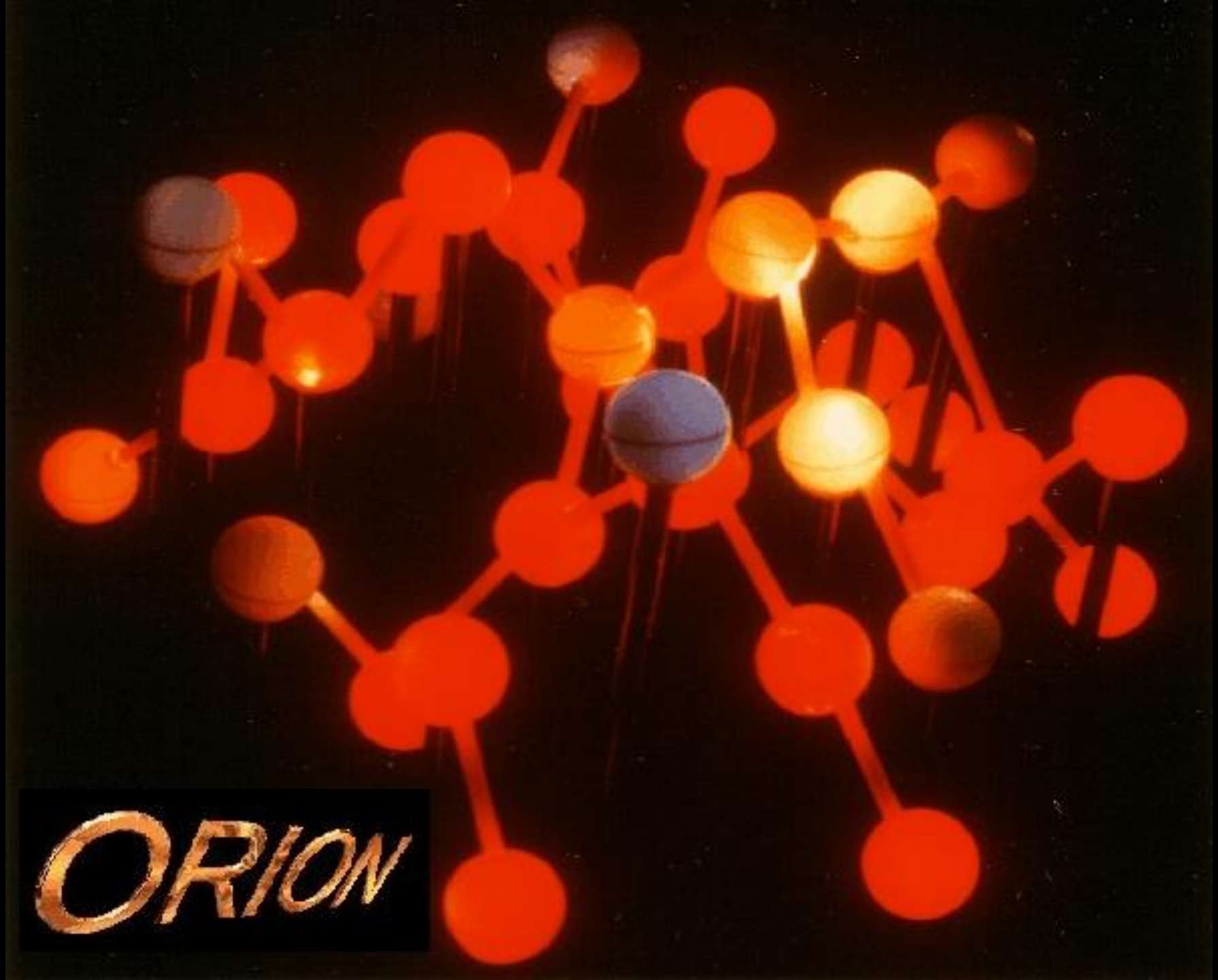
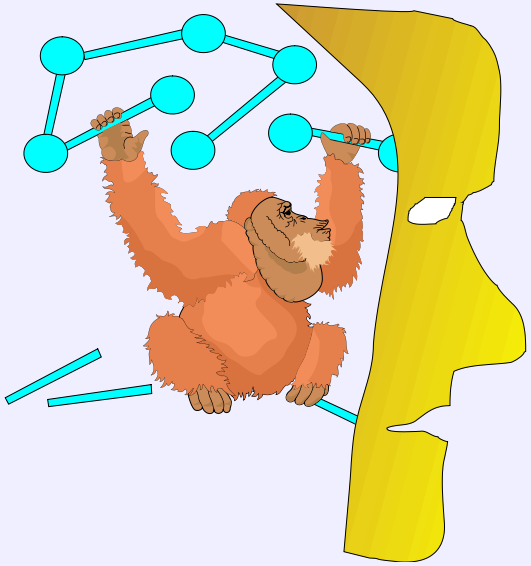
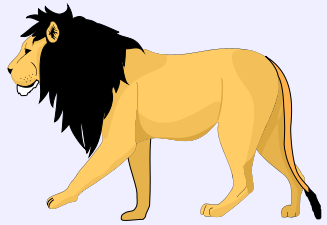

ORION

Knowledge Is Structure

What does that mean?

Knowledge isn't rules that work from the outside, but structure that works from the inside, modelling the world and providing predictions of behaviour in previously unseen situations.

