Geo-Visual Analytics: Requirements from a User Perspective

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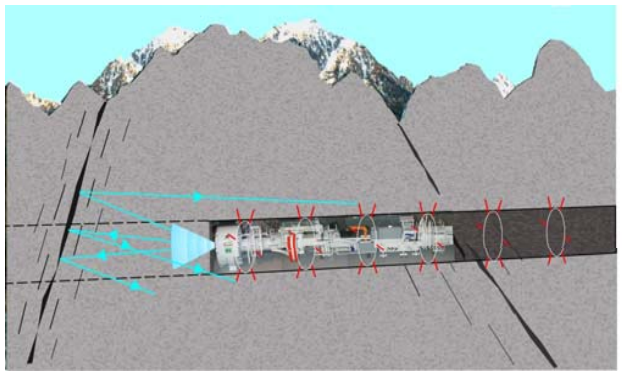
Objective of the talk

- **How to evolve Geo Visual Analytics into a mature technology?**
- G. Andrienko: The important thing is not to develop more novel visualization methods. The main question is: How to design proper visualizations and tools which will be applied by users?
- No single answer. Several concepts and approaches exist to find an answer
- Our concept is derived from our work with users. Context: German Research Center for Geosciences (GFZ)
- We present experiences, no results from a sound scientific study

Examples from our work

Example 1:

Determine rock classes in real-time during tunnel drilling



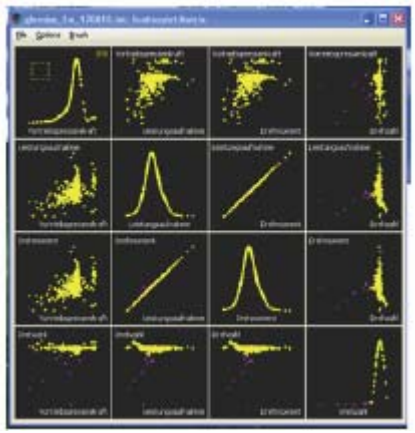
Analytical approach:
To define classifiers from 400 parameters for a Support Vector Machine which classifies the incoming data in real-time

Examples from our work

Example 1:

Determine rock classes in real-time during tunnel drilling

Interactive visulalization
to define good classifiers



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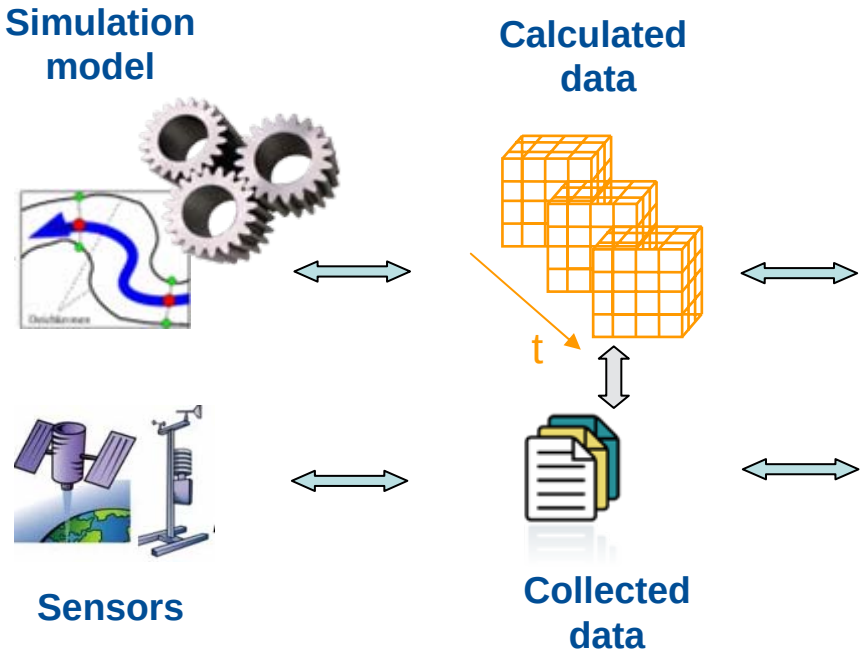
Example 2:

