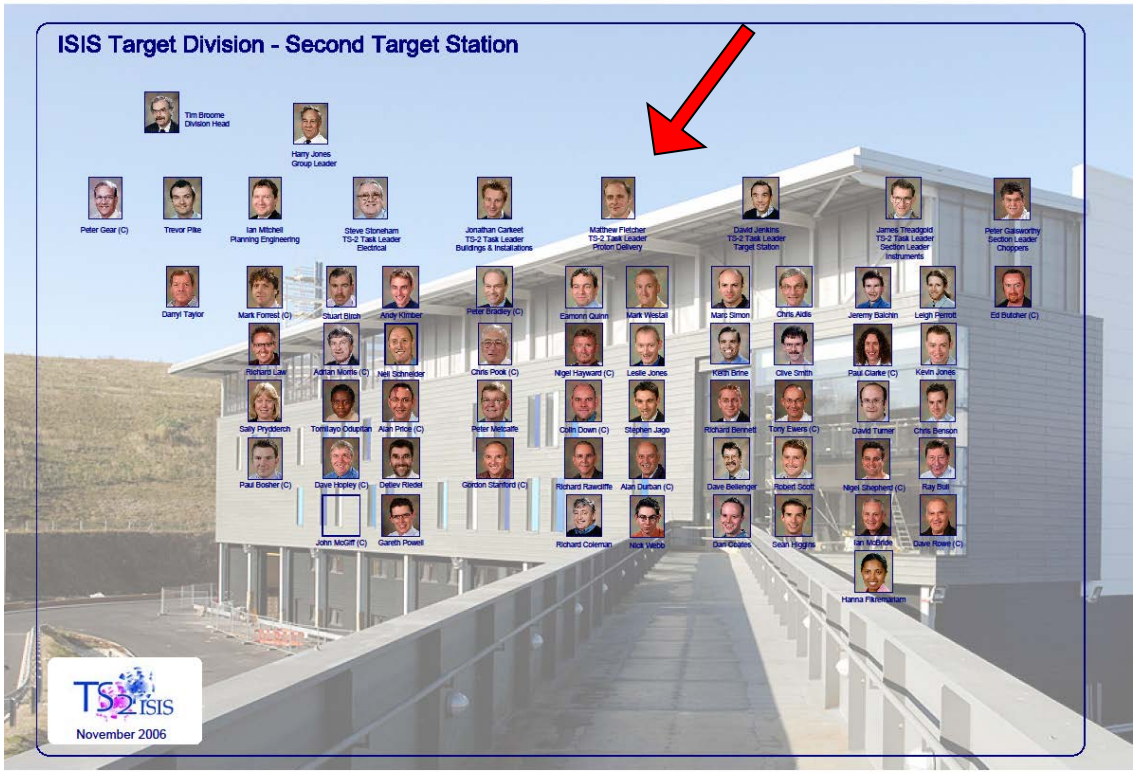


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# Nov 07


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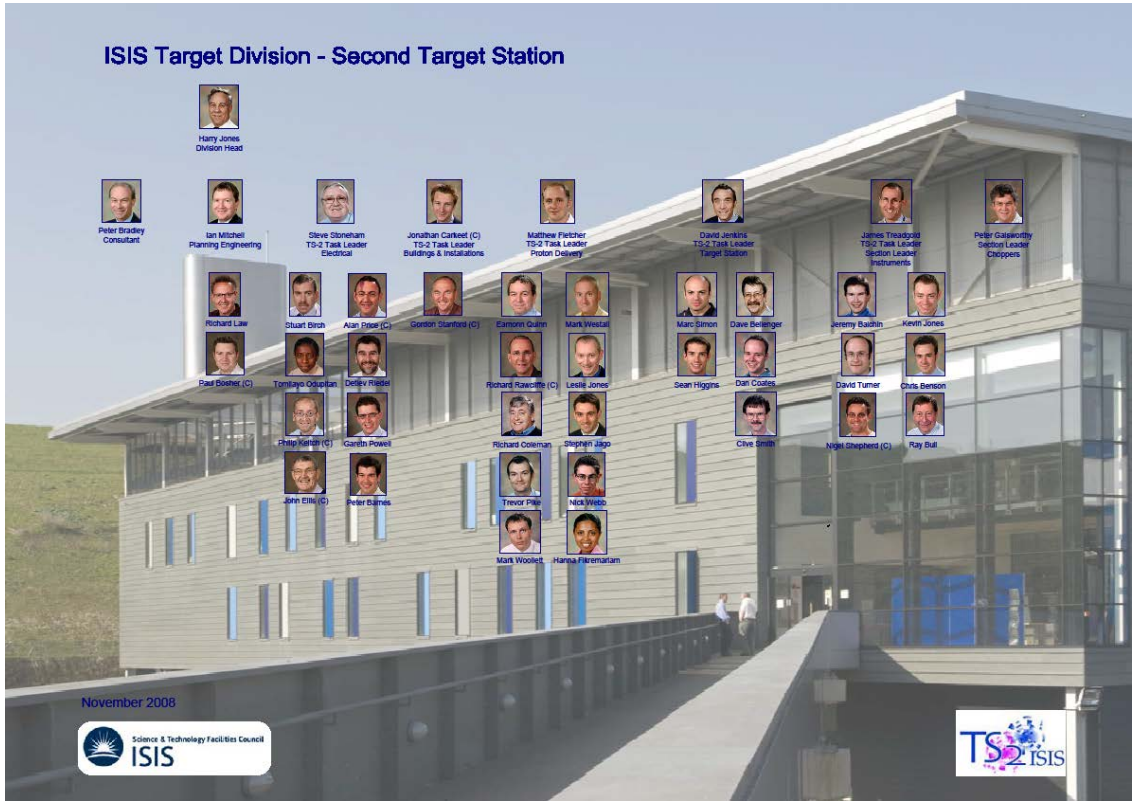
# Nov 08