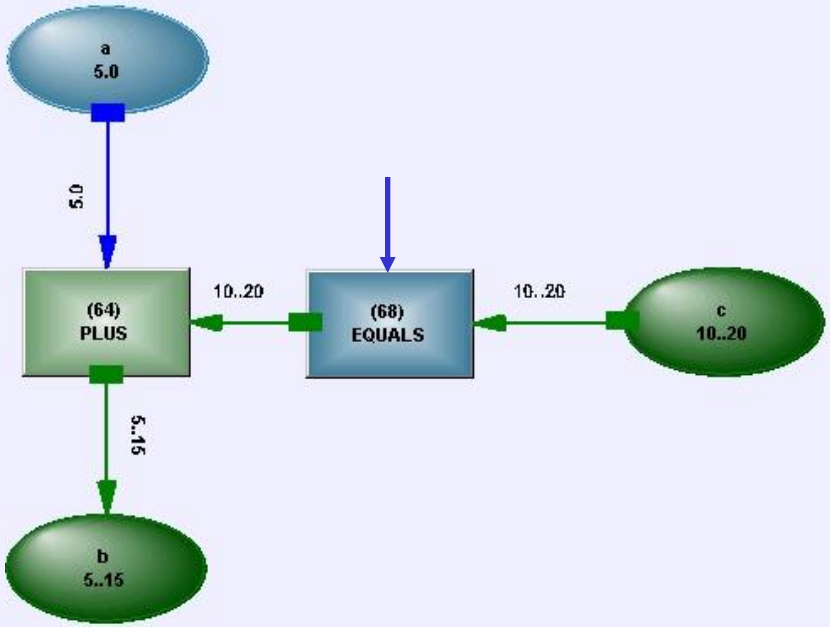




There can't be any implied states, so the structure must hold all states

A Simple Structure

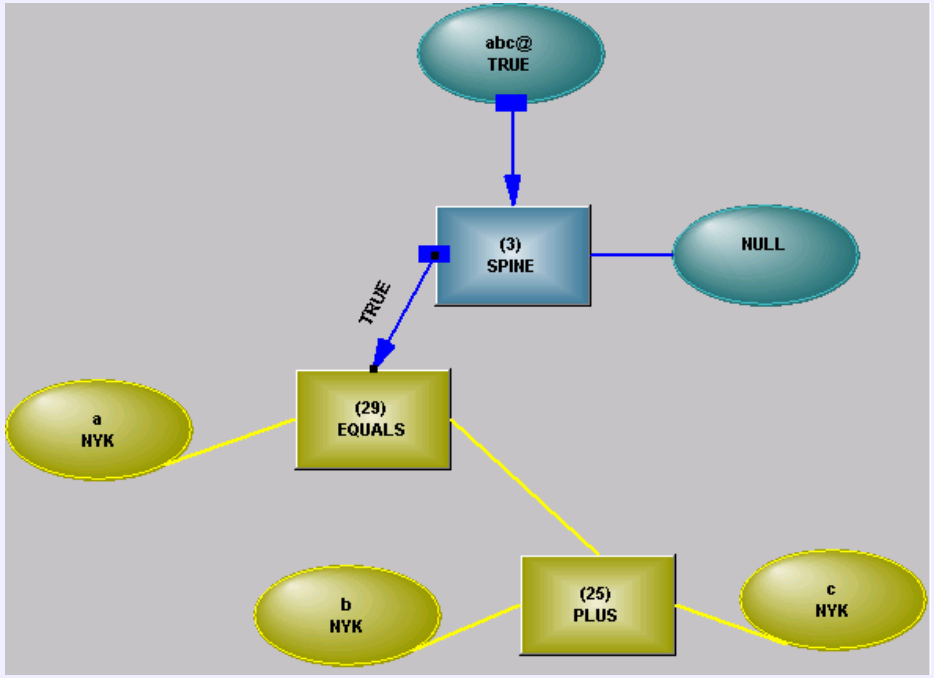
The structure can propagate a wide range of entities through its connections, and the operators can operate on analytic or experiential information, and the structure can change itself.



- Visible
- Undirected
- Dynamically Extensible
- Controllable Existence

Logical Surface

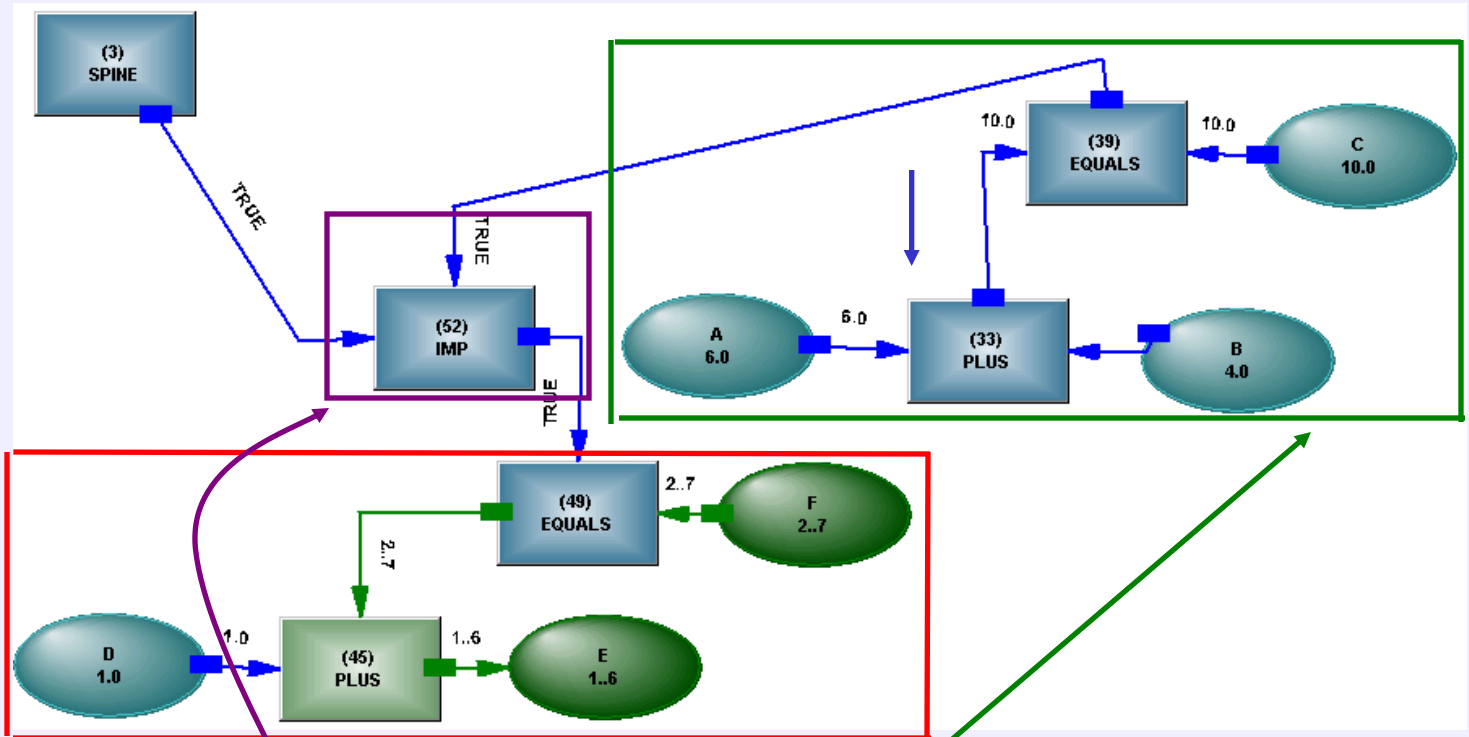
Statements are written on a logical surface



