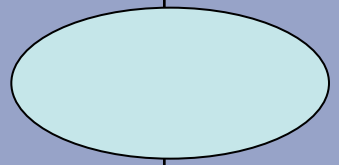
Algorithms
LIACS

Joost N. Kok

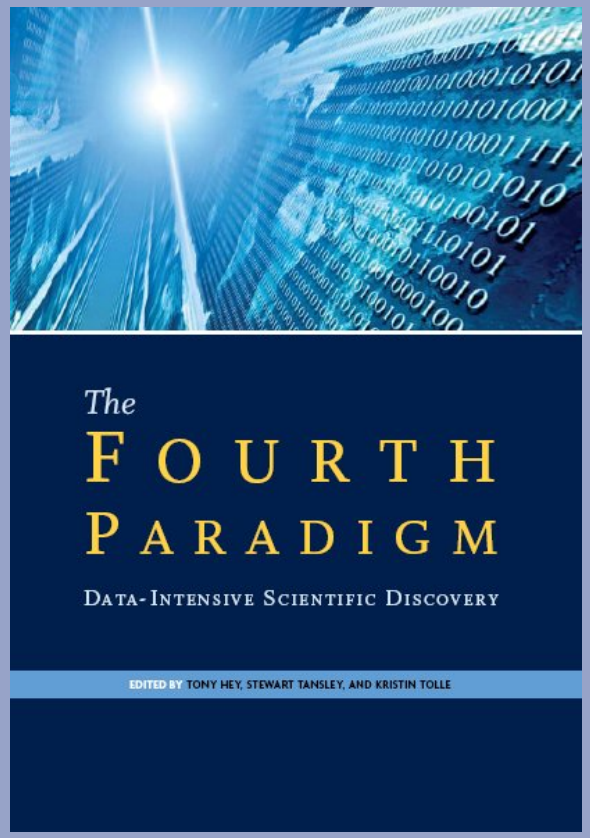
LIACS	Fundamenteel Onderzoek	BioScientific Processing and Modelling
Computer Systems, Imagery and media		
Algorithms and Software Technology		


ПОЧТА СССР
4к
1983
1200
ЛЕТ
Мухаммед
аль-Хорезми

The Fourth Paradigm

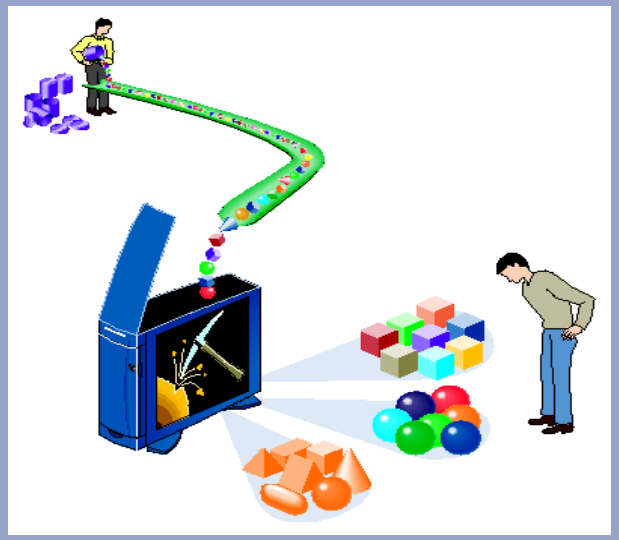
- Data-Intensive Scientific Discovery

"One of the greatest challenges for 21st-century science is how we respond to this new era of data-intensive science. This is recognized as a new paradigm beyond experimental and theoretical research and computer simulations of natural phenomena—one that requires new tools, techniques, and ways of working."
— **Douglas Kell**, University of Manchester