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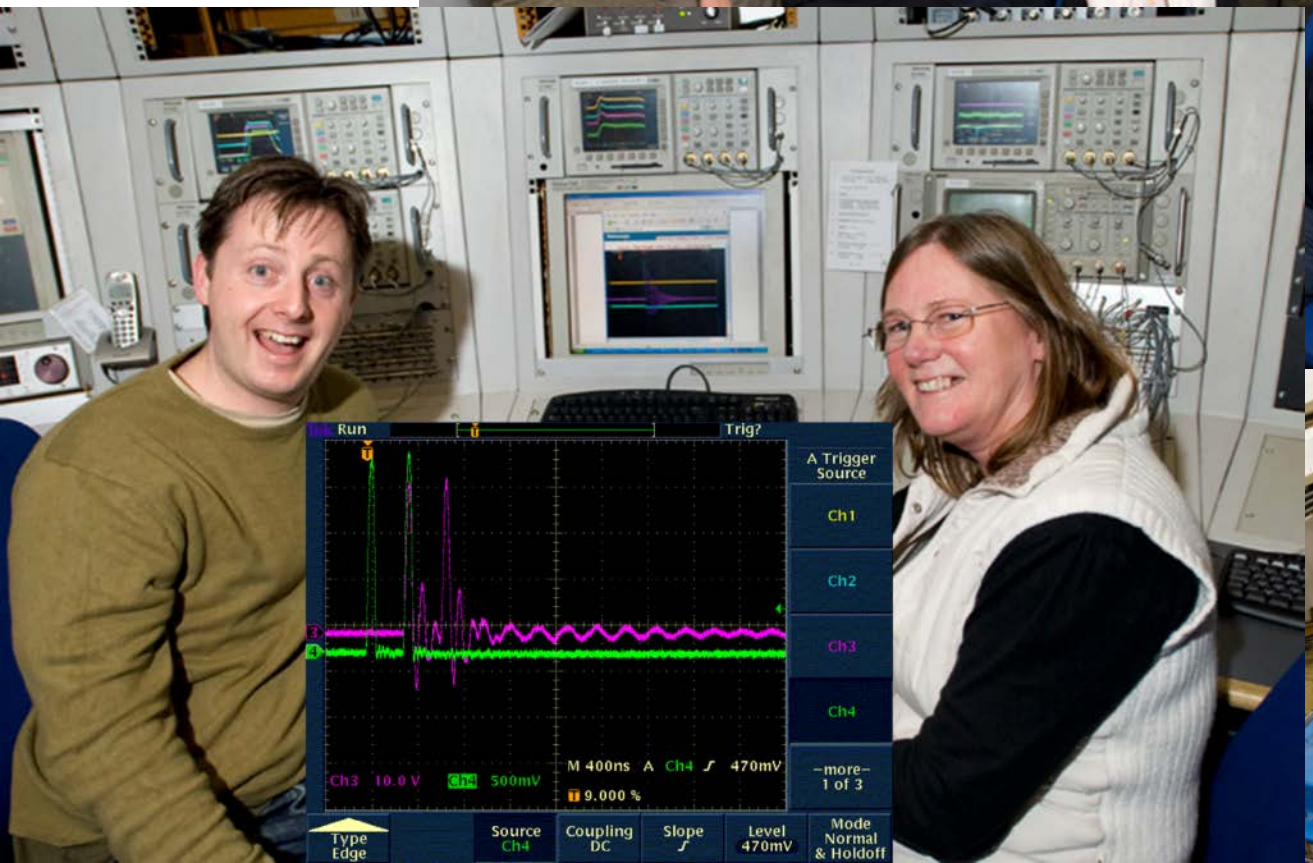
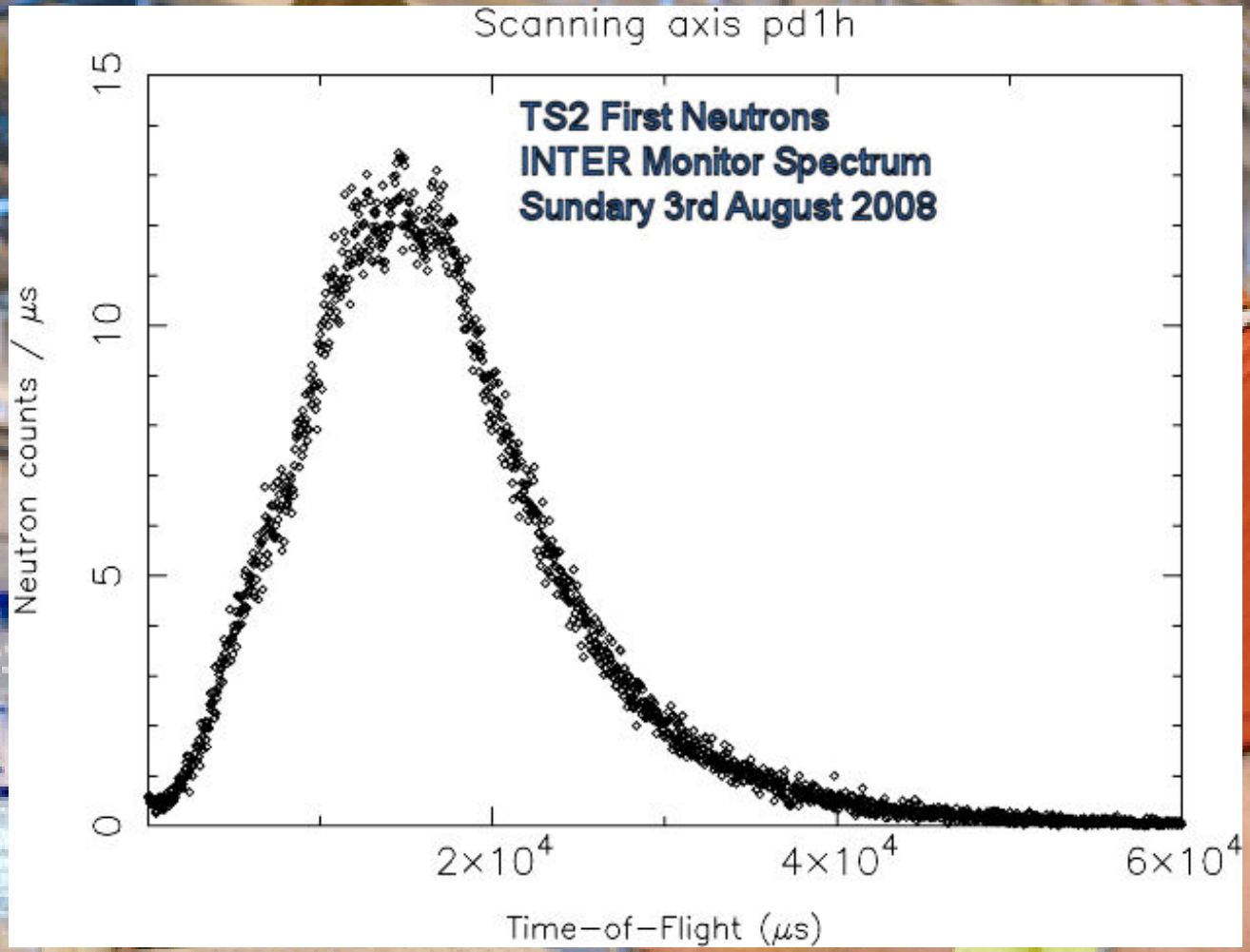
# 16th December 2007 – Beam to TS-2 !




