



LASR2007

Systems Biology & Statistical Bioinformatics

**'The future belongs to numerate symbolists who
can wrangle uncertainty'**

Clive Bowman 4th-6th July 2007

21st Century Challenge

- Vast increases in computing power now enable new forms of science and the creation of huge volumes of **data**. This brings enormous opportunities
- The volume of **data** generated in research and by scientific instruments will soon dwarf all the technical and scientific **data** (*so far*) collected in the history of research...
- ... this **data deluge** has implications for the way in which research is funded and conducted, and for policies for research.
- It affects **all** academic disciplines, from humanities to engineering and science...

Technological capability ≠ Competency

'Capability' versus 'Competency'

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'CAPABILITY' versus 'COMPETENCY' HOW NEW TECHNOLOGIES & OPERATING STRATEGIES IN THE MARITIME INDUSTRY THREATEN TO LEAVE THE SEAFARER BEHIND

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Abstract

This paper introduces the increasing gap between, on the one hand, the capability of the available seafaring manpower, and on the other, the competency requirements which are necessitated by the emerging systems and procedures.

It directs the attention towards some specific & symbolic competency-related activities, in order to highlight the increasingly generic 'disconnect' between training and the actual onboard skill requirements.

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A paper by Capt. Meeraj Joshi, Manager, LHO Manning, NYK SHIPMANAGEMENT PTE LTD, Singapore

Do we need more
science or more art?

Statistical Bioinformatics and Systems Biology Science?

- *Wikipedia:-*

- **Statistics** => ...is a mathematical **science** pertaining to the collection, analysis, interpretation or explanation, and presentation of data.
- **Bioinformatics** =>Bioinformatics and computational biology involve the use of **techniques** including applied mathematics, informatics, statistics, computer science, artificial intelligence, chemistry, and biochemistry to solve biological problems usually on the molecular level.
- **Systems Biology** => ... variety of viewpoints... illustrative of the fact that systems biology refers to a cluster of peripherally overlapping concepts rather than a single well-delineated field.... Systems biology can be considered as a **field of study**, particularly, the study of the interactions between the components of *biological systems*, and how these interactions give rise to the function and behavior of that system.... as a **paradigm**, usually defined in antithesis to the so-called reductionist paradigm (as) **operational protocols used for performing research**, namely a cycle composed of theory, computational modelling to propose specific testable hypotheses about a biological system, experimental validation, and then using the newly acquired quantitative description of cells or cell processes to refine the computational model or theory..... as a **socioscientific phenomenon** *defined by the strategy of pursuing integration of complex data about the interactions in biological systems from diverse experimental sources using interdisciplinary tools and personnel.*

