

# What is Neo-Informatics?

**What is Neo-Informatics?**  
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**A moment of history - dawn of Informatics**  
 In 1957-1958 the International Geophysical Year (IGY) greatly expanded our knowledge about global processes, heralded the exploration of geospace, and left a legacy of monumental achievements.

**X-informatics - Use Cases, Information Models, Architecture, ...**

**Neo-informatics: responding to disruption(?)**  
**Disruption: asymmetric information flows and rates**

**Scenario(?)**

**Ask what Informatics can do for you**  
**We need some new Informatics approaches**

- Smart: incorporating asymmetries, switching activation spaces (with collaborators inside)
- Transparency: tell me what did you do there? Or did I do there?
- Dynamic: i.e. there are friends humans and others

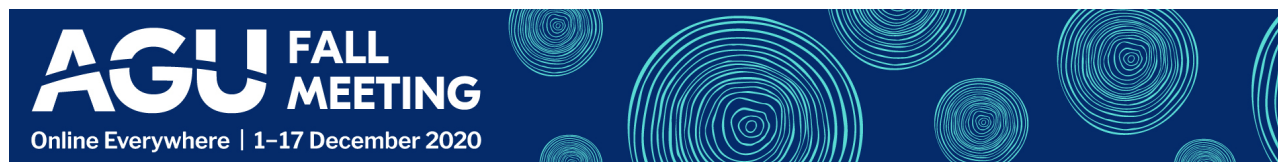
ABSTRACT CONTACT AUTHOR PRINT GET POSTER

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PRESENTED AT:





