

# VISUALISING EDUROAM

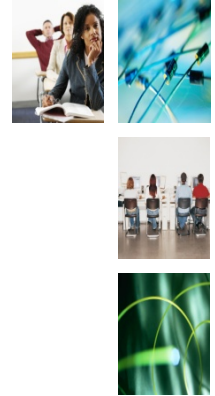
What we can do now, what  
we need to do in the future

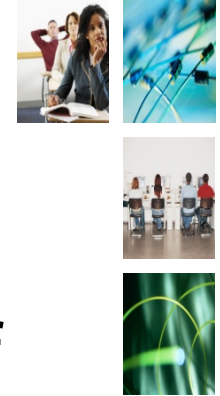
...and a trivial afterthought

Mark O'Leary  
June 2010

# AGENDA

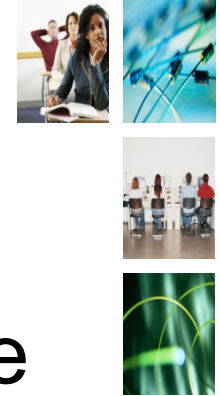
- Free effort?
- Visualising eduroam
- Transition to RadSec
- Restoring visualisation: IF-MAP
- Trivial solution?





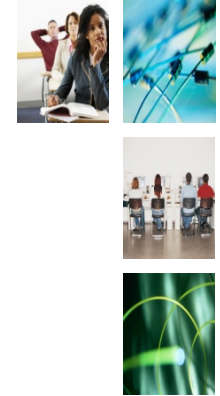
# FREE EFFORT?

- An NREN's primary role is delivery of the network
- But we do try to be members of the **broader educational community**
- Arguably, there is a 'social responsibility' obligation on us to provide **opportunities for student engagement** with our activities



# FREE EFFORT?

- University IT courses increasingly use **‘real-world’ project activities** to provide students with experience
  - The University of Southampton runs a five week ‘Group Design Project’ for MSc students each year
  - JANET(UK) **‘plays the customer’** for a GDP team
  - 3<sup>rd</sup> year of collaboration



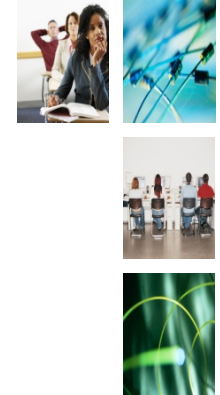
# FREE EFFORT?

- We specify an *achievable* task with a programming component
- The students do the work, and communicate their ongoing management of the project
- We provide feedback that contributes towards their assessment
- Valuable learning experience and useful deliverables: **win-win!**

# FREE EFFORT?

GDP 08/09

- Wireless Location Awareness

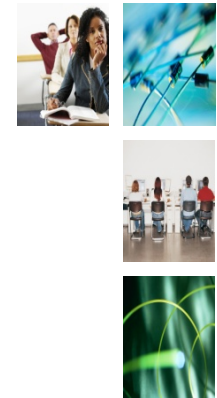
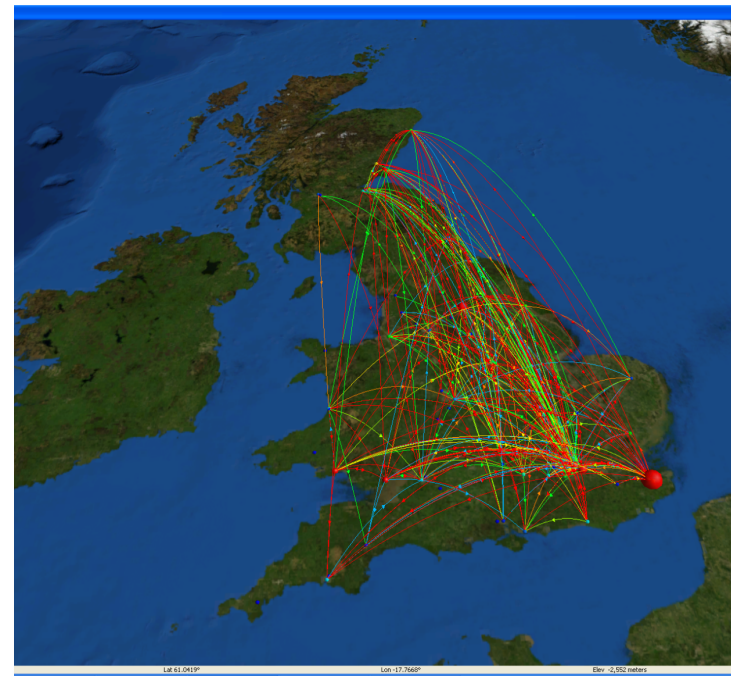


# FREE EFFORT?

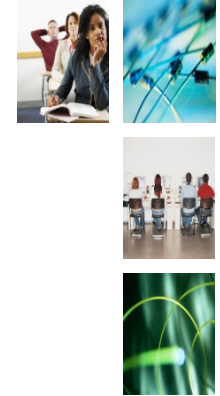
GDP 09/10

- Visualising eduroam

- Thanks to:
  - Sam Miller
  - Dan Stoner
  - Richard Clarke
  - Lesley Oakey
  - Dr Tim Chown



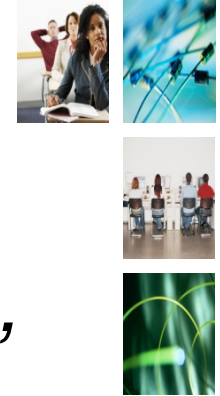
# FREE EFFORT?



