



Application of digital microscopy for the remote identification of invertebrate pests

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Remote Microscopy (RM):

- Essentially ...
- A camera connected to a microscope that in turn is connected to dedicated hardware/computer
- A live image of a specimen under the microscope is transmitted over the internet and remotely accessed by a diagnostician, with real time communication via telephone or voip (voice over internet protocol, e.g., Skype)

Study tour to Australia & New Zealand (by my colleague Dan Pye)

All organisations used:

Nikon Digital Sight
System (Nikon controller
and Nikon digital
microscope camera)

Approximate cost per
unit: £4,500 (= €6,370)

Thompson M. *et al*: (2011) *Australian
Journal of Entomology* **50** (1): 1-6



Remote Microscopy (RM): Proof of Concept Study



- Objective: To lay the foundations of a RM network as a tool for specialist-specialist interactions between the different constituent Plant Health bodies within the UK
- Fera, SASA & RBG Kew (Quarantine House)

Remote Microscopy (RM): Proof of Concept Study



- Successful two-way trials carried out (eventually) between Fera and SASA, and between Fera and Kew
- Successful three-way trial carried out last week!
- Unable to use live video streaming (Room 1), but RM was conducted using an image refresh time of 500 milliseconds (Room 3)
- All parties concluded this provided sufficient capacity of requisite image quality
- **THE TECHNOLOGY WORKS!**

Room 1 or Room 3?



A screenshot of a web browser window displaying the Nikon DS-L3 interface. The browser's address bar shows 'remdiag.fera.defra.gov.uk'. The page has a dark background with a repeating pattern of glowing orange circles. At the top left is the Nikon logo, and at the top right is 'DS-L3'. Below this is a grey bar with the text 'Please Enter the Room .'. A white box contains three menu items: 'ROOM1' (with a right-pointing triangle), 'ROOM2', and 'ROOM3', each followed by a description. To the right of this box is an image of the Nikon DS-L3 device. At the bottom, a copyright notice reads 'Copyright 2011 Nikon Corporation, all right reserved'. The Windows taskbar is visible at the very bottom, showing the time as 13:07 on 24/11/2015.

Please Enter the Room .

▶ ROOM1

Java Applet(Windows - IE,Firefox/MacOS - Safari,Firefox)