# 3th August 2008 – First Neutrons !




KONECRANES
50.0t/15.0t

# ISIS Target Division - Second Target Station


Tim Broome
Division Head


Harry Jones
Group Leader


Peter Gear (C)


Trevor Pike


Ian Mitchell
Planning Engineering


Steve Stoneham
TS-2 Task Leader
Electrical


Jonathan Carkeet
TS-2 Task Leader
Buildings & Installations


Matthew Fletcher
TS-2 Task Leader
Proton Delivery


David Jenkins
TS-2 Task Leader
Target Station


James Treadgold
TS-2 Task Leader
Section Leader
Instruments


Peter Galsworthy
Section Leader
Choppers


Darryl Taylor


Mark Forrest (C)


Stuart Birch


Andy Kimber


Peter Bradley (C)


Eamonn Quinn


Mark Westall


Marc Simon


Chris Aldis


Jeremy Balchin


Leigh Perrott


Ed Butcher (C)


Richard Law


Adrian Morris (C)


Neil Schneider


Chris Pook (C)


Nigel Hayward (C)


Leslie Jones


Keith Brine


Clive Smith


Paul Clarke (C)


Kevin Jones


Sally Prydderch


Tomilayo Oduptan


Alan Price (C)


Peter Metcalfe


Colin Down (C)


Stephen Jago


Richard Bennett


Tony Ewers (C)