Evaluate the quality of simulation models



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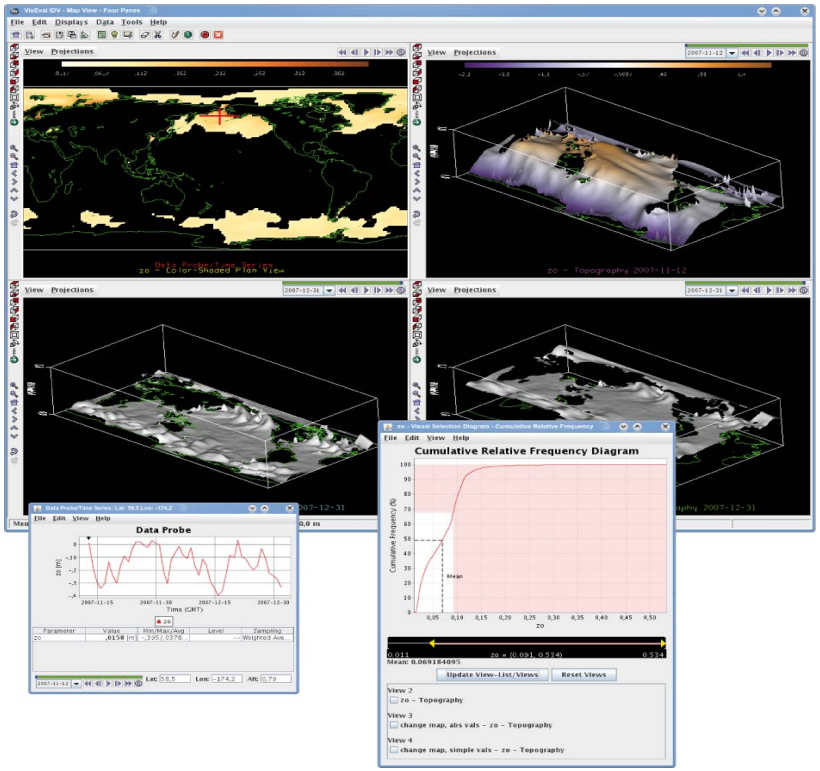


Assessing Scientist

- Are there inconsistencies in structure or bahavior?
- Are there differences between calculated and collected data?
- Where are they in space, time, and attribute space?
- What are the reasons for them?

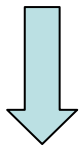
Main user recomendations

1. Real world problems are complex

⇒ a sequence of analytical actions is necessary to solve the problems

⇒ Geo-VA needs to be an integrated part in the entire analytical process

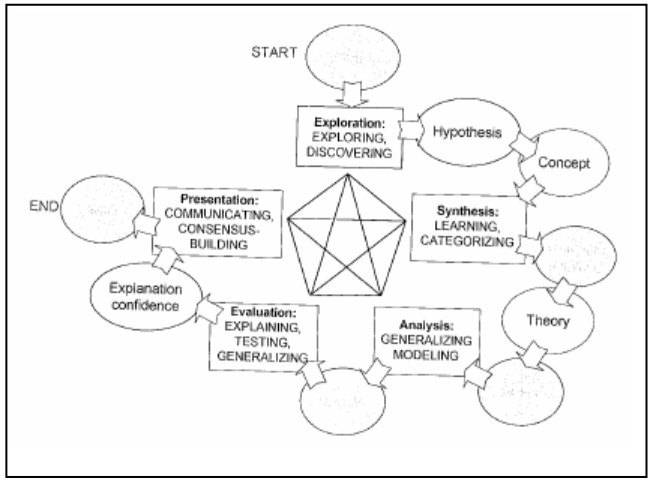
2. GeoVA has to bring some surpluse value