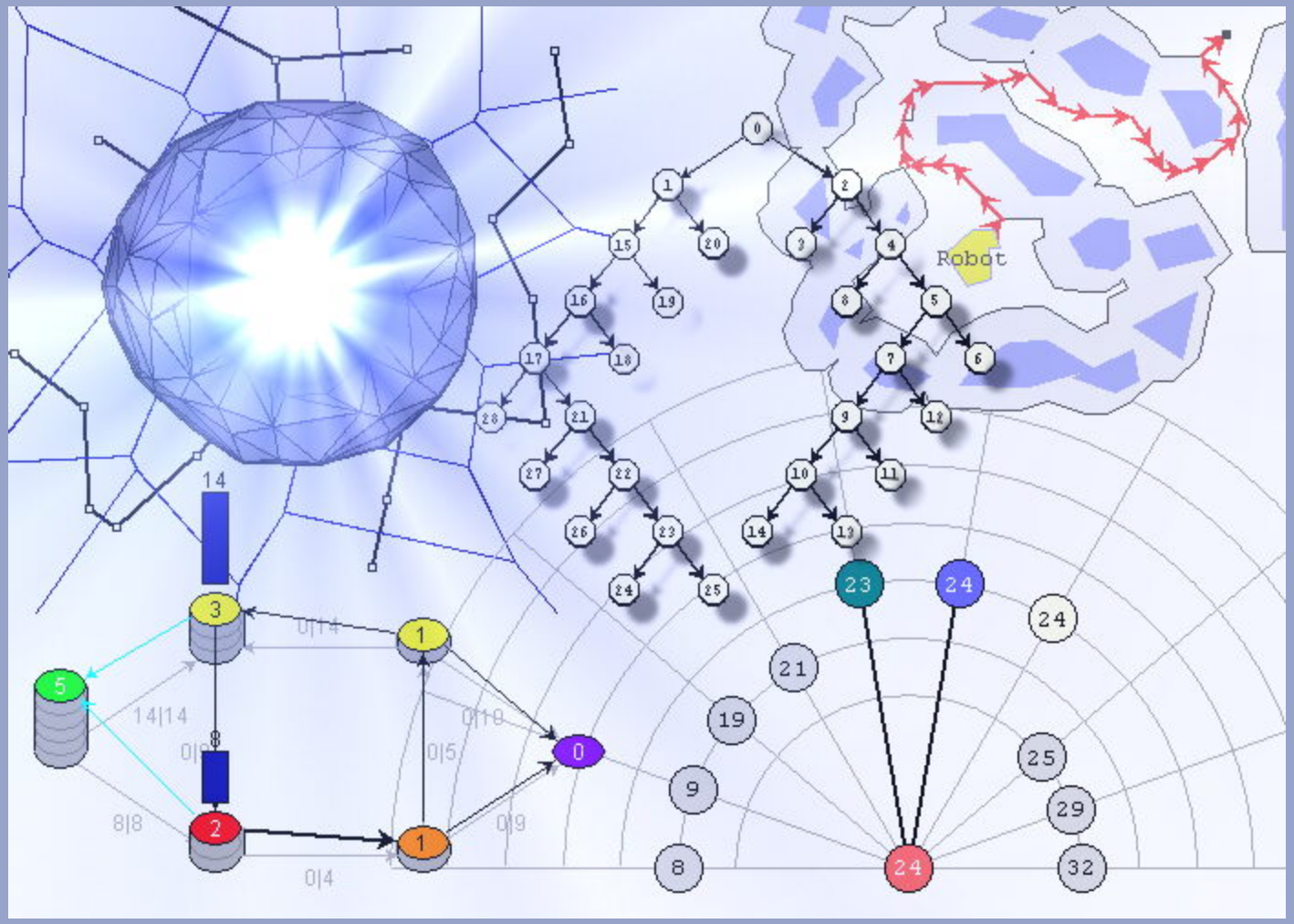


Data Mining

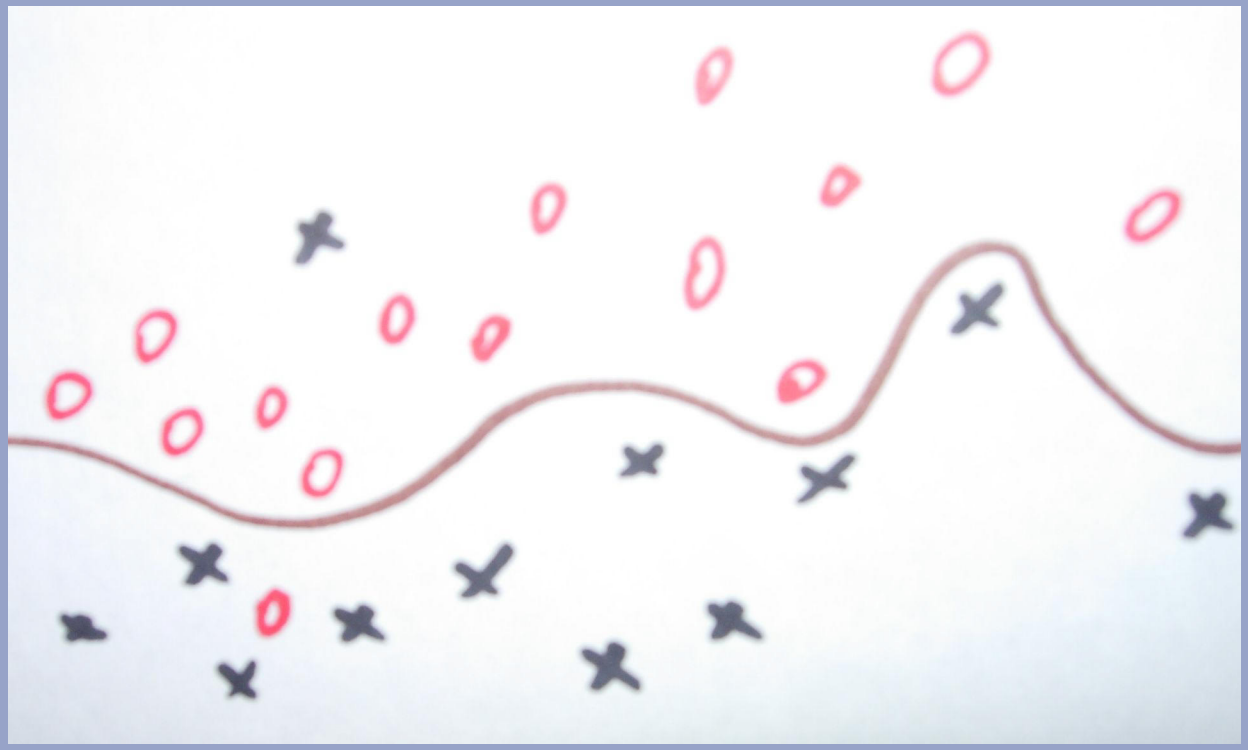
- Secondary analysis of data
- Induction of understandable useful models and patterns from data
- Algorithms for large quantities of data