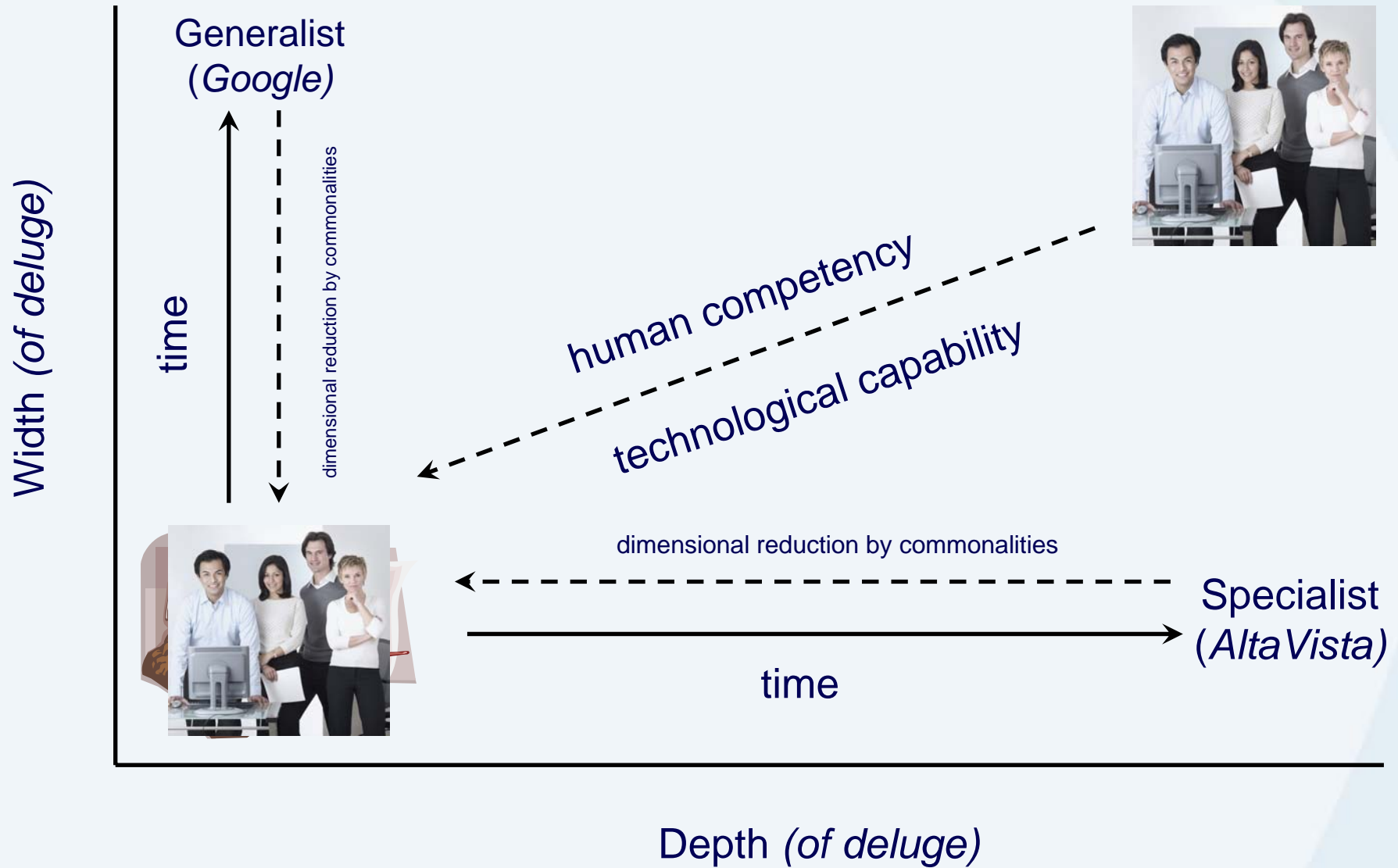

Note this word !

Statistical Bioinformatics and Systems Biology

Art?

- Visible instrumental capabilities : *concrete know-how (concepts etc) and work performances/ proficiencies (modelling etc)* - **SCIENCE**
 - but
- Invisible **symbolic** competencies : *critical mind, language, imagination/play, abstraction, formulation, association, interpretation, and reframing/translation*
 - **ART**
- Most Western adults view art as fundamentally separate from their lives. Why?
 - our culture doesn't nourish artistic **symbolic** competency the way it does linguistic competency
 - (*our*) children are not raised to be competent in the arts
- The individual's **symbolic** capacity are above all concerned with representations of reality (numerical, graphical and symbolic) ... which in turn acts as a filter through which the world is perceived.

Back to the Future

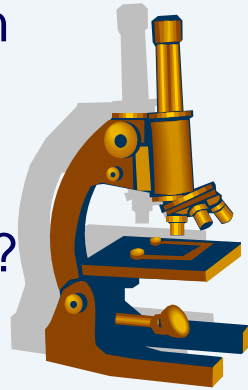


21st Century solution

Technological Capability underpinned by Human Competency

- In this exciting *Statistical Bioinformatics and Systems Biology* meeting,
 - as you look
 - and listen
 - and learn

- What is the **science** ?



Spot the brain!



- and, Where is the **art** ?