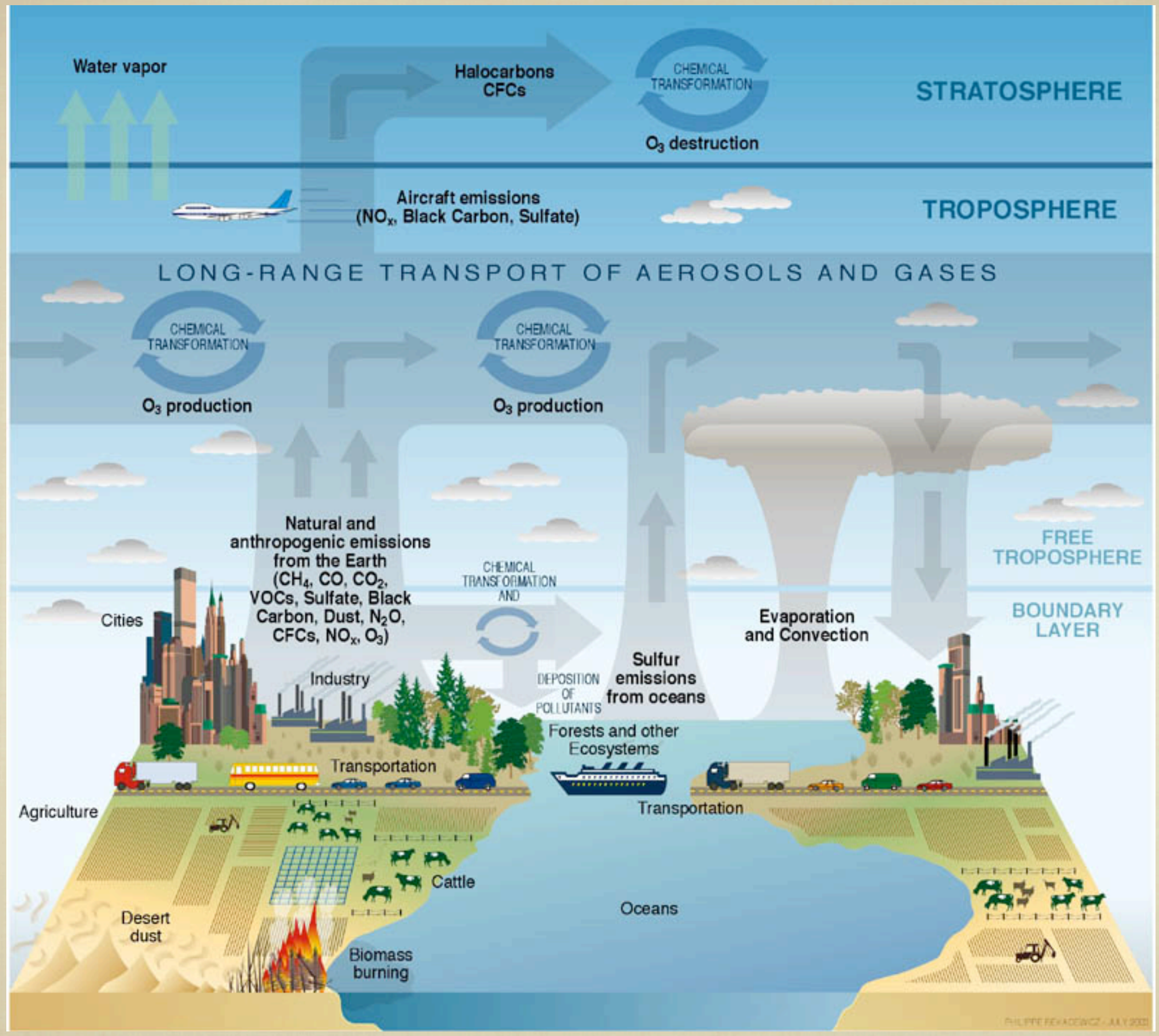
Modelling

for digital resources


Water vapor
Halocarbons
CFCs
CHEMICAL TRANSFORMATION
O_3 destruction
STRATOSPHERE
Aircraft emissions
(NO_x, Black Carbon, Sulfate)
TROPOSPHERE
LONG-RANGE TRANSPORT OF AEROSOLS AND GASES
CHEMICAL TRANSFORMATION
O_3 production
CHEMICAL TRANSFORMATION
O_3 production
Natural and anthropogenic emissions from the Earth (CH_4, CO, CO_2, VOCs, Sulfate, Black Carbon, Dust, N_2O, CFCs, NO_x, O_3)
CHEMICAL TRANSFORMATION AND
FREE TROPOSPHERE
BOUNDARY LAYER
Cities
Industry
DEPOSITION OF POLLUTANTS
Sulfur emissions from oceans
Evaporation and Convection
Forests and other Ecosystems
Transportation
Transportation
Agriculture
Cattle
Oceans
Desert dust
Biomass burning

Modelling?

- Modelling is the process of creating a model

- A model is

  - a representation of something for purposes of study (model of..)

  - a design for realizing something new (model for...)

Modelling!

- The theory of modelling is an attempt to understand the methodological base for digital representation and the interaction with it

- By "modelling" I mean the heuristic process of constructing and manipulating models; (McCarthy 2005, p. 24)

The semantic field

The semantic field

- Analogy

The semantic field

- Analogy
- Representation

The semantic field

- Analogy
- Representation
- Diagram

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- Map

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- Experiment

Analogy?

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- Greek analogia, 'equality of ratios, proportion'.

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- A form of logical inference or an instance of it, based on the assumption that if two things are known to be alike in some respects, then they must be alike in other respects.