GDP 10/11

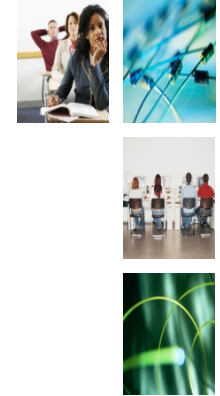
- Another eduroam-related project
- *Watch this space!*





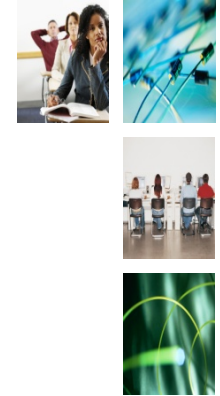
# WHY VISUALISE DATA?

- *“A picture is worth a thousand words”*
- The pattern of eduroam transactions is complex
  - difficult to spot even broad trends
- Is eduroam successful?
  - A fundamental question.
  - possibly more of a talking point in the UK than elsewhere?



# GOALS OF VISUALISATION

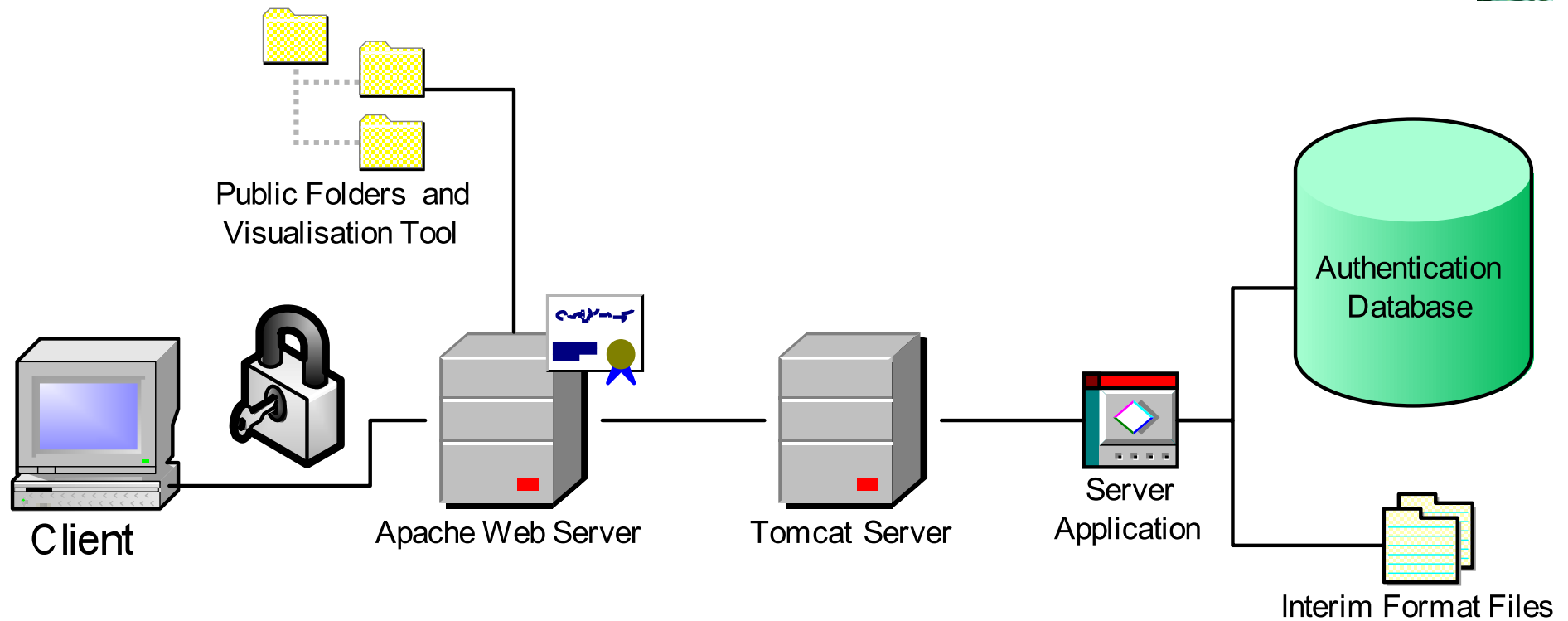
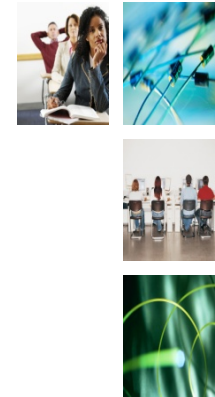
- Analytical
  - Usage patterns & levels
- Diagnostic
  - Error conditions highlighted, geographically located
- Promotional Tool
  - Compelling picture of usage
  - Unattended demo mode



# CAVEATS

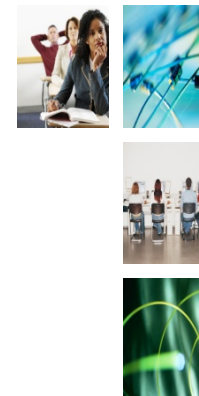
- Privacy protection: don't display data that allows an individual users travels to be inferred.
  - **Blurring**: temporal aggregation
  - **Blurring**: image manipulation techniques
  - **Authorisation**: role-based data release policies