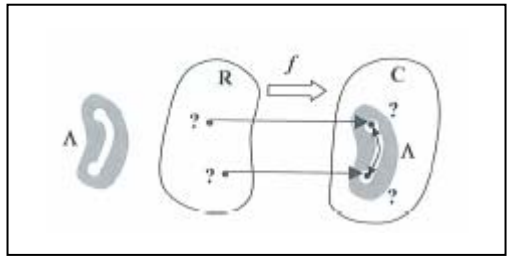
A close view to the users and their activities is necessary

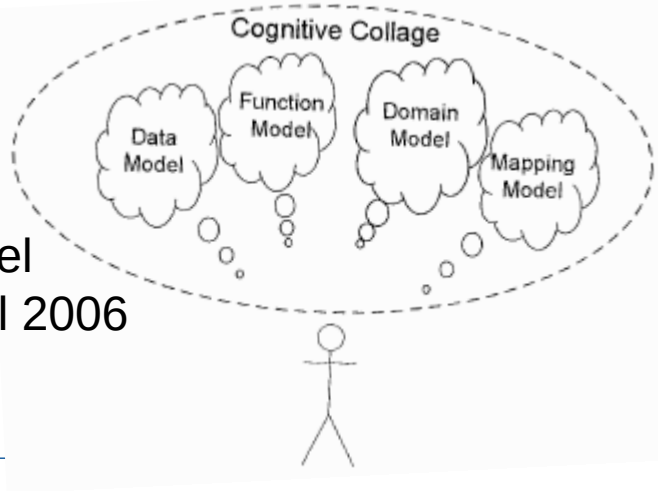
Approaches

Activities of GIScience
Gahegan 2005

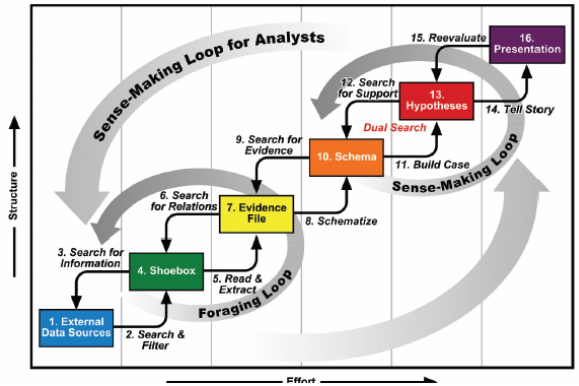


Elementary and synoptic tasks
Andrienko 2006





User model
Kulyk et al 2006



Sense making loop
Thomas, Cook 2004

Approaches

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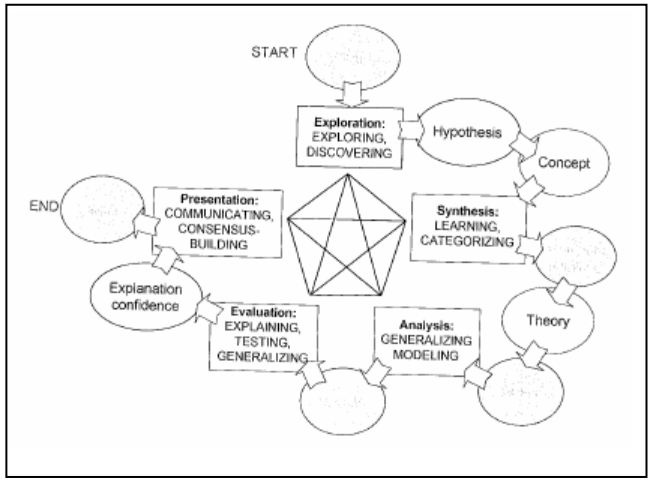

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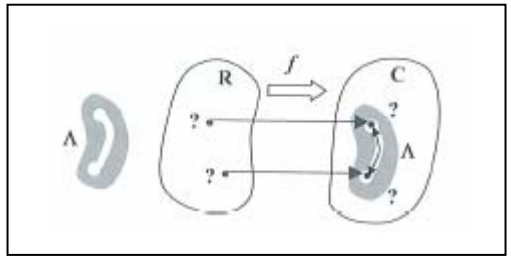