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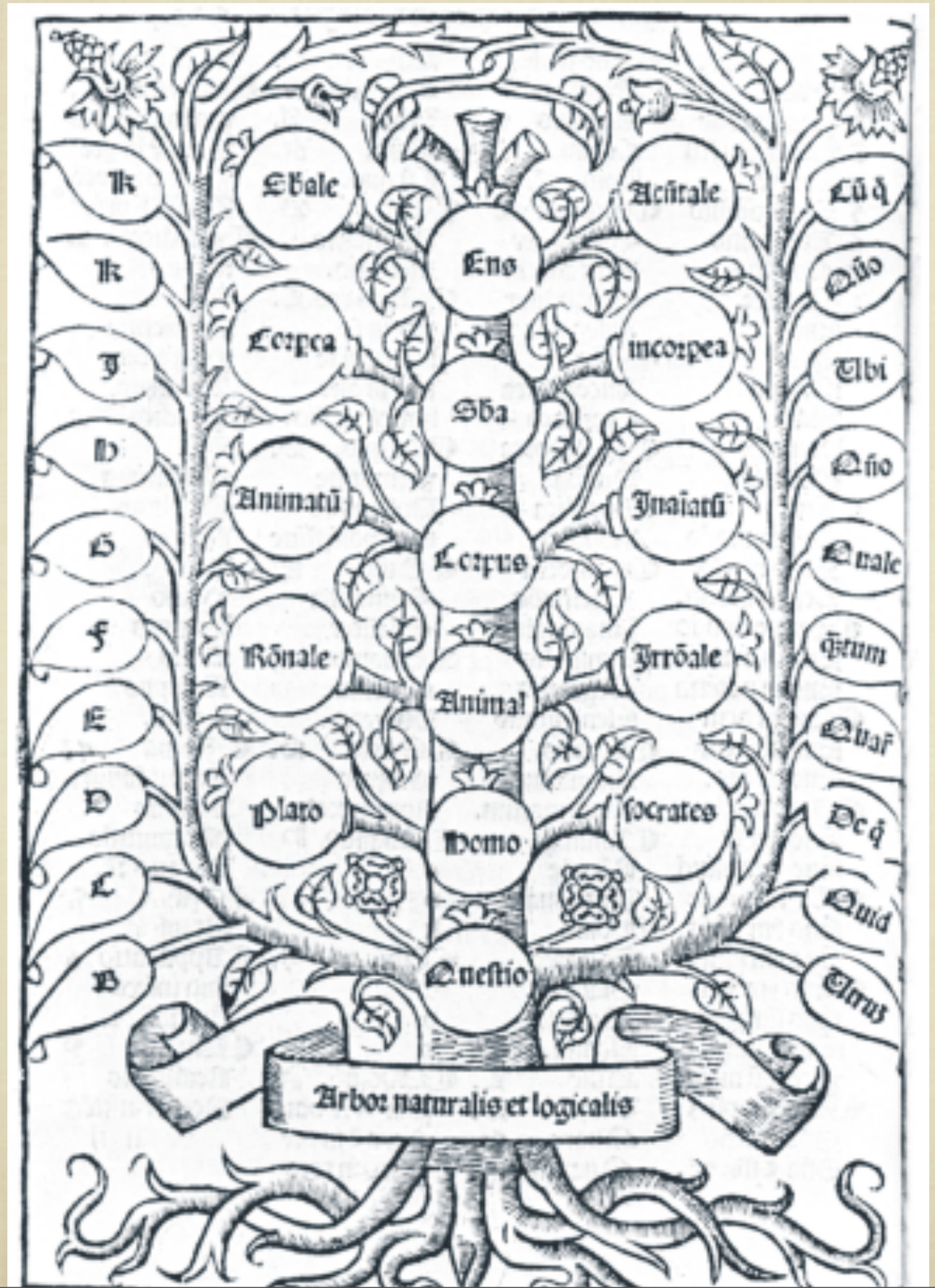
- An analogical relation between the **model** and the **modelled object** is required.

Representation?



The tree of nature and logic, by Ramon Lull (1232-1315)

Representation?

Taima Mandara. 13 th century. Color on silk;
71 3 / 8 x 70 5 / 8 in. Nara National Museum.

Representation

Representation

- From the OED:
  - An image, likeness, or reproduction in some manner of a thing ...
  - A material image or figure;
  - a reproduction in some material or tangible form; in later use esp.
  - a drawing or painting (of a person or thing)

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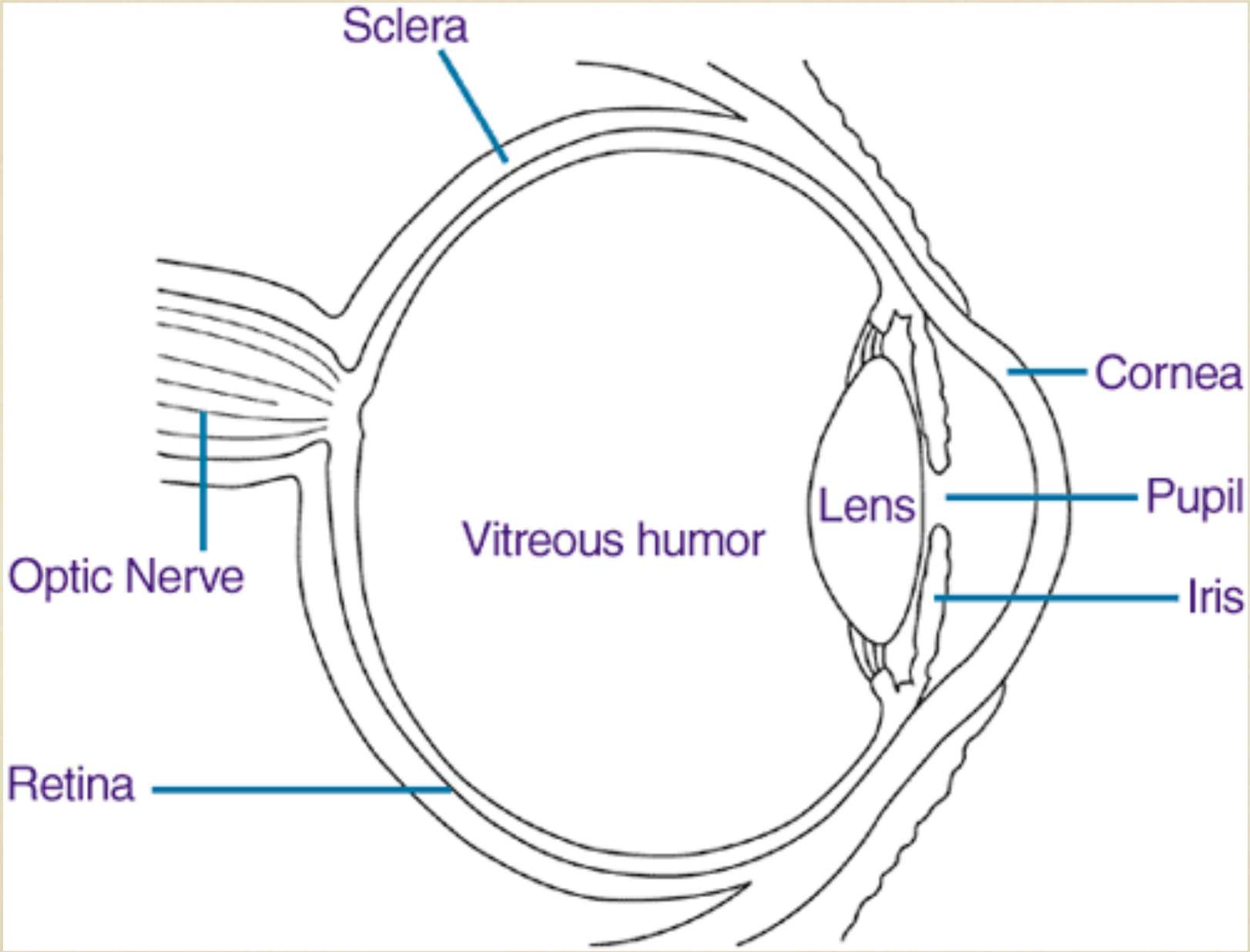
  - a drawing or painting (of a person or thing)
- knowledge representation (within, e.g. Artificial Intelligence)

