Virtual Microscopy: The UCL experience

Marco Novelli

Virtual microscope

Hamamatsu Nanozoomer

Overview

- Research.
- Scanning - image quality, reliability etc.
- Use of virtual microscopy in routine histopathological reporting.
- Current areas of clinical interest.
  - Remote reporting
  - UK EQA schemes
  - Teaching
- Areas of difficulty.

Overview

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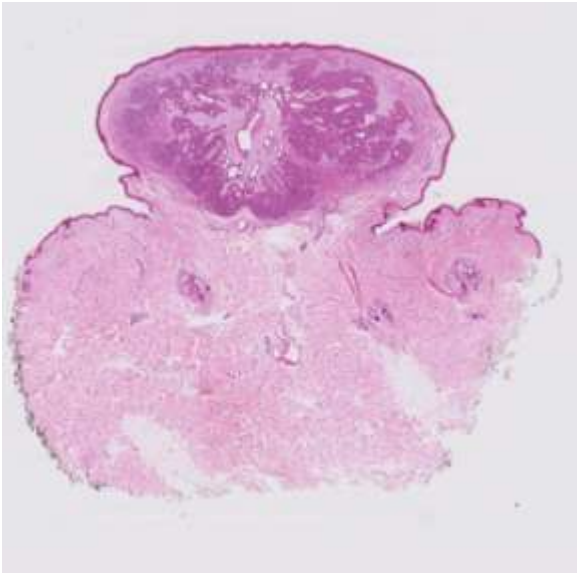
Scanning - image quality, reliability etc.

Dahmane Oukrif – Research Fellow

Scanning



- Simple.
- Reliable.
- Relatively quick.
- High quality images.
- Simple effective viewer (NDP.view)

Use of virtual microscopy in routine clinical histopathology

Radiologists have PACS.
How about virtual microscopy for pathologists?

Use of virtual microscopy in routine clinical histopathology

- Current UK situation:
  - Capacity
  - Cost
  - Reporting speed
  - Pathologist compliance

Capacity

- UCLH
  - Medium sized UK teaching hospital.
  - 21,000 cases per annum
  - 120,000 slides per annum
  - 500MB per slide

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→ **60,000 GB / 60 Terabytes**

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  - 120,000 slides per annum
  - 250 working days

  → 480 slides/day

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→ 480 slides/day

Scanning time @ 5mins/slide

2400 minutes = 40 hours/day.

Capacity

- UCLH
  - Medium sized UK teaching hospital.
  - 20,000 cases per annum
  - 100,000 slides per annum
  - 250 working days

→ 400 slides/day

Scanning time @ 5mins/slide

2400 minutes = 40 hours.

→ 3+ Nanozoomers

Cost

- Technician(s) to scan slides - ? € 30000+/pa
- Virtual microscope(s) - ? € 100,000+ each
- Computer, monitor and network upgrades -?? €

- Unlike radiology (PACS)
  - Unlikely for clinicians to want to see images.
  - ALL ON COSTS (no change in processing etc).
  - Little (if any) saving.

Reporting speed and pathologist compliance

- Over local network reporting speed very fast.
- Pathologists will have to “learn” how to use systems (inherently conservative!).
- Benefits of virtual images need to be emphasised
  - Measurements (e.g. Breslow thickness).
  - Counts (e.g. Proliferation index assessment).
  - Remote reporting – flexible working.