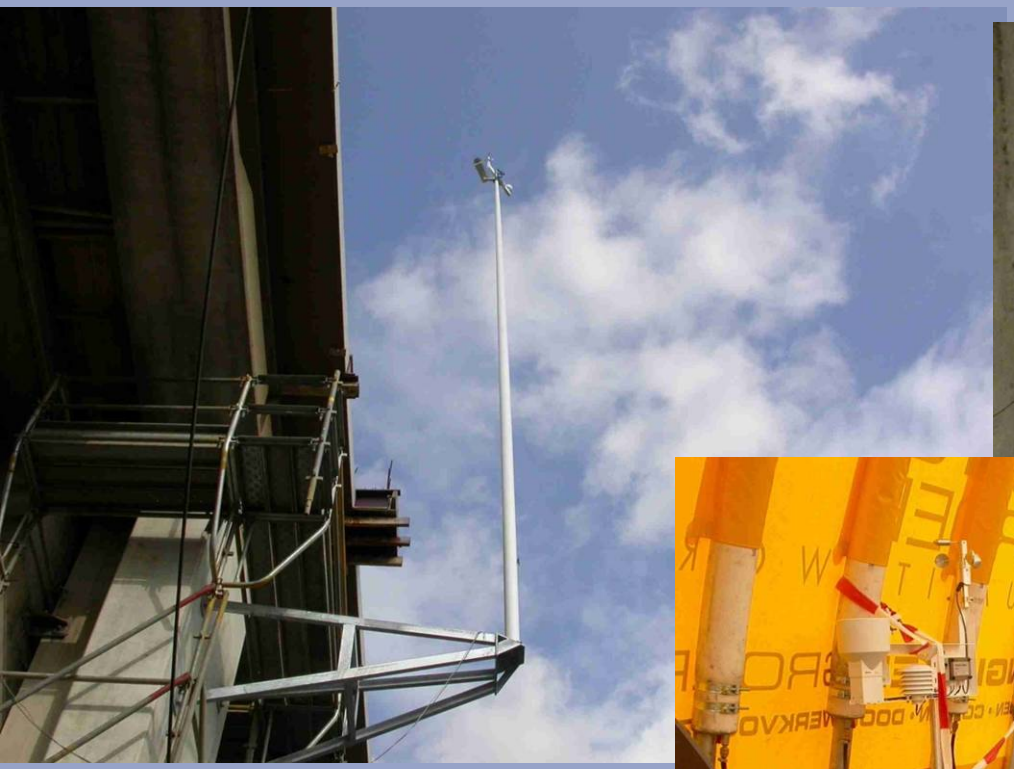

BIG
DATA


Robot
14
3
1
5
14|14
0|14
0|10
0|5
0
8
2
1
8|8
0|9
0|4
23
24
24
21
19
25
9
29
8
24
32

