

Challenges in Visual Analytics

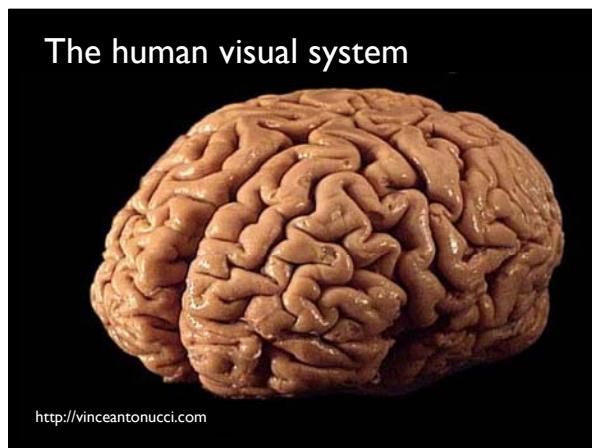
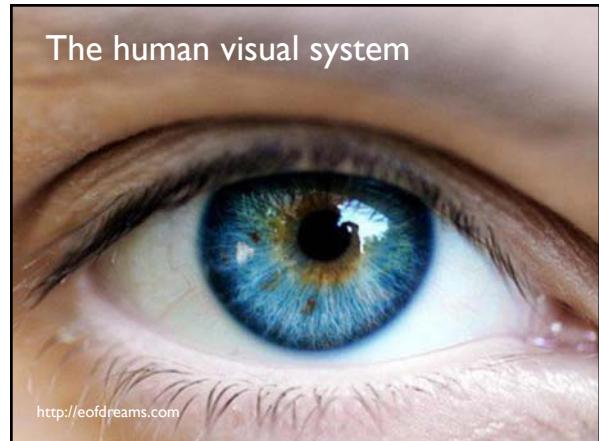
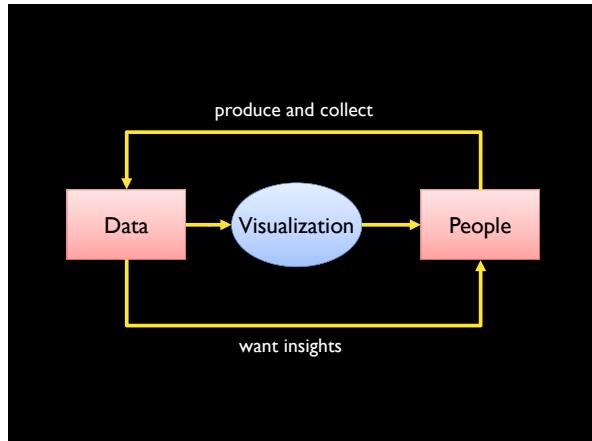
Jack van Wijk

TU/e Technische Universiteit
Eindhoven University of Technology
Where innovation starts