NDP.serve - Melanoma_ulcerated - Windows Internet Explorer
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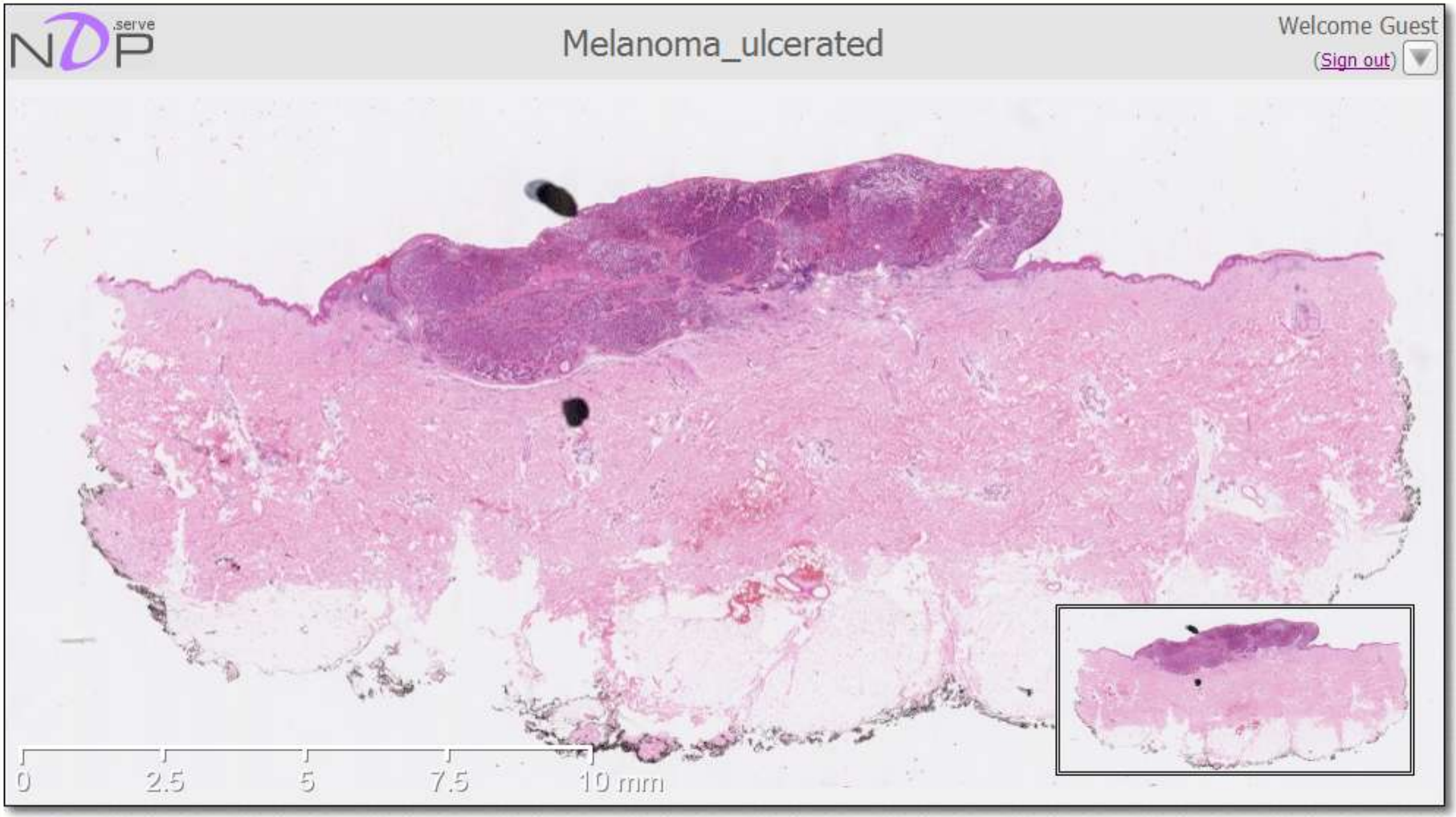

