

Models as Forms, Models as Concepts

Øyvind Eide

@oeide

oeide@uni-koeln.de

www.oeide.no

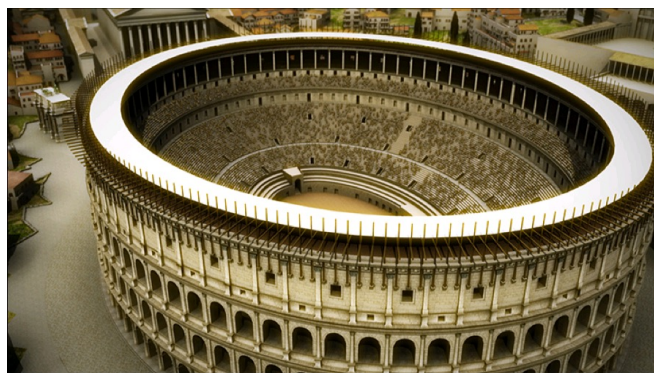


Communication over E-Mail

- Send from uni account
- Signature with your name
 - for me to do anything, Matrikelnummer
- General training for university systems
 - not my job
- Missed information due to absence
 - ask other students



What is a model?



$$\begin{aligned}h(x, y, z) &= |I_0|^2 + 2|I_1|^2 + |I_2|^2 \\I_0(x, y, z) &= \int_0^\alpha B_0(\theta, x, y, z) \left(t_s^{(1)} t_s^{(2)} + t_p^{(1)} t_p^{(2)} \frac{1}{n_s} \sqrt{n_s^2 - n_i^2 \sin^2 \theta} \right) d\theta \\I_1(x, y, z) &= \int_0^\alpha B_1(\theta, x, y, z) \left(t_p^{(1)} t_p^{(2)} \frac{n_i}{n_s} \sin \theta \right) d\theta \\I_2(x, y, z) &= \int_0^\alpha B_2(\theta, x, y, z) \left(t_s^{(1)} t_s^{(2)} + t_p^{(1)} t_p^{(2)} \frac{1}{n_s} \sqrt{n_s^2 - n_i^2 \sin^2 \theta} \right) d\theta \\B_m(\theta, x, y, z) &= \sqrt{\cos \theta} \sin \theta J_m(k \sqrt{x^2 + y^2} n_i \sin \theta) e^{jW(\theta)} \\W(\theta) &= k \left\{ t_s \sqrt{n_s^2 - n_i^2 \sin^2 \theta} + t_i \sqrt{n_i^2 - n_i^2 \sin^2 \theta} - t_i^* \sqrt{n_i^{*2} - n_i^2 \sin^2 \theta} + \right. \\&\quad \left. + t_g \sqrt{n_g^2 - n_i^2 \sin^2 \theta} - t_g^* \sqrt{n_g^{*2} - n_i^2 \sin^2 \theta} \right\}\end{aligned}$$