# DESIGN

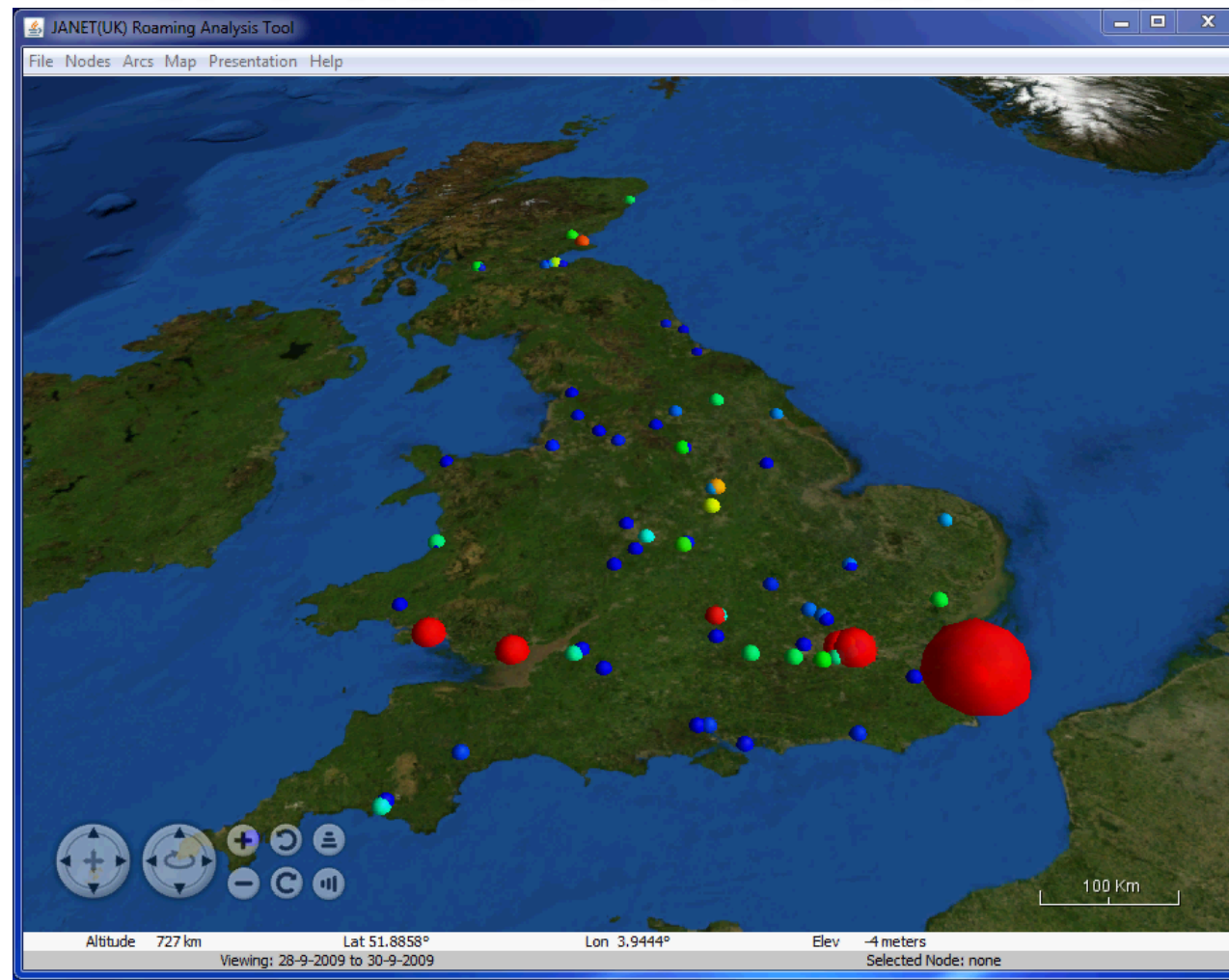
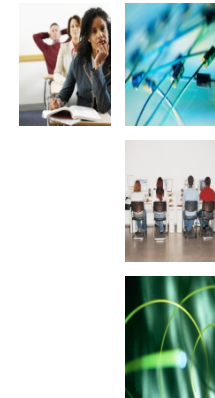