a = b + c

Building Structures

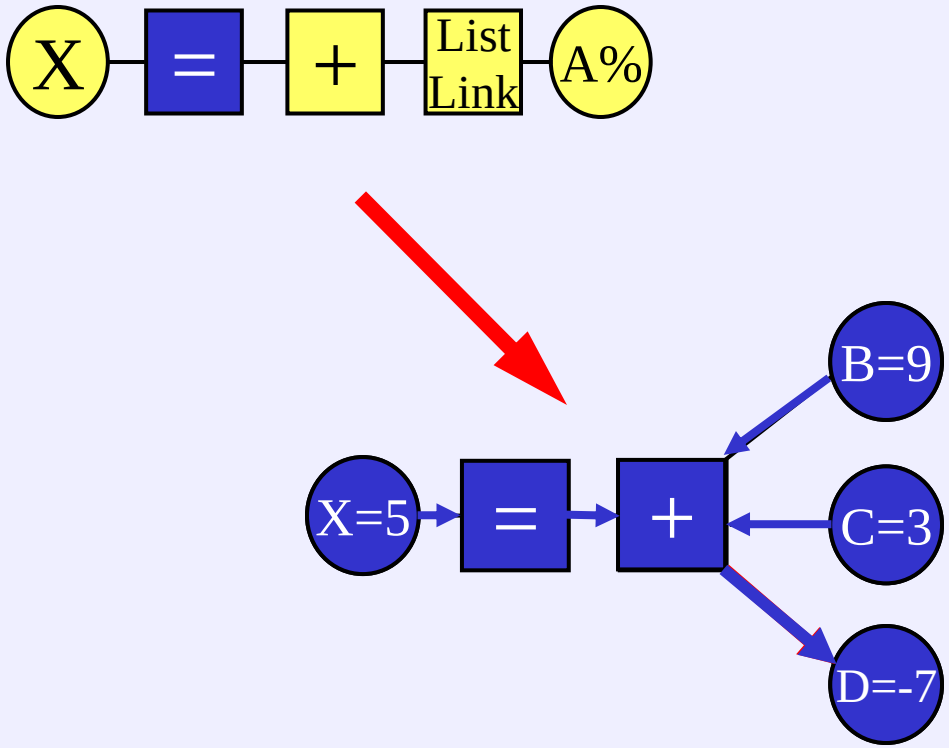
We can combine small logical structures into larger structures without concern for how they will later be used



FOR

IF a + b = c THEN d + e = f

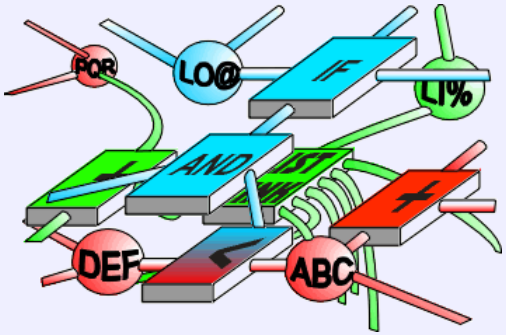
Self Modification



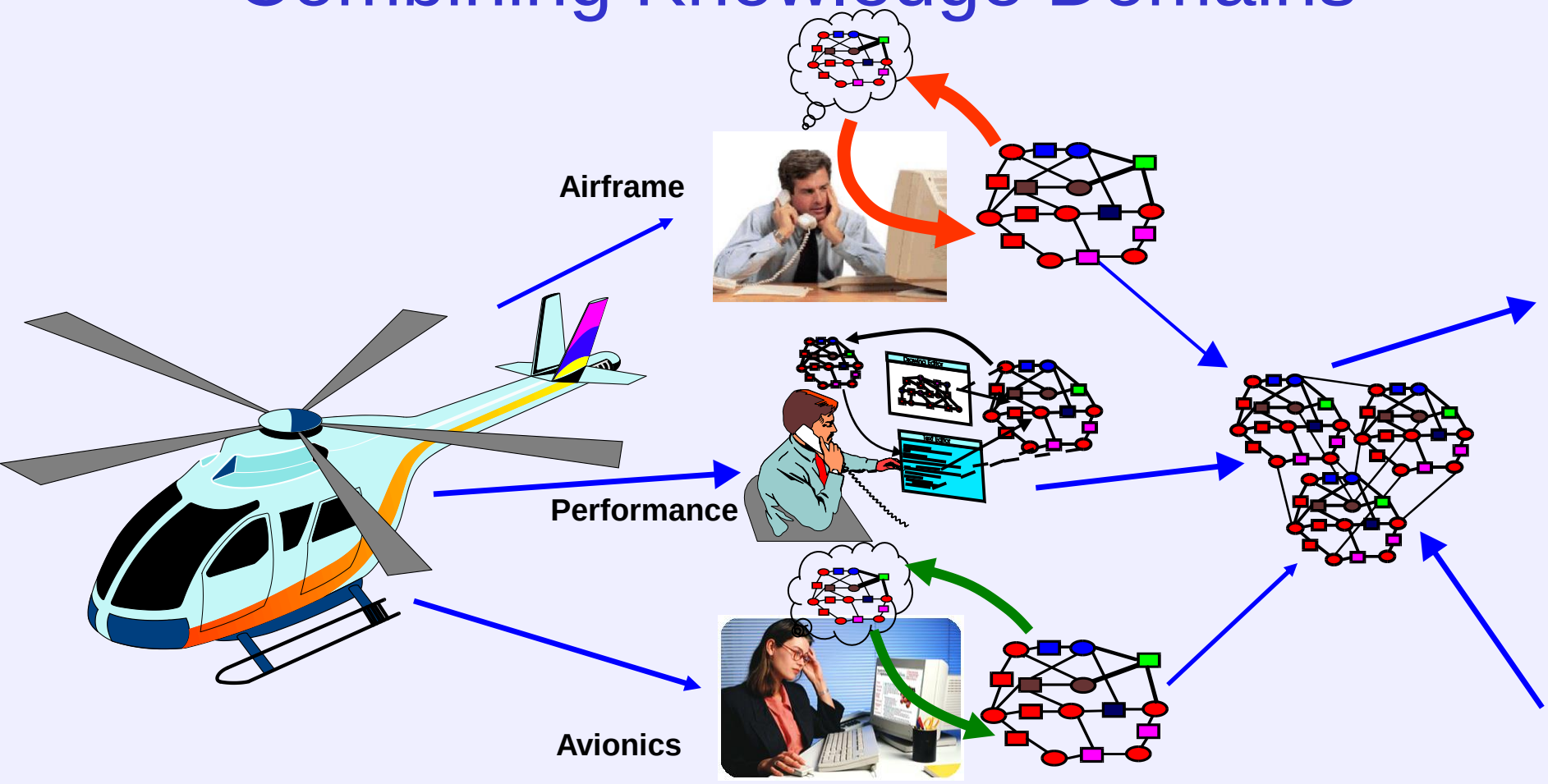
The structure can change itself, adding more structure and more states as it increases its complexity