David Turner


Chris Benson


Paul Bosher (C)


Dave Hopley (C)


Detlev Riedel


Gordon Stanford (C)


Richard Rawcliffe


Alan Durban (C)


Dave Bellenger


Robert Scott


Nigel Shepherd (C)


Ray Bull


John McGiff (C)


Gareth Powell


Richard Coleman


Nick Webb


Dan Coates


Sean Higgins


Ian McBride

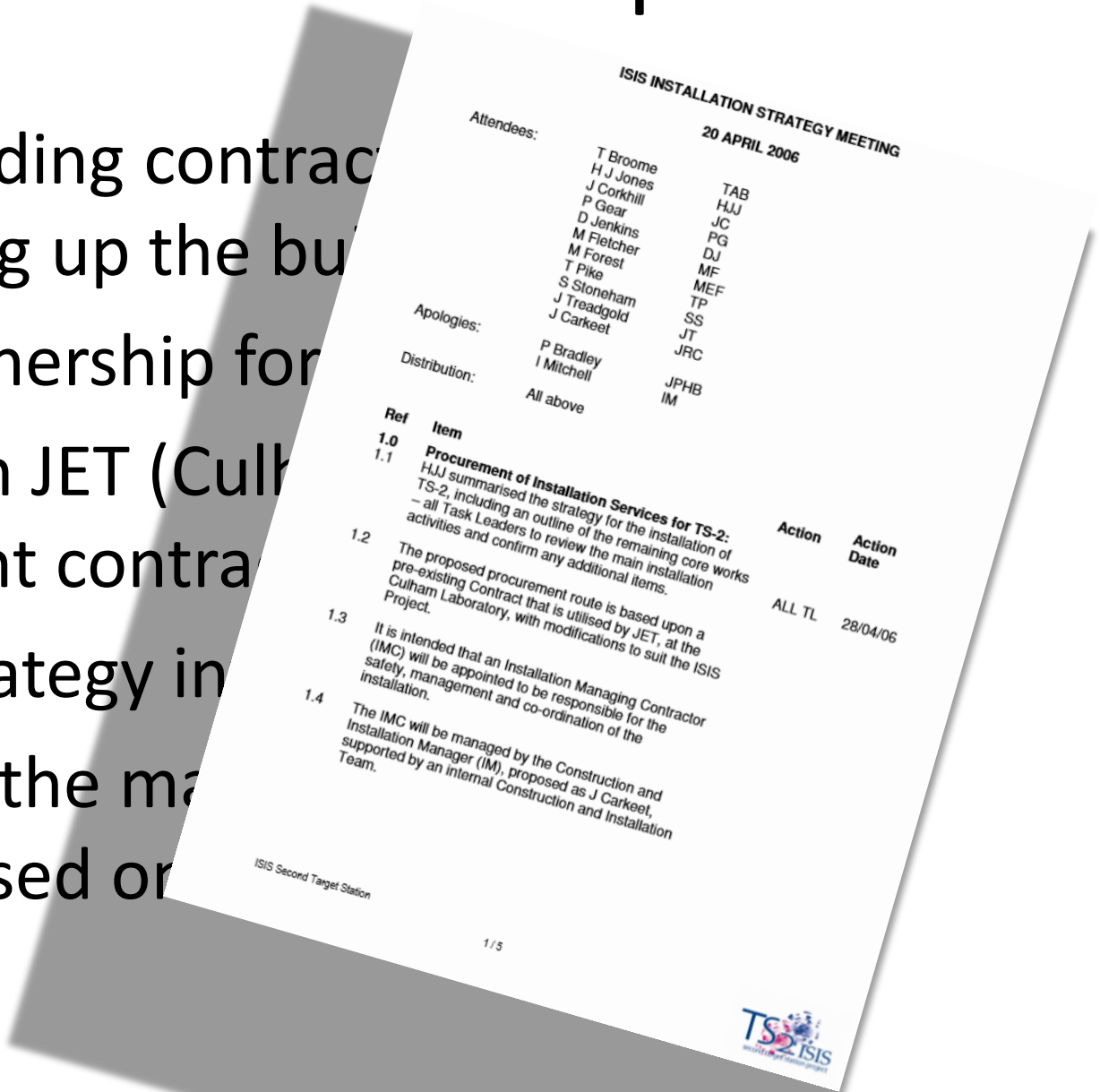

Dave Rowe (C)


Hanna Fikremariam

TS-2 ISIS
November 2006

# Installation set-up

- Costain (building contrac
  whilst putting up the bu
- ISIS took ownership for
- Lessons from JET (Culh
  ‘management contra
- Set-out a strategy in
- Went out to the ma
  reviewed based or



**ISIS INSTALLATION STRATEGY MEETING**

**20 APRIL 2006**

Attendees:

| | |
|---|---|
| T Broome | TAB |
| H J Jones | HJJ |
| J Corkhill | JC |
| P Gear | PG |
| D Jenkins | DJ |
| M Fletcher | MF |
| M Forest | MEF |
| T Pike | TP |
| S Stoneham | SS |
| J Treadgold | JT |
| J Carkeet | JRC |