Diagram



A diagram of the eye

Diagram

Diagram

- Greek diágramma:
  - that which is marked out by lines, a geometrical figure, written list, register, the gamut or scale in music.

Diagram

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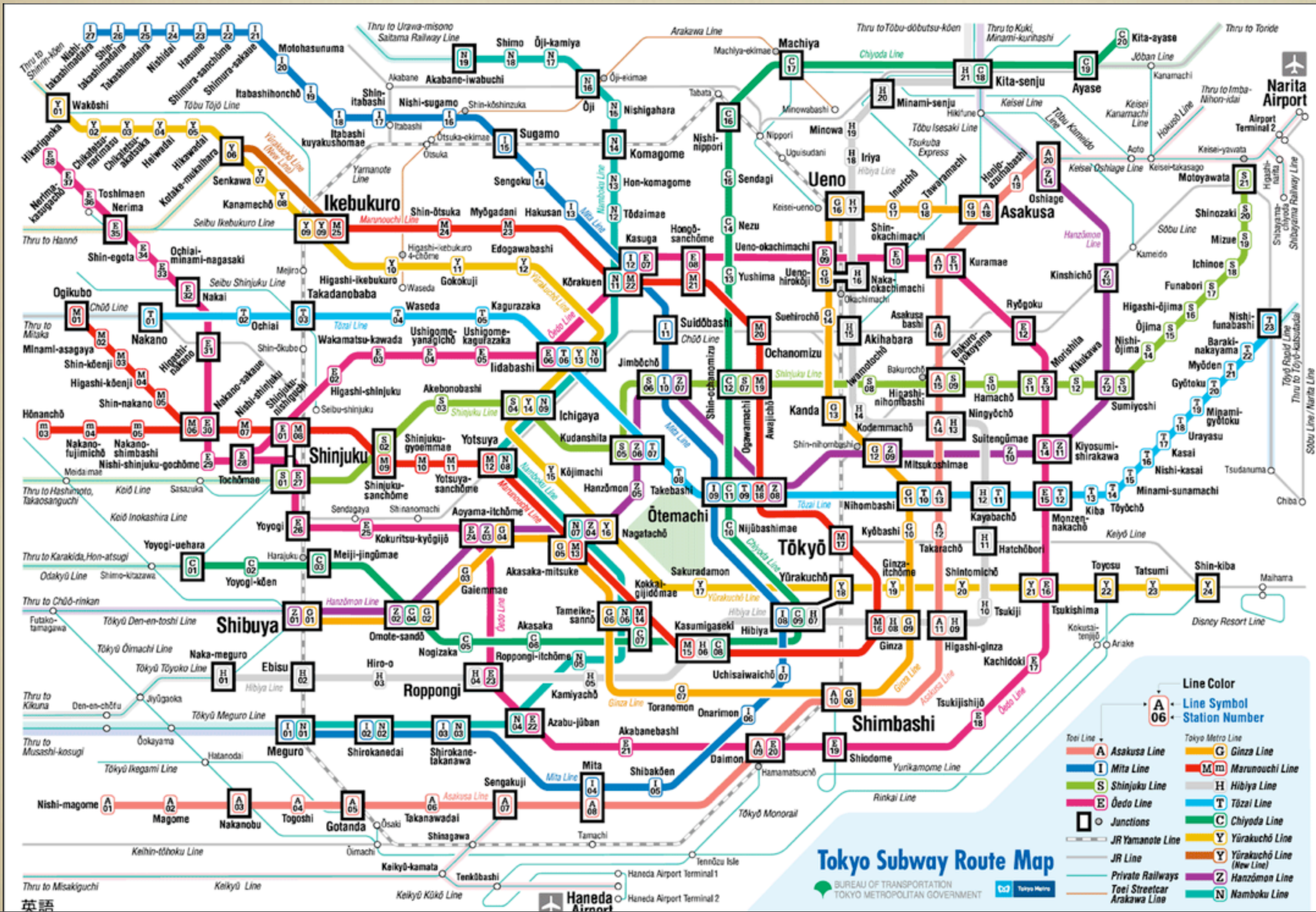
- a figure drawn in such a manner that the geometrical relations between the parts of the figure illustrate relations between other objects,

Diagram

- Greek diágramma:
  - that which is marked out by lines, a geometrical figure, written list, register, the gamut or scale in music.
- a figure drawn in such a manner that the geometrical relations between the parts of the figure illustrate relations between other objects,
- thefreedictionary.com:
  - A plan, sketch, drawing, or outline designed to demonstrate or explain how something works or to clarify the relationship between the parts of a whole.