Combining Structures

It may seem simple, but the ability to combine knowledge structures is a very strong constraint on how the knowledge is structured.



Combining Knowledge Domains



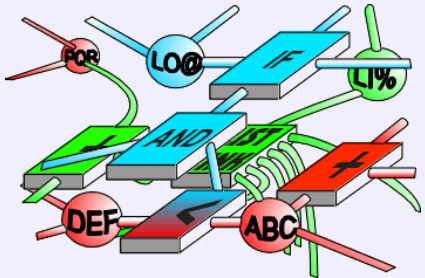
Assemble Pieces of Knowledge Into an Active Object
Which Itself Can be Assembled...

Multiple Interacting Sources

In almost every case when attempting to support or supplant a human's ability, the problem comes down to the emulation of multiple interacting sources.

Constraint Reasoning is appealing for the reason that multiple sources move from numeric ranges to single values, interacting as they do so, but only in a static structure. Its continual pruning of alternatives is too simplistic for complex problems, where objects acquire new alternatives because of the context they find themselves in.

In an Active Structure, every operator represents a source, and each source can operate in a dynamic structure.



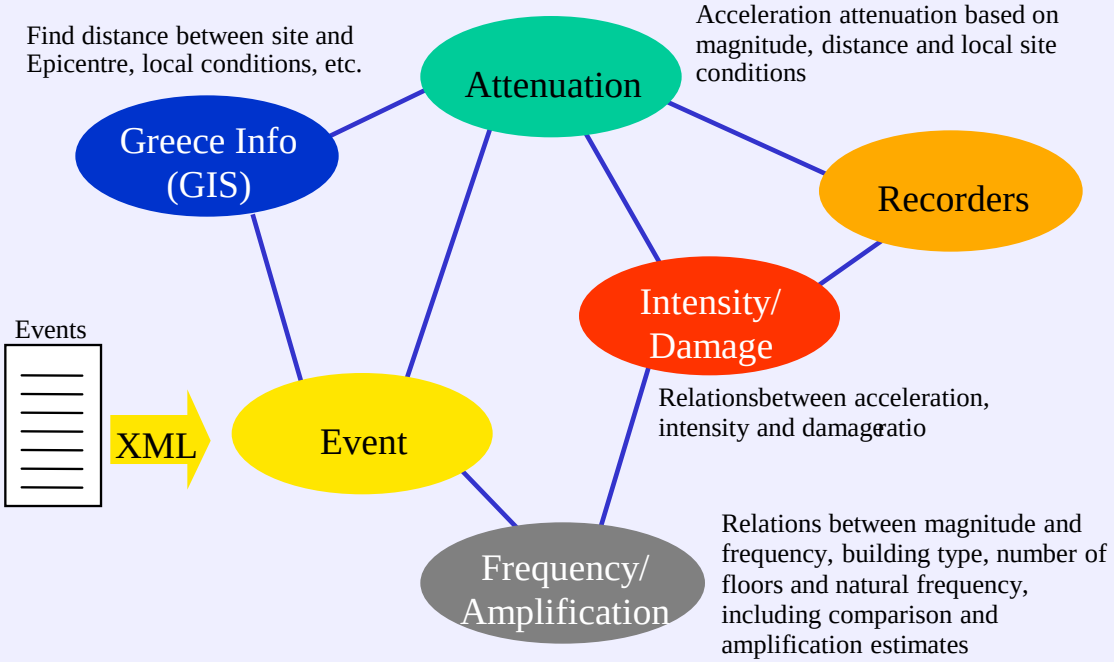
External Algorithm
vs
Internal Activity

We mentioned “active structure”. What’s wrong with an algorithm and a data structure?
We also mentioned “dynamic” or “self-modifying”. If the structure can modify itself, then an algorithm external to the structure becomes lost, because structure it assumed existed disappears, and new structure may appear. The only valid location is inside the structure, responding to local activity.

