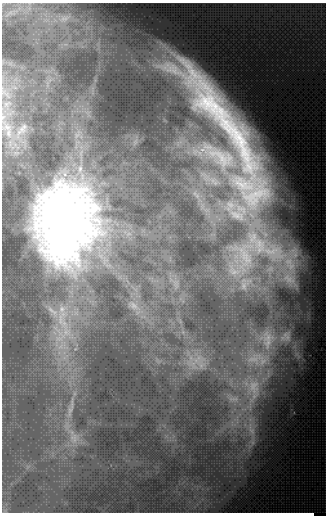# "Visual" and "Metric 3D"

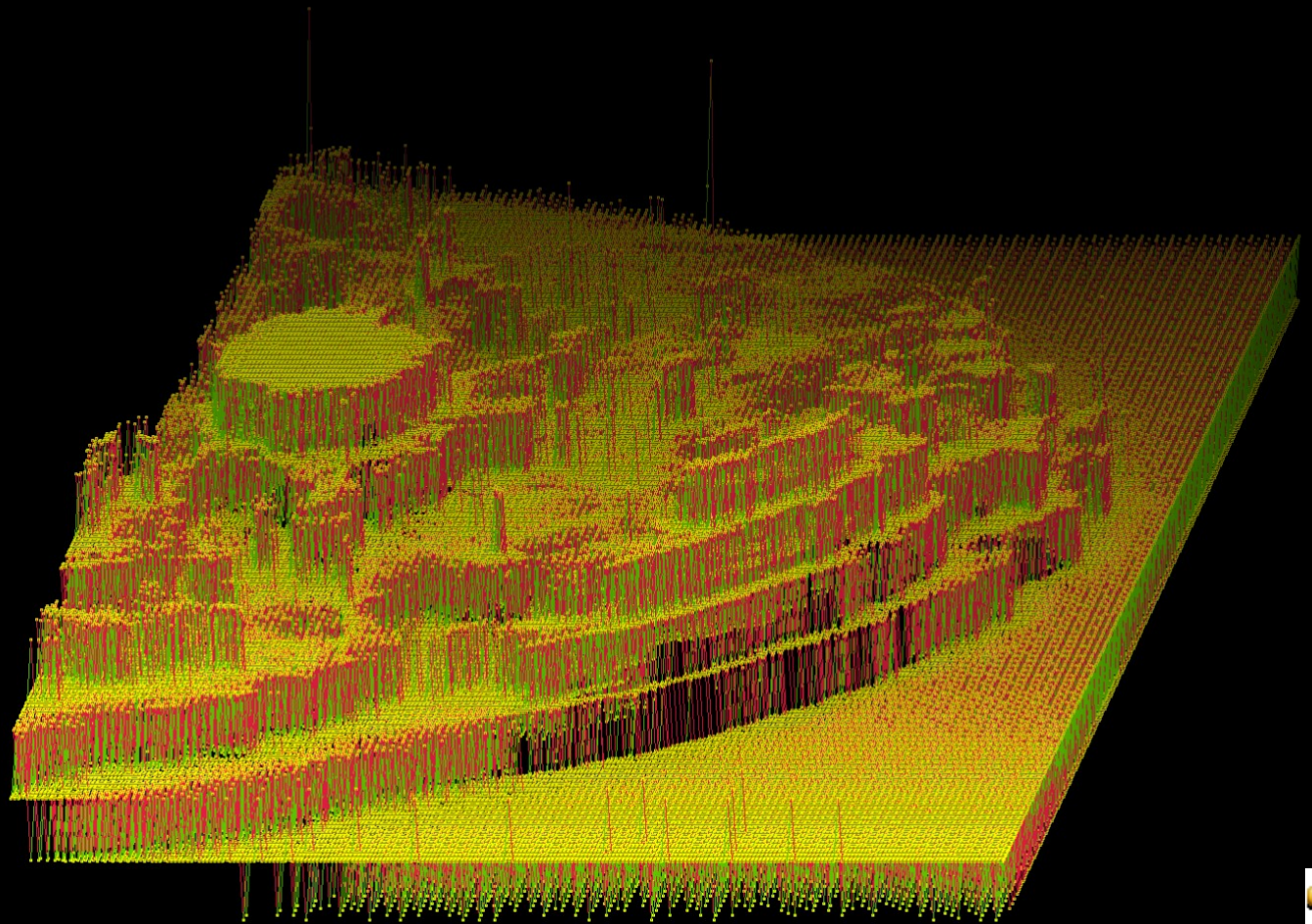## On the Benefits of "Software Vision" for Medical and Bio-Applications