# DEMONSTRATION

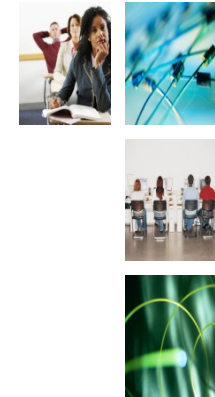
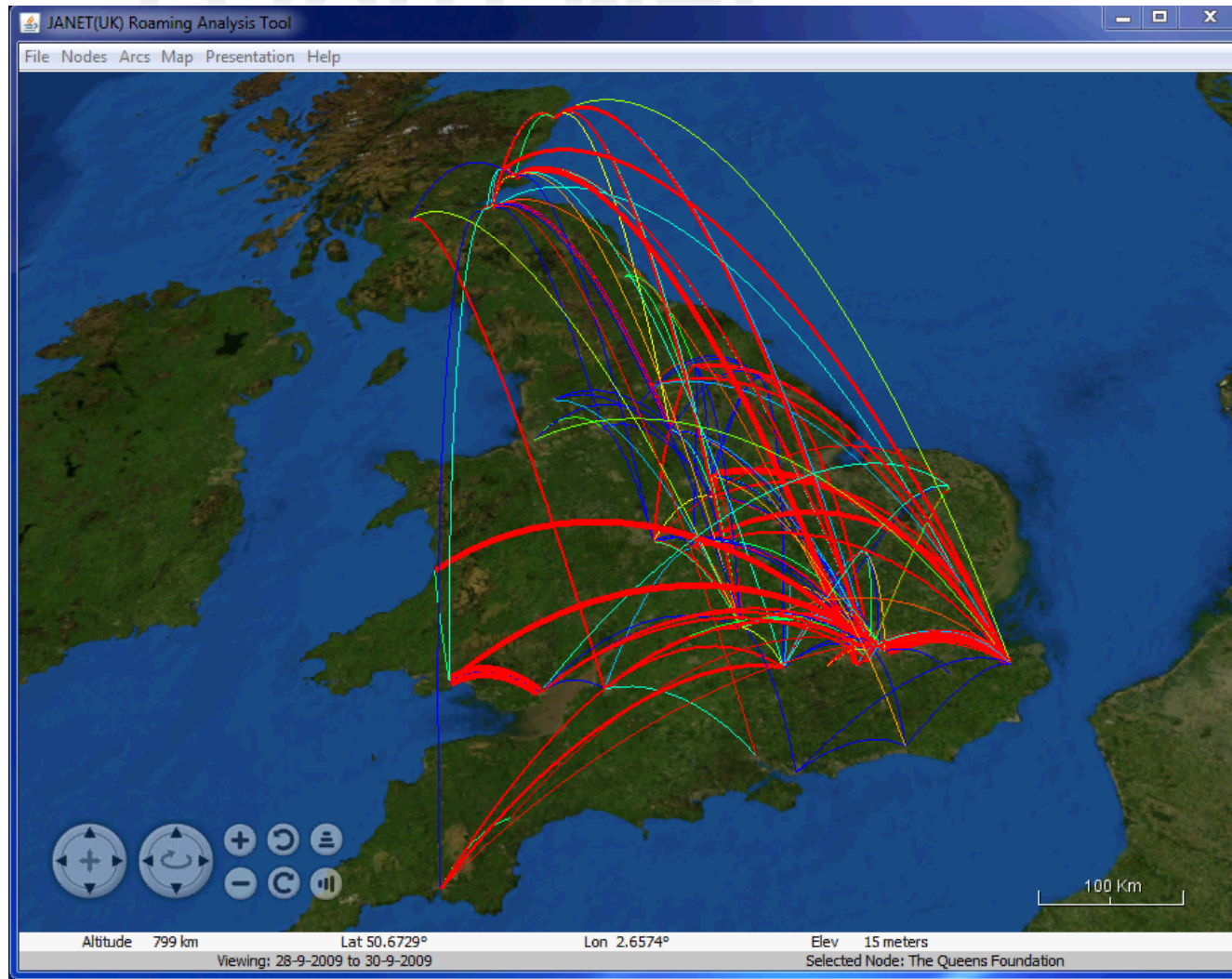
- Roaming sites
- 'Flight map' transaction arcs
- Bar chart activity monitoring



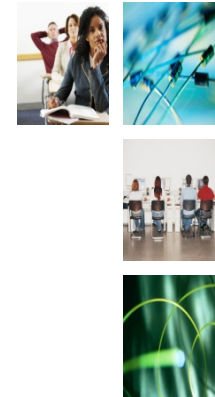
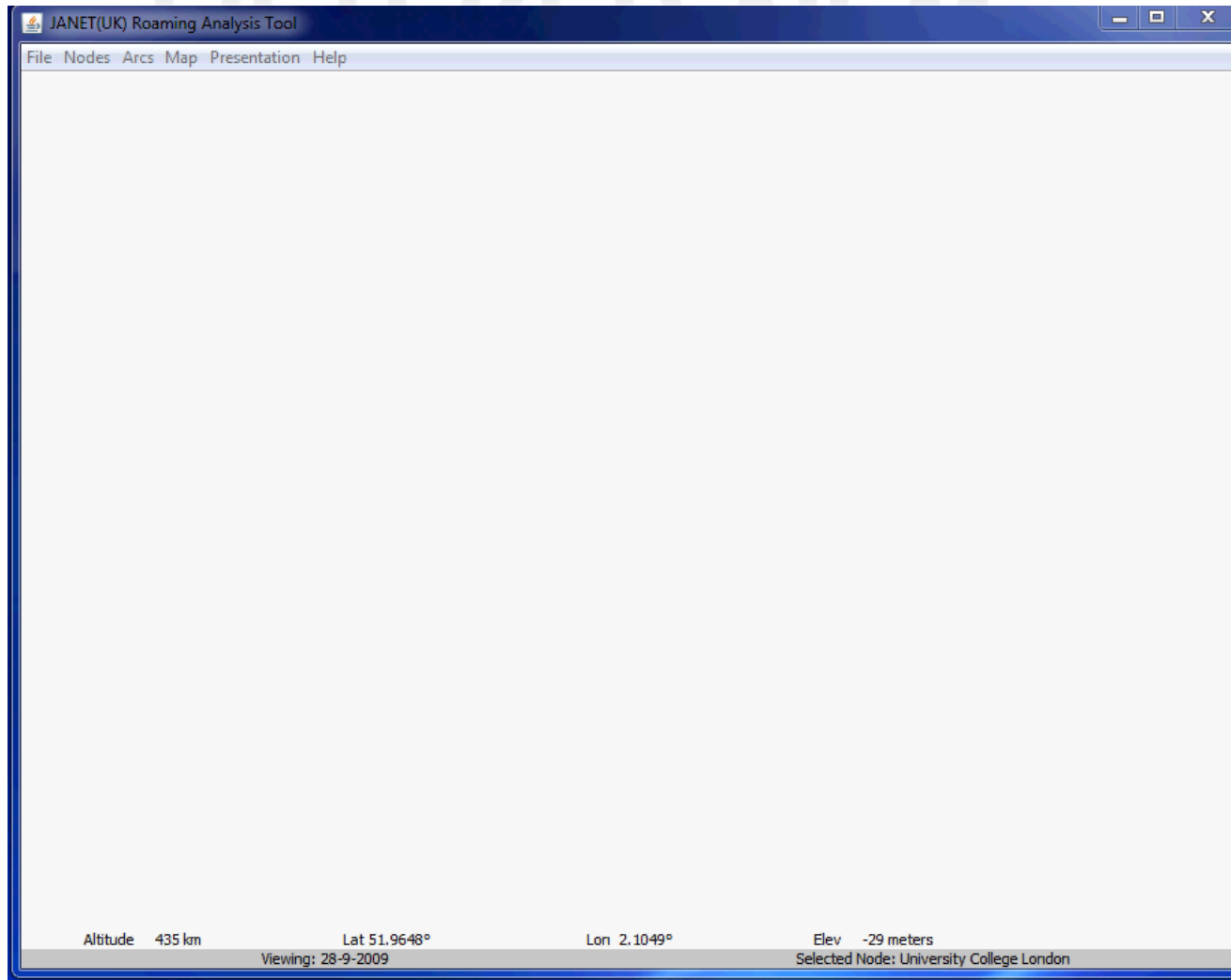
# SEEING THE SITES



