virtual laboratory for e·science

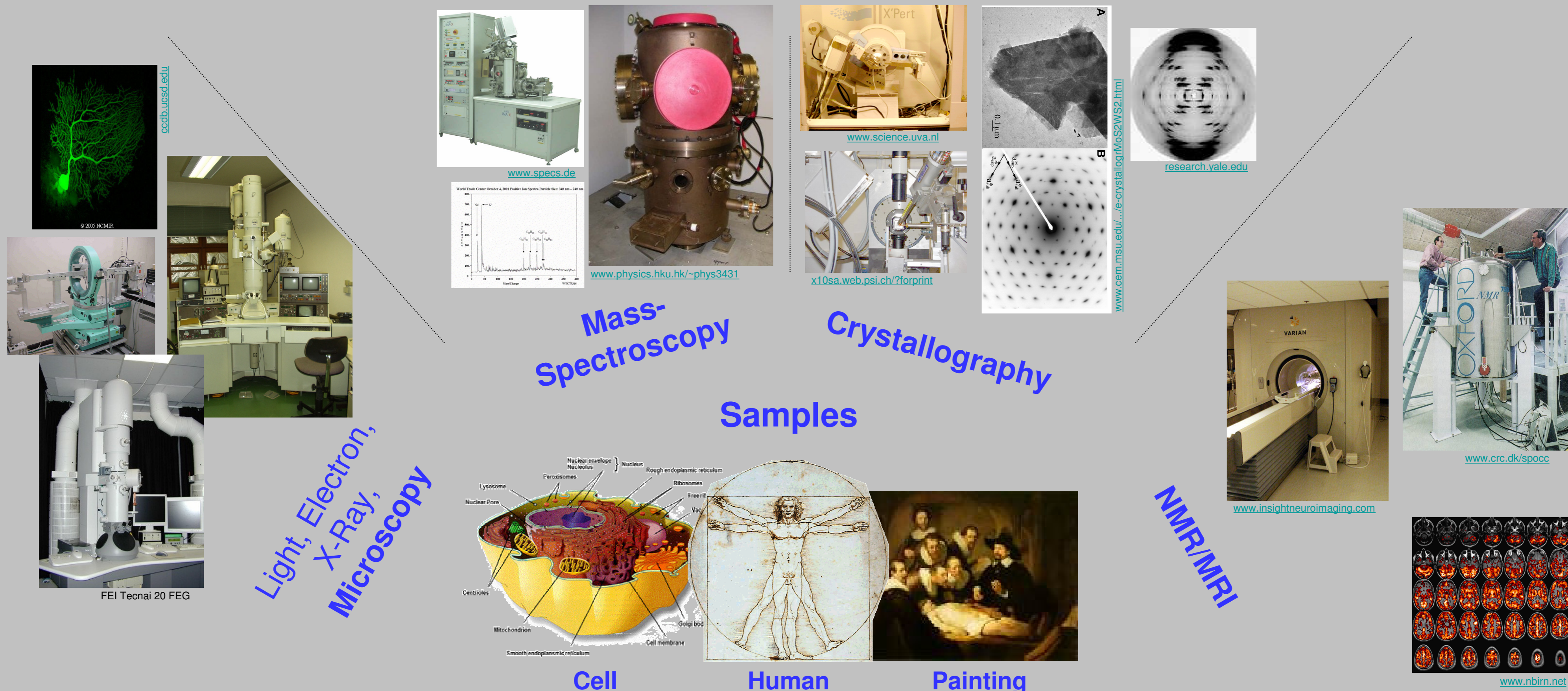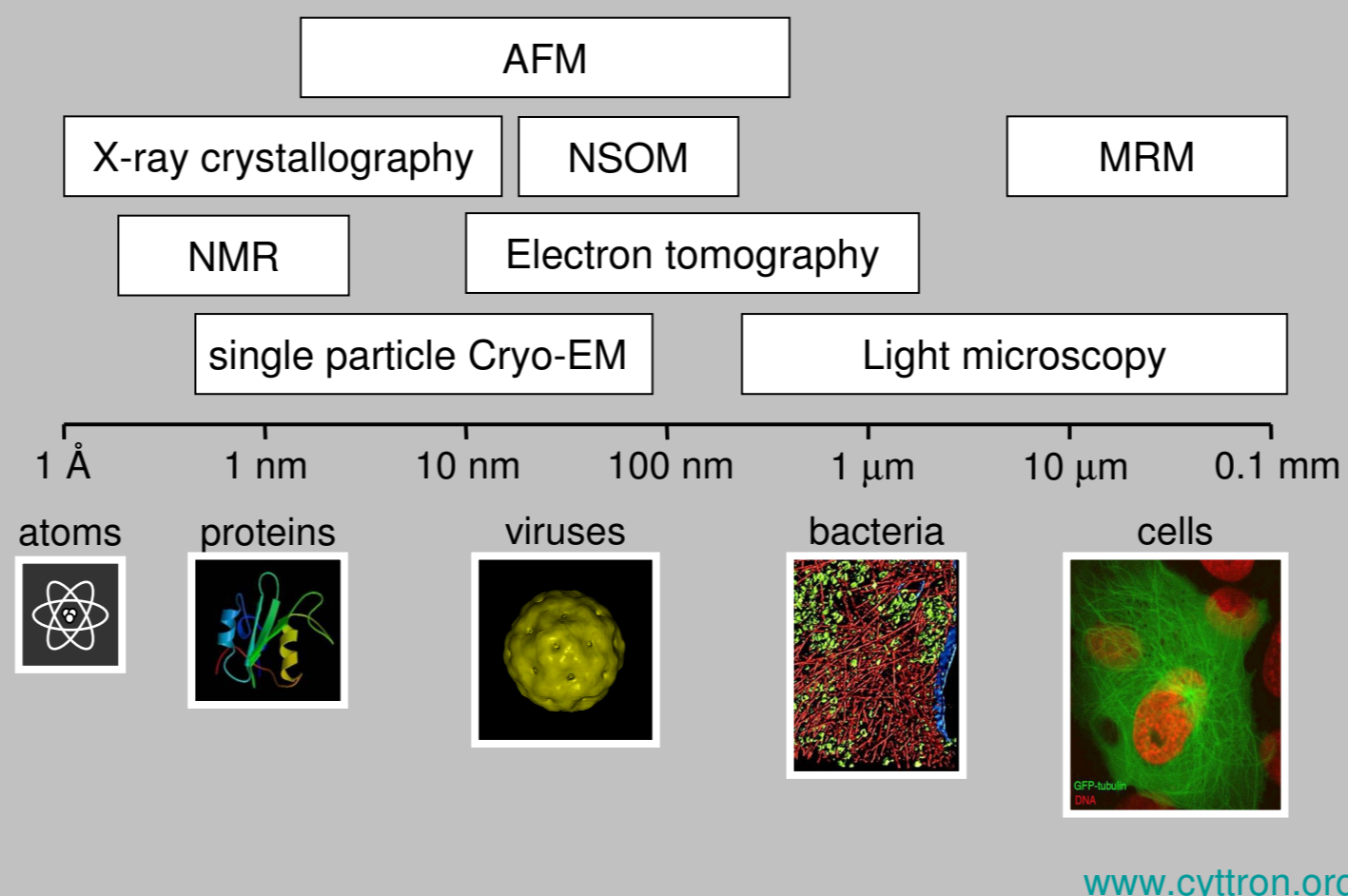# Towards Sharing Device Measurement Experiments Using an Abstract View: Are we Ready and Willing?