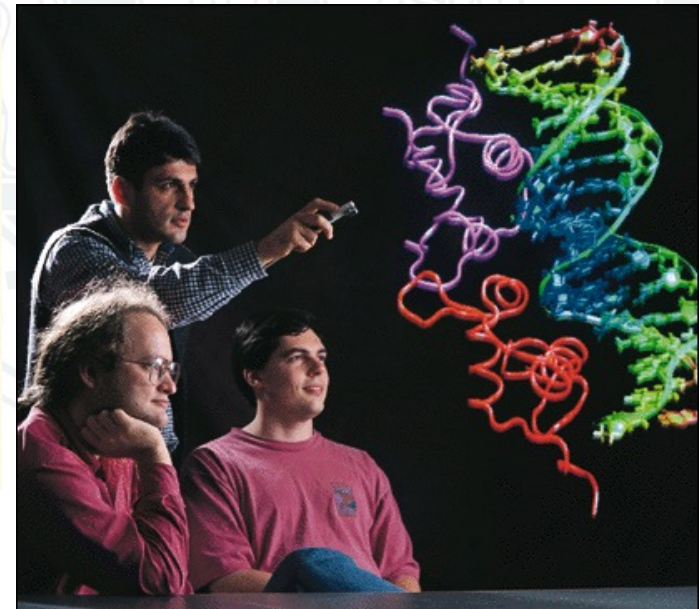
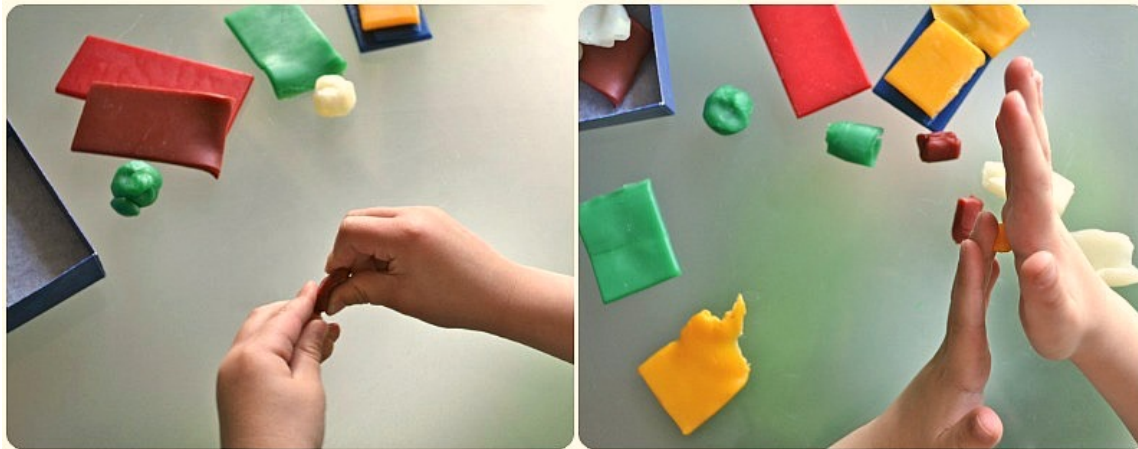
This distinction is the core of this paper

- For example, take a 3D computer-based artefact
 - which is based on a geometric expression
- The 3D visual artefact we see
 - is *not* (just) a visualisation
- *It is a model:*
 - we create it
 - we manipulate it
 - we learn from it
- The geometric expression is also a model
 - how are the two related?



What is modelling?

- Creative process of thinking/reasoning
 - meaning made and negotiated through creation and manipulation of external representations



- As research strategy:
 - process by which researchers make and manipulate external representations (“imaginary concreta”, Godfrey-Smith 2009) to make sense of conceptual objects and phenomena

Modelling in the sciences

- The Bohr model of the atom
- The double helix model of the DNA
- The Lotka-Volterra model of predator-prey interaction
- Actor based models of economic transactions
- Actor-network models
- Economic models
- Climate models