## A MOMENT OF HISTORY – DAWN OF INFORMATICS

In 1957-1958 the International Geophysical Year (IGY) greatly expanded our knowledge about global processes, heralded the exploration of geospace, and left a legacy of monumental achievements:



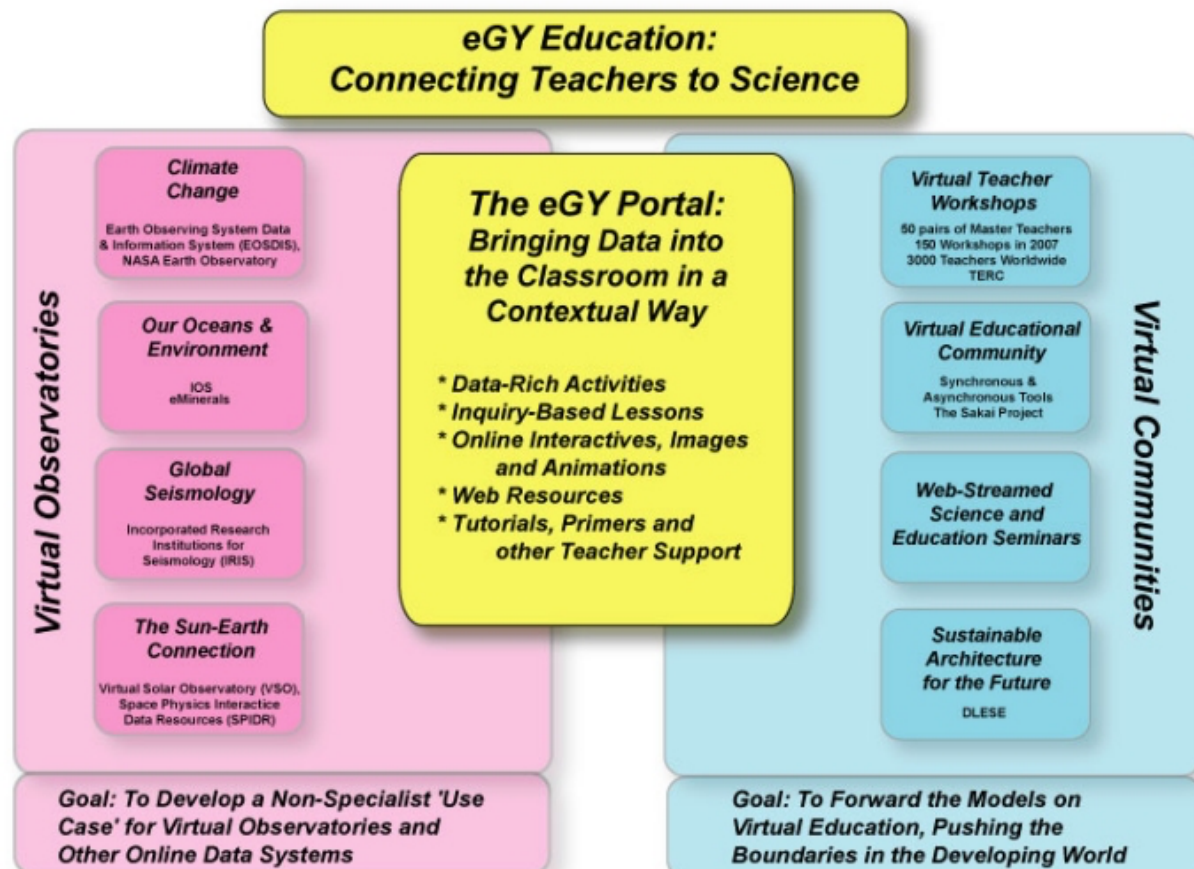
- Huge increase in the number and spread of geophysical observing stations around the globe, particularly in Antarctica (12 nations maintained 65 stations in Antarctica, 40 on the continent)
- Discovery of the Van Allen Radiation Belts
- Investigation of large unexplored areas of Antarctica
- First measurement of the thickness of the Antarctic ice sheet
- First artificial satellite was launched - the Russian Sputnik-1, launched 4 October 1957
- Establishment of the World Data Center system
- The Antarctic Treaty
- Global Atmospheric Research Programme (GARP - predecessor to World Climate Research Program)
- New spirit of international cooperation and harmony was created despite a background of political tension.