# FLIGHT MAP

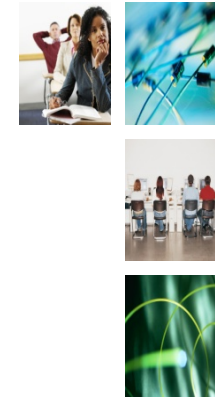
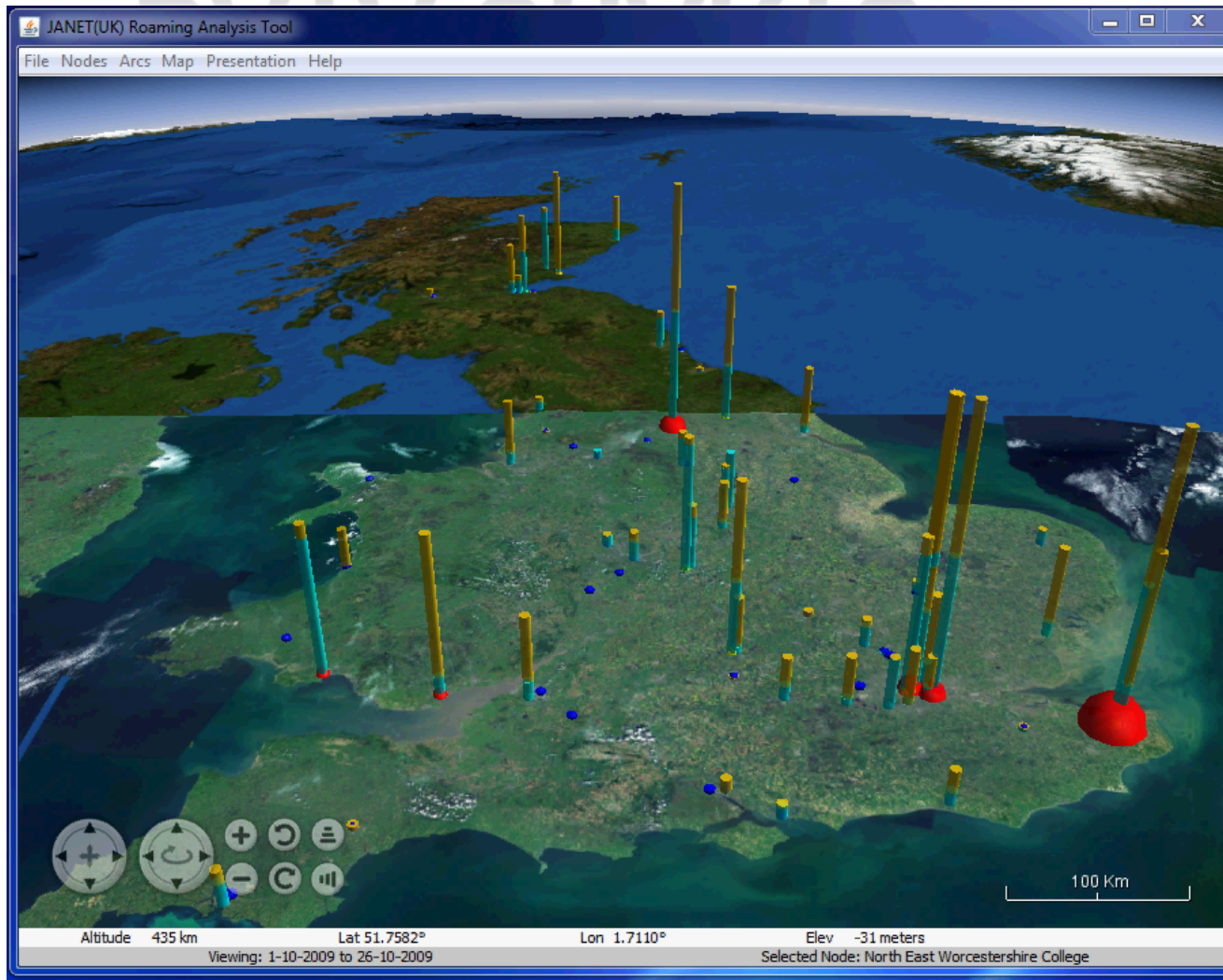