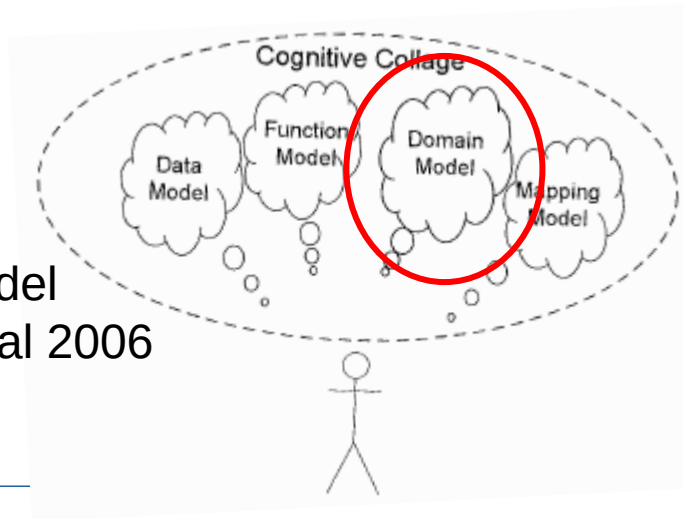

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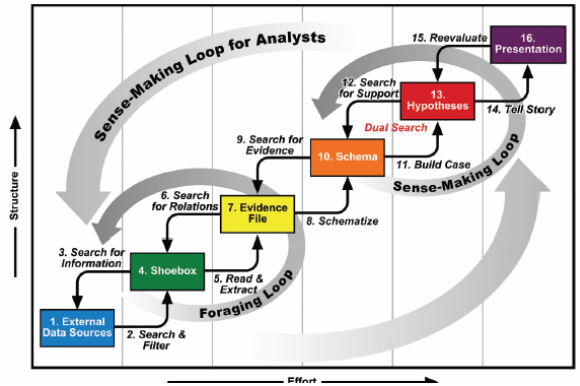

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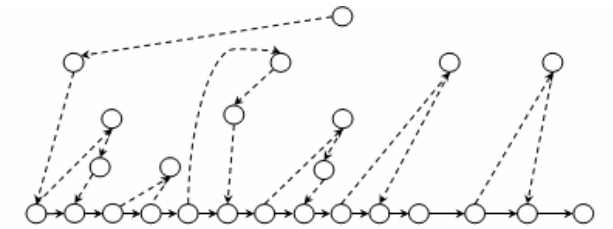
Domain Model

Domain Task Analysis



Sequence of analytial actions

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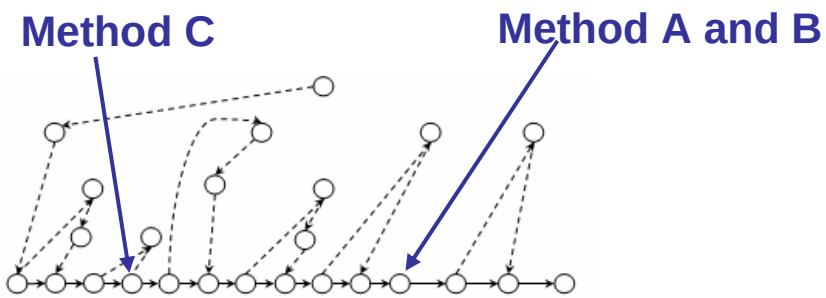

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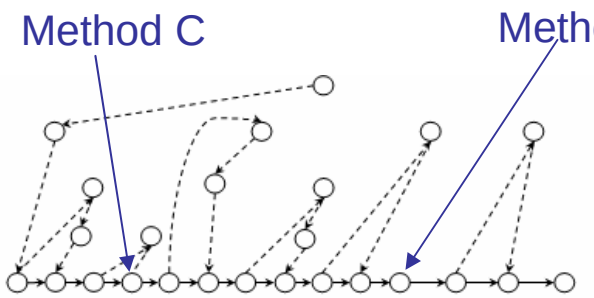

Sequence of analytical actions

- Where are methodical gaps?
- Where is potential for improvement?
- What type of improvement?