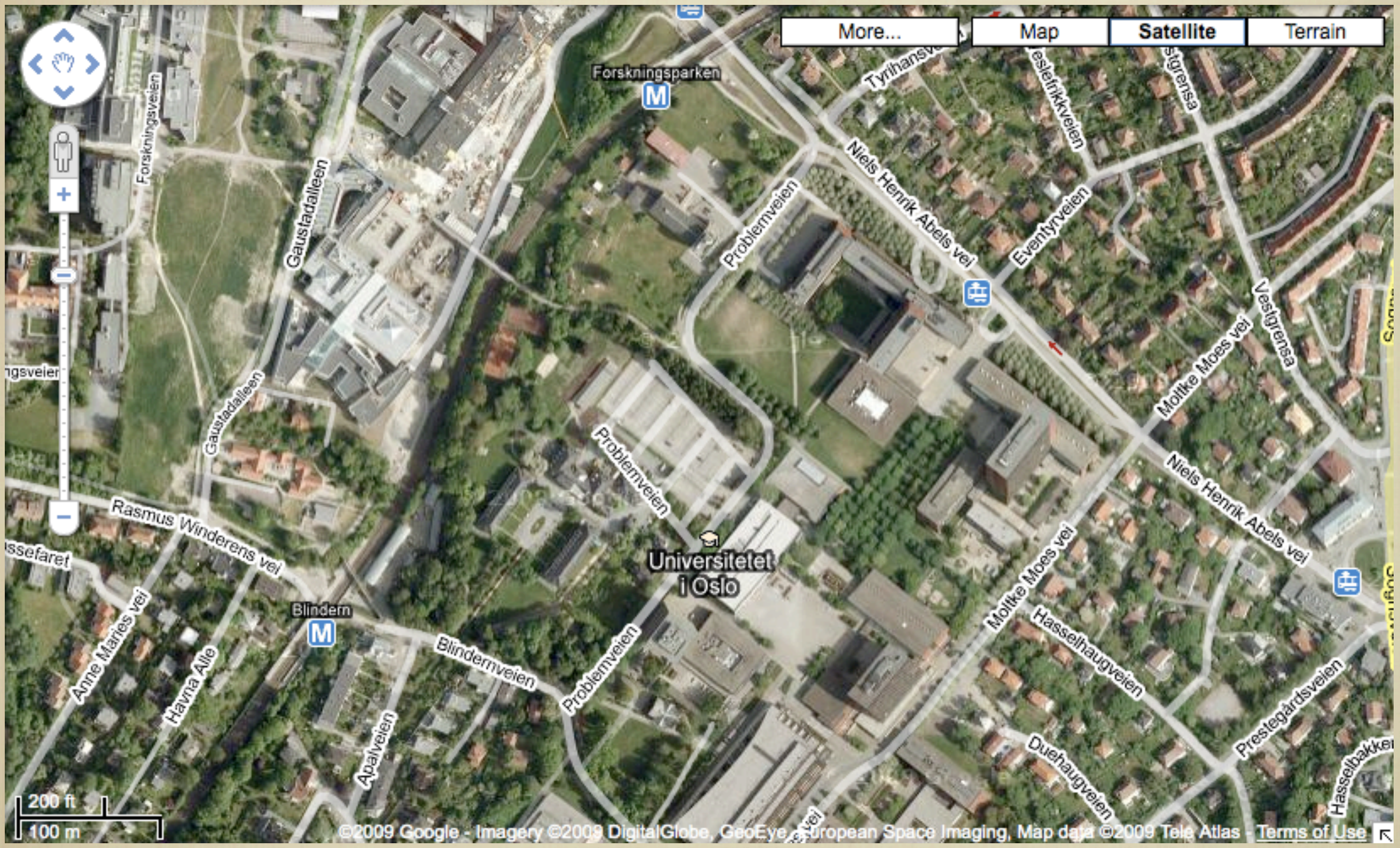
Map?


Tokyo Subway Route Map
BUREAU OF TRANSPORTATION TOKYO METROPOLITAN GOVERNMENT
Line Color
Line Symbol
Station Number
Toei Line
Tokyo Metro Line
Asakusa Line
Mita Line
Shinjuku Line
Ōedo Line
Junctions
JR Yamanote Line
JR Line
Private Railways
Toei Streetcar Arakawa Line
Ginza Line
Marunouchi Line
Hibiya Line
Tōzai Line
Chiyoda Line
Yūrakuchō Line
Yūrakuchō Line (New Line)
Hanzōmon Line
Namboku Line
Ikebukuro
Shinjuku
Shibuya
Roppongi
Ueno
Asakusa
Ōtemachi
Tōkyō
Shimbashi
Haneda Airport
Narita Airport
Motohasunuma
Wakōshi
Hikarigaoka
Nerima
Toshimaen
Senkawa
Kanamechō
Sugamo
Komagome
Hon-komagome
Tōdaimae
Kasuga
Kōrakuen
Iidabashi
Ichigaya
Yotsuya
Kōjimachi
Hanzōmon
Nagatachō
Akasaka
Kasumigaseki
Hibiya
Ginza
Higashi-ginza
Tsukiji
Kachidoki
Tsukishima
Toyosu
Tatsumi
Shin-kiba
Machiya
Kita-senju
Ayase
Kita-ayase
Minami-senju
Minowa
Iriya
Nishi-nippori
Sendagi
Nezu
Yushima
Akihabara
Ochanomizu
Kanda
Nihombashi
Kayabachō
Monzen-nakachō
Kiba
Tōyōchō
Minami-sunamachi
Nishi-kasai
Kasai
Urayasu
Ogikubo
Nakano
Ochiai
Takadanobaba
Waseda
Kagurazaka
Jimbōchō
Suidōbashi
Takebashi
Kudanshita
Akebonobashi
Meiji-jingūmae
Omote-sandō
Gaiemmae
Aoyama-itchōme
Ebisu
Hiro-o
Kamiyachō
Toranomon
Meguro
Shirokanedai
Shirokane-takanawa
Azabu-jūban
Mita
Sengakuji
Gotanda
Togoshi
Nakanobu
Magome
Nishi-magome
Takanawadai
Daimon
Shiodome
Onarimon
Uchisaiwaichō
Shibakōen
Akabanebashi
Tsukishima
Ryōgoku
Morishita
Kikukawa
Sumiyoshi
Kinshichō
Oshiage
Motoyawata
Shinozaki
Mizue
Ichinoe
Funabori
Higashi-ōjima
Ōjima
Nishi-ōjima
Thru to Toride
Thru to Hannō
Thru to Mitaka
Keiō Line
Tōkyū Den-en-toshi Line
Tōkyū Tōyoko Line
Tōkyū Meguro Line
Keikyū Line
Tōkyō Monorail
Yurikamome Line
Rinkai Line
Disney Resort Line
Sōbu Line
英語

Map?