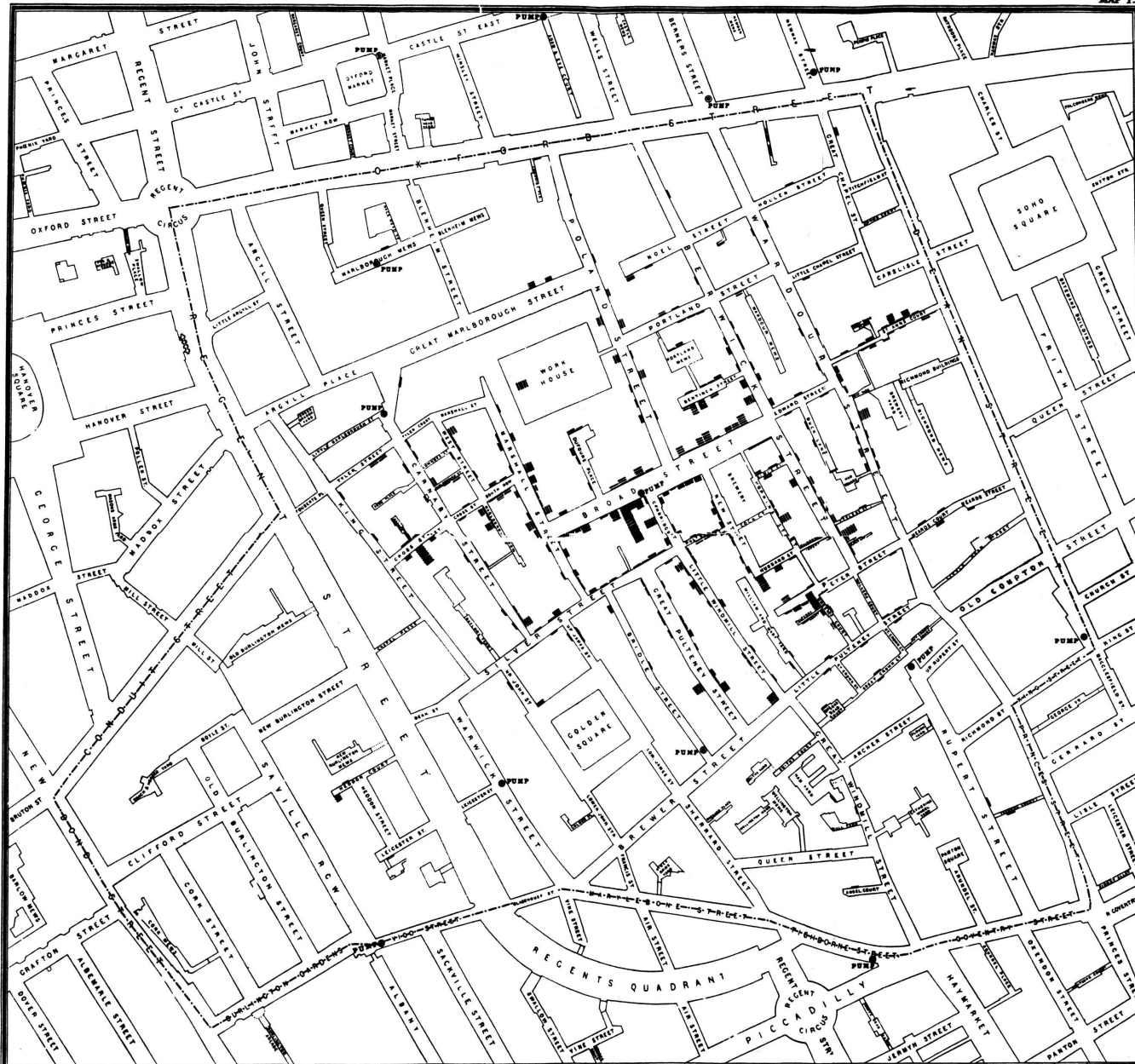


Modelling in the sciences

- Fundamental to science
- Important in society
 - still hard to define
- Not just static
 - tools for interactive inquiry
- Can have quite different forms
 - physical and fictional objects
 - set-theoretic structures
 - mathematical equations
 - ...



Analysis and understanding



Original map made by John Snow in 1854. Cholera cases are highlighted in black. Wikimedia Commons. URL: <http://en.wikipedia.org/wiki/File:Snow-cholera-map-1.jpg>