Apologies: P Bradley, I Mitchell

Distribution: All above — JPHB, IM

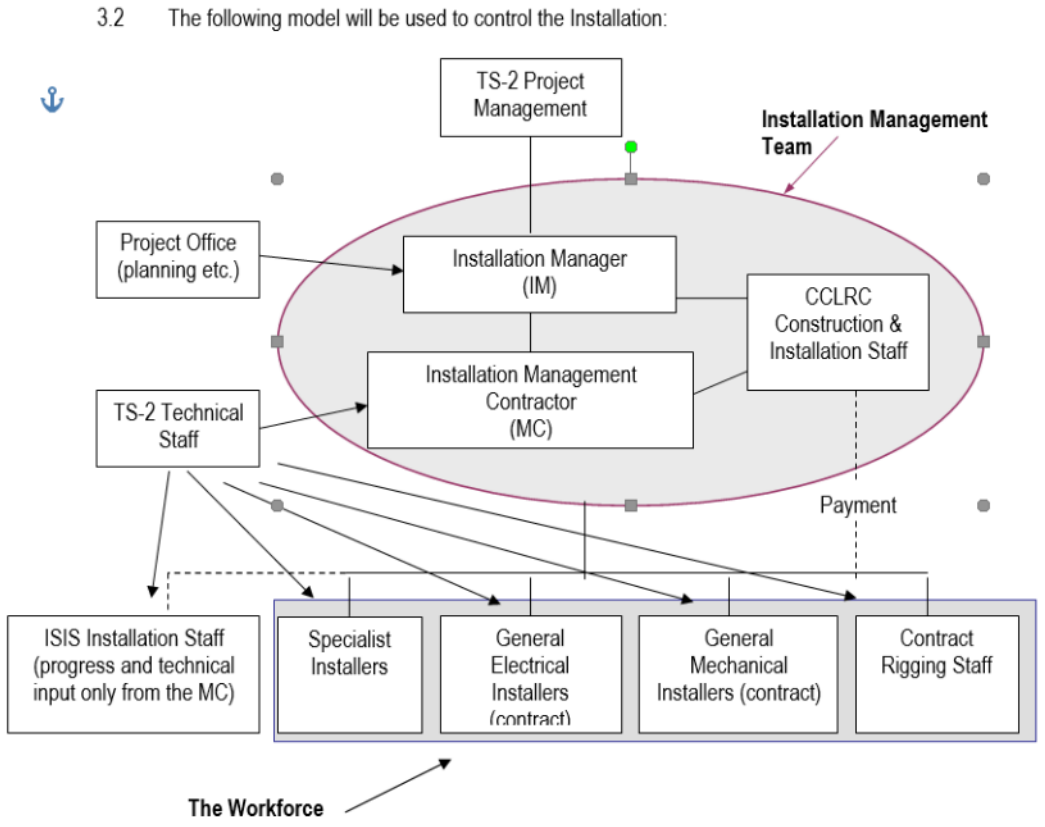
| Ref | Item | Action | Action Date |
|---|---|---|---|
| 1.0 | | | |
| 1.1 | **Procurement of Installation Services for TS-2:** HJJ summarised the strategy for the installation of TS-2, including an outline of the remaining core works – all Task Leaders to review the main installation activities and confirm any additional items. | ALL TL | 28/04/06 |
| 1.2 | The proposed procurement route is based upon a pre-existing Contract that is utilised by JET, at the Culham Laboratory, with modifications to suit the ISIS Project. | | |
| 1.3 | It is intended that an Installation Managing Contractor (IMC) will be appointed to be responsible for the safety, management and co-ordination of the installation. | | |
| 1.4 | The IMC will be managed by the Construction and Installation Manager (IM), proposed as J Carkeet, supported by an internal Construction and Installation Team. | | |