# FILTERED VIEW

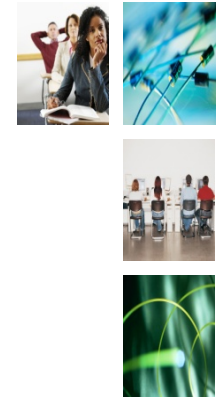
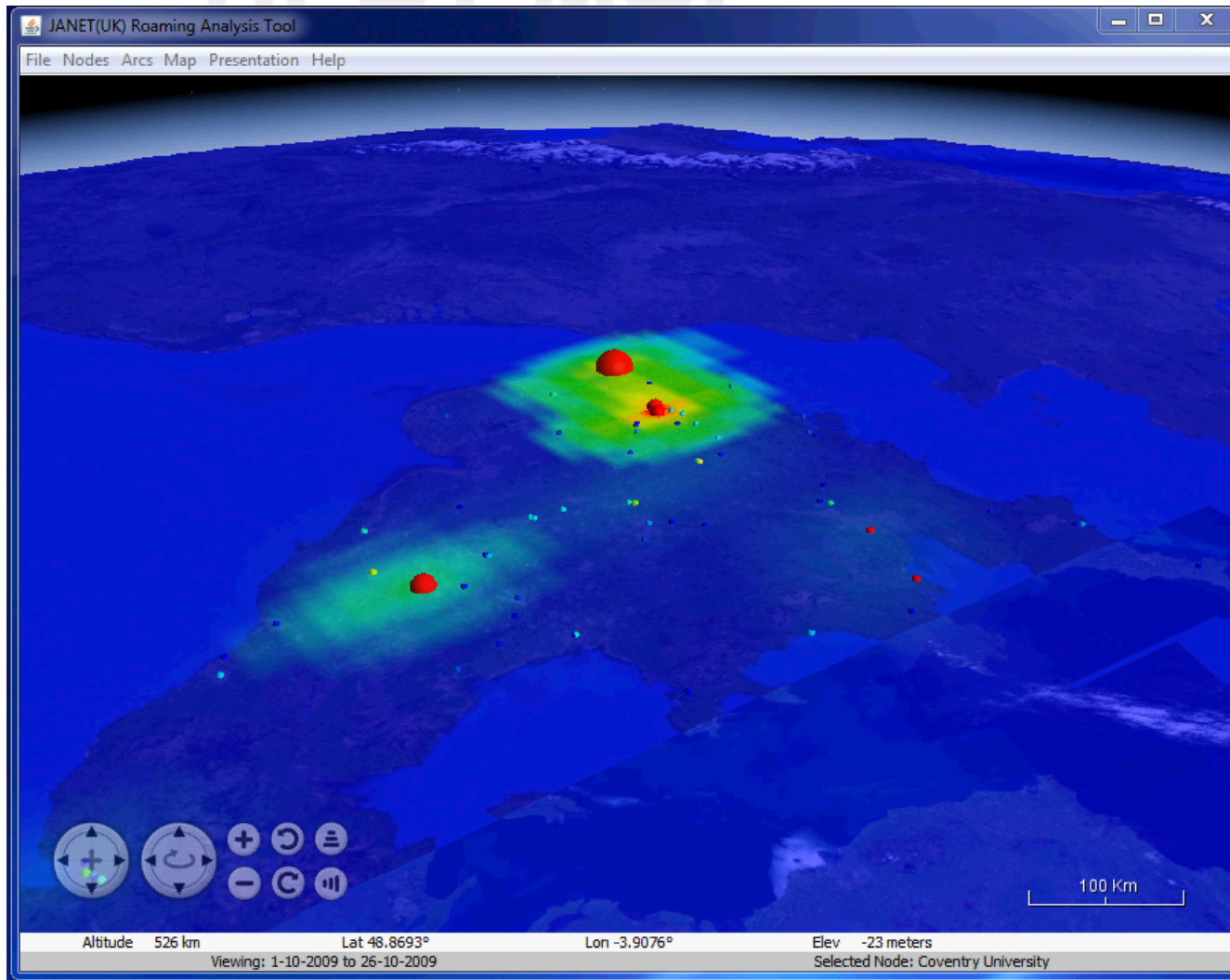