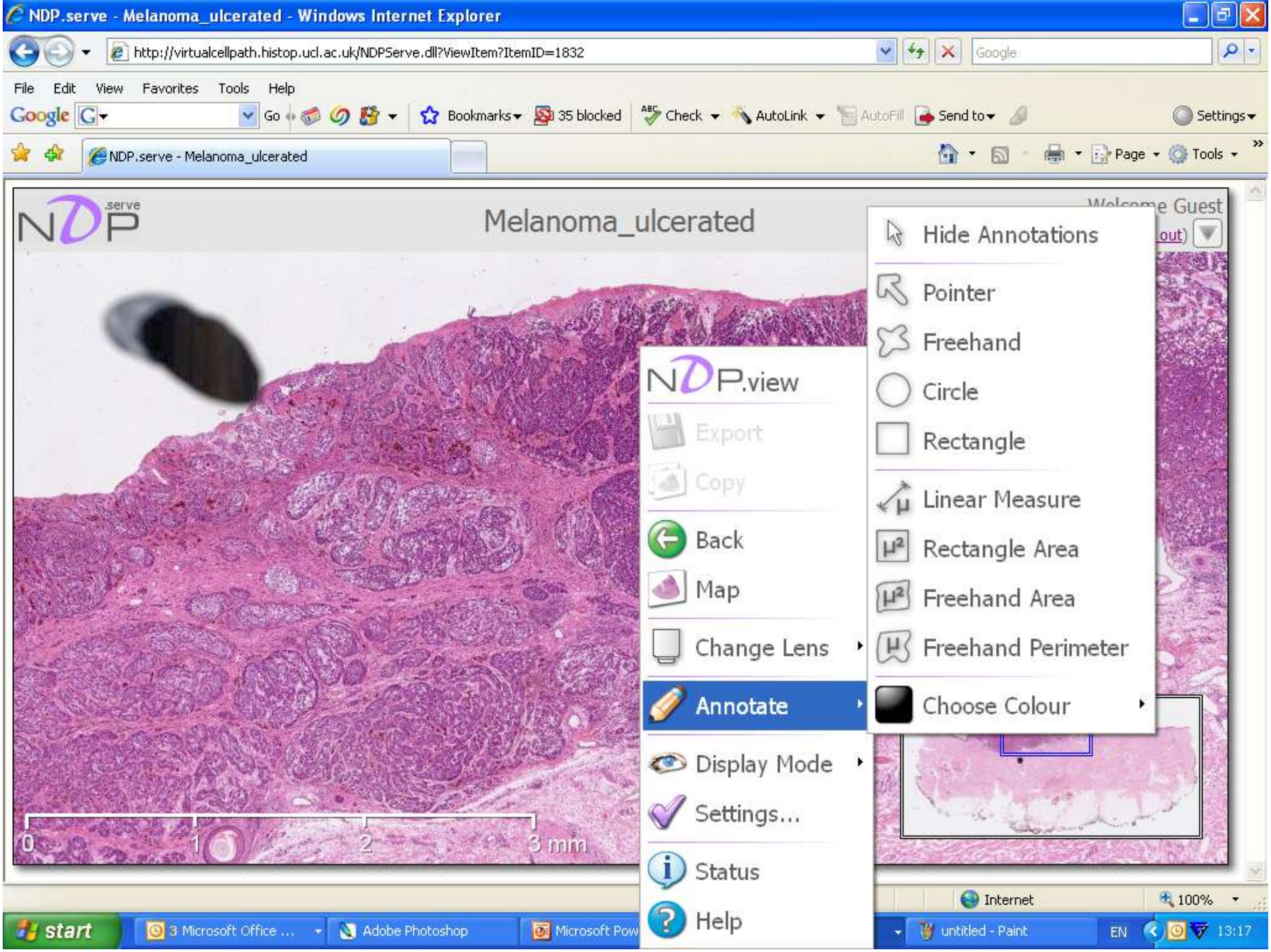
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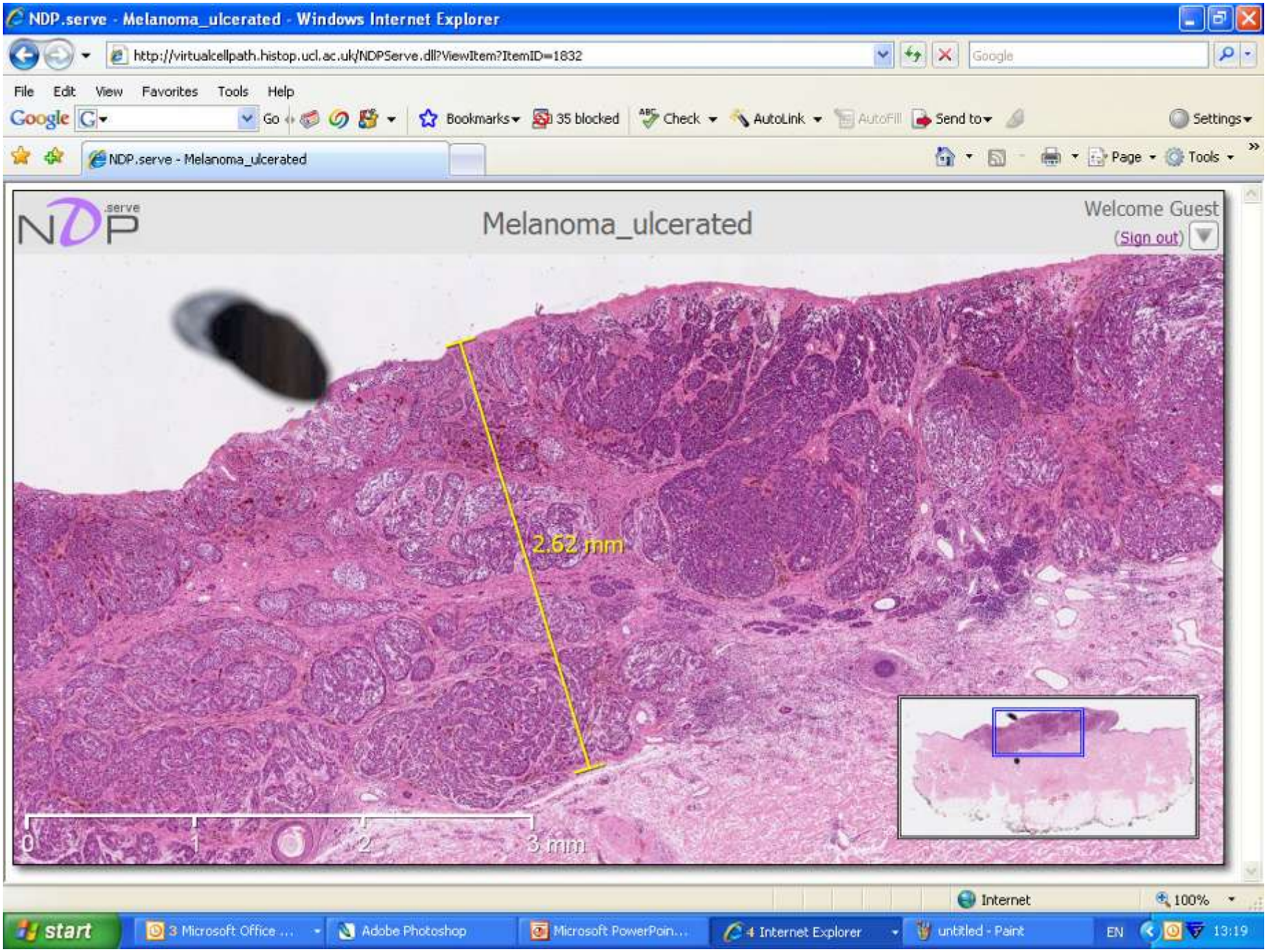
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Use of virtual microscopy in routine clinical histopathology