Examples

Earthquake Knowledge

Model Structure

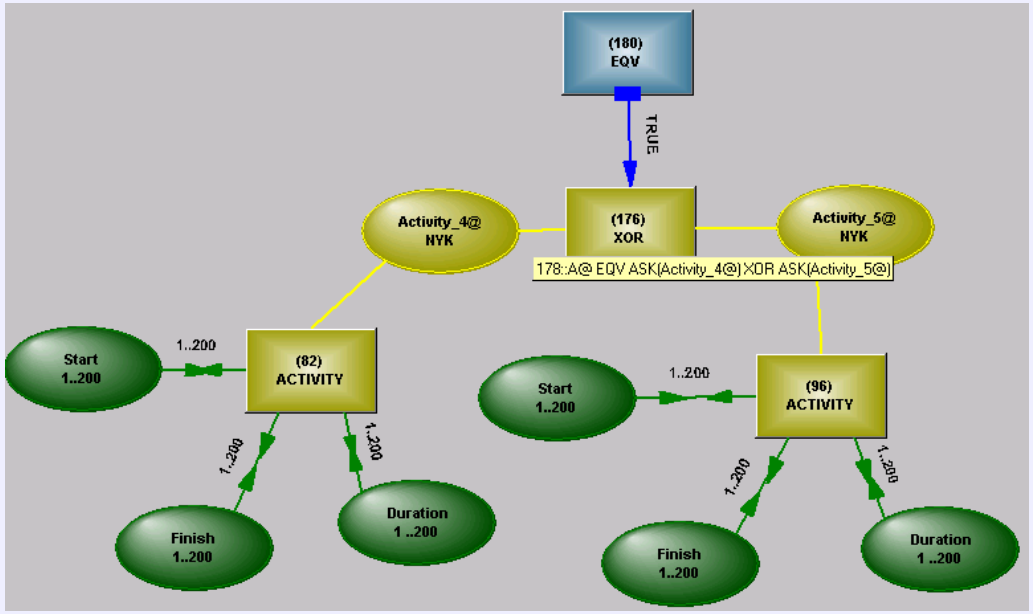


Project Management

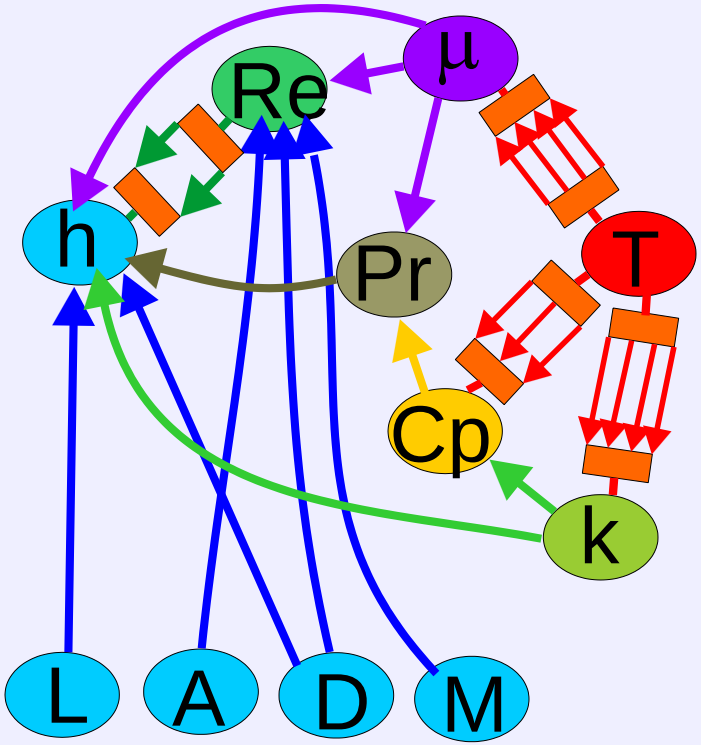
Development projects have a life of their own.

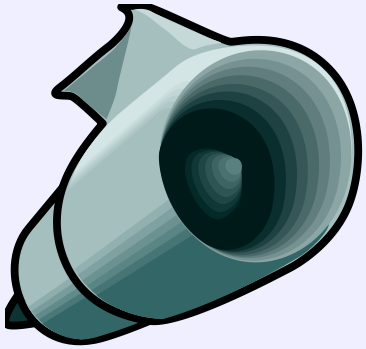
There is uncertainty in what you are doing, and whether and when you will be doing it.

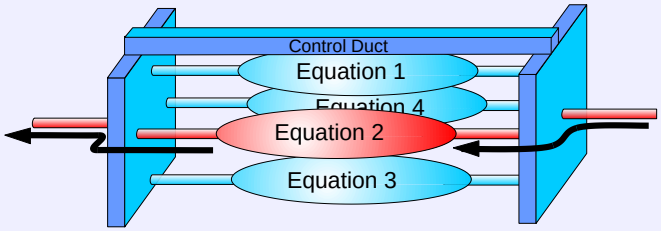
Critical Path Method doesn't allow you to plan what to do, only when to do it - these activities have both logical and existential control