Sabine K McNeill – Dec. 10, 2008
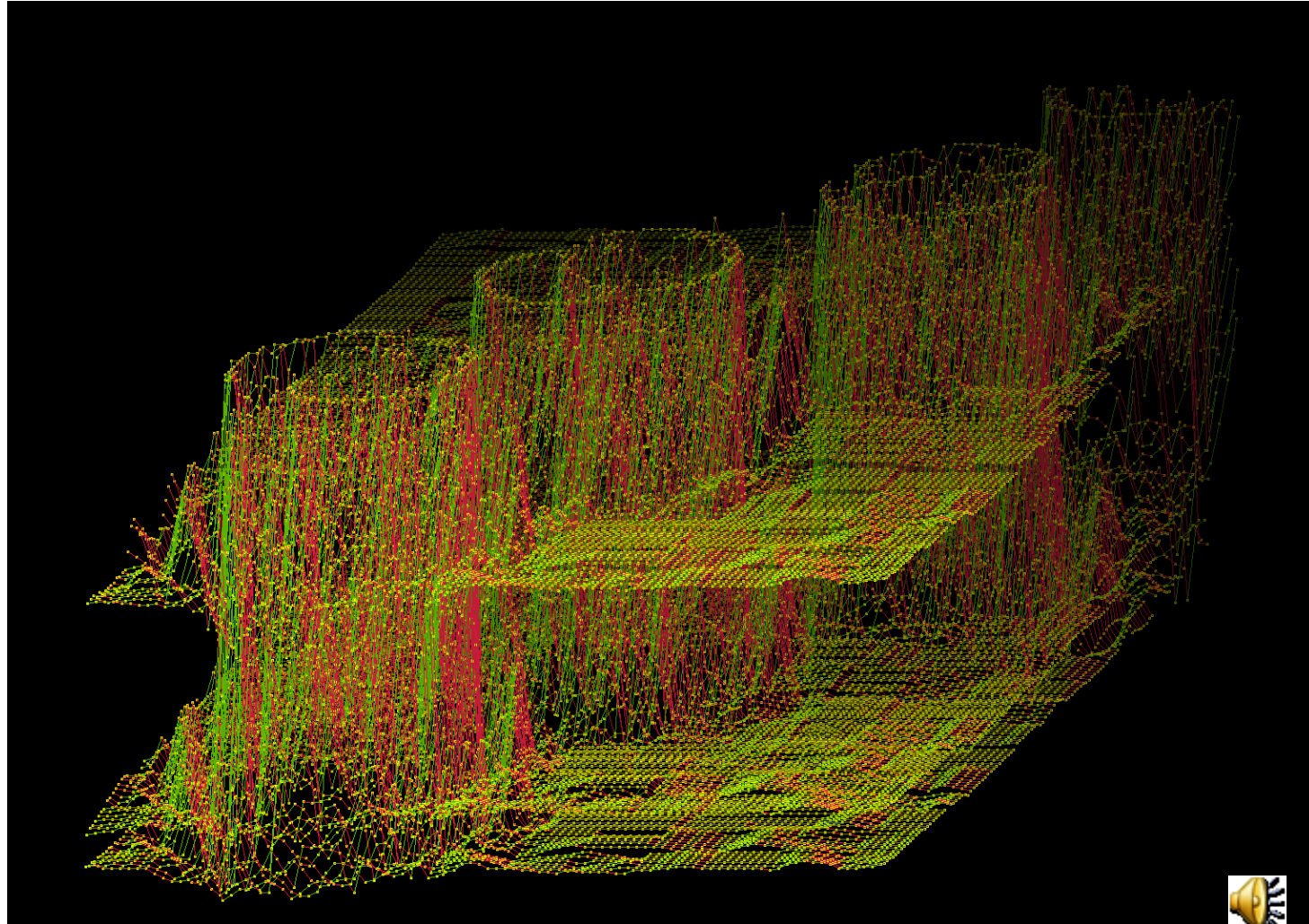
A Mammograph