ISIS Second Target Station

1 / 5

# Key features

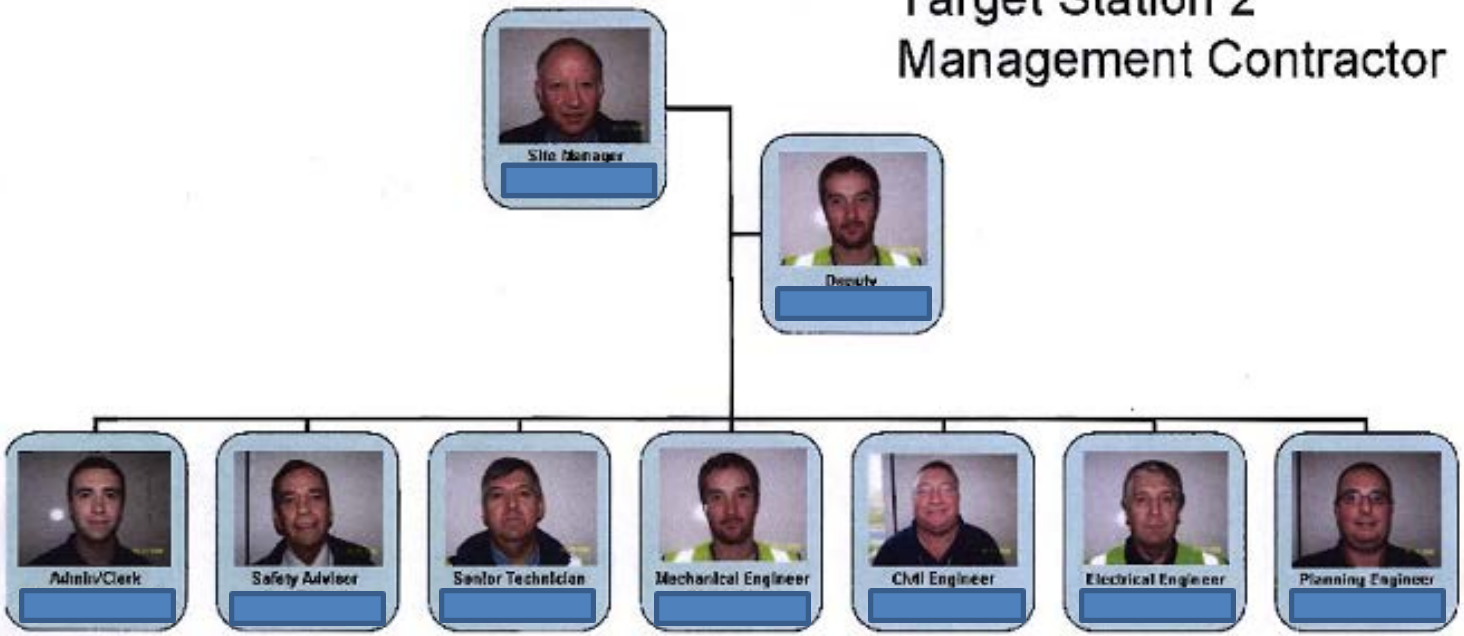
- Contract that of ‘cost plus’
- Indicative 11 management
- Indicative 54 workers
- Bonus 5% controlled by IM