Machine Learning

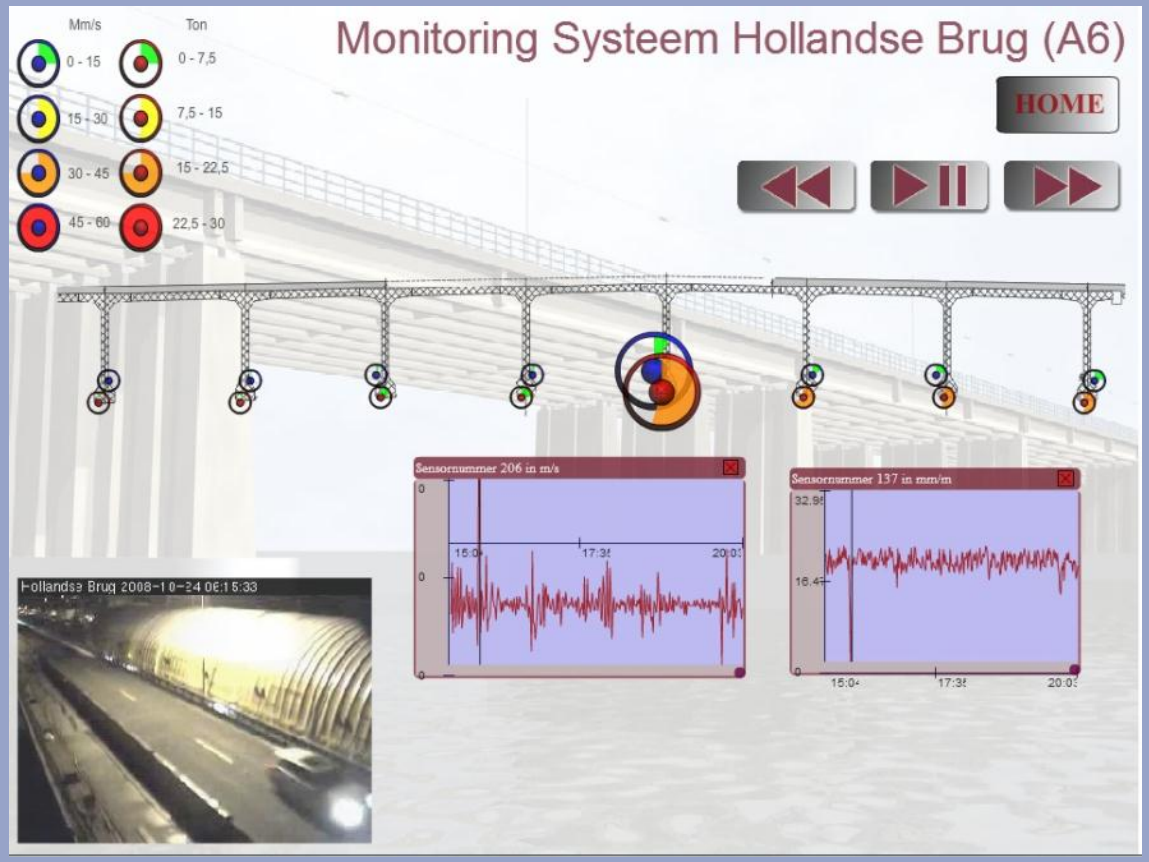


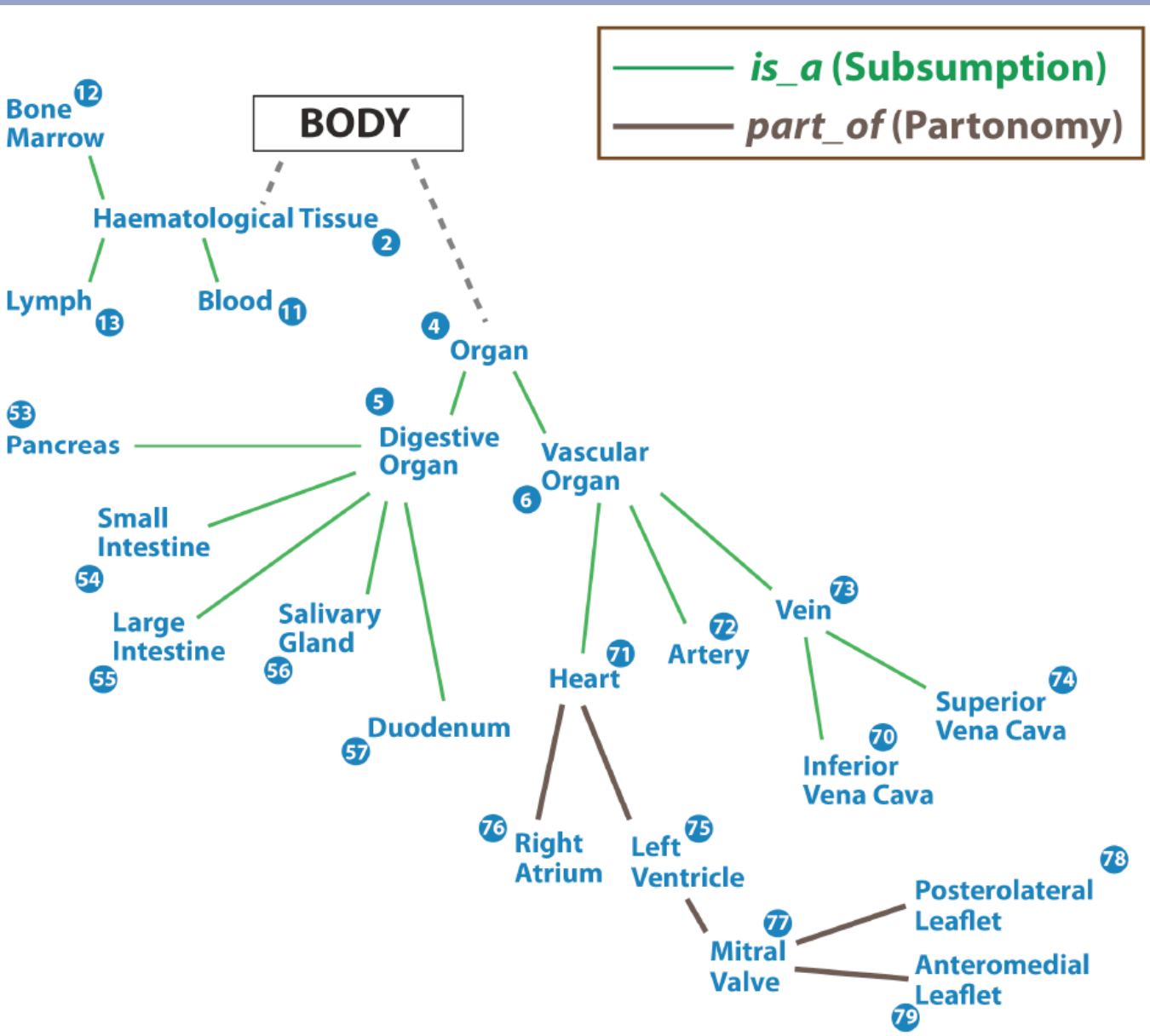
Intelligente Brug

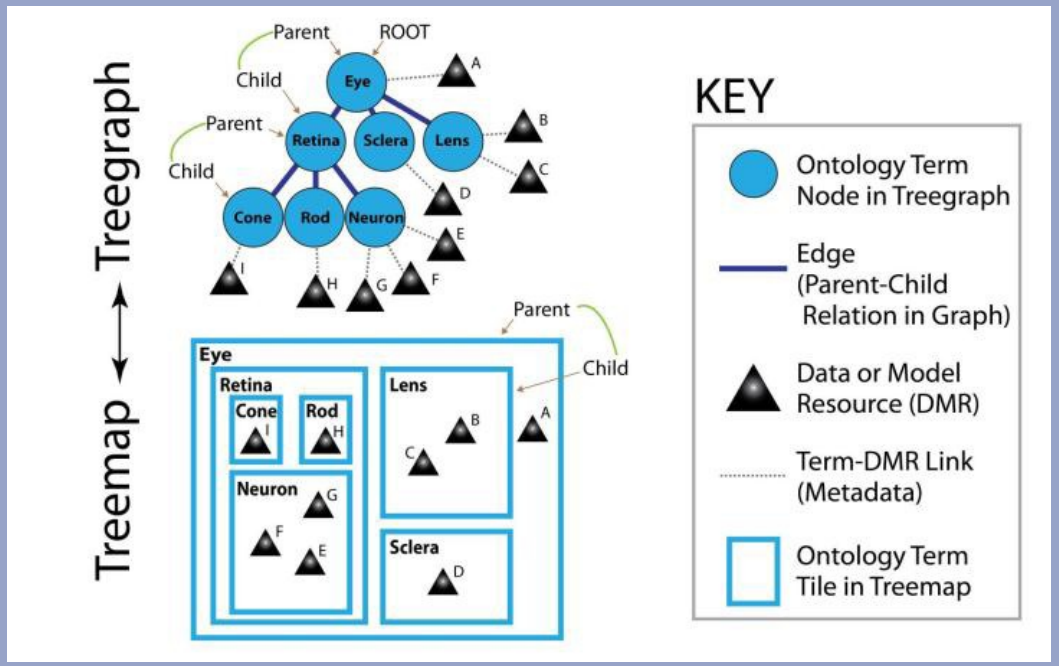


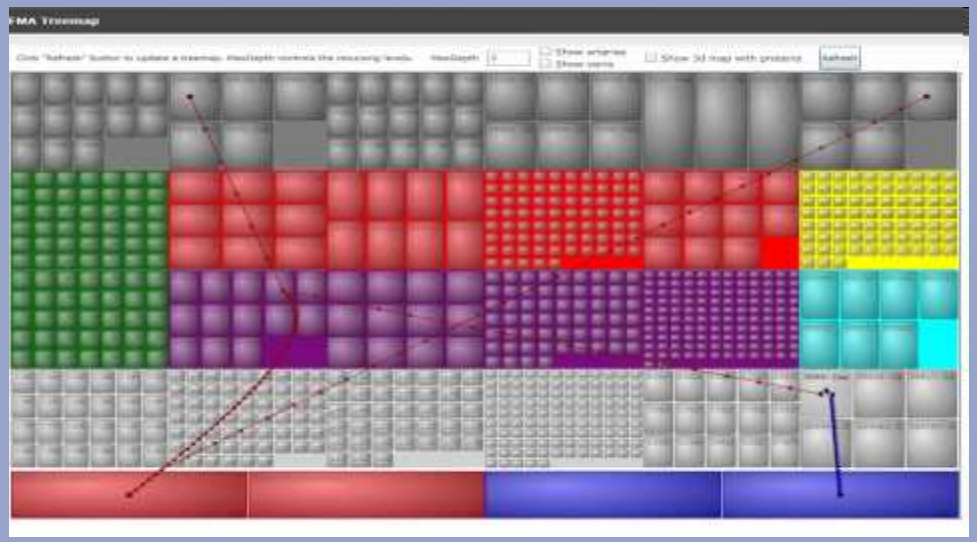
Sensor Viewer