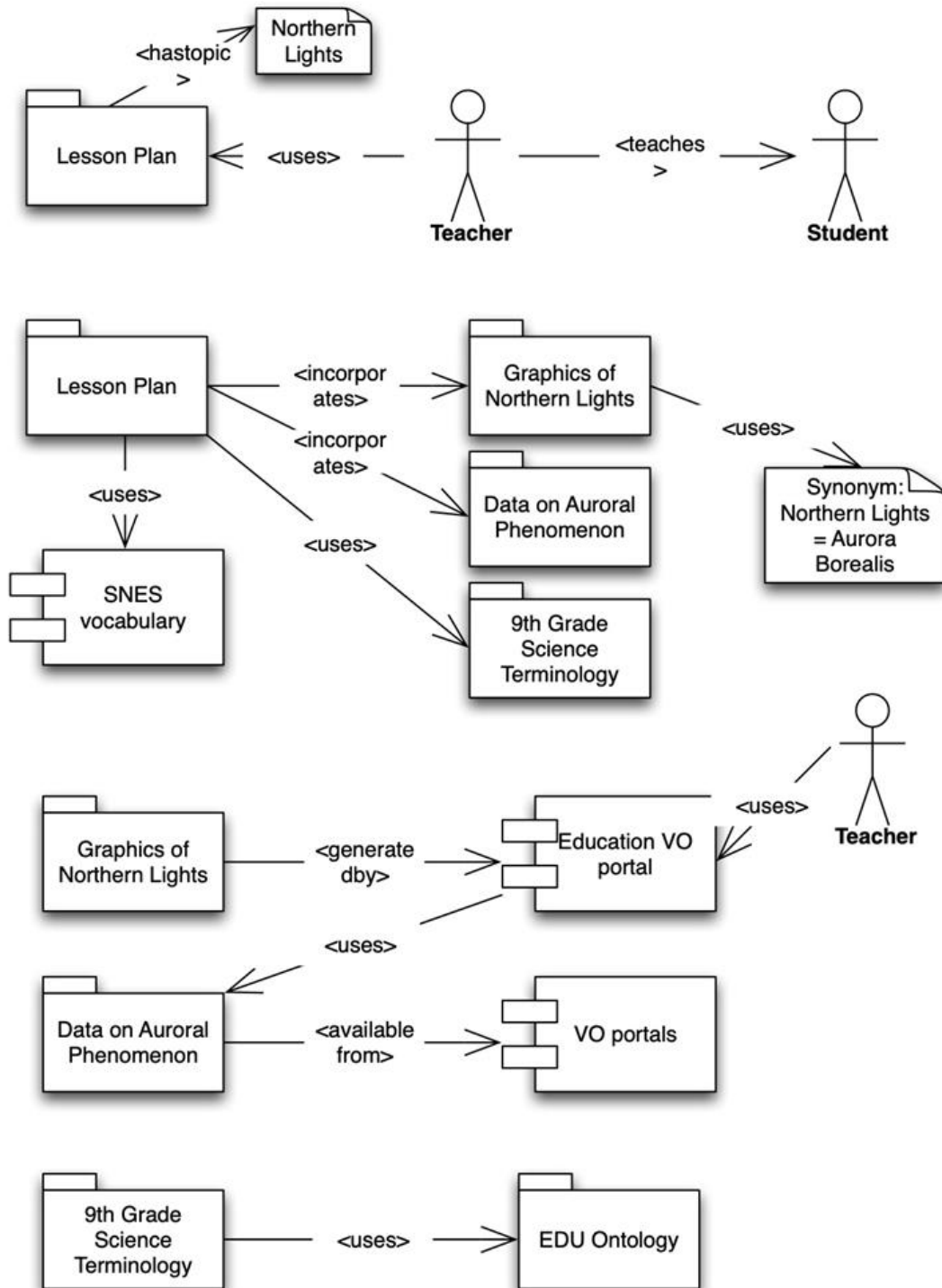
**The field of Informatics was defined.**