Our "software vision" produces "visual 3D" for the human eye: new perspective, new depths, new visual effects for clarity of texture and patterns.
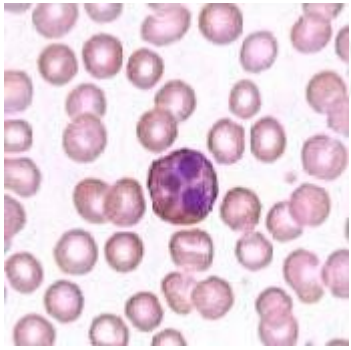
Stem cells

Our "software vision" uses "metric 3D" for its processes: new quantitative comparisons and numerical differences between images as a whole and their components.
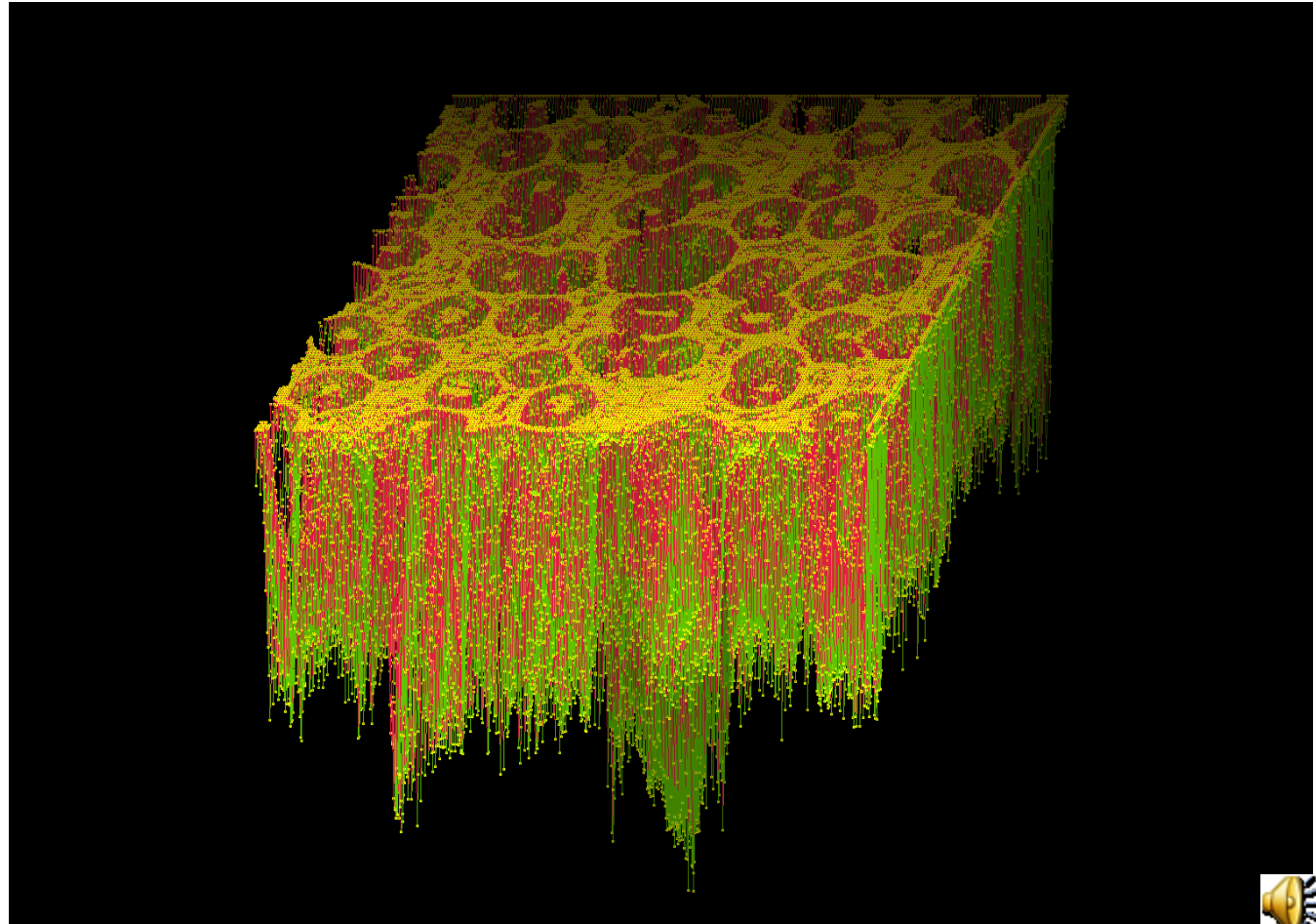
Red & white Blood Cells