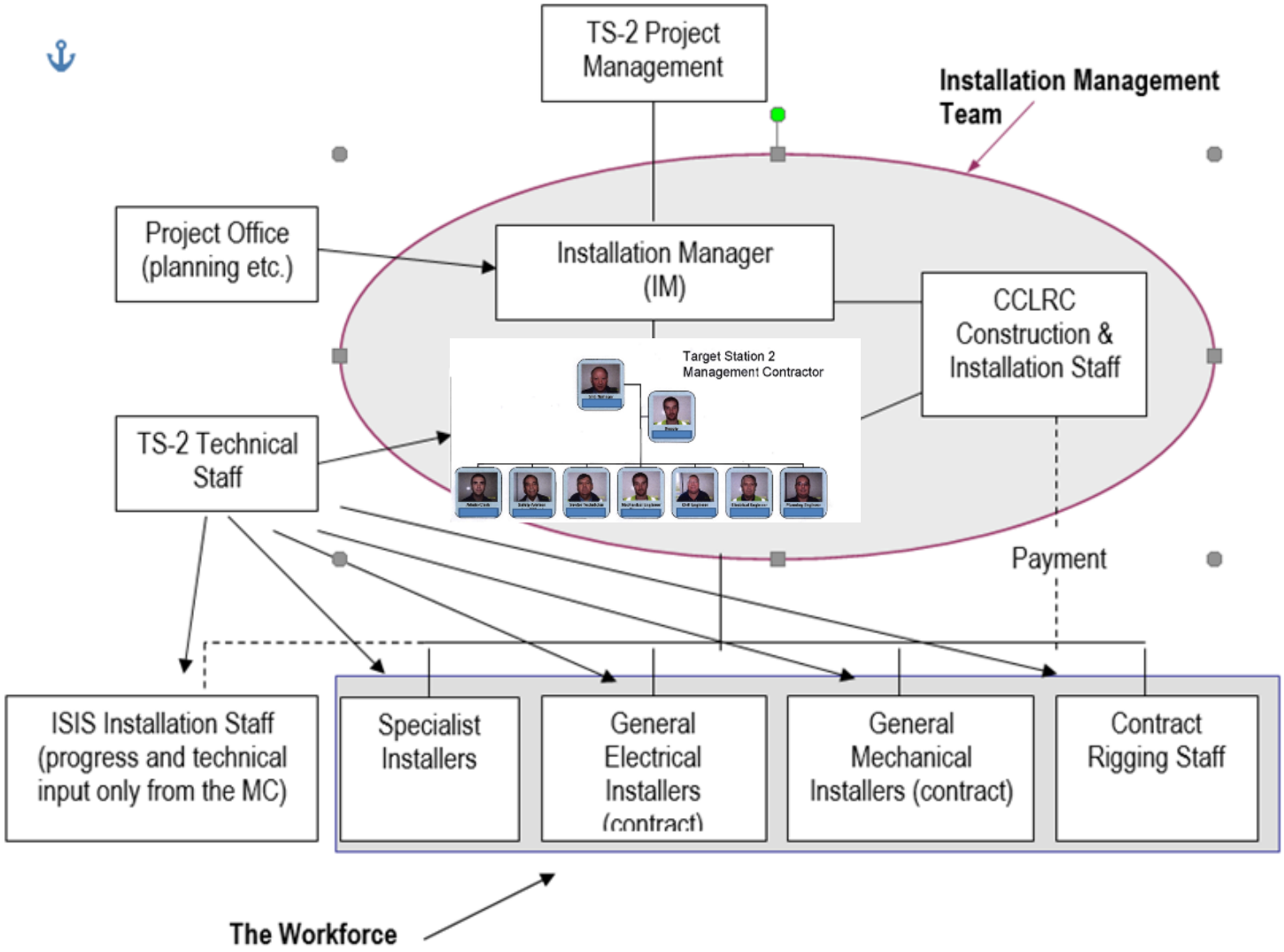


# Responsibilities

- Management and co-ordination of ALL site activities
- Managed under CDM regulations
  - From the construction industry
- Health and Safety for the site
  - Under STFC framework

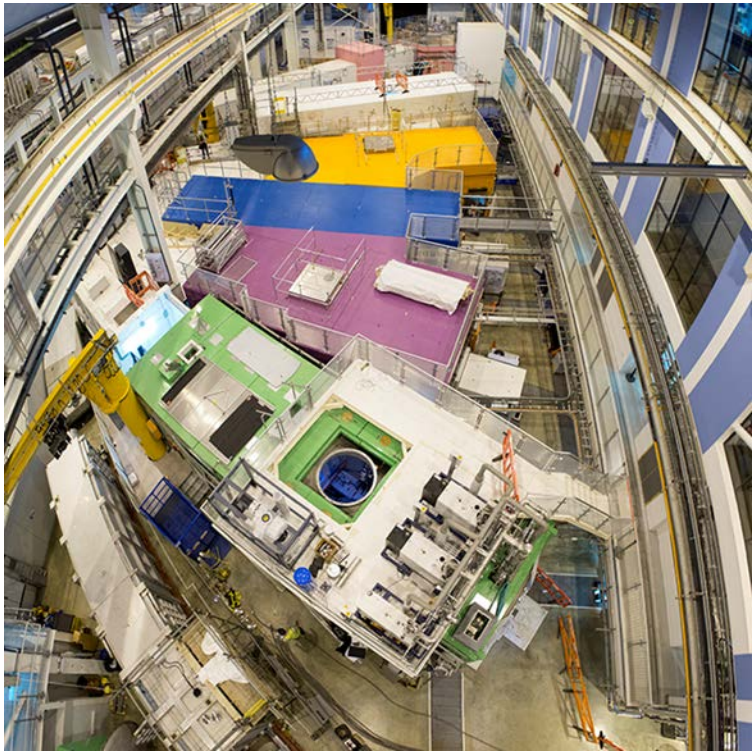

# Target Station 2
# Management Contractor




TS-2 Project Management
Installation Management Team
Project Office (planning etc.)
Installation Manager (IM)
CCLRC Construction & Installation Staff
Target Station 2 Management Contractor
TS-2 Technical Staff
Payment
ISIS Installation Staff (progress and technical input only from the MC)
Specialist Installers
General Electrical Installers (contract)
General Mechanical Installers (contract)
Contract Rigging Staff
The Workforce

# Points of note

- Management Contractor had a Nuclear background
- Took time to adapt to the STFC ways
- STFC took time to adapt to MC procedures
- Management numbers fluctuated and people changed
  - Strong dependence on competance
- Workforce fluctuated



# Information flow

- Design Input (from design team) 6 weeks before
- Installation method statement from the installation team, reviewed by the design team

- No plan survives contact with the enemy!

# Lessons 1

- Financial
  - Removing financial barriers was extremely good to prevent internal teams arguing on a cost basis
  - 5% bonus gave some incentive to perform - milestones
- Find solutions to small issues – bolts, tools etc
- Shifts were used at times – they are not twice as effective
- Logistics should have been better controlled – where equipment was kept / offloaded / ready for install

# Lessons 2

- Takes time to build a working team – and you need to
- Cultures are different – laboratory to commercial. Civil to nuclear etc
- Getting design teams on the ground and installation teams into design is a challenge
- Not all staff able to do all activities

# Lessons 3

- Having paperwork is good
- Having a conversation is good
- The combination is best.
- We had a central pinch point which when removed enabled better progress

# Lessons 4

- We had procedures on how / who is responsible etc (68 page document)
- It is important to define – but by defining does not make it happen.
  - **Few people read documents**
  - **Hardly anyone follows them**
- Design teams will be designing whilst installing and their **responsibility (and probable preference)** is the design