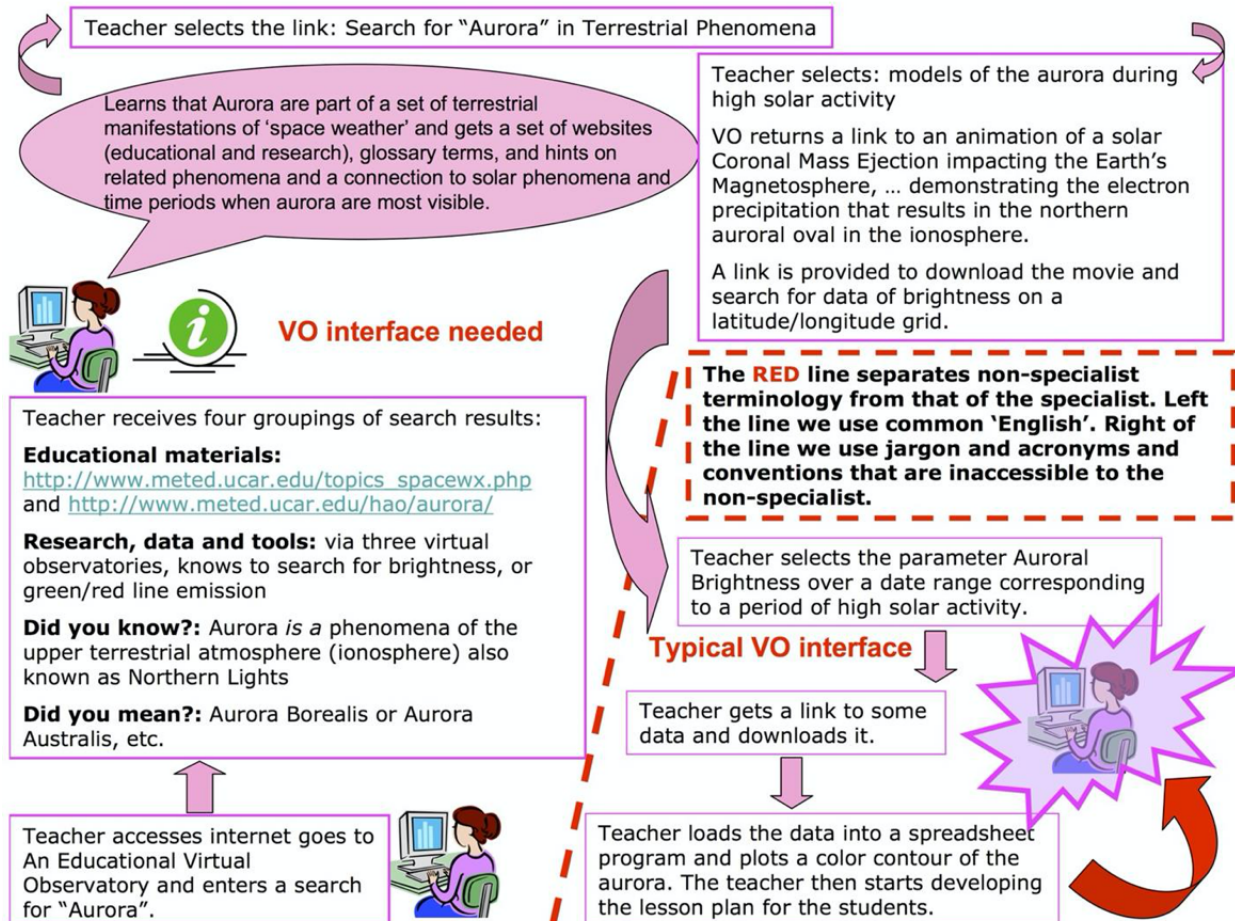


**In 2007-2008 Informatics was redefined: [www.egy.org](http://www.egy.org)**

# X-INFORMATICS - USE CASES, INFORMATION MODELS, ARCHITECTURE, ...

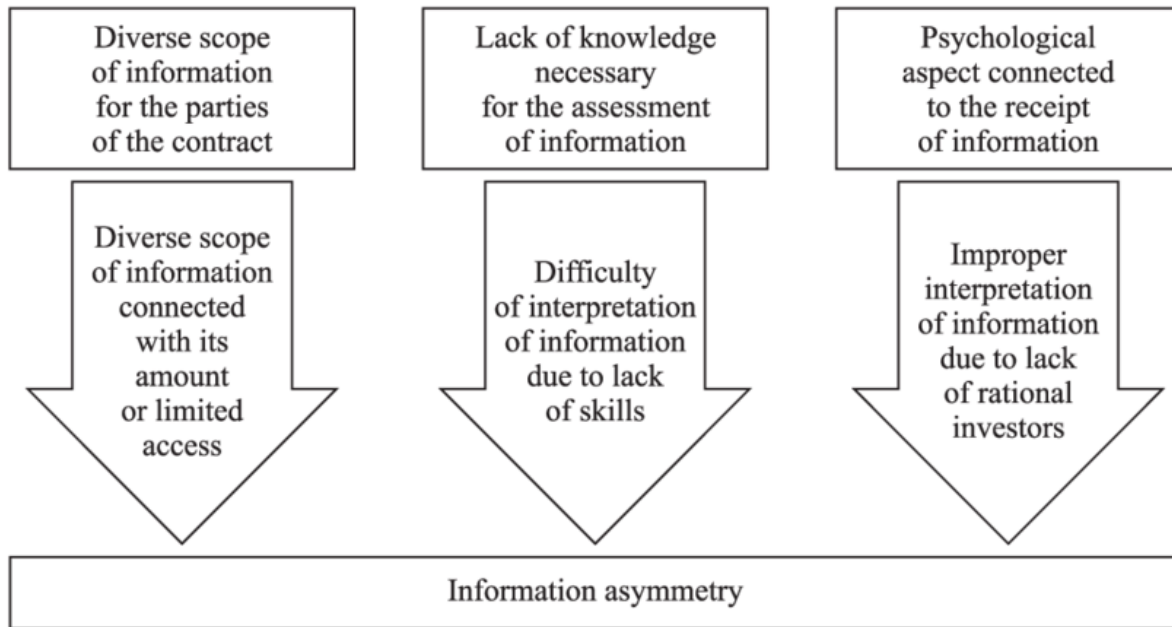






## NEO-INFORMATICS: RESPONDING TO DISRUPTION(S)

### Disruption: asymmetric information flows and rates



**Information asymmetry**

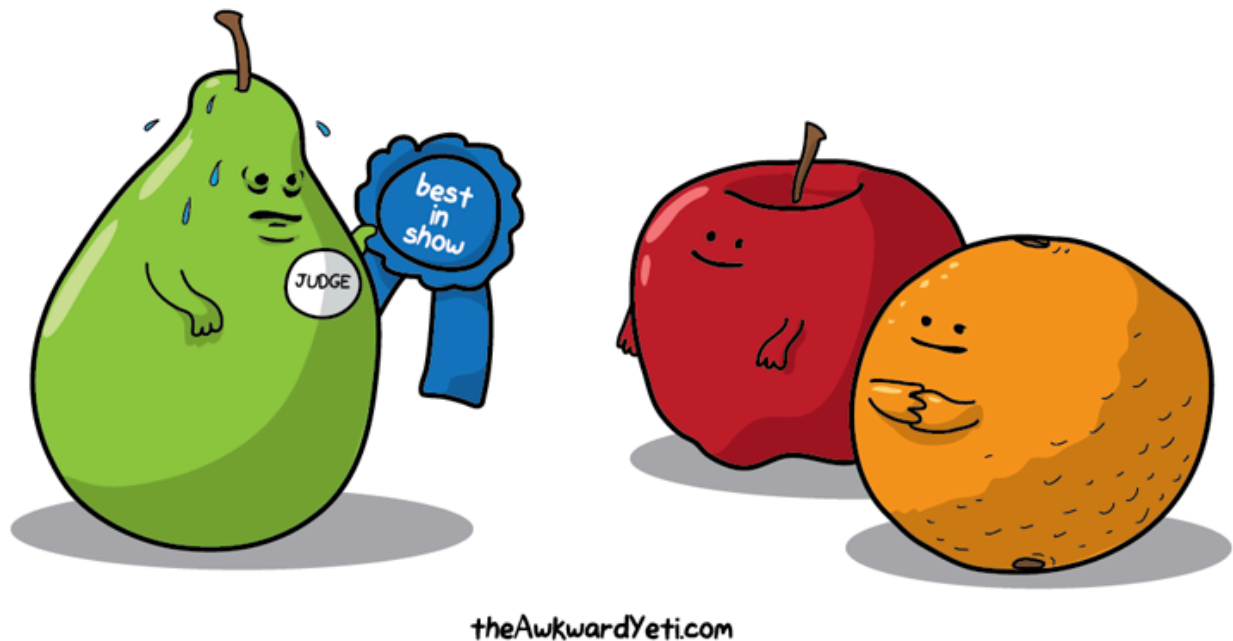
Information asymmetry deals with the study of decisions in transactions where one party has more or better information than the other. This creates an imbalance of power in transactions which can sometimes cause the transactions to go awry, a kind of market failure in the worst case.

The slide features a decorative floral border on the left and a background illustration of a city skyline with silhouettes of four business professionals (three men and one woman) standing in front of it. A blue navigation arrow is visible in the bottom right corner.