Knowledge Based Engineering



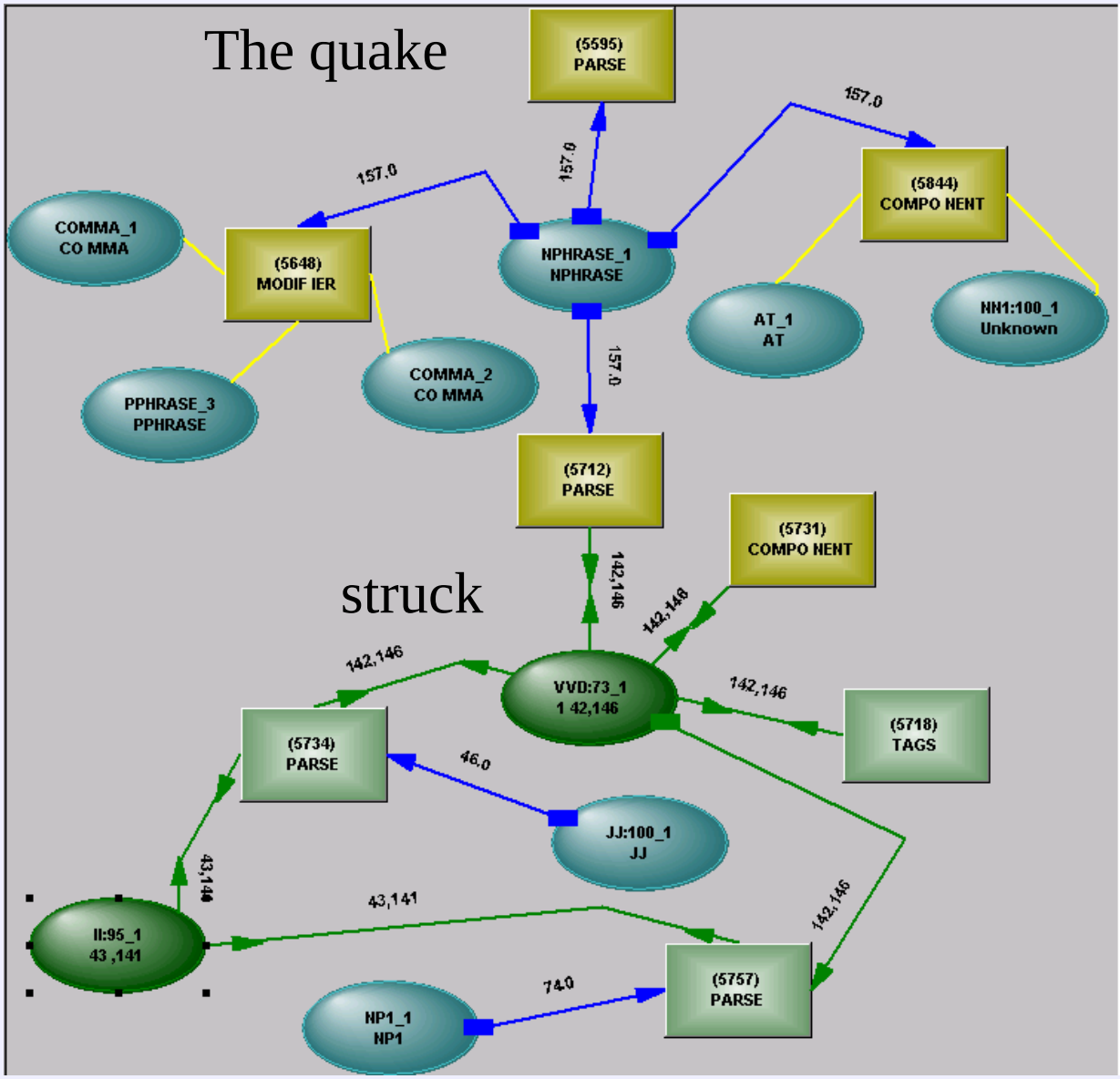




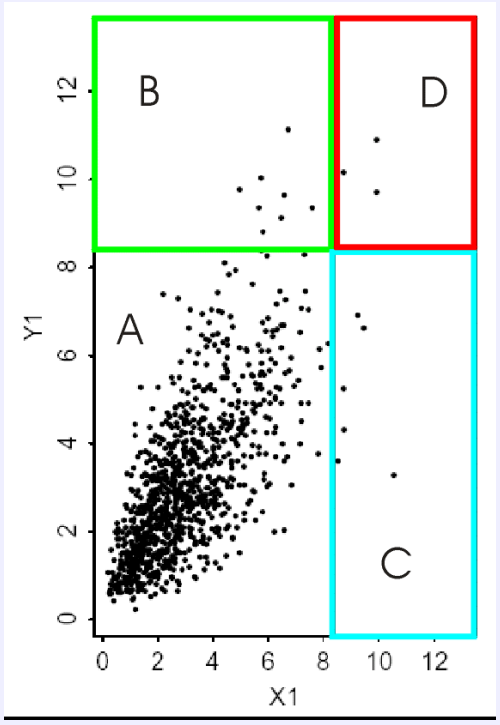
Non-parametric analysis requires influence and existence to be modifiable within the model

Information Extraction

The network continually alters itself as it moves through processes of tokenising, parsing, semantic extraction and knowledge model enhancement