Narrotological models: Propp

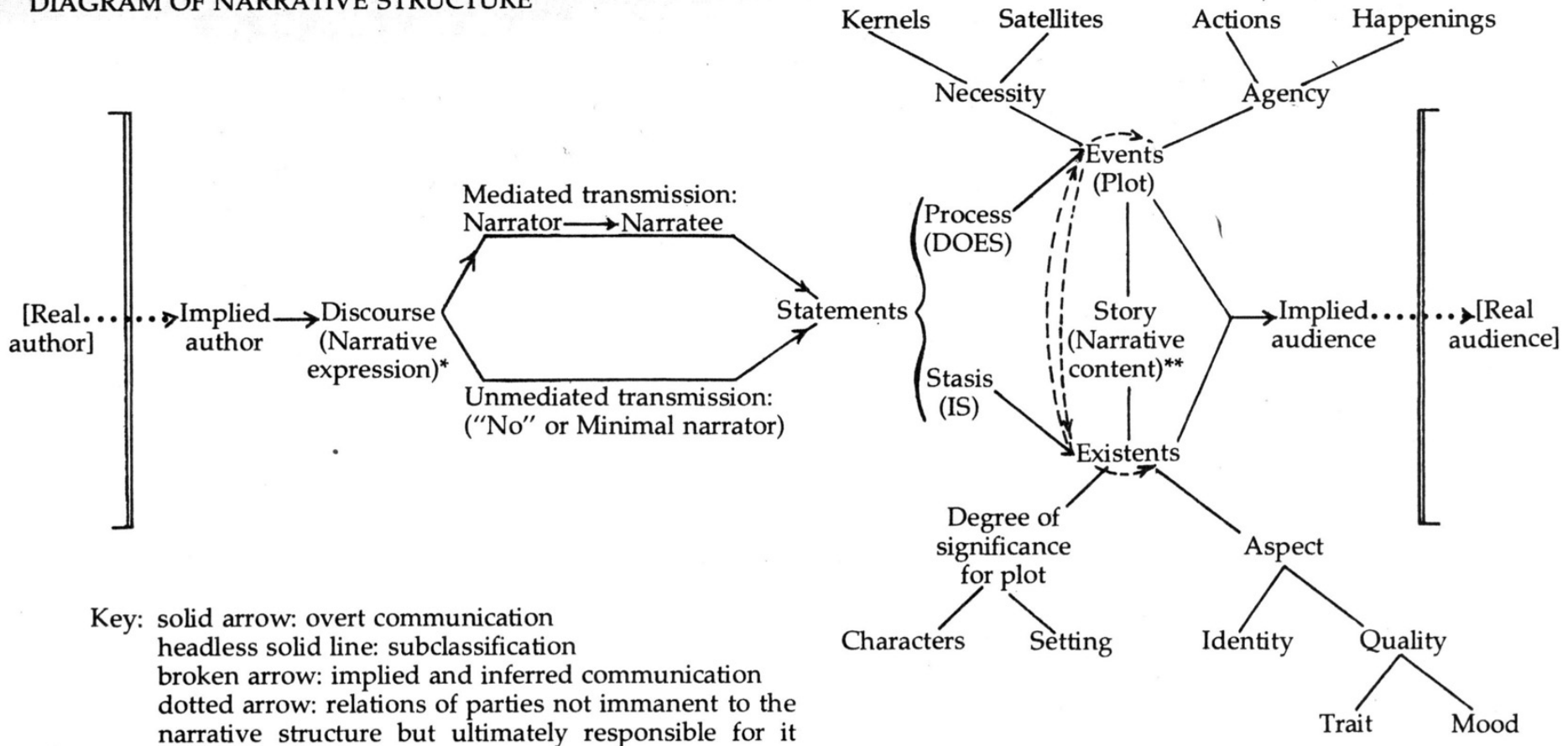
- Absentation
- Interdiction
- Violation Of Interdiction
- Reconnaissance
- Delivery
- Trickery
- Complicity
- Villainy Or Lack
- Mediation
- Beginning Counter-Action
- Departure
- First Function Of The Donor
- Hero's Reaction
- Receipt Of A Magical Agent
- Guidance
- Struggle
- Branding
- Victory
- Liquidation
- Return
- Pursuit
- Rescue
- Unrecognized Arrival
- Unfounded Claims
- Difficult Task
- Solution
- Recognition
- Exposure
- Transfiguration
- Punishment
- Wedding

Propp, Vladimir. *Morphology of the Folktale*. Bloomington, 1958. Orig: Морфология сказки.



Narratological models: Chatman

DIAGRAM OF NARRATIVE STRUCTURE



Key: solid arrow: overt communication
 headless solid line: subclassification
 broken arrow: implied and inferred communication
 dotted arrow: relations of parties not immanent to the narrative structure but ultimately responsible for it

*This is the form of narrative expression; its *substance* or manifestation appears in various media (verbal: fiction, history; visual: paintings, comic strips; audio-visual: cinema, etc.).

**This is the form of the content not its substance.

Modelling and storytelling

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.
Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui ont été en Russie, le noir ceux qui en sont sortis. Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Chiers, de Léguir, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre. Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mohilow en ont rejoint vers Orscha et Witebsk, avaient toujours marché avec l'armée.