## Disruption: blacker boxes

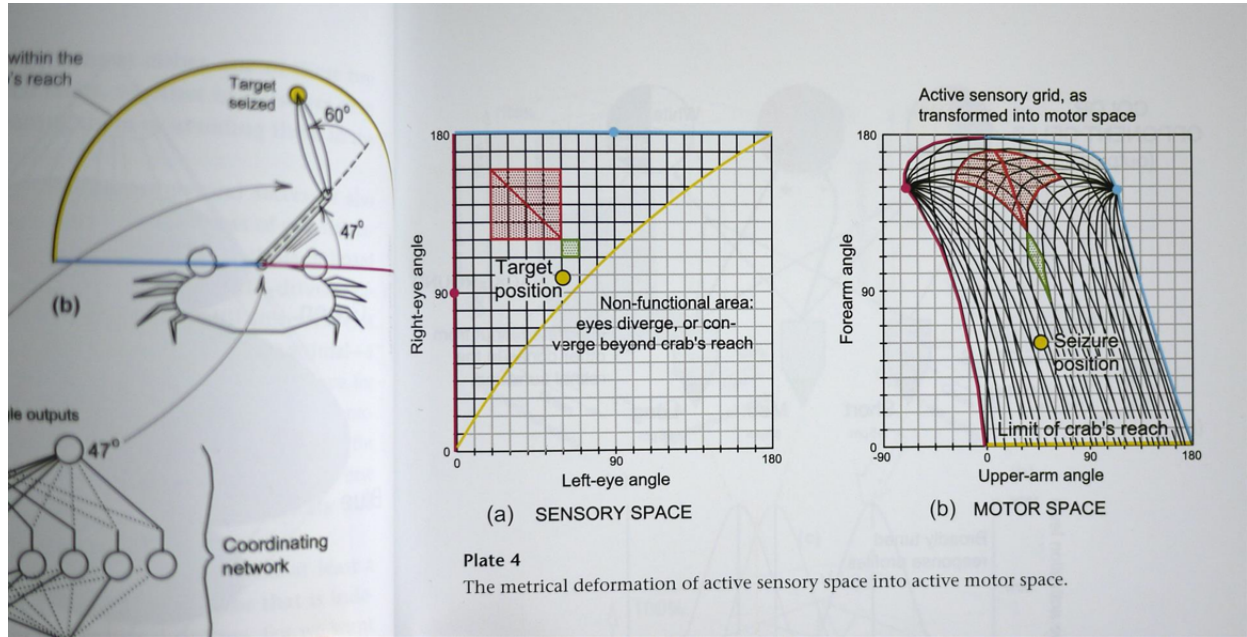


## Disruption: fruit baskets



theAwkwardYeti.com

## Disruption: activation spaces in the face of many 'data' dimensions



# SCENARIO(S)

The screenshot shows a JupyterLab environment. On the left, a file browser displays a list of notebooks under the path `..shared_ > CommunityNotebooks`. The notebook `idealpyroxenes.ipynb` is selected. On the right, the code editor shows the following content:

## Two Pyroxene geothermometer

Constructed based on Mg-Fe and Ca-Mg exchange for Ca-rich Cpx and Ca-poor Opx

### Using close-to-ideal pyroxenes

Based on the code 'Symple-Pyroxene-Geothermometer' modified by A. Manjón-Cabeza Córdoba

Required Python code to load the phase library.