VISIGRAPP 2017
Porto, February 27, 2017

Overview

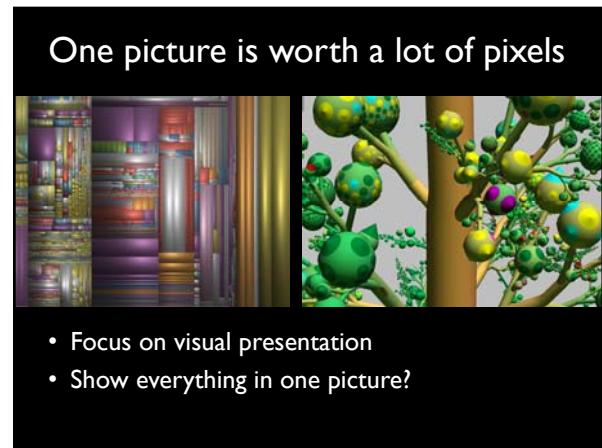
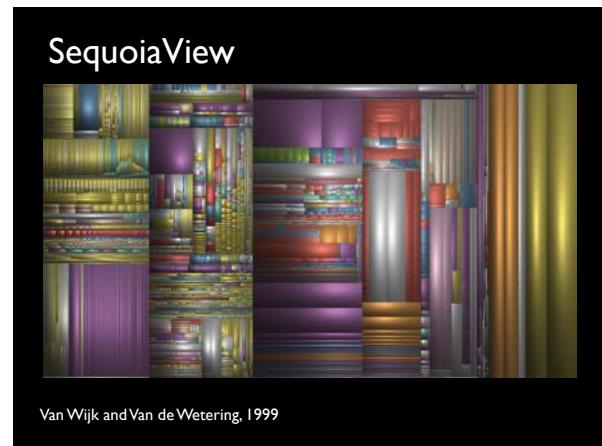
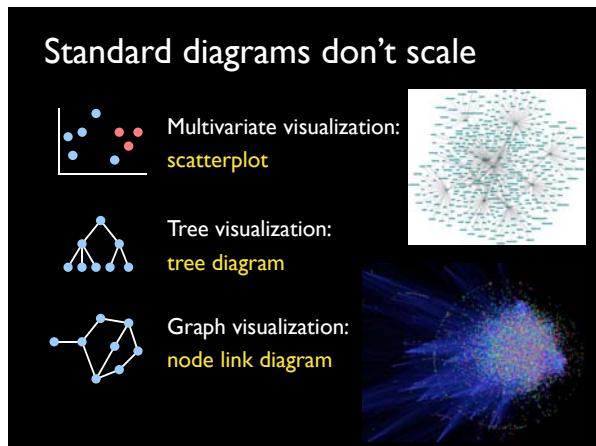
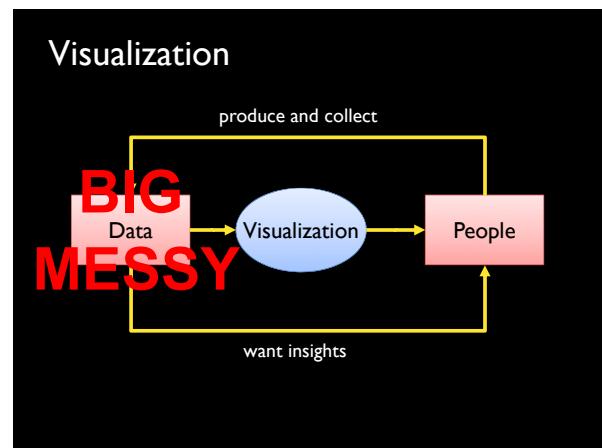
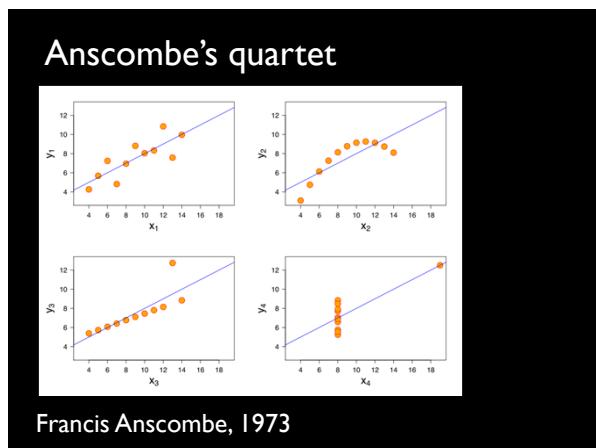
- Handling big, messy data
- Dealing with models
- Most examples from Eindhoven
- Lessons learned, challenges ahead