"Visual 3D" is
for experts:
to determine
values associated
with measures:
qualities to be
quantified from
comparing images.

"Metric 3D" is for
expert software :
to automate
classification,
sorting, ranking
and selecting
images.

Seeing & Measuring

Human Vision

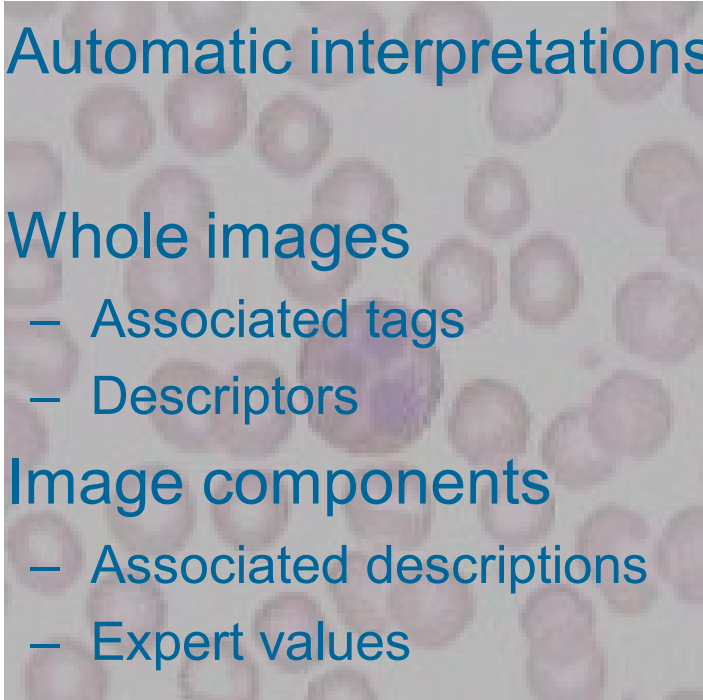- "Visual 3D" is for overall impressions of few images

- Automatic interpretations

- Whole images
  - Associated tags
  - Descriptors

- Image components
  - Associated descriptions
  - Expert values

Software Vision

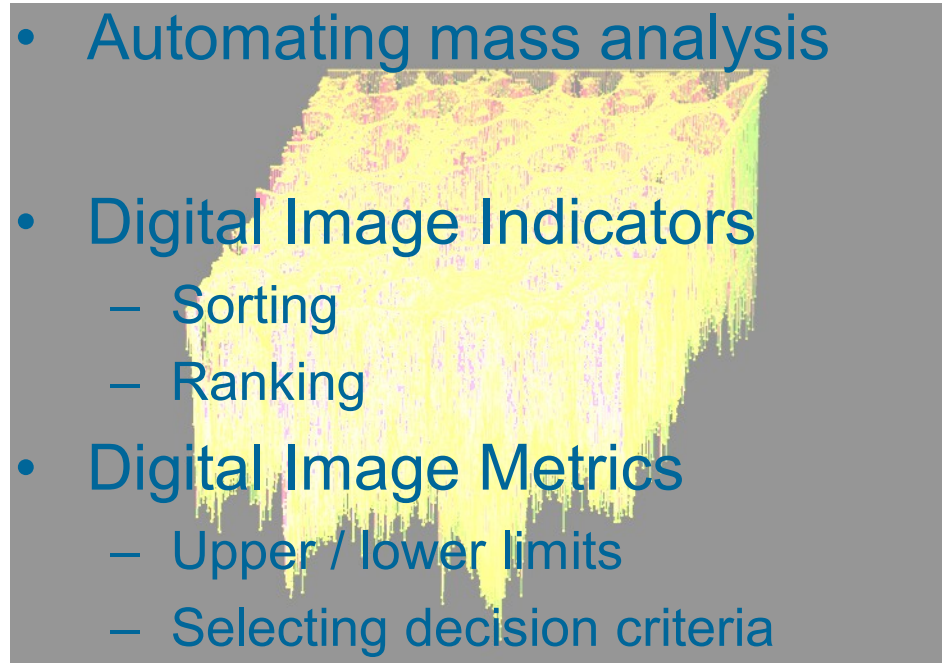- "Metric 3D" is for more detail in many images