A NEW MAP of NORTH AMERICA, From the Latest Discoveries 1778.
BAFFINS BAY
HUDSONS BAY
LABRADOR or NEW BRITAIN
WESTERN SEA
NEW ALBION
GULF of MEXICO
ATLANTIC OCEAN

Map?

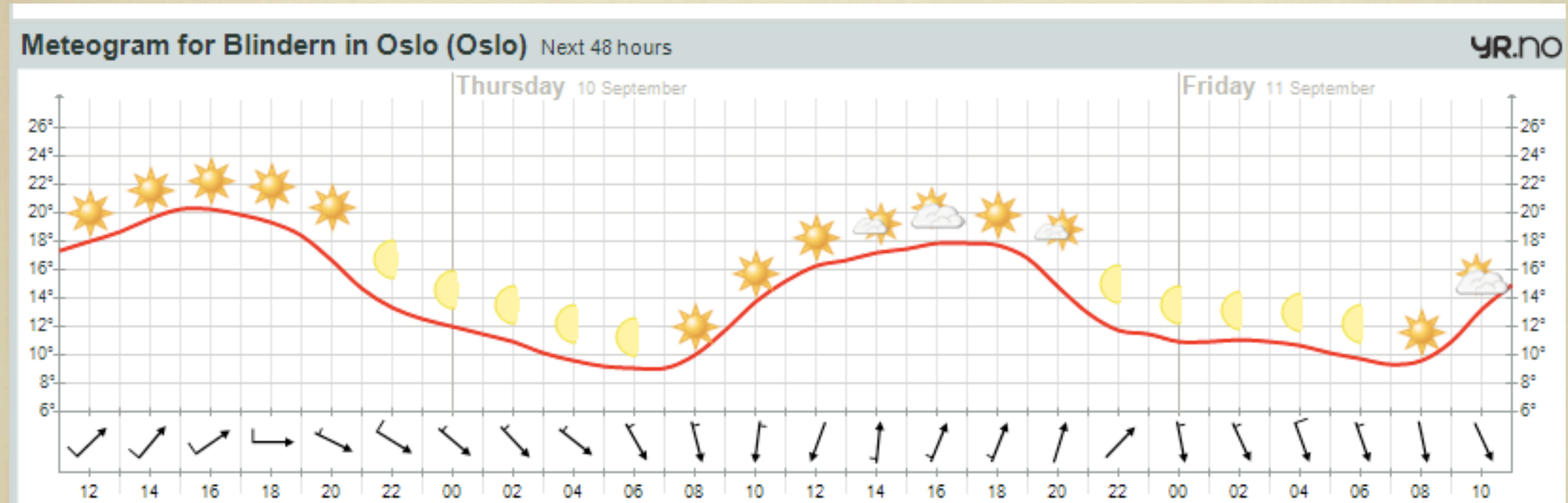

More...
Map
Satellite
Terrain
Forskningsparken
Gaustadalleen
Forskningsveien
Problemveien
Niels Henrik Abels vei
Eventyrveien
Vestgrensa
Moltke Moes vei
Rasmus Winderens vei
Universitetet i Oslo
Blindern
Blindernveien
Anne Maries vei
Havna Alle
Apalveien
Hasselhaugveien
Duehaugveien
Prestegårdsveien
200 ft
100 m
©2009 Google - Imagery ©2009 DigitalGlobe, GeoEye, European Space Imaging, Map data ©2009 Tele Atlas - Terms of Use

Map

- schematic spatial representation
- A representation, usually on a plane surface, of a region of the earth or heavens (thefreedictionary.com)
- A map is a visual representation of an area —a symbolic depiction highlighting relationships between elements of that space such as objects, regions, and themes (wikipedia)
- A diagram of anything we can imagine spatially (maxwell)

Simulation

Simulation



Today and tonight, 09 September 2009

The data is automatically generated. The meteorological model and local conditions may lead to deviation.

Tomorrow, 10 September 2009

The data is automatically generated. The meteorological model and local conditions may lead to deviation.

Finance.xls [Compatibility Mode] - Microsoft Excel

Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins | @RISK

Define Distributions | Add Output | Insert Function | Define Correlations | Distribution Fitting | Distribution Artist | Model Window — Model

Iterations 5000 | Simulations 1 | Start Simulation | Advanced Analyses — Simulation

Browse Results | Summary | Define Filters — Results

Excel Reports | Swap Functions | Library | Utilities | Help — Tools

C10 =RiskOutput() + NPV(0.1,C22:L22)