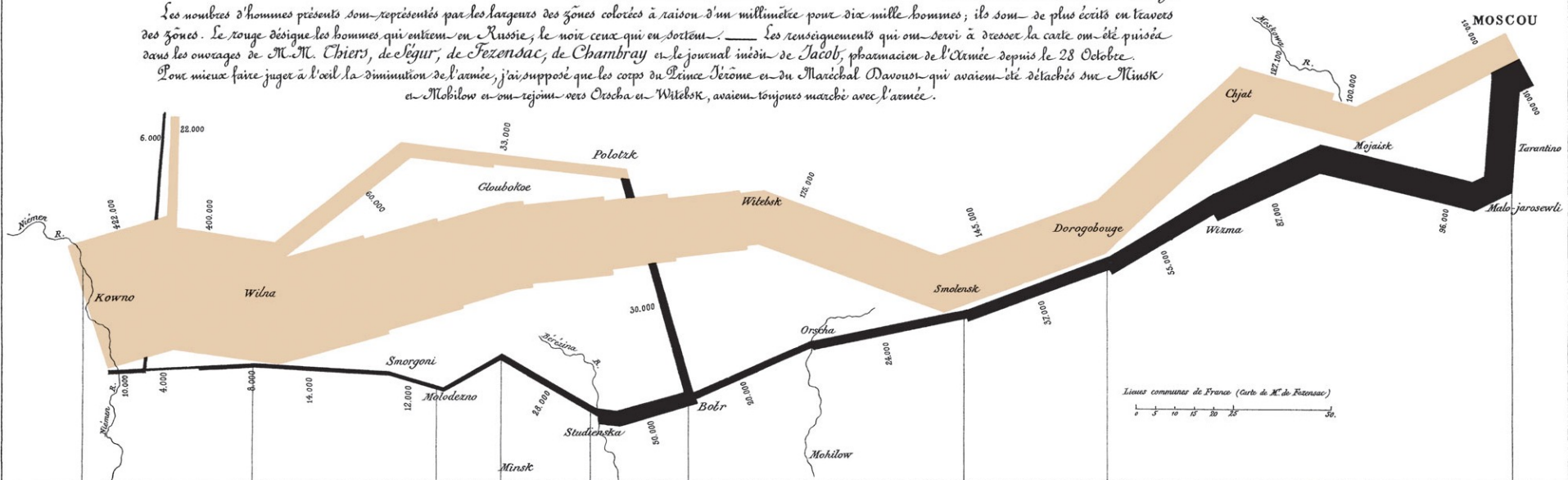
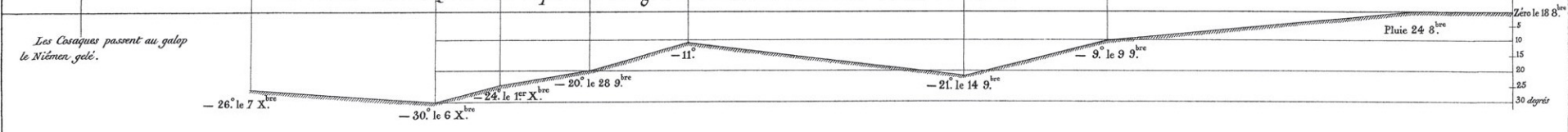


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.



Autog. par Regnier, 8. Par. S^{te} Marie S^{te} O^{de} à Paris.

Imp. Lit. Regnier et Doucet.

Charles Minard's 1869 chart showing the number of men in Napoleon's 1812 Russian campaign army, their movements, as well as the temperature they encountered on the return path. Lithograph, 62 x 30 cm. Wikimedia Commons. URL: <http://commons.wikimedia.org/wiki/File:Minard.png>

Modelling in Digital Humanities

- Purposes include
 - making things
 - understanding things
 - teaching
 - making implicit information explicit
- Basis for modelling
 - media products
 - other objects/structures
- Mediated models
 - thus, no focus on mind models
- Models are dynamic
 - sometimes in form
 - can be modified
 - always in creation
 - always in use
- Thus: *modelling*