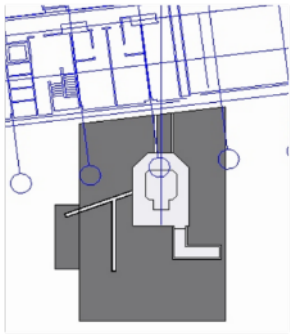
# Lessons 5

- Get technical owners controlling work early
  - Survey we outsourced, but not under the existing survey team strong direction
- Cranes always an issue
- Quality – spots issues and who decides…..
  - Ultimately the ones who end up being responsible should
  - Probable discussions will occur
  - Quick fixes for expediency you nearly always regret

# Lessons 6

- Survey can put things accurately in the wrong place
  - Clarity of reference
- **Services are difficult!**
- Competition for space – electrical / plant / mechanical / civil
  - Different CAD systems

Never forget services – they need space too



Original services trench design

Revised, greatly extended services trench design

# Quality

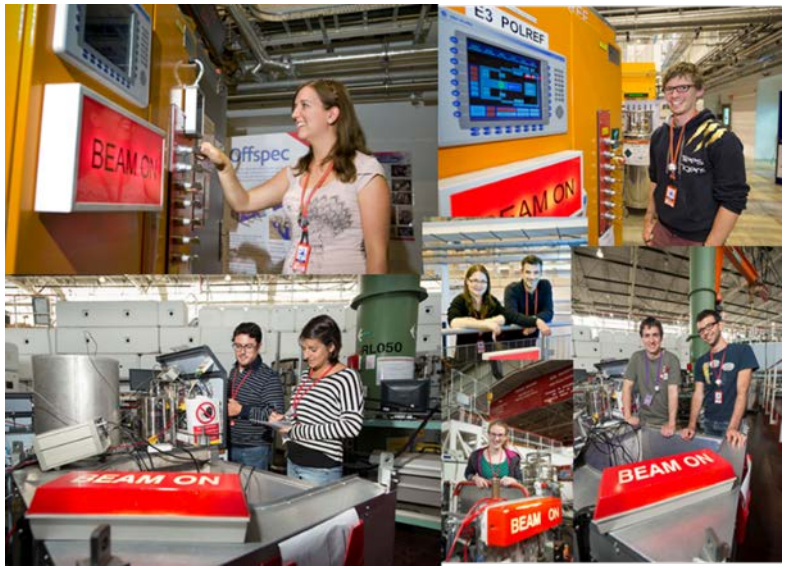
- You will have technical issues – we did
  - Poor design / installation
- Test at source as much as possible
- Pre-build where possible
- Best person to decide solution – **not just who shouts loudest**
- Not everything is clear – and there will be differences of view as to what is the technical situation

# Documentation

- You will create lots!
- Quality not quantity
- It lasts, people leave
  - Some are builders not commissioners / operators
- Drawings last more than documents
- Documenting as-built is never 100%
  - Aim high – expect less
  - Focus on what is critical – Target station / active
- People are critical to understand the documents

# Operating

- It gets very complex when you ‘go hot’
  - We transferred ownership of the site between MC and STFC
- Having an already existent 24hr crew in place which knew the site etc really helped us
- Pressure to hit political milestones vs trialling equipment



# If I was ESS

- There will be much more in-kind than we had to deal with - So much more complex
- Set-out protocols to be followed **clearly and simply** – make things **easy (and clear)** for others
- **Define early and be consistent**
- Communicate this **more than you ever thought you need** to and in more formats.
- Expect people to **NOT** follow them and work out how you will cope
- Put in place the ‘lubrication’ for installation – easy access to small often overlooked items – fixings etc
- Logistics is very important – in-kind will be remote
- Operational teams involved with the build

# Last messages

- Try to build a team – collective will solve problems – You will have them.
- Remove ‘irritations’
- Remove financial barriers if possible
- Expect **owners** of equipment to spot / decide on quality issues
  - Will need to work out who is the owner…. Operator / in-kind etc – involve them with the build
- Remember **what** you build is most important
  - How, how much, when etc fades (but has to be afforded)

Thankyou
Questions?

# Wikipedia

- History and background of ISIS[edit]The source was approved in 1977 for the RAL site on the Harwell campus and recycled components from earlier UK science programmes including the accelerator hall which had previously been occupied by the Nimrod accelerator. The first beam was produced in 1984, and the facility was formally opened by the then Prime Minister Margaret Thatcher in October 1985.[3]

- The second target station was given funding in 2003 by Lord Sainsbury, then science minister, and was completed in 2009, on time and budget, with the opening of 7 instruments. In April 2010, the Science Minster, David Willetts gave a £21 million investment[4] to build 4 new instruments.

- ISIS was originally expected to have an operational life of 20 years (1985 to 2005), but its continued success led to a process of refurbishment and further investment, which has extended its operational life for a further 20 years. [5]