Financial Forecasting

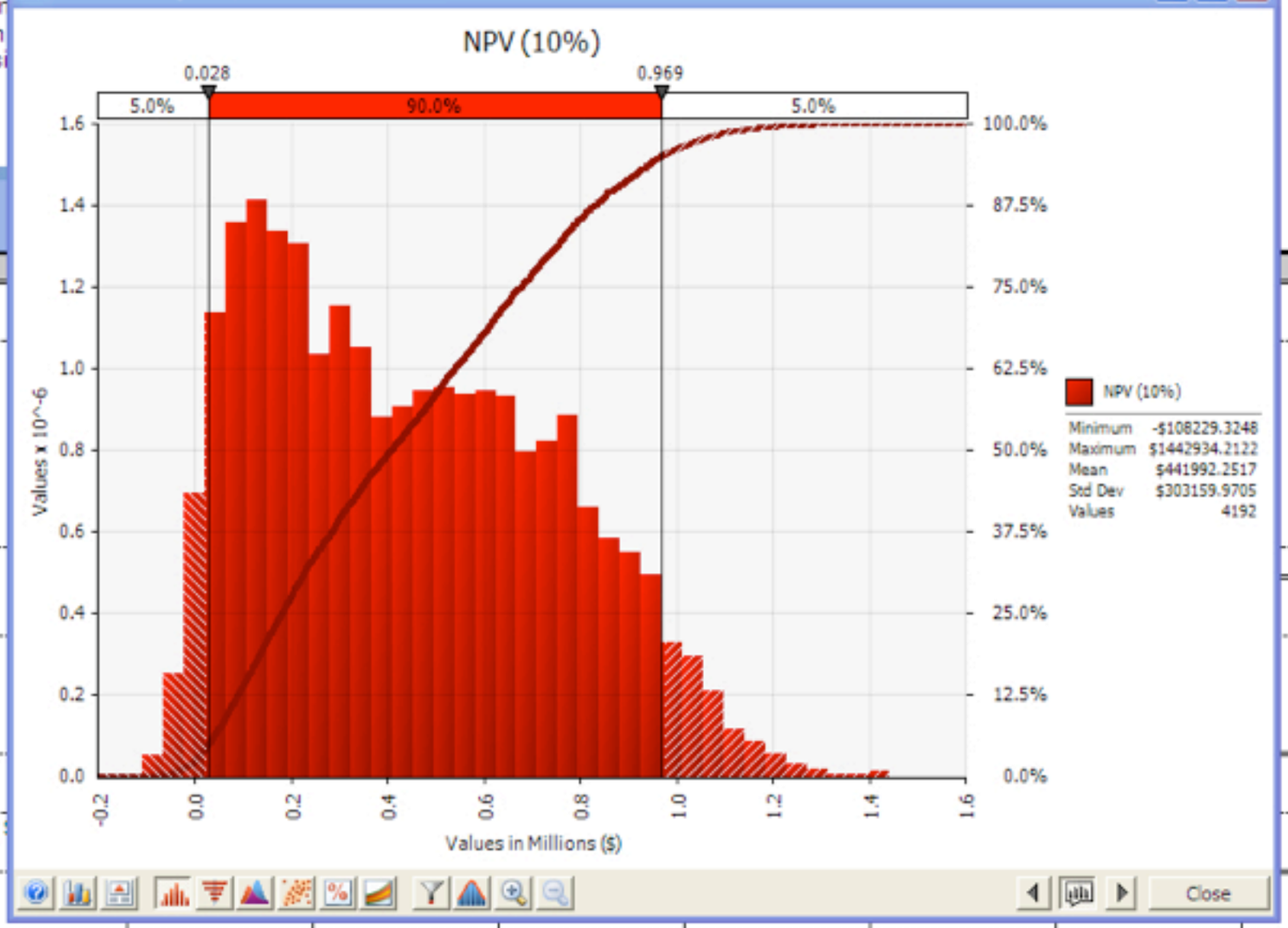
This model demonstrates the analysis of uncertainty in a financial forecast. Imagine you are deciding whether to launch a new product line. A simplified analysis of the cash flow activity of this venture might look as shown below. Since most of the elements of the model involve the prediction of future events they all involve uncertainty. The values in cells in green have all been formulas. The cells in red, the NPV value in cell C10 and the Net Incor marked as @RISK outputs so a detailed analysis can be performed on @RISK distributions to your financial models, you can go beyond the si analysis that can lead to bad business decisions.

NPV (10%) $363,248.03

Year	2010	2011	
Cash Flow			
Total Revenue	$ -	$ -	$
Cost of Goods Sold	$ -	$ -	$
Gross Margin	$ -	$ -	$
Operating Expenses	$ 100,000.00	$ 130,000.00	$
Earnings Before Taxes	$ (100,000.00)	$ (130,000.00)	$
Tax Basis	$ (100,000.00)	$ (230,000.00)	$
Income Tax	$ -	$ -	$
Net Income	$ (100,000.00)	$ (130,000.00)	$
Market Conditions			
Number of Competitors			
Unit Cost			
	46%	46%	
	$ 50,000.00	$ 20,000.00	$ 10,000.00
	$ 50,000.00	$ 100,000.00	$ 25,000.00
	$ -	$ 10,000.00	$ 20,000.00
	$ 100,000.00	$ 130,000.00	$ 55,000.00

$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$
$ 10,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$
$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 2
$ 30,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 2

@RISK - Output: C10



Close

@RISK Simulating...

88%

Iteration: 4420 of 5000

Simulation: 1 of 1

Runtime: 00:00:06 of 00:00:07

Iters Per Sec: 604.24

Sheet1

Ready Calculate 100%

Simulation

Simulation

- Simulation is the technique of imitation some state of affairs or process. The act of simulating something generally requires representing certain key characteristics of a selected physical or abstract system.