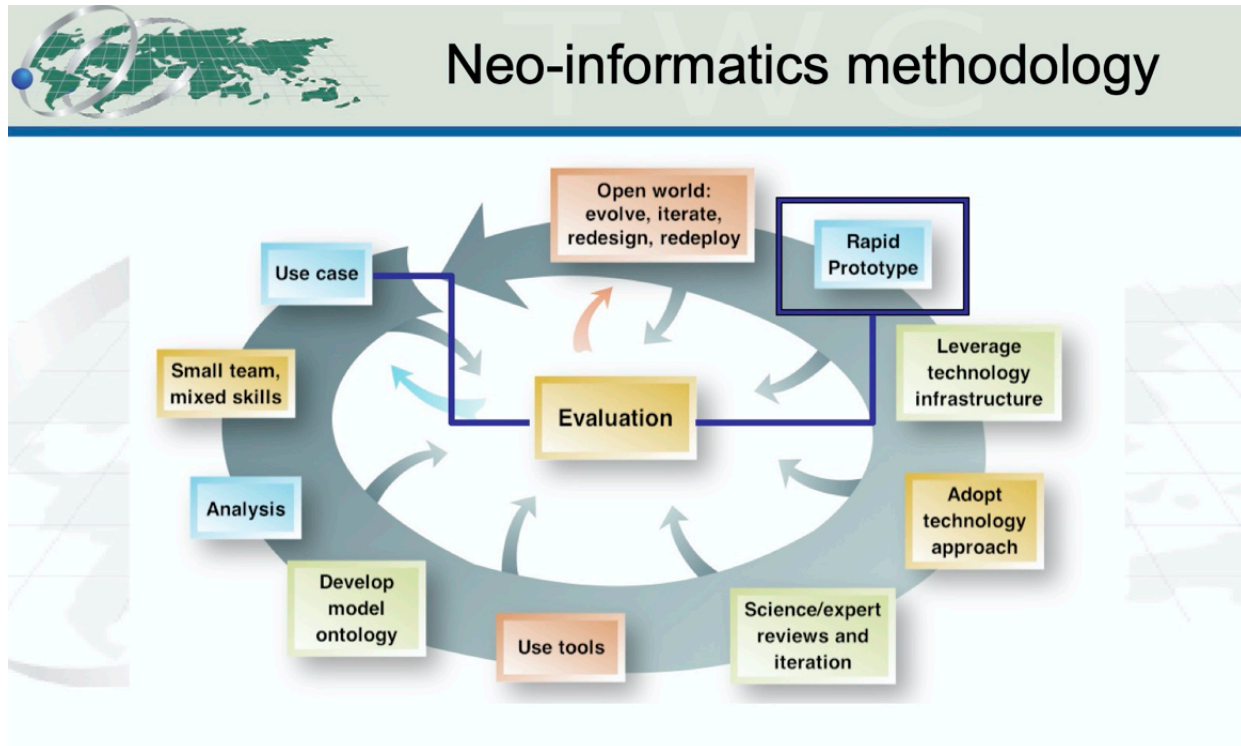
```
In [1]: import numpy as np
import matplotlib.pyplot as plt
from scipy import optimize as optim

import thermoengine as thermo

%matplotlib inline

In [2]: def validate_endmember_comp(moles_end, phase):
print(phase.props['phase_name'])
for i in range(0, phase.props['endmember_num']):
print ("mole number of {0:10.10s} = {1:13.6e}".format
phase.props['endmember_name'][i], moles_end[i]))
if not phase.test_endmember_comp(moles_end):
print ("Calculated composition is infeasible!")
```





# ASK WHAT INFORMATICS CAN DO FOR YOU

## **We need some new informatics approaches**

- Smart: incorporating asymmetries, switching activation spaces (with collaborators inside)
- Translucency: tell me what did you do there? Or did IN there?
- Dynamic: i.e. there are (many) humans and machines in the loop of execution
- Stateful: “... don’t you, forget about me ...”

## **Executable use cases?**

- Dynamic analysis for actors, resources, “workflow”, pre-conditions, post-conditions, alternate flows
- Dynamic iteration of use case narrative (and diagrams) based on actor(s) mediation = as you are typing in a Jupyter notebook, modifying code, etc. – smart mediation brings up the next optional cells for you
- Leverages asymmetry while reducing complexity of mediation
- Determines optimal activation spaces using conditional entropy and semiotic considerations
- Makes you the best coffee (or tea) you have ever had

Activation spaces - thanks to Chris Rose (RISD).

# ABSTRACT

The discipline of informatics, generically cast as the science and engineering of information system within a socio-technical framework, originating in the middle of last century has undergone generational adaptations as computer hardware, networks and software have evolved. Within the "eScience" era of the last two decades, discipline-specific fields of informatics have flourished, such as geoinformatics, mineral informatics and many more. In fact even in geosciences, there may be few fields of study that have not added an informatics sub-field. Over the same time, efforts at systematizing the common (or core, i.e. discipline neutral) aspects of informatics have been successful: use cases, human-centered design, iterative approaches, information models and more are some of the key elements. However new pressures are being placed on functional and non-functional requirements of information systems: with the now somewhat routine underlying data that are high dimensional, heterogeneous, sparse and with uncertain quality. However, demands have arisen from renewed attention to hub/ server/ cloud-based provision of the application of machine learning, neural networks and artificial intelligence in general. Those methods as implemented in software libraries producing results to be assessed and interpreted (often leading to decisions made) by "humans-in-the-loop". Informatics, revisited is a possible answer. This presentation features some history of informatics, recent disruptions that need to be addressed, and offers ideas for new directions, with the goal of advancing geoscience in general.