

Signals and symbols, models and meanings

or Whatever happened to MOLGEN?

John Fox COSSAC IRC (Oxford, UCL, Edinburgh)



Interdisciplinary working

- "There is much talk about the desirability of interdisciplinary research" [but it always fails in committee] *Alan Bowman*
- "I absolutely reject Snow's two cultures" *Mike Brady*
 - I do too –
 - there are dozens!



Medical thinking: cognitive prostheses





People are smart

- "It is extraordinary to observe the effortless way in which experts mobilise their knowledge in" [reasoning and decision-making] Mike Brady
- "What experts can do in interpreting [tablets] is quite superior to what we can program" Segolene Tarte





Image capture scenarios Graeme Earle

- Image capture protocols and kit
- Processing tools and libraries
- The beauty of images: free wins
- Gadgets or Bundles?
 - Commercial sponsorship?



Simon Tanner

- "Other scrollers have come along over the years and said 'naaah, that's wrong'"
 - "Unify scholarly resources"
 - "Provide interactive tools within a supportive research framework"



Dirk Obbink

- "Crowd analysis" of papyri
 25,000 objects, 50,000 assessors
 Different levels of competence and task
 - Statistical weighting methods



Text-image linking environment Dot Porter

- Controlled vocabulary (vocabularies?)
- Multi-level
 - Fragments
 - Objects
 - Subjects
 - Manuscripts
- Manual annotation of images
- Semi-automated creation of links
- Interoperability (APIs, output formats)
- CSCE (the problem of contradictions: ST)



Melissa Terras, Henrietta Roued-Cunliffe

- "Its clear that we are never going to press a button and get a computer to tell us what a text says"
- We can have
 - Character analysis and word recognition
 - Word searches
- We may be able to have
 Cognitive prostheses for interpretation



Building a VRE for the humanities John Pybus

- No predefined technology (ground up approach)
 - Communications tools
 - Collaborative document editing
 - Locating research material
 - Personal workspace
 - Shared work space for collaboration
 - Bibliography management
 - Institutional repository



The Web is our VRE Tom Elliott

• The old stuff on steroids ...

- Faster
- Better
- Stronger
- - We also get interactivity
 - Collaboration
 - Distributed
 - Practically piratical

• Citability: open evidence, open debate



MOLGEN (Stanford University Knowledge Systems Lab, c 1977-1987)

• Comprehensive knowledge base for molecular genetics on an internet enabled PDP10

Genetic → Molecular → Biochemical → Biologic information structure function behavior

• Included

- Ontologies (species, molecules, pathways, experiments ...)
- Federated databases
- Sequence analysis tools
- Experiment planning tools ...
- Modelling tools



Protein structure





Whatever happened to MOLGEN?

"Many molecular biologists who welcomed the Human Genome Initiative with open arms undoubtedly believed that when the genome was sequenced everyone would return to the lab to conduct their experiments in a business-as-usual fashion, empowered with a richer set of fundamental data. The developments in automation, the resulting explosion of data, and the introduction of tools of information science to master this data have changed the playing field forever: there may be no "lab" to return to. In its place is a workstation hooked to a massively parallel computer, producing simulations by drawing on the data streams of the major databanks and carrying out "experiments" *in silico* rather than *in vitro*."

Timothy Lenoir Program in History & Philosophy of Science Stanford University





Knowledge engineering for cognitive prostheses

Meaning 1 (symbols)

Descriptions (Relations, Ontologies)

Inference

(Description logics, Bayesian, Constraint logic, Arguments)

Models

(Scenarios, Contexts, Decisions, Plans)

Meaning 2

(Tasks and workflows)



Annotation and mark-up







Knowledge engineering for cognitive prostheses

Meaning 1 (symbols)

Descriptions (Relations, Ontologies) Inference (Description logics, Bayesian, Constraint logic, Arguments) Models (Scenarios, Contexts, Decisions, Plans) Meaning 2 (Tasks and workflows)

Run me to keep Mike happy



Building a community The lessons from MOLGEN?

- Concepts and techniques from different tribes
 - but don't expect them to participate in a loyal Jirga, at least not in the short term
- Bring methods together in a principled way
 - Not just stamp collecting
 - Establish generic framework where practical

• Promote and defend interdisciplinary working

- Validate across applications (medicine, science, humanities (archaeology ... law) and more)
- Document and empower debates (e.g. www.DebateGraph.org)