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- Virtual reality

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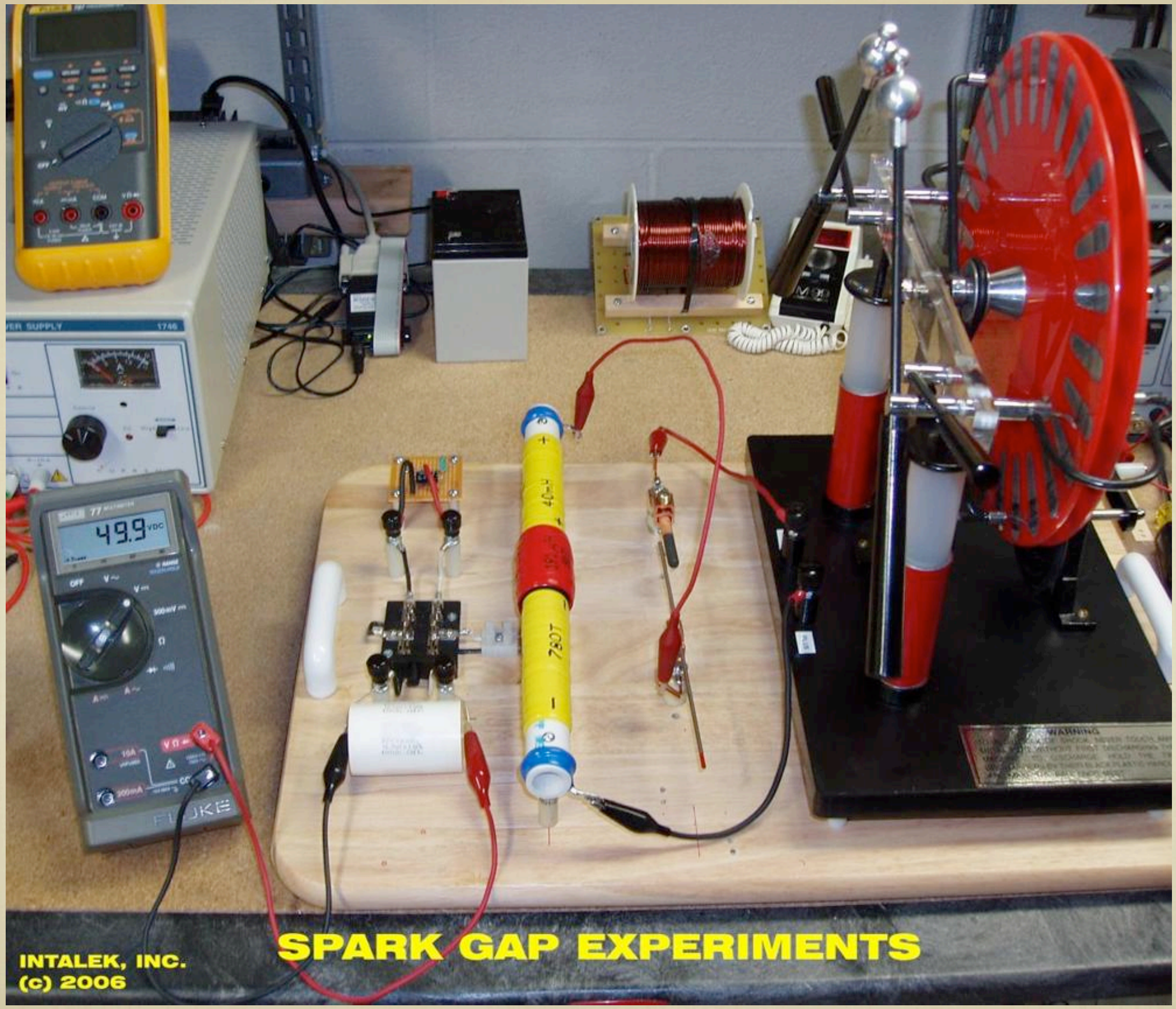
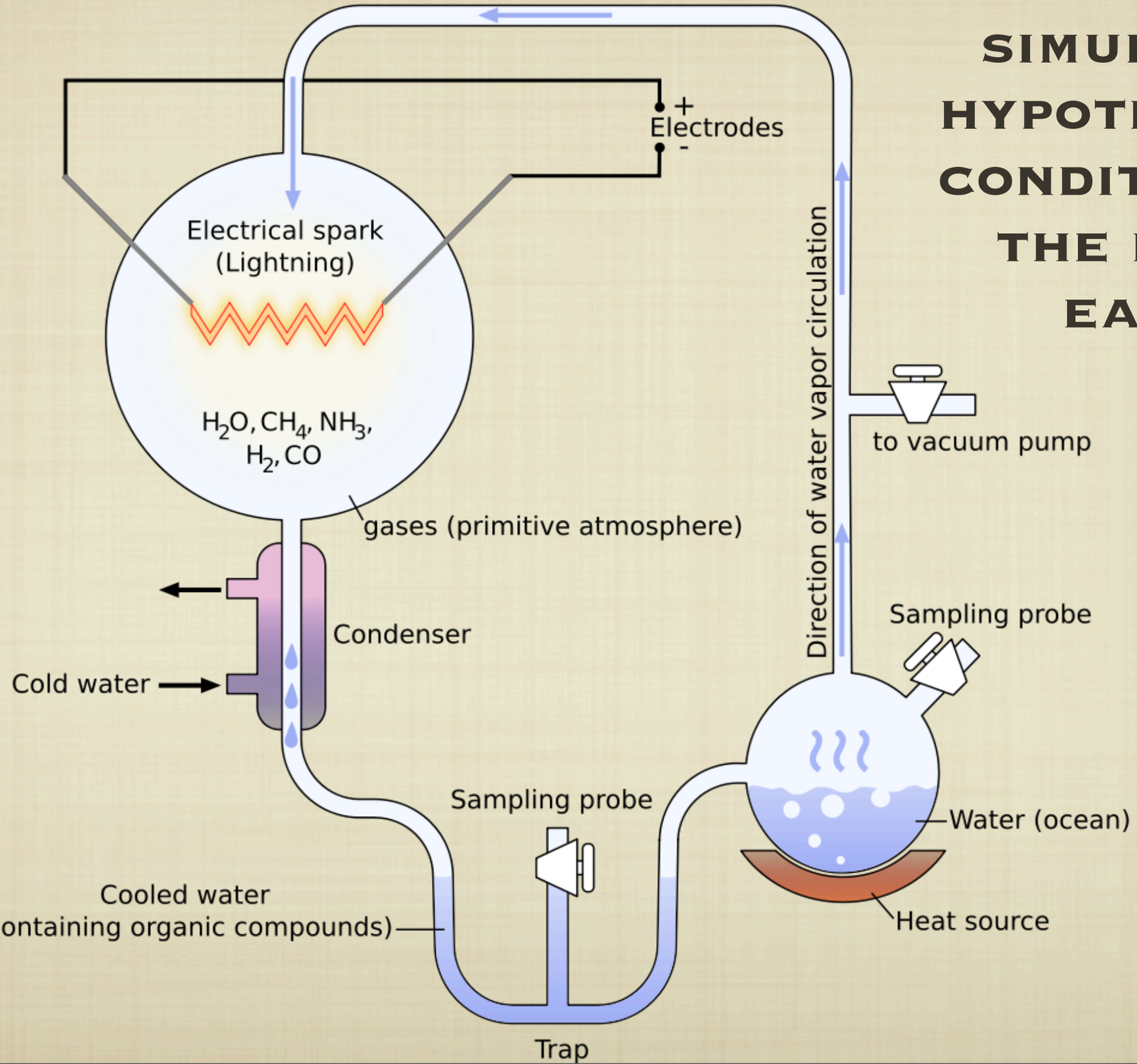
- Computer games simulating history