Examples:

- How to deal with heterogenious data?
- How to find correct classifiers?
- How to make the work flow more efficient?

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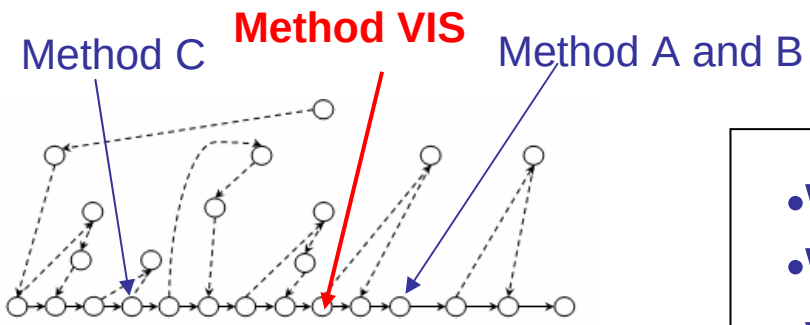

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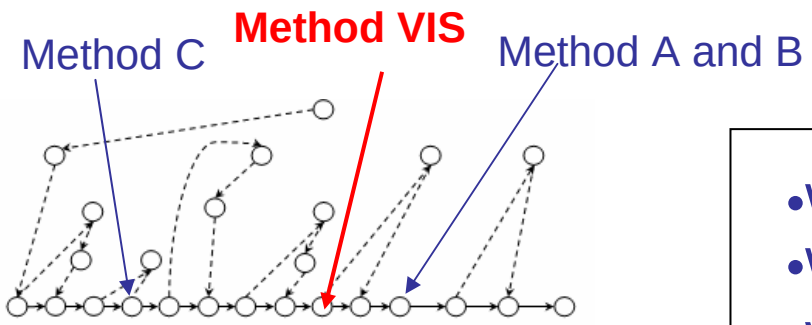

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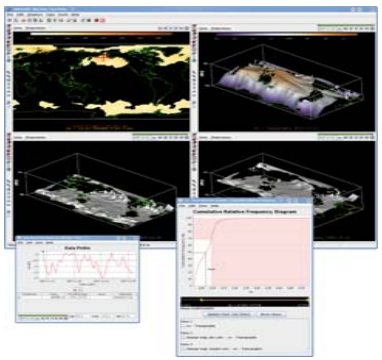

VIS Design

Examples:

- How to deal with heterogenious data?
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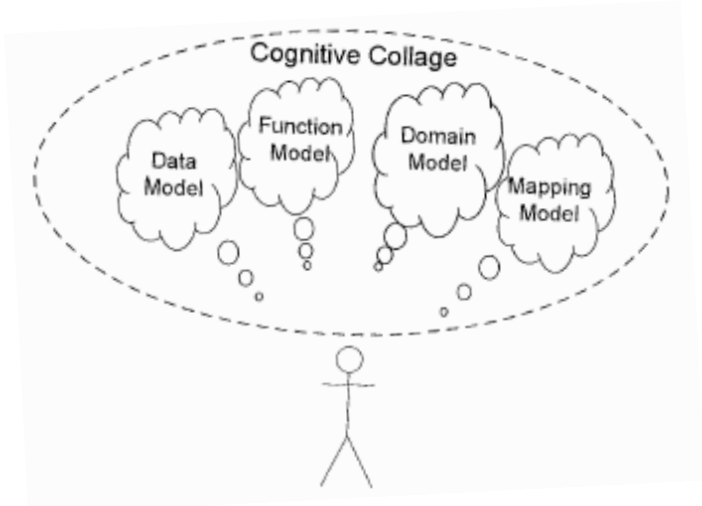
Conclusion

How to evolve GeoVis or GeoVA into a mature technology?

1. Basis for our work:
User Model



2. Define the sureplus => - Find measurements
- Make usability tests
- Formulate arguments