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Mass-Spectroscopy

Crystallography

Samples

Light, Electron, X-Ray, **Microscopy**

NMR/MRI

FEI Tecnai 20 FEG

Cell   Human   Painting

Equipment and Technology:
- Crystallography & Diffraction
- Atomic Force Microscopy (AFM)
- Confocal Laser Scanning Microscopy (CLSM)
- Near-field Scanning Optical Microscopy (NSOM)
- Scanning Tunneling Microscopy (STM)/ Scanned Probe Microscopy (SPM)
- X-ray Microscopy and Ion Beams
- Nano-technique & Nano-mechanics
- Nuclear Magnetic Resonance (NMR)
- Particle Beams
- Three-Dimensional (3-D) Imaging

http://www.ou.edu/research/electron/www-vl/long.shtml

AFM		
X-ray crystallography	NSOM	MRM
NMR	Electron tomography	
single particle Cryo-EM	Light microscopy	

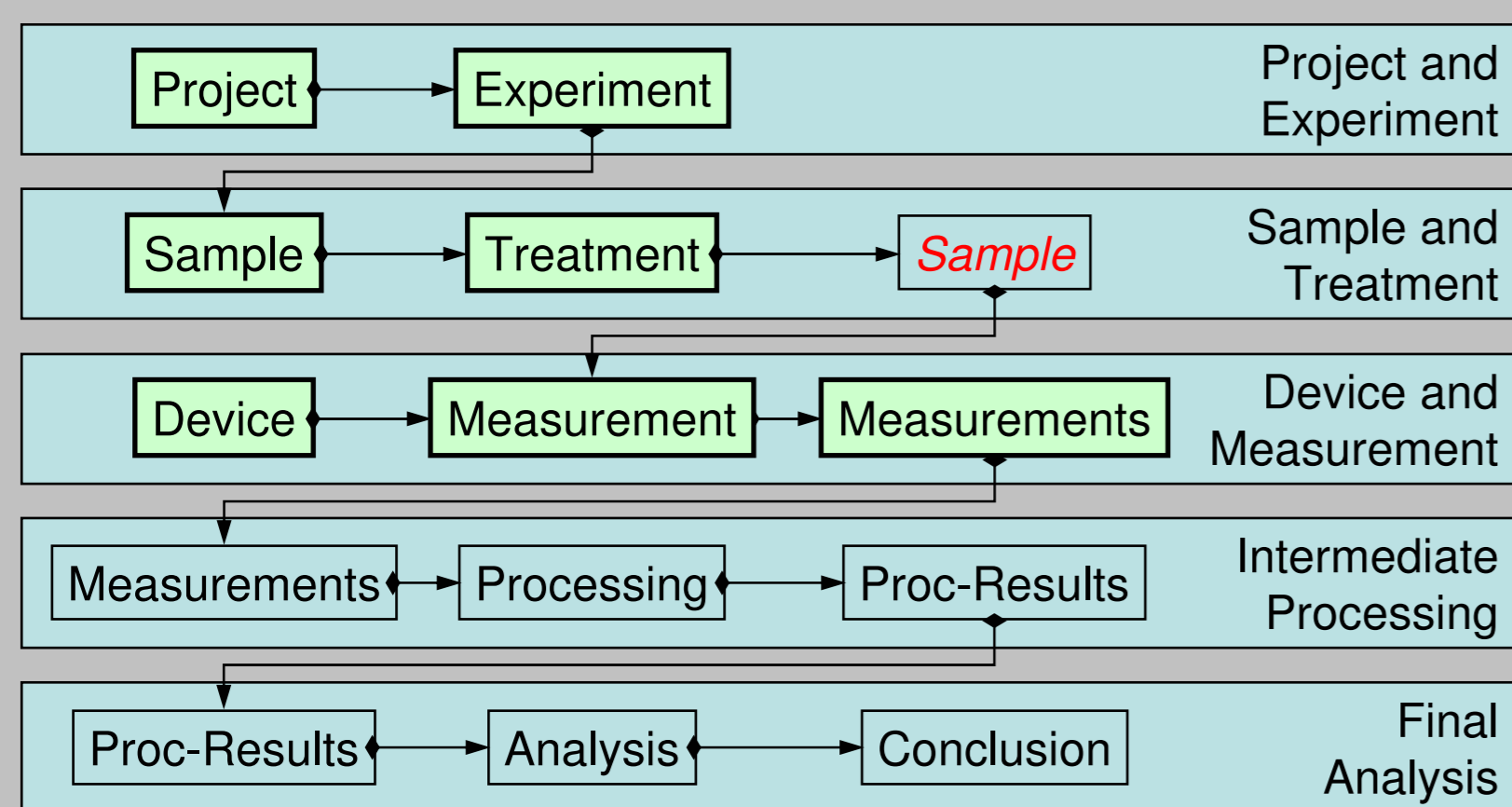| 1 Å | 1 nm | 10 nm | 100 nm | 1 μm | 10 μm | 0.1 mm |
| atoms | proteins | viruses | bacteria | cells | | |

www.cyttron.org

Despite the differences, all device measurement experiments have one of these:
- Hypothesis
- Experiment
- Sample
- Treatment Protocol
- Device
- Measurements
- Analysis

We capture these generic features in a high level Device Measurement Experiment workflow:

Device Measurement Experiment Workflow

Project → Experiment	Project and Experiment
Sample → Treatment → *Sample*	Sample and Treatment
Device → Measurement → Measurements	Device and Measurement
Measurements → Processing → Proc-Results	Intermediate Processing
Proc-Results → Analysis → Conclusion	Final Analysis

Our Claim and Proposal

We claim this is sufficiently generic to represent just about any kind of Device Measurement Experimentation. If so, can we use this simple representation as basis to search other Device Measurement Experiments.

Questionnaire :

- Is this a sufficiently generalized representation of your device measurement experimentations?

  ☐ **Yes**   ☐ **No**

  If No, could you elaborate more? What would you change and how : (add/remove/rename) ?

Goal is to stimulate:

- **Sharing** and collaboration among scientist and institutes
- thinking in multi-scale and in multi-dimensions hypothesis driven vs phenomenon discovery
- integration of Meta-MetaData (later)
- Realization of Virtual Microscopy (much later)

- Would you or your institute collaborate on this system by providing very brief information about Project , Experiment , Sample , … and a contact person for some of your experiments?

Summary

➢ Everyday many device measurement experiments are performed. Many results are sitting on the shelves nicely!!!

➢ Different measurements devices and techniques provide complementary information.

➢ These experiments have many common characteristics that can be captured in a high-level Device Measurement Experiment Workflow.

➢ We propose a search engine using this representation:

  DevMea-Ex: Search Engine for De**vi**ce **M**easurement **E**xperiments

➢ Would you collaborate by sharing some of your data with some description

  Science is about sharing knowledge…