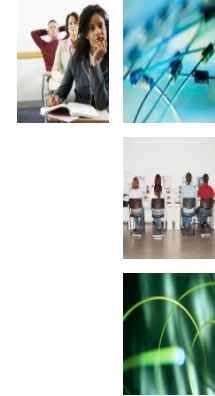
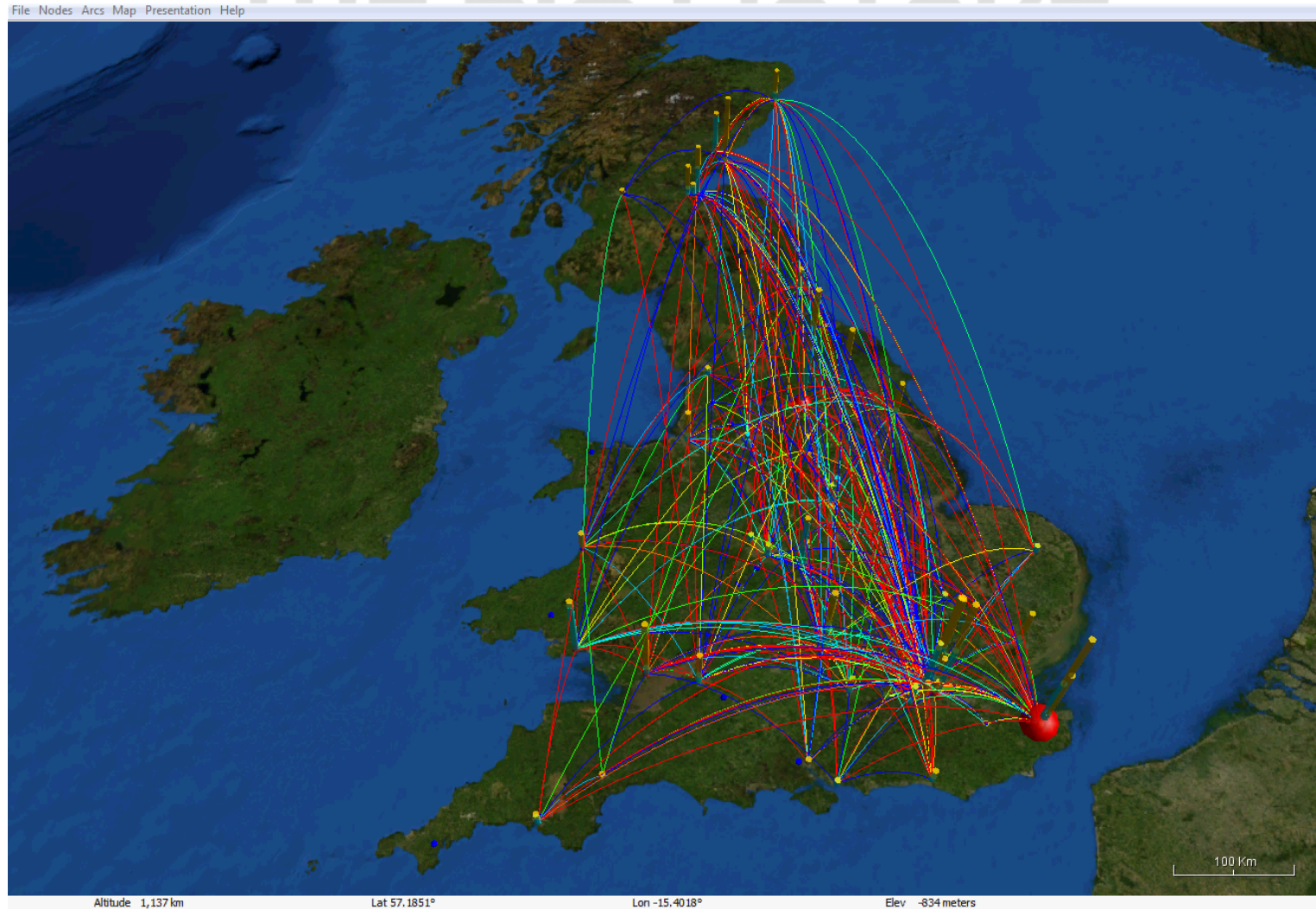
# DATA CHARTS



# HEAT MAP

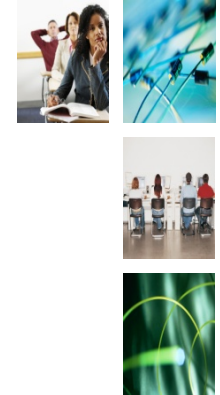


# THE BIG PICTURE

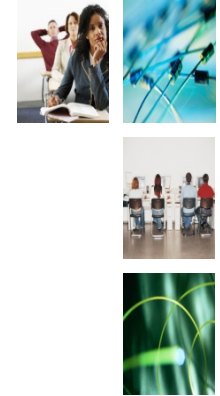


# BUT...

- Current eduroam design is based on binary peering, so the originator of requests to be proxied at the national level is always obvious.
- However, standard RADIUS 'shared secret' security is considered by some to be imperfect

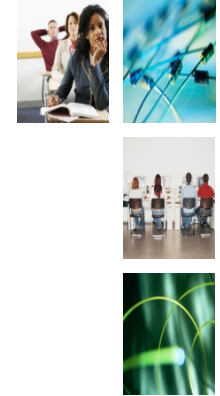






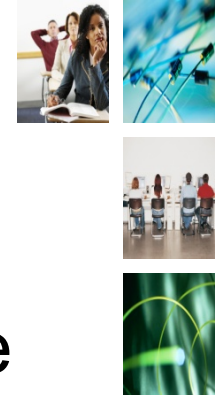
# SUDDENLY... RADSEC

- “RADIUS over TCP/TLS” – advanced standardisation, split into multiple documents
- Secures the RADIUS packet exchange, *but removes any hints to the origin of the roaming transaction!*
- Monitoring and visualisation will be increasingly undermined as RadSec adoption increases



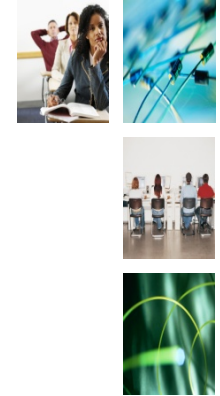
# IF-MAP TO THE RESCUE

- MAP = Metadata Access Point
- Developed by the Trusted Computing Group (TCG), as part of the Trusted Network Connect (TNC) suite of standards



# IF-MAP CHARACTERISTICS

- Standardises the kind of data gathering we currently use SNMP and Syslog for
- Aggregates and correlates data from disparate systems
- Allows arbitrary extensions to support new use cases without the limitations of a global schema
- Allows 'subscription': automatic notification of changes
- Simple to implement!



# IN OR OUT?

- IF-MAP was designed for use cases internal to the network domain
  - Primarily for ‘next generation’ NAC
- *What if we adapted it to allow inter-domain sharing of metadata?*





## USE CASE: *EDUROAM*

RadSec

- RadSec undermines centralised logging of originating visited

Metrics

- Service metric unreliable!

Logging

- Restore logging by publishing (anonymised?) roaming events to an externally-readable MAP instance.