- Students constructed a “mediaplayer” to view the data over time.



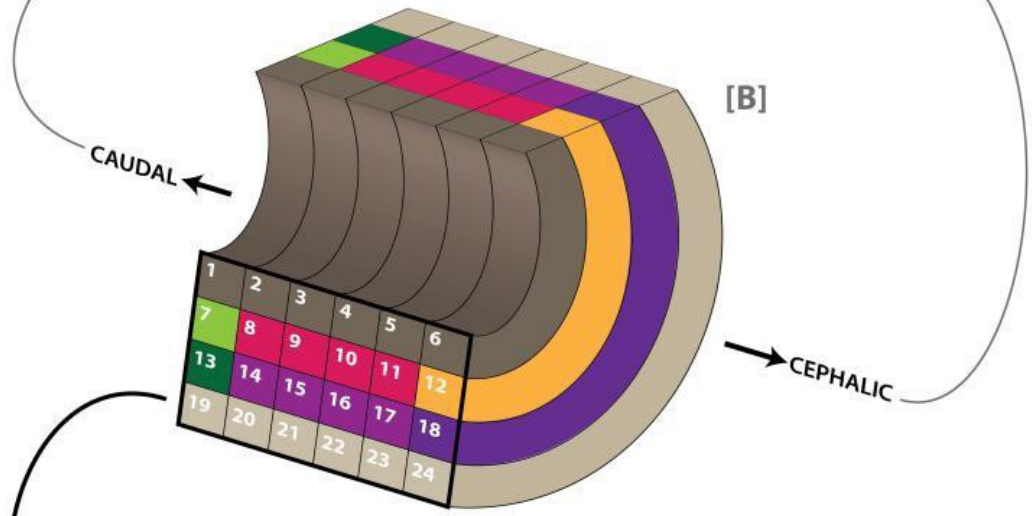

is_a (Subsumption)
part_of (Partonomy)
BODY
Bone Marrow 12
Haematological Tissue 2
Lymph 13
Blood 11
4 Organ
5 Digestive Organ
53 Pancreas
Small Intestine 54
Large Intestine 55
Salivary Gland 56
Duodenum 57
6 Vascular Organ
Heart 71
Artery 72
Vein 73
Superior Vena Cava 74
Inferior Vena Cava 70
76 Right Atrium
75 Left Ventricle
77 Mitral Valve
78 Posterolateral Leaflet
Anteromedial Leaflet 79