- Current UK situation:
  - **Capacity √**
  - **Cost X**
  - **Reporting speed √**
  - **Pathologist compliance ?**

Current areas of clinical interest

Remote reporting

- Is remote reporting feasible?
- Why would you want remote reporting?
- Where and how should we start?

Remote reporting

- Is remote reporting feasible?

Remote reporting

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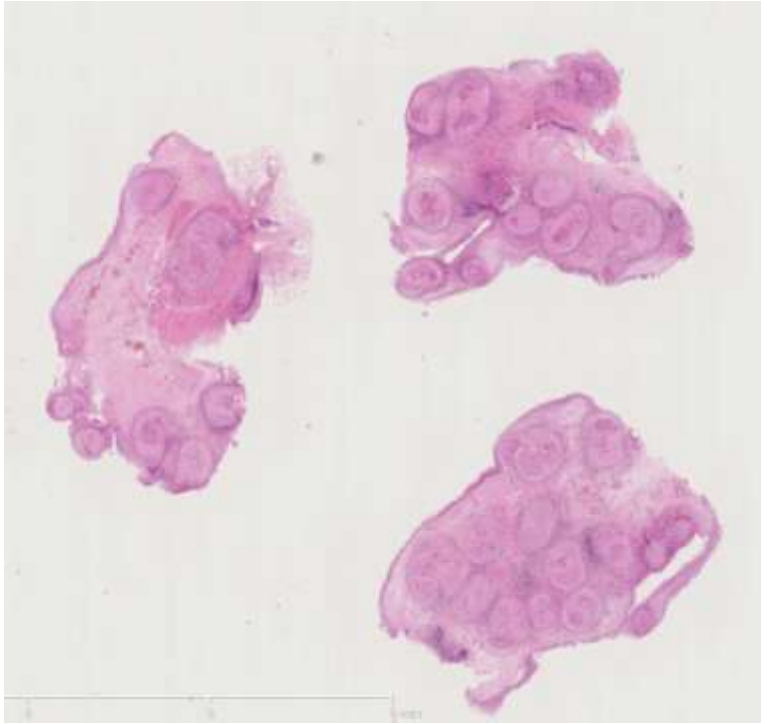