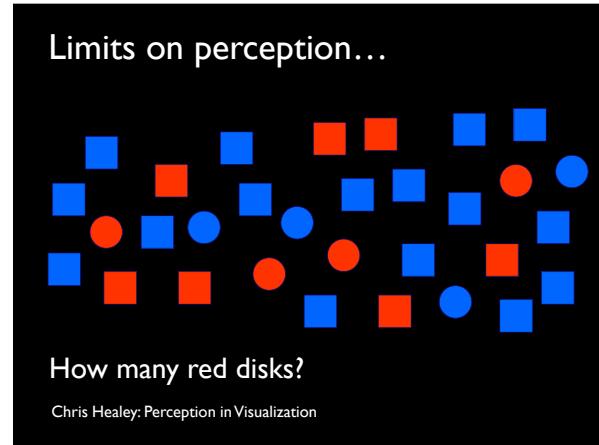
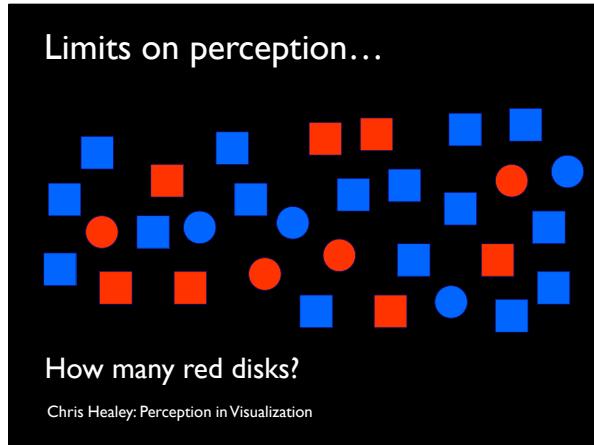
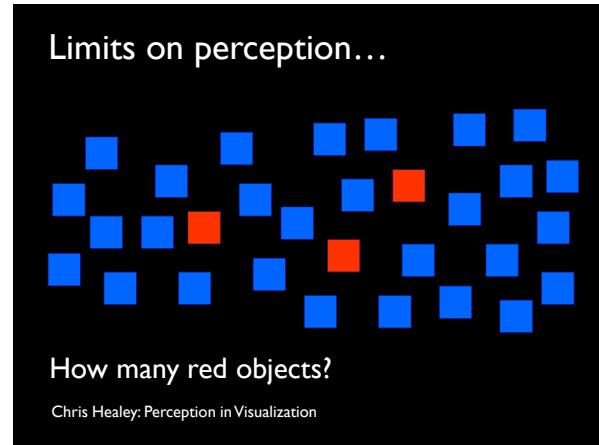
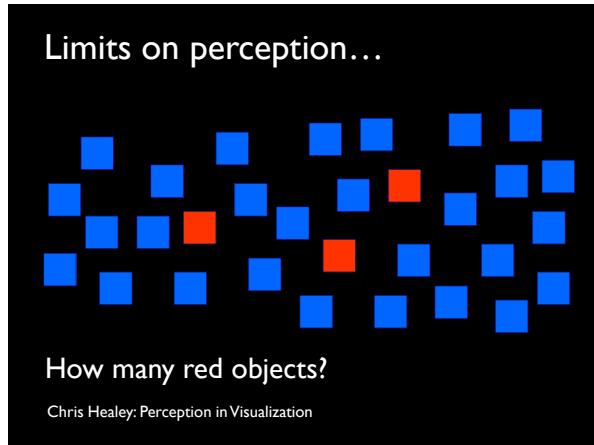
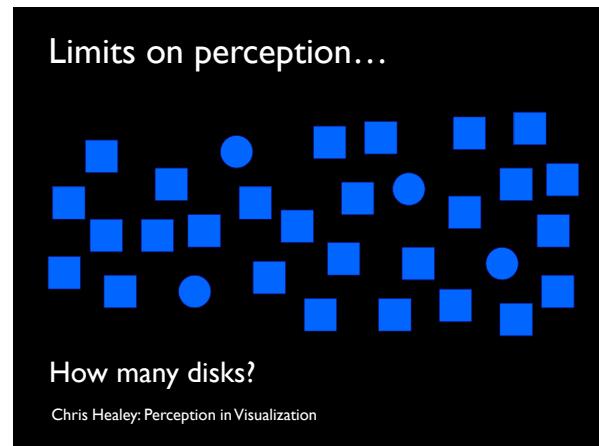