▶ ROOM2

CF Card & USB Memory Access

▶ ROOM3

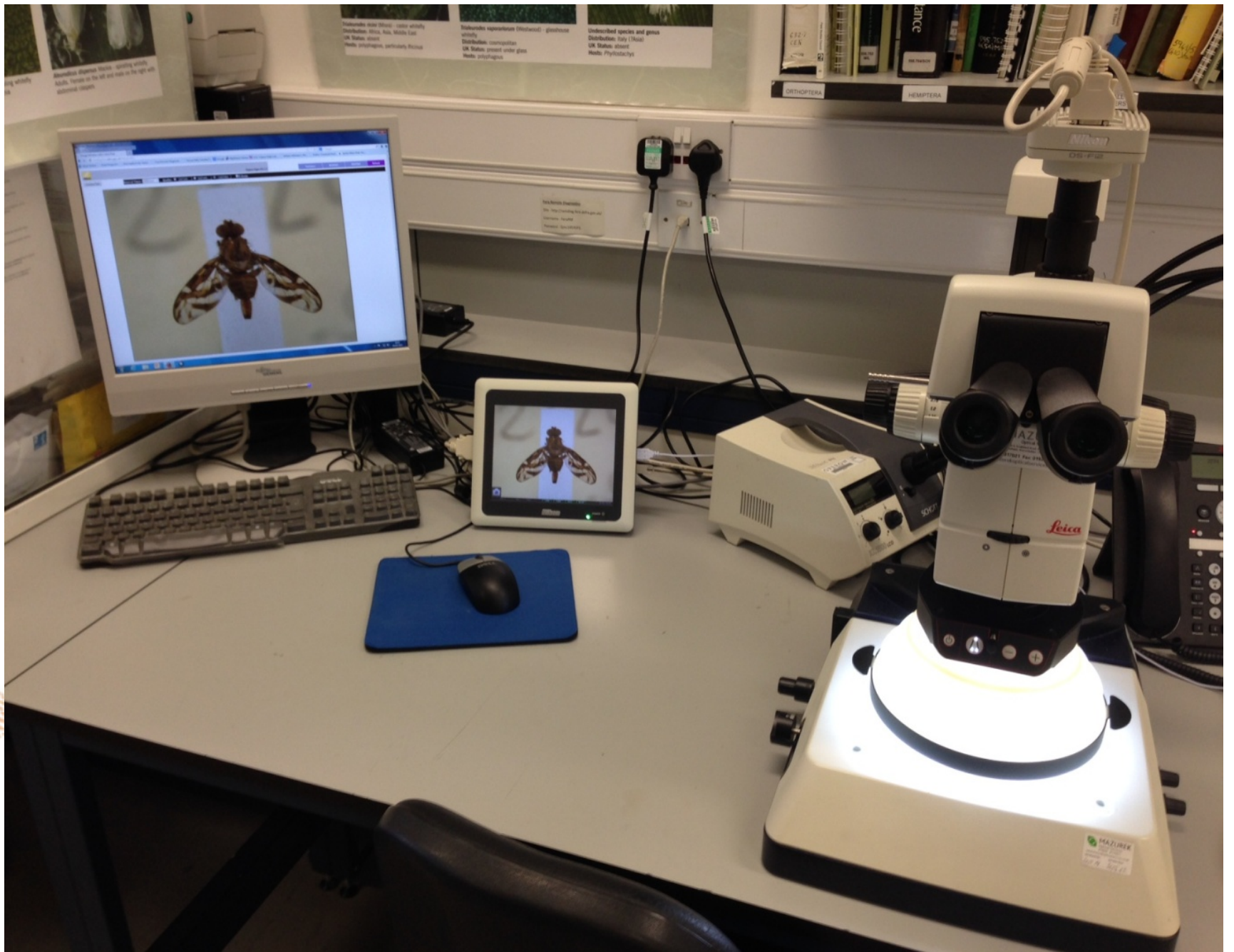
Image Window with Control Pad

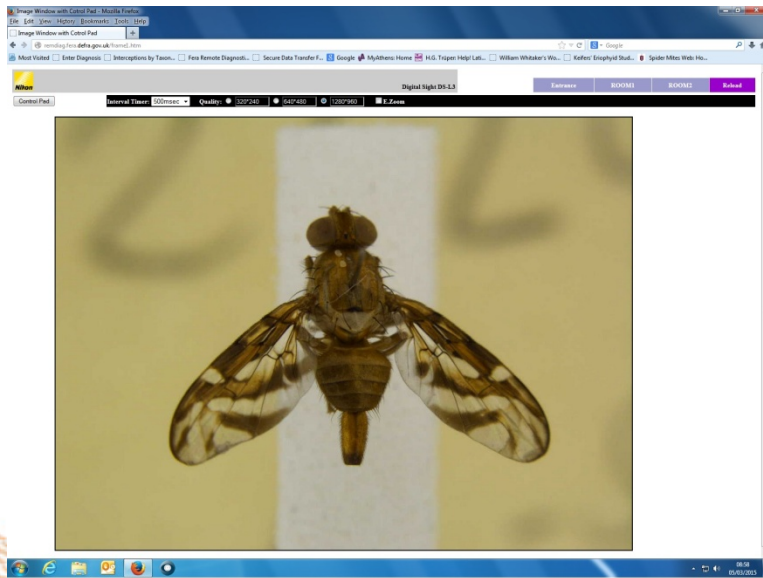


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2014.06.04

13:07
24/11/2015





Remote Microscopy (RM): Proof of Concept Study



HOWEVER ...

- Project proceeded slowly because of IT security issues and concerns
- Each institute's IT Dept. has an obligation to ensure new applications do not compromise their organisation's IT security



Remote Microscopy (RM): Proof of Concept Study

- But once the system was understood, it was found to be fairly easy to install onto the respective networks
- Simple common security principle was agreed: each organisation controls access to their own site (owner of the image hosts it on their bespoke server accessible by approved partners dialling in to a specified password-protected address)



Next?

Decide which organisations to link up

Diagnostic laboratories?

Ports-of-Entry?

UK Overseas Territories?

EPPO laboratories?

Linking taxonomic specialists?

Training modules (new pests?)

Long Distance Remote Training (extension work)