Remote reporting

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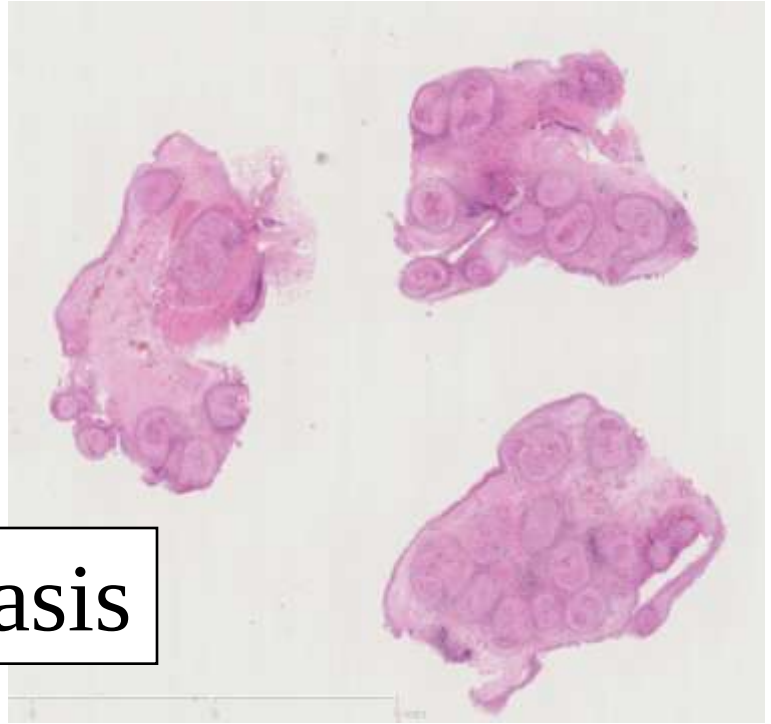
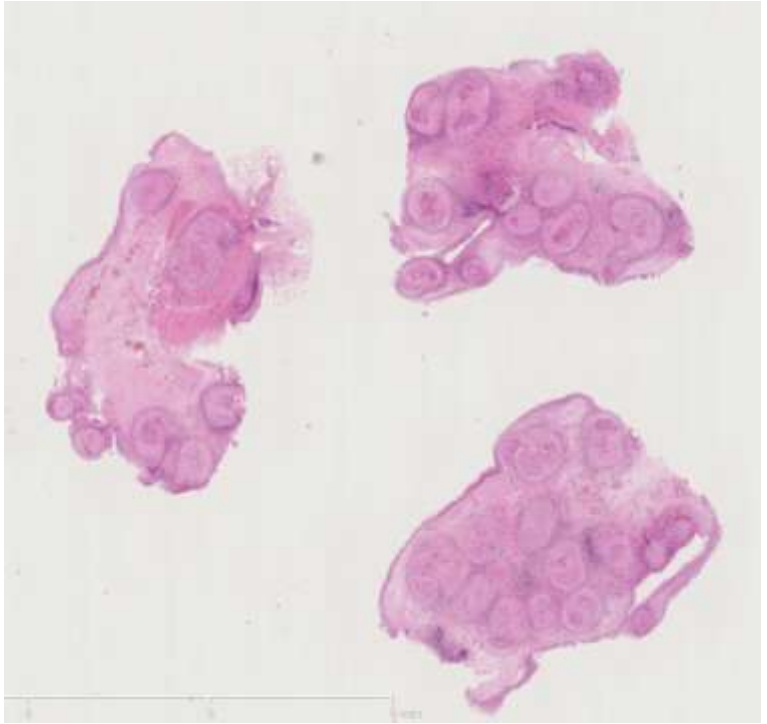


Schistosomiasis

Remote reporting

- Is remote reporting feasible?

YES



Remote reporting

- Why would you want remote reporting?