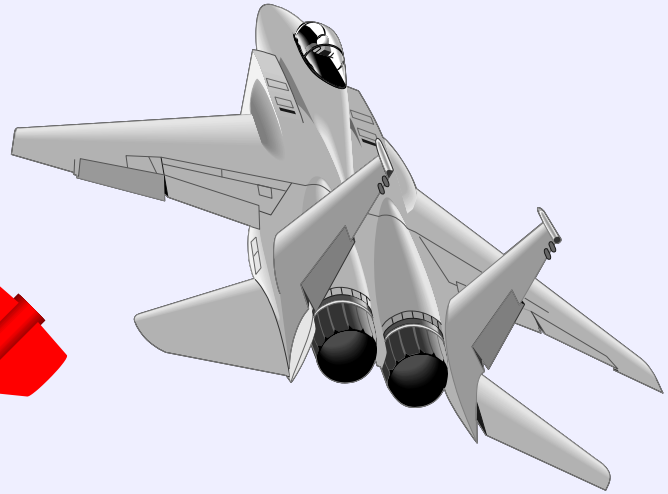
Risk Analysis

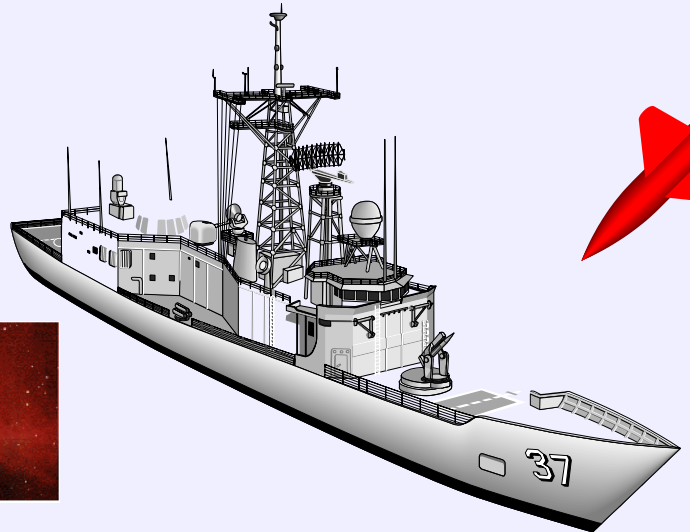


Combining historical and hypothetical risk

Active Representation of Uncertainty

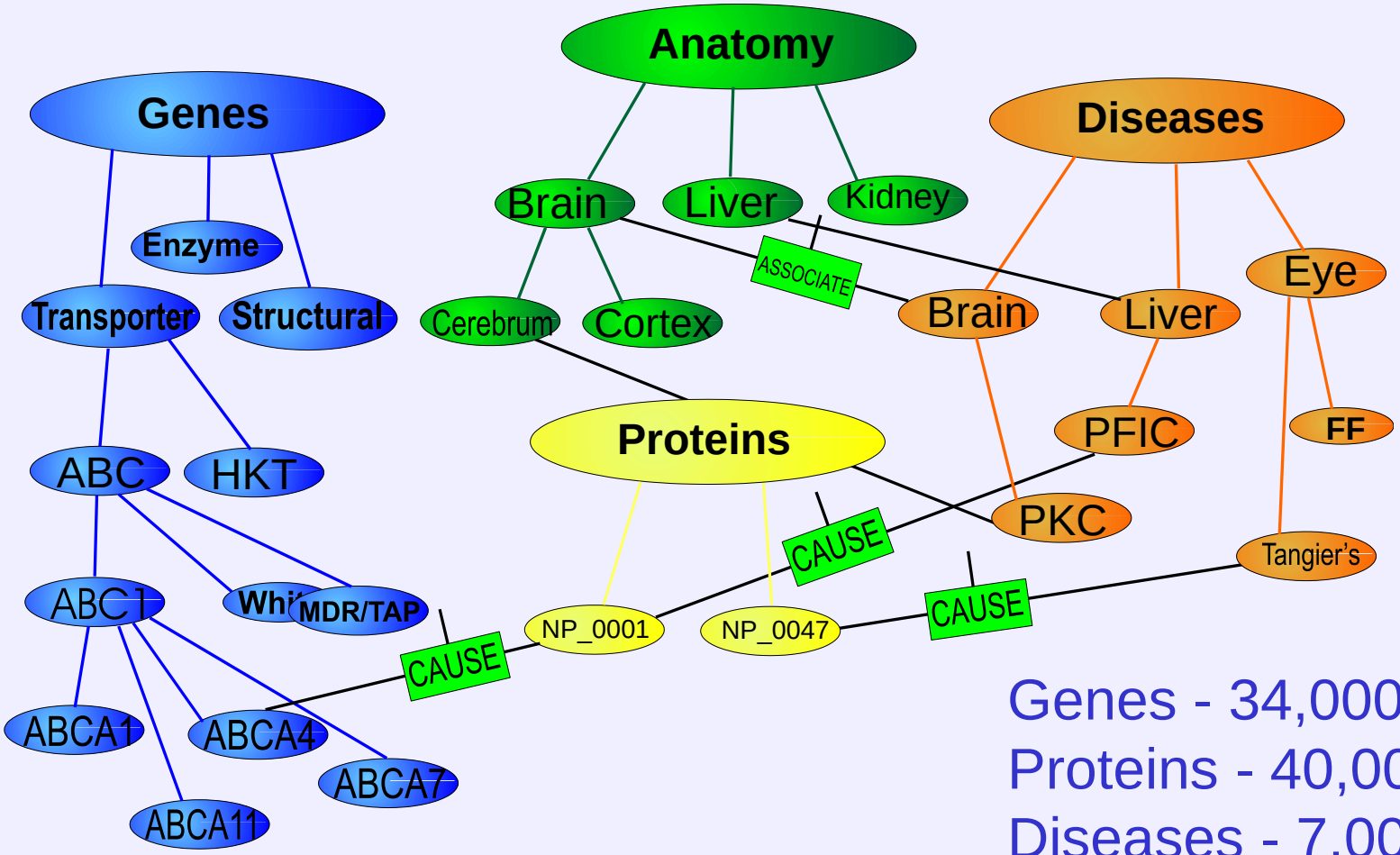
Control Systems





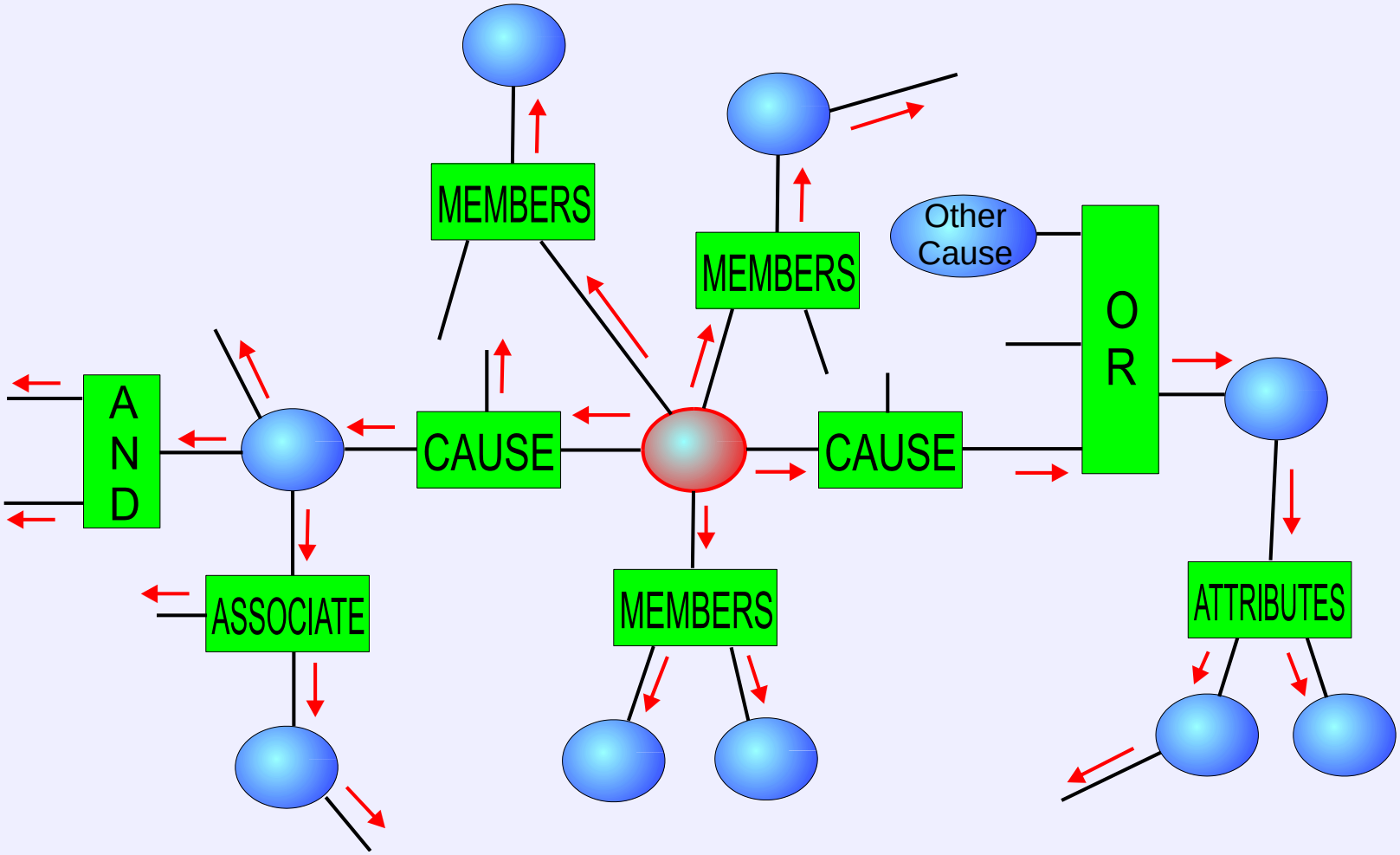
Complex, Dynamic Interactions

Genetic Knowledge



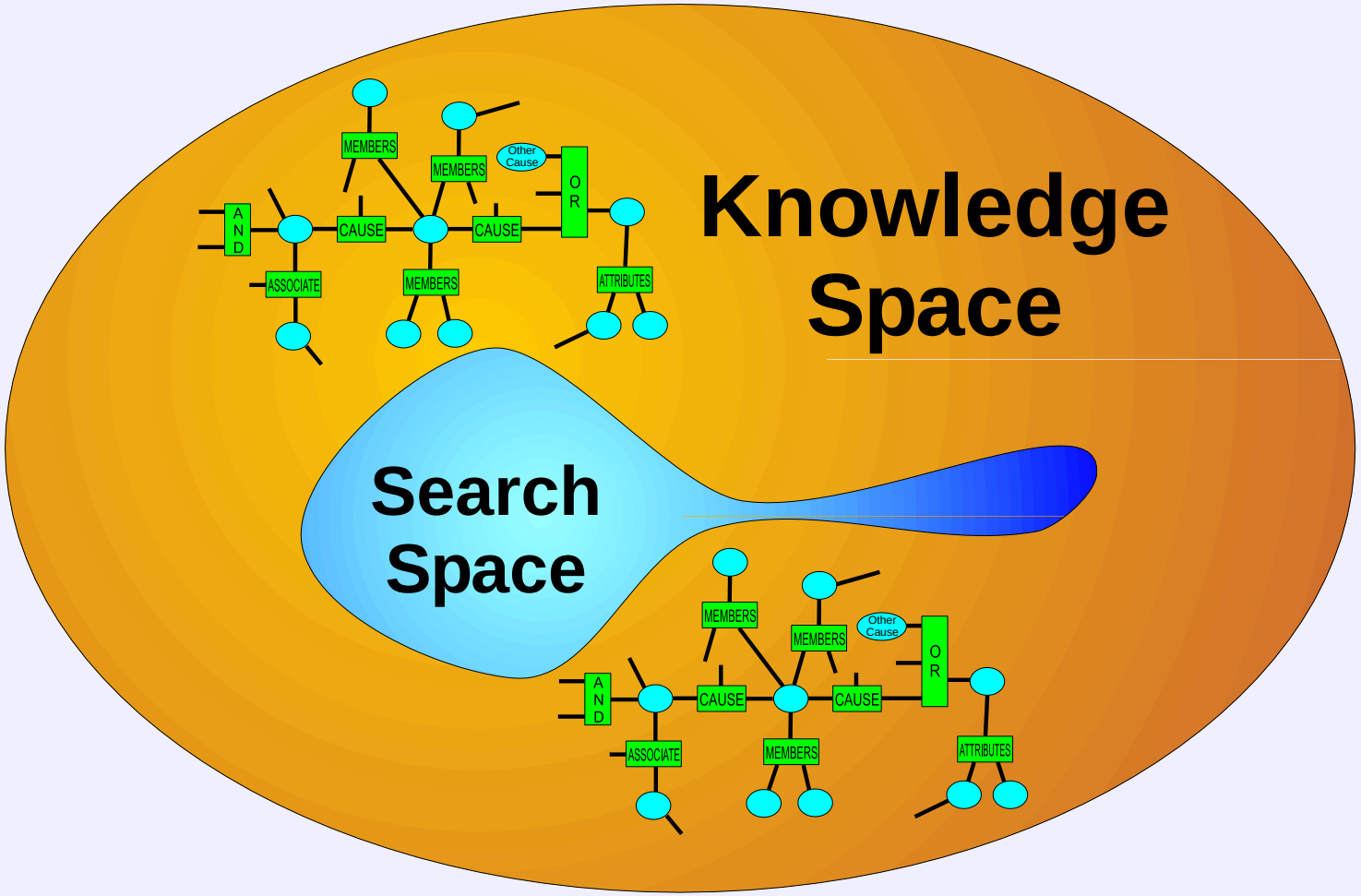
Genes - 34,000
Proteins - 40,000
Diseases - 7,000
Anatomy - 5,000
Cells - 3,000

Activate To Search



The structure represents everything in the text
An existence pulse travels through the structure

Moldable Search Space



You decide what to include and what to ignore, by examining what is currently being ignored

What's the Point?

We need to build cognitive machinery to handle every state transition - we can't use the twin crutches of sequenced instructions and procedural stack frames

If we do this, we can handle complex and dynamic interactions beyond the reach of programming

The structure can be modified on the run, it can see itself and can adapt and extend itself, it can backtrack out of a scenario it has dynamically constructed