- Automating mass analysis

- Digital Image Indicators
  - Sorting
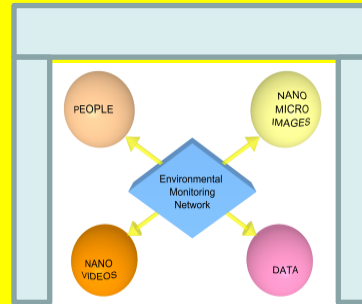 - Ranking

- Digital Image Metrics
  - Upper / lower limits
  - Selecting decision criteria

Human + Software Expertise

INTELLIGENCE

User and Domain dependent **Menu Options**

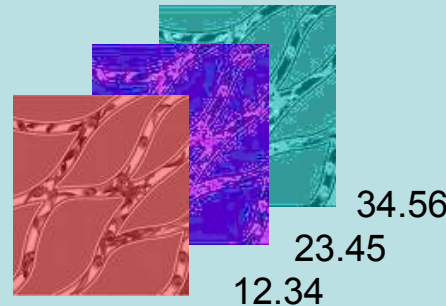**WEB PORTALS**

Context Dependent Visualization

INTERPRETATION
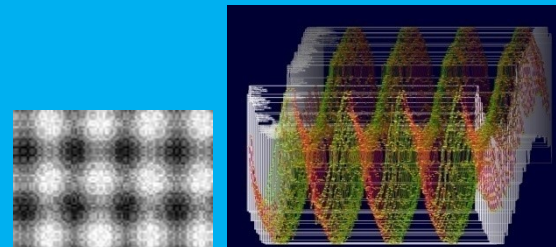
User and Domain dependent **Vocabularies**

AUTOMATION

Image Collections Data Bases

34.56
23.45
12.34

DATA

Visualizing **Layers** and re-visualizing **Images** to **Demonstrate Method**

TOOLBOXES

Core Processes Algorithms

The Benefits

Human Expertise

- Seeing
  - Evaluating visually
- Interpreting
  - Criteria for comparisons

- Learning
  - Visual differences
  - Quantitative differences
- Standardising
  - Quality controls

Layered Expert Software

- Measuring
  - Evaluating analytically
- Imaging
  - Distinguishing test images

- Optimising
  - Adapting technology
  - Reference images
- Calibrating
  - Comparing at nanoscale

New Instrument of Investigation

"Humboldt had a horror of the single fact, believing that in order to explore any one thing, one needs to approach it from all sides... Every discovery opens up the imagination further, stimulating more discovery:
it enlarges the sphere of ideas, excites a taste for investigation, while the creation of new instruments of observation increases the intelligence."

Theodore Zeldin, *An Intimate History of Humanity*, London 1994

Summary

- Measuring 'on screen'
  - Value added seeing from time series across different intervals
  - Higher order comparisons across different measurements
  - Consistent automation of retrieving relevant images.

- More is on
  - http://3dmetrics.co.uk
  - http://3dmetrics.wordpress.com

- Or by email from
  - sabine@3dmetrics.co.uk
  - T: 020 7328 3701
  - M: 07968 039 141