Remote reporting

- Why would you want remote reporting?
  - Lack of local histopathologist/expertise
    - Frozen sections at remote/satellite hospital
    - Expert/specialist opinion

Remote reporting

- Why would you want remote reporting?
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  - Use of time zones

Remote reporting

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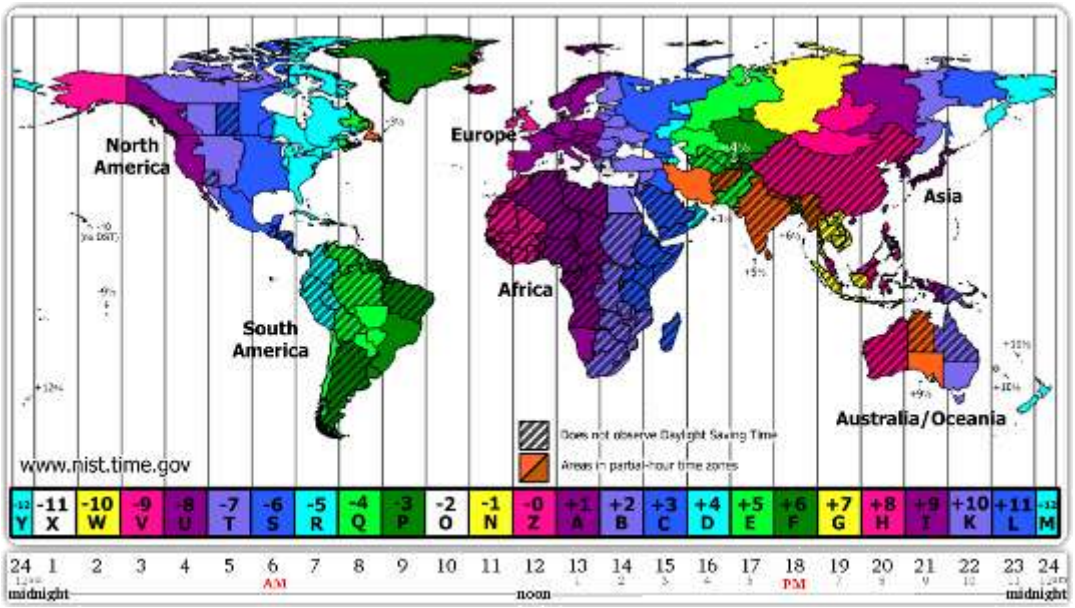
Delhi - London 5.5 hours

Heidelberg – New York 6 hours



Remote reporting

- Why would you want remote reporting?
  - Lack of local histopathologist/expertise
  - Use of time zones
  - Lifestyle (histopathologists)

Colorectal cancer
Press F1 for help...

Remote reporting

- Where and how should we start?
  - Peripheral hospitals (e.g frozen sections).
  - Gulf + developing world.
  - ? Joint venture with Western private health care providers (e.g HCA, Capio etc).

UK EQA Schemes

- External Quality Control Schemes
  - Sets of slides circulated to histopathologists.
  - Histopathologists report cases.
  - Scored anonymously (candidate numbers).
  - Repeated poor performance.

→ Re-train

Virtual Microscopy EQA schemes

- Many advantages:
  - 1 set of slides.
    - Cost
    - Can use small biopsies
  - Cost (No postage).
  - Uniform sections.

UCL:
http://virtualcellpath.histop.ucl.ac.uk

Leeds University:
http://www.virtualpathology.leeds.ac.uk

- Disadvantages:
  - Variable computer access/connections.
  - Pathologist compliance.

Teaching

- Extremely useful here.
  - Slide access pre-courses.
  - Image libraries.
  - E-learning (www.eurocytology.)

Areas of difficulty

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- Variable web access + computer types (PC/Mac)
- Hospital firewalls
- Choice of software + cost
  - Image analysis
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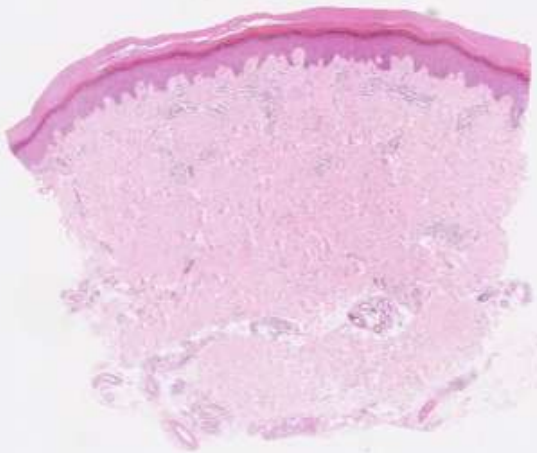

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NDP.serve - Drug reaction_01