Treemap ⟷ Treegraph
Parent
ROOT
Child
Eye
A
Parent
Retina
Sclera
Lens
B
Child
C
D
Cone
Rod
Neuron
E
I
H
G
F
Parent
Child
Eye
Retina
Cone
I
Rod
H
Neuron
G
F
E
Lens
B
C
A
Sclera
D
KEY
Ontology Term Node in Treegraph
Edge (Parent-Child Relation in Graph)
Data or Model Resource (DMR)
Term-DMR Link (Metadata)
Ontology Term Tile in Treemap



BioMaps

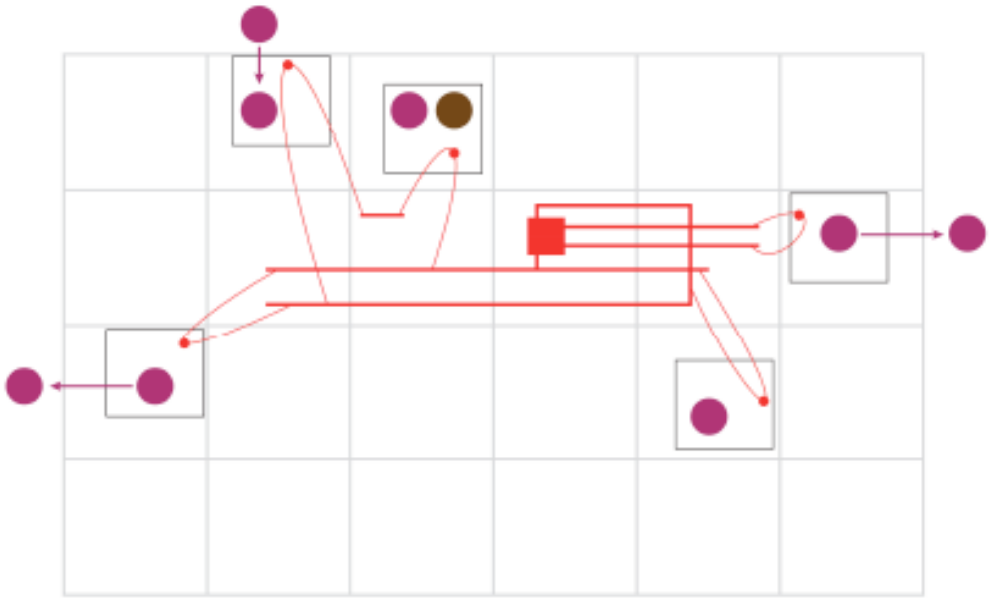
[A]



[B]

Large Intestine	Jejuno-Ileum	Liver Pancreas Duodenum	Stomach	Esophagus	Mouth Throat
Genitals Gonads	Vascular Caudal	Vascular Abdominal	Vascular Cardiac	Vascular Cephalic	Lungs
Urinary Tract	Nervous Caudal	Nervous Lower Spinal	Nervous Upper Spinal	Nervous Cephalic	Cranial Nerves
Lower Limb	Pelvis	Abdomen	Thorax	Neck Upper Limb	Head

[C]



[App.1.Fig.9] Mockup of a multi-scale physiology ApiNATOMY circuit-board illustrating cardiovascular (red) connections overa flat treemap representing organ regions in human anatomy. This diagram shows the transit of ethanol alcohol molecules (wine-coloured dot) through the body, namely: [top row] from small intestine to liver (where it meets an enzyme that breaks down ethanol – brown dot), [second row] the passage of ethanol into breath in the lungs, and [third row] the eventual accumulation of ethanol in the cerebellum and excretion through the kidneys.

WELKOM!