49.9
INTALEK, INC.
(c) 2006
SPARK GAP EXPERIMENTS

Experiment

The Miller–Urey experiment simulating hypothetical conditions of the early earth



Experiment

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- In scientific research, an experiment is a method of investigating causal relation–ships among variables, or to **test** (verify) a hypothesis. (based on wikipedia)
- An action or operation undertaken in order to **discover** somthing unknown (McCarthy)

⇒ A THEORY OF MODELLING

- THE UNBRIDGEABLE BREAK BETWEEN THE LIMITED AND SELECTIVE CONSCIOUSNESS OF THE SUBJECT AND THE UNLIMITED COMPLEXITY AND "RICHNESS" OF THE OBJECT IS NEGOTIATED BY **PURPOSEFUL SIMPLIFICATION** AND BY TRANSFORMATION OF THE OBJECT OF STUDY INSIDE CONSCIOUSNESS ITSELF. (TEODOR SHANIN, THE RULES OF THE GAME, 1972)

- How does a user of a tool know what (s)he is doing?

TOOLS

A tool

What is a tool?

What is a tool?

- A tool is known through the totality of use or interaction with it

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- In use, it disappears, becomes part of us (Heideggers 'zuhanden')

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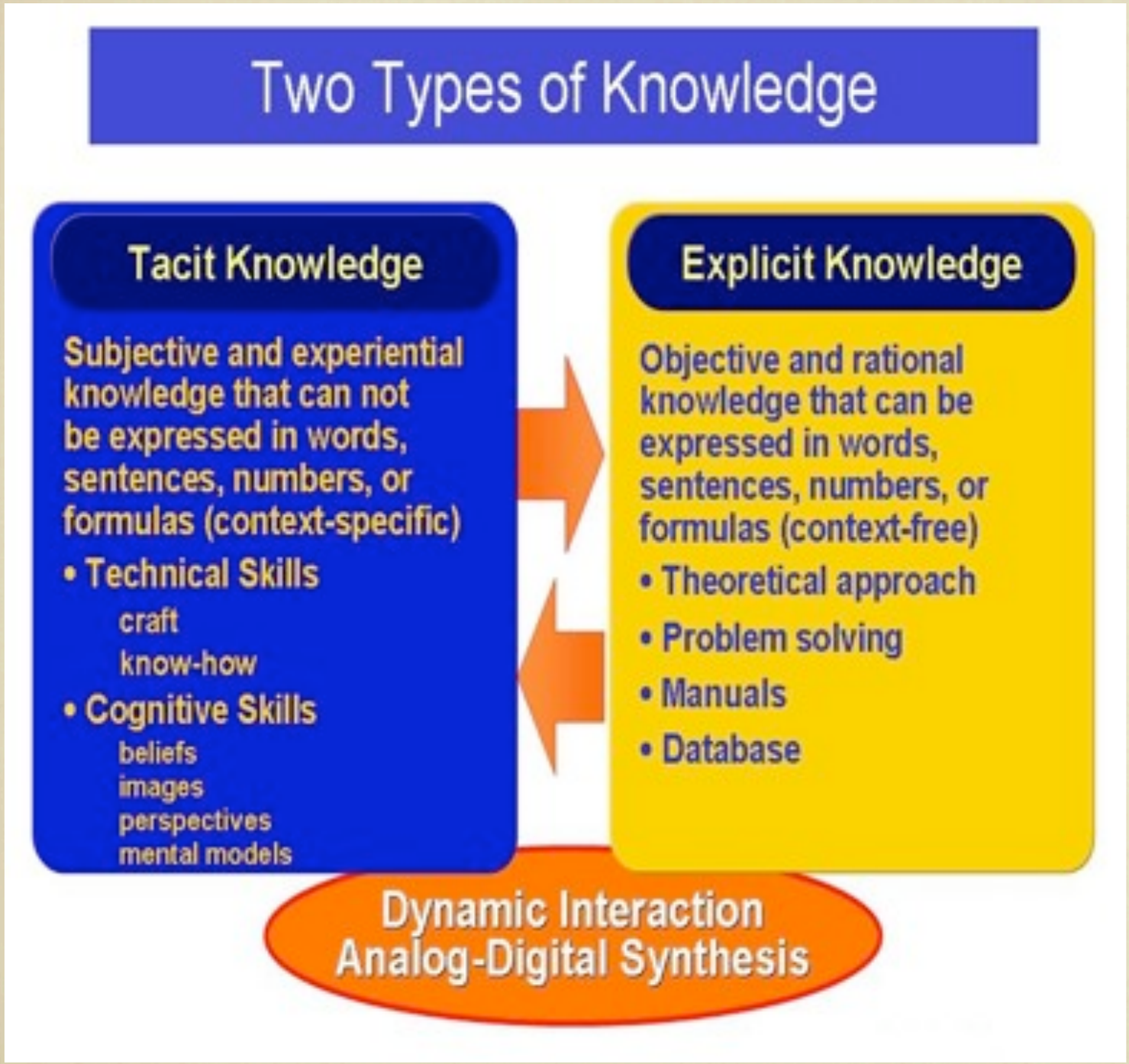
- in use, it disappears, becomes part of us (Heideggers ‘zuhanden’)

- A breakdown or problem causes reflection on the tool, which is now merely present (‘vorhanden’)

Tacit Knowledge



From a website on Knowledge Management in organizations

Tacit knowledge

Tacit knowledge

- No rules can account for scientific discovery

Tacit knowledge

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- Discovery must be arrived at by the tacit powers of the mind, and its content, so far as it is indeterminate, can be only tacitly known. (Michael Polanyi, Personal Knowledge, 1958)

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- Discovery must be arrived at by the tacit powers of the mind, and its content, so far as it is indeterminate, can be only tacitly known. (Michael Polanyi, Personal Knowledge, 1958)

- Good guessing, based on the known facts (→Darwin, Pierce, Sherlock HOlmes)

Modelling Circle

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- Next, we refine the model