Page Tools

NDP.serve

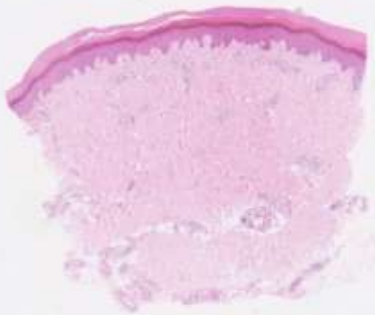
Drug reaction_01

Welcome Guest
(Sign out)

Viewer

- (•) Viewer for Windows Internet Explorer
- ( ) Viewer for MacOSX, Linux, Windows and other Web Browser
- ( ) Full screen viewer for Windows

Apply



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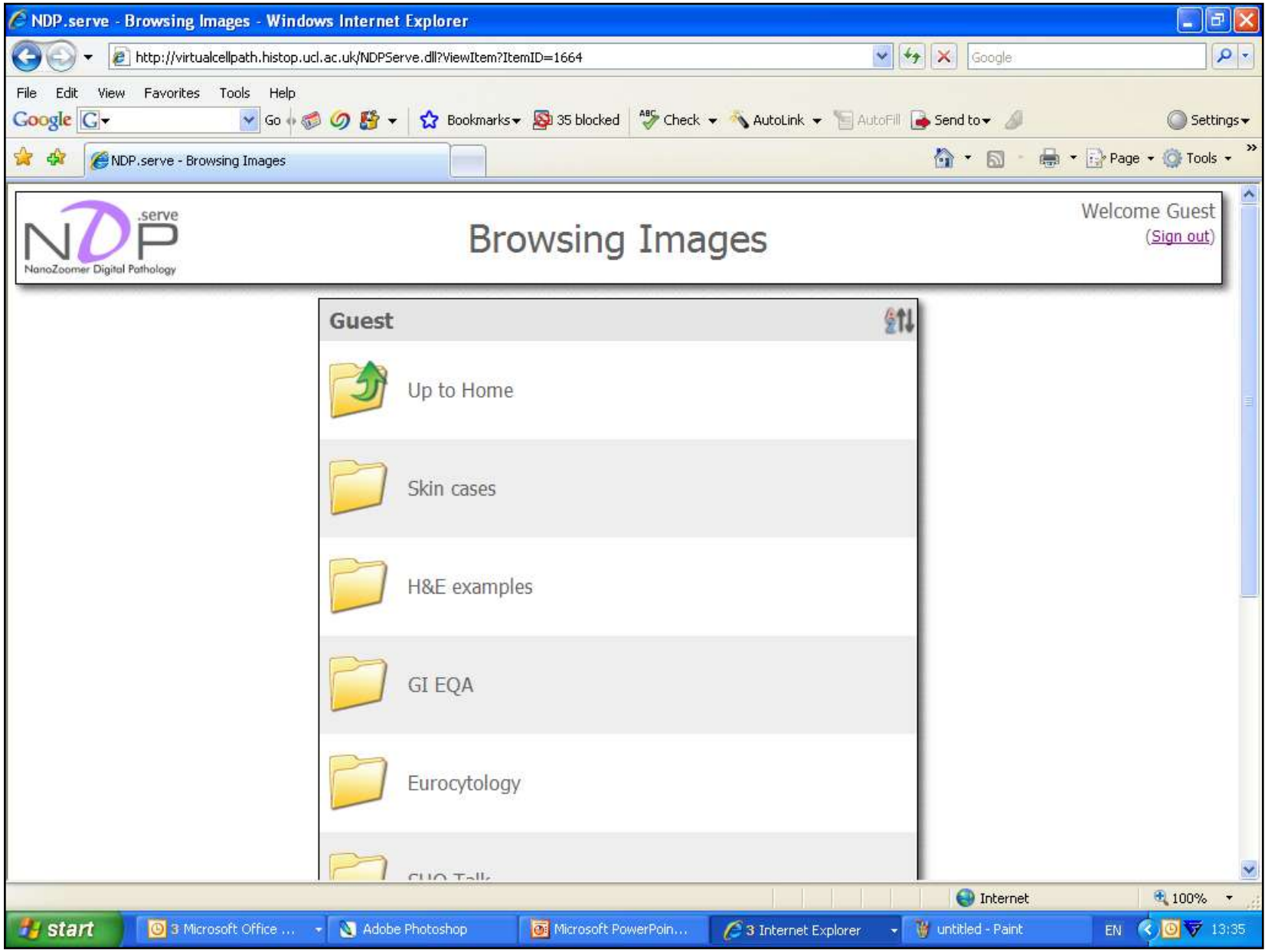
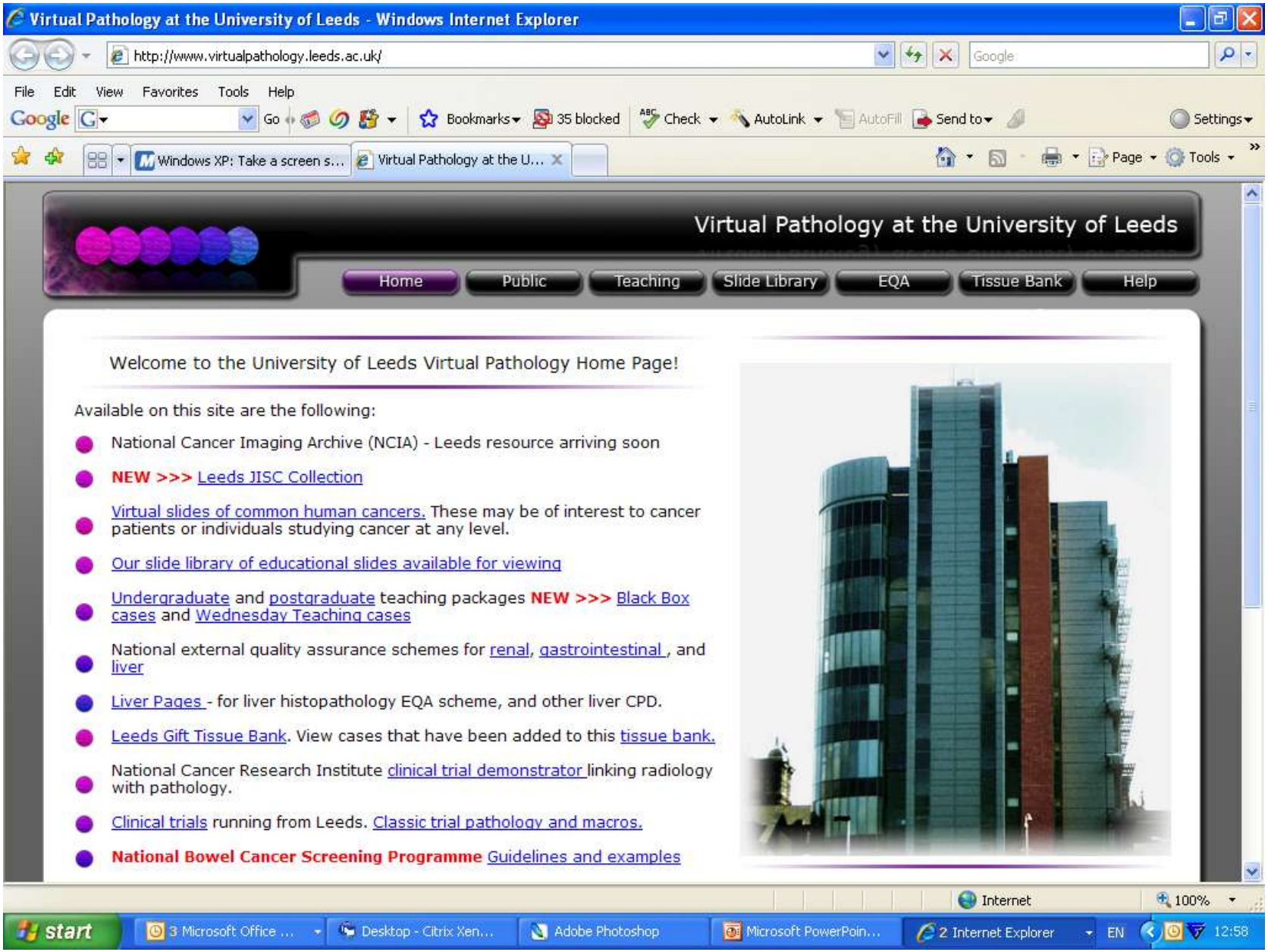


UCL server web interface



Leeds University server web interface

Where does all this leave me?

Beautiful machine

Beautiful machine, but I am still learning to drive and I cannot afford a chauffeur!

HAMAMATSU

Photon is our business