Subscription

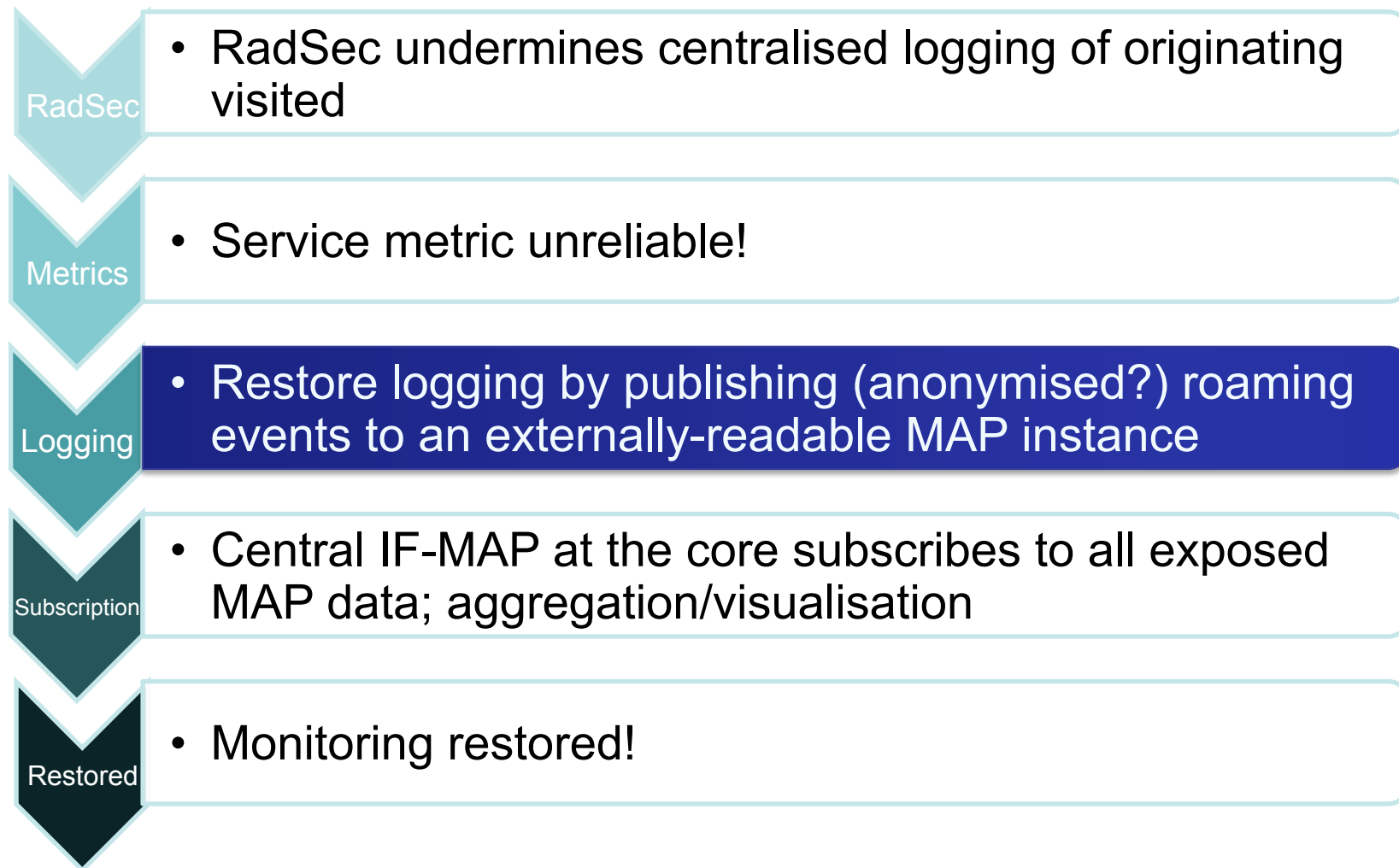
- Central IF-MAP at the core subscribes to all exposed MAP data; aggregation/visualisation

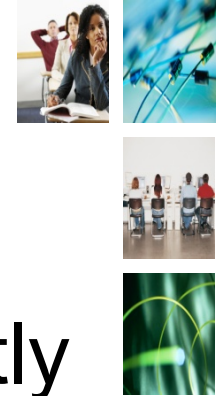
Restored

- Monitoring restored!



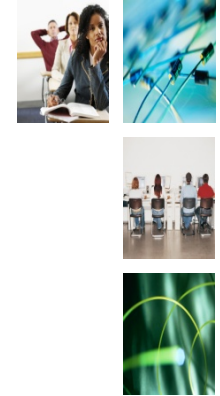
## USE CASE: *EDUROAM*





# TWO TASKS

1. Enable RADIUS proxies to log directly to an IF-MAP instance
  - a) Directly modify one or more RADII?
  - b) PERL module or similar to allow arbitrary logs (and services) to be tailed into IF-MAP
2. Secure a MAP instance such that it may be exposed outside the organisation firewall
  - a) Authentication/Authorisation – Federation?
  - b) Improved server security model

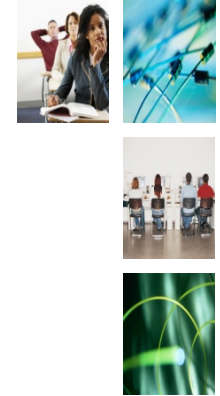


## TRIVIAL?

- “Tri via” – the meeting of three roads
- Traditional site for placement of community noticeboards ~100 A.D.

*So, if we are doing this for eduroam...*

- Does collecting a lot of ‘trivial’ local data give a more valuable emergent picture of larger scale features?



## A POSSIBLE FUTURE?

- Many classes of metadata are of interest between community members
  - Domain 'network weather'
  - Shared intelligence (IDS etc.)
- Some classes of metadata could usefully be aggregated at the JANET core
  - JRS/eduroam stats is just one example...

# THANKS FOR LISTENING!

Are there any questions?

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