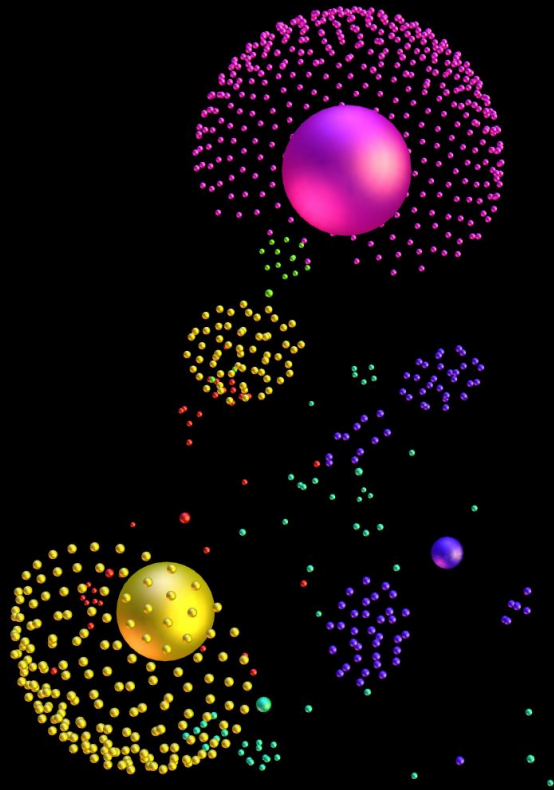


METAPHORS IN INTERACTIVE VISUAL ANALYTICS

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Susan Keller
Dilal Saundage**

**and
SAS Visual Analytics
Collaboratory**



INTERACTIVE VISUAL ANALYTICS

Interactive visual analytics (IVA) is an approach to data analysis by means of visual manipulation of data representation, which relies on human innate abilities of perception and cognition to interact with the environment.

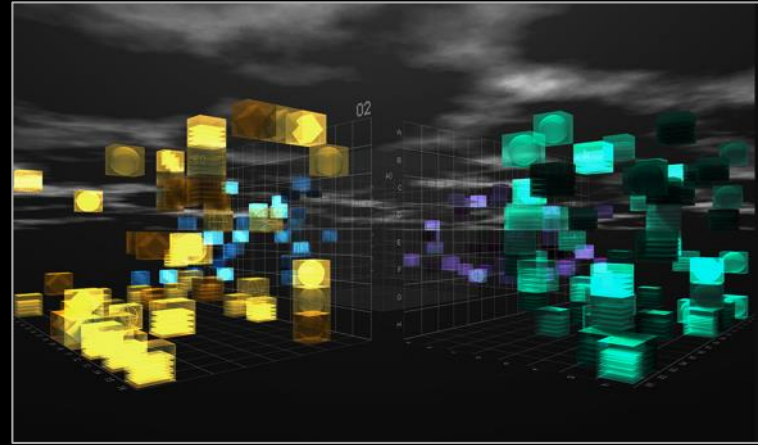
Information visualization allows analysts to engage instinctively with complex data to discover patterns, clusters and gaps in data, as well as, derive and communicate insights about business and social phenomena, and eventually translate these insights into effective decisions and actions.

SCIENTIFIC IVA: REALITY HELPS

Layers + Time



Representation



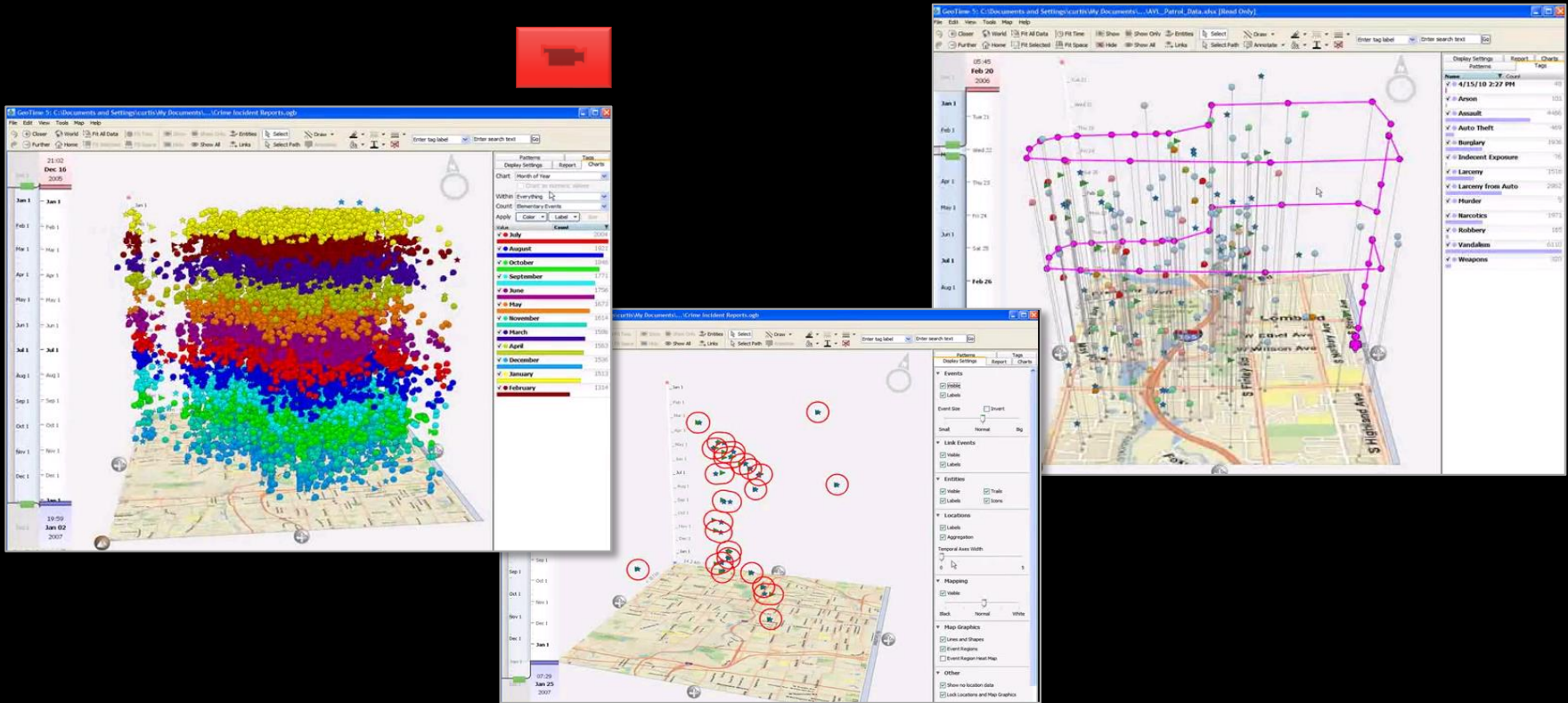
Gaminess



Immersion



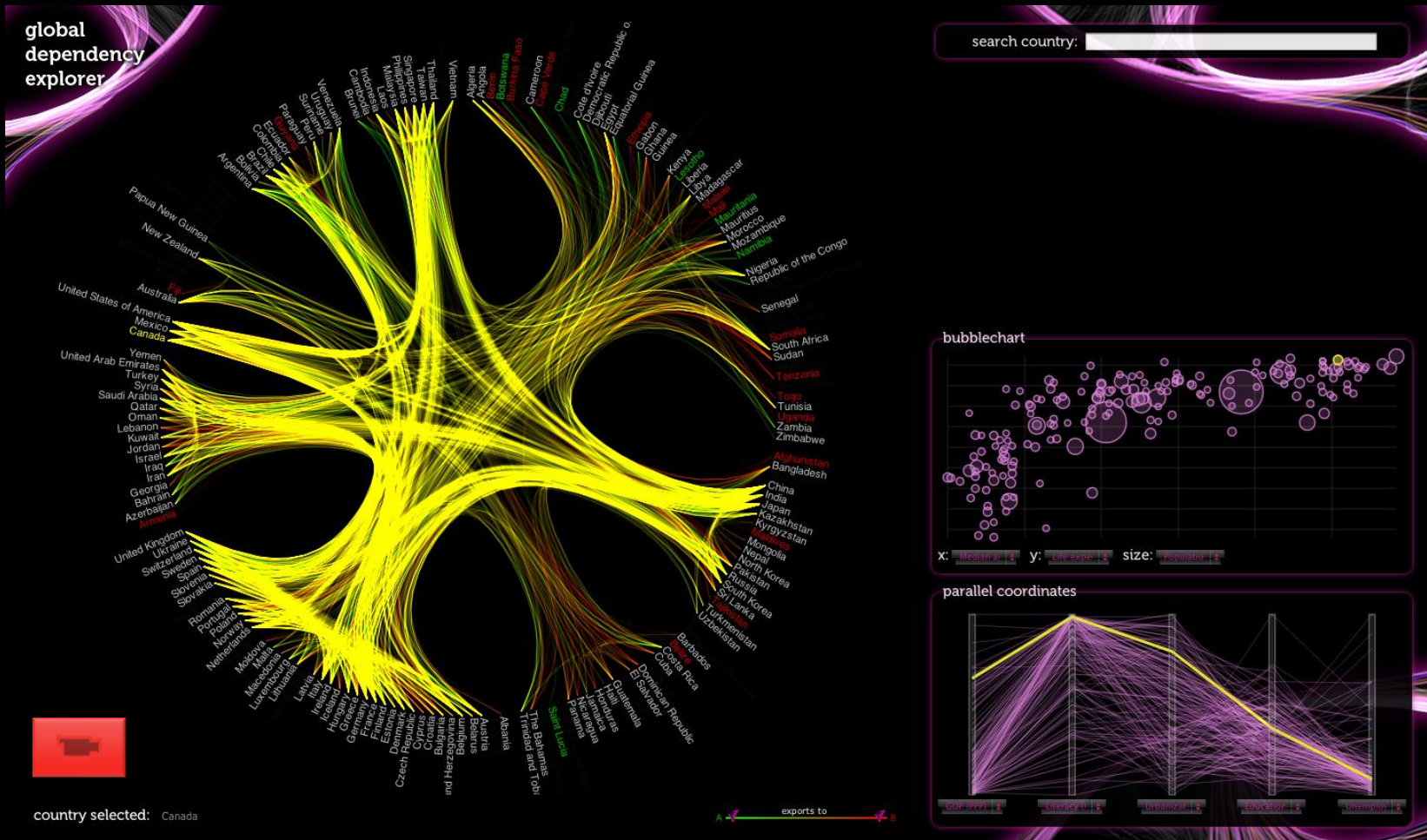
BUSINESS / SOCIAL IVA: 'REALITY' NEEDS TO BE FOUND



Visualization of scientific and engineering data (e.g. astronomical, geographical, medical or architectural), obtained from sensors, simulations and laboratory tests, is often focused on communicating meaning representing natural structures and phenomena, which are familiar to experts in the field.

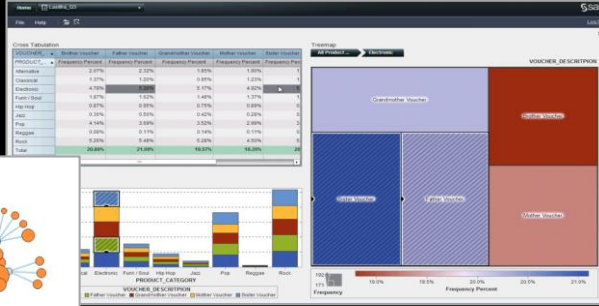
METAPHORS FOR BUSINESS IVA

The key to effective visual metaphors is in their ability to stimulate the formation of mental images of data by reference to previous experience and the familiarity of the adopted visual form.

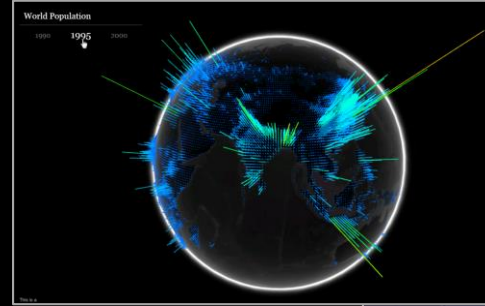


METAPHORS IN IVA

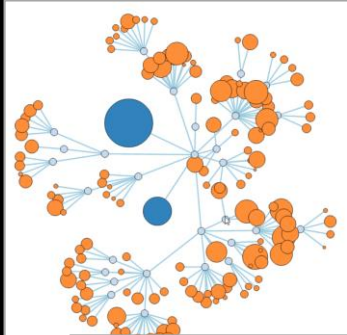
Dashboard



Needles



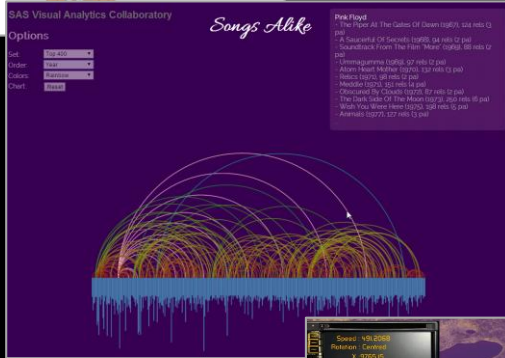
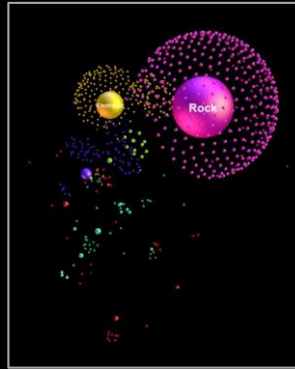
Bunch



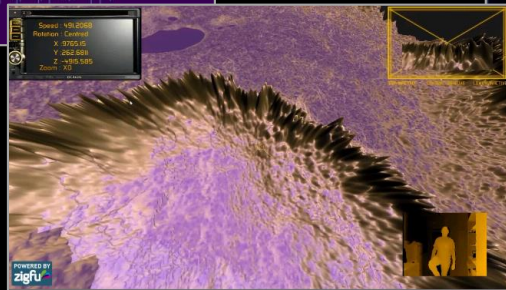
Missiles



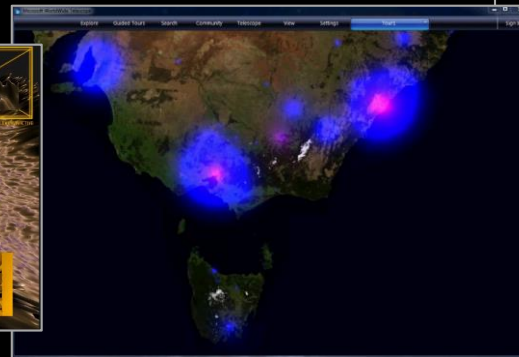
Clusters



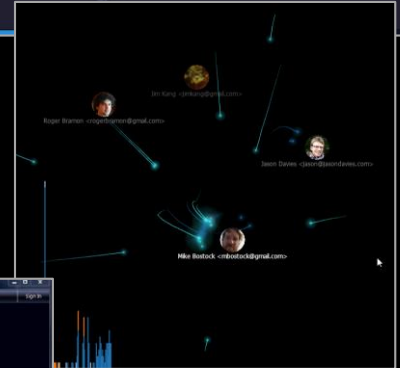
Hairball



Terrain

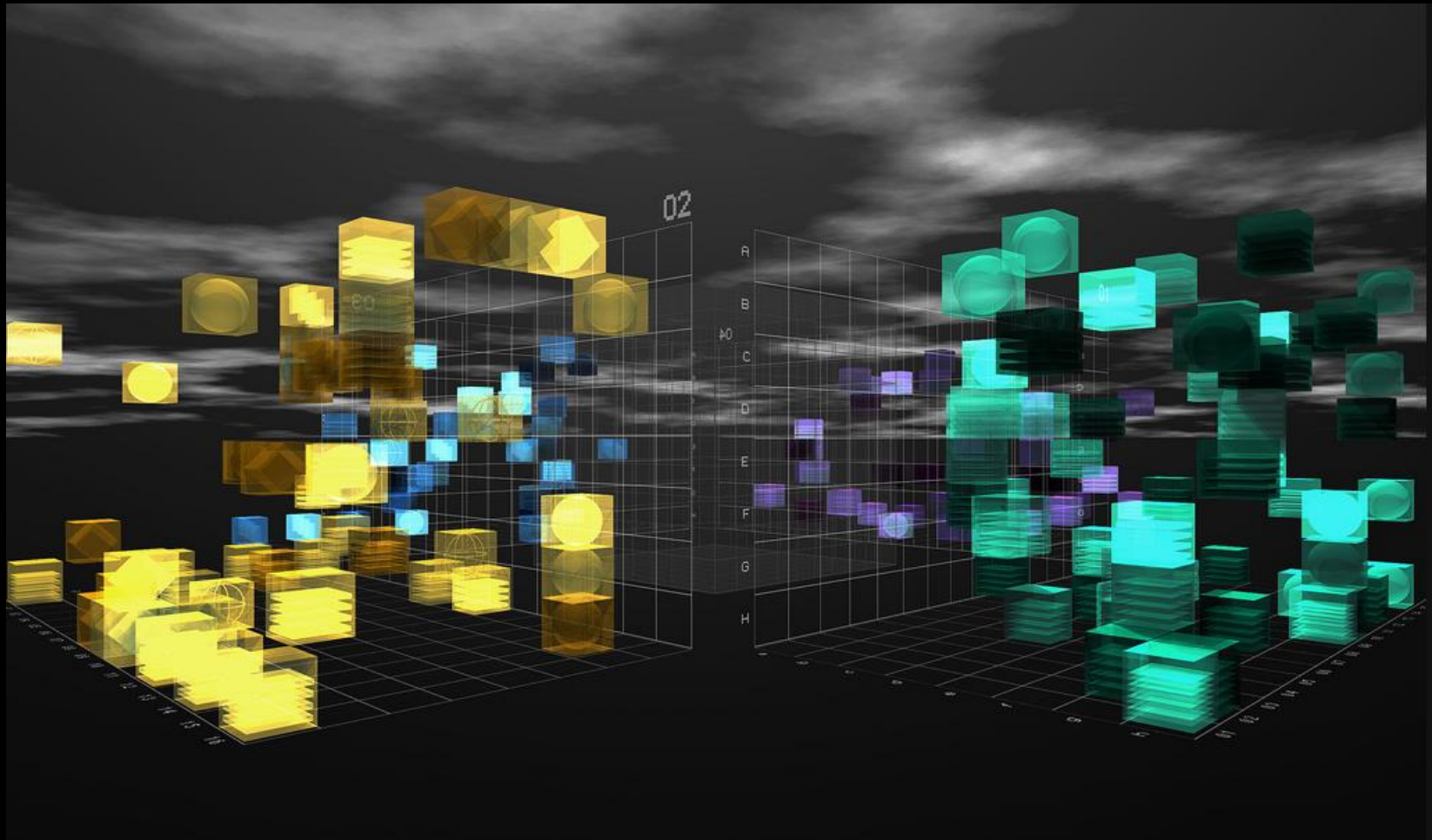


View from Space



Missiles

VISUALISATION OF ABSTRACT DATA



VISUALISATION AS 3D TERRAIN

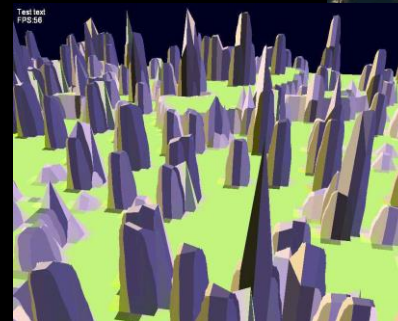
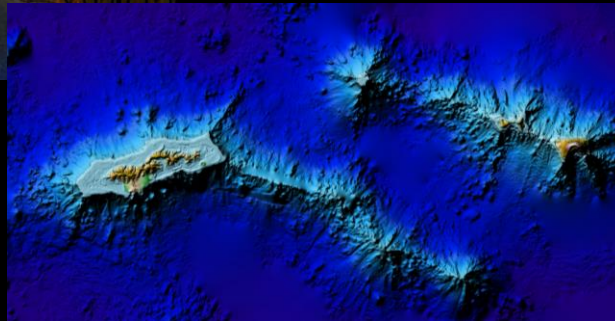
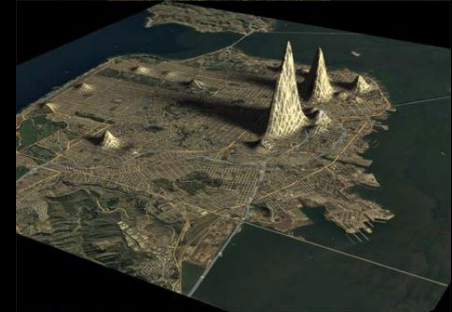
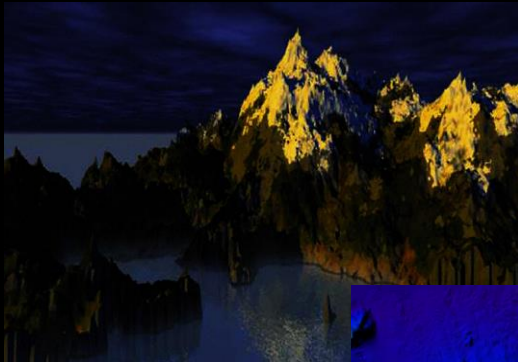
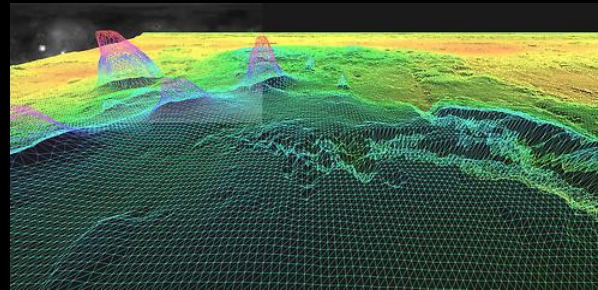
Why 3D?

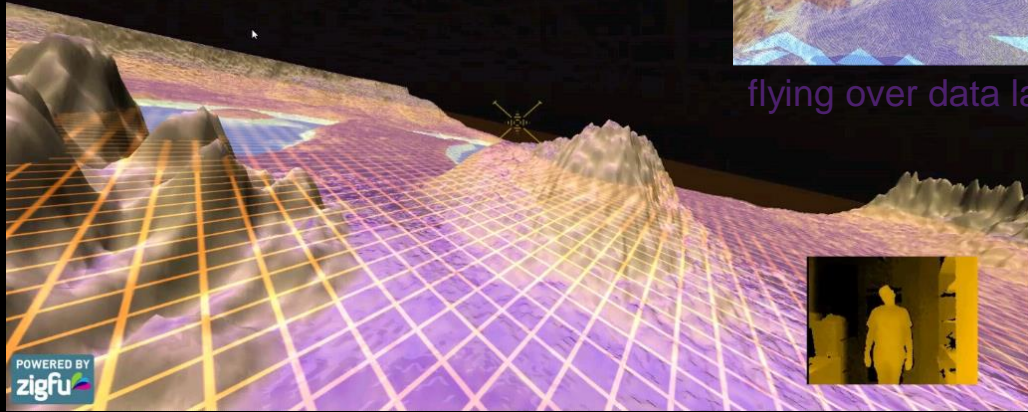
Why terrain?

Geo-located data?

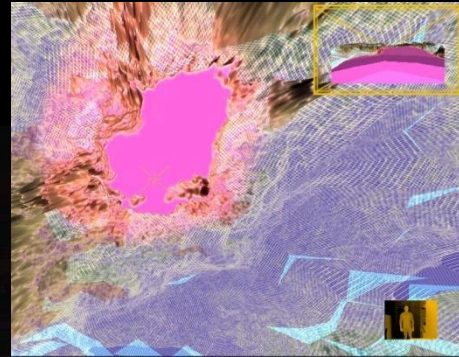
Abstract data?

Exploring terrain





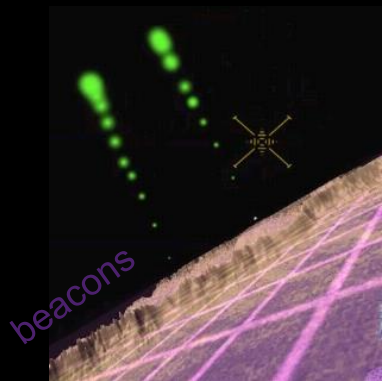
walking through a data terrain



flying over data landscape

Motor-Visual Metaphors

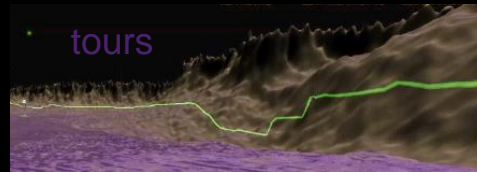
- Data terrain
- Peaks of risk
- Valleys of safety
- Layers and masks
- False colour coding
- Waves of data in time
- Exploration walks
- Walking on a glass ceiling
- Flying over data landscape
- Planting marker flags
- Seeking marker beacons
- Leaving exploration trace
- Retracing a tour of insights
- Multiple explorers
- Navigation gestures
- Touching data



beacons



markers



tours

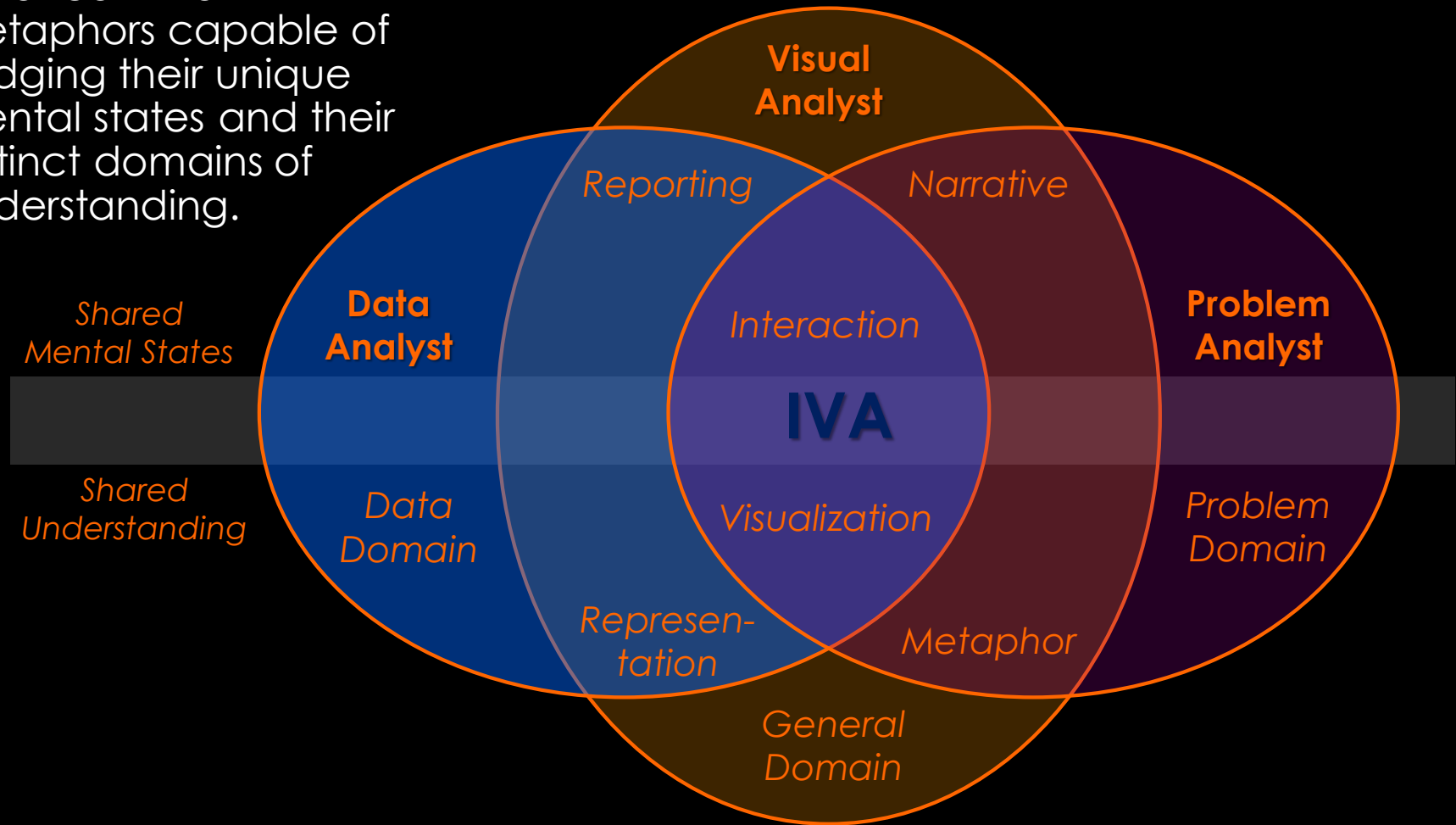
3D TERRAIN FOR IVA

PRIMARY METAPHORS

Atemporal
<i>Similarity is proximity</i> The tendency for similar objects to be clustered together (e.g. these chairs aren't quite the same but they're close).
Quantity & Degree
<i>Quantity is size</i> Perception of correlation between volume and quantity (e.g. huge amount of work).
<i>Quantity is vertical elevation (more is up)</i> Correlation between quantity and level in piles, fluid in containers (e.g. crime is down).
Time, action, event
<i>Experience of time is our own movement along a path</i> Moving to a new place being aware of new world-state (e.g. I am just coming out of a bumpy period).
<i>Intensity of activity is heat</i> Activity leads to feeling warm (e.g. the trading has really heated up this week).
<i>Means are a path</i> The correlation between goal-oriented decision making and confronting alternative paths (e.g. there are many paths to success).
Affect, evaluation & social structure
<i>Importance is size/volume</i> Correlation between size of objects and value/threat etc. they represent as we interact with them (e.g. a huge test).
Thought & consciousness
<i>Analysis is cutting</i> cutting into an object and gaining information about its internal structure (e.g. she quickly dissected the problem)

In visual interaction, participants need to establish the basis of shared communicative acts and meanings, and they need to agree on a set of common metaphors capable of bridging their unique mental states and their distinct domains of understanding.

SUMMARY: THE ROLE OF METAPHORS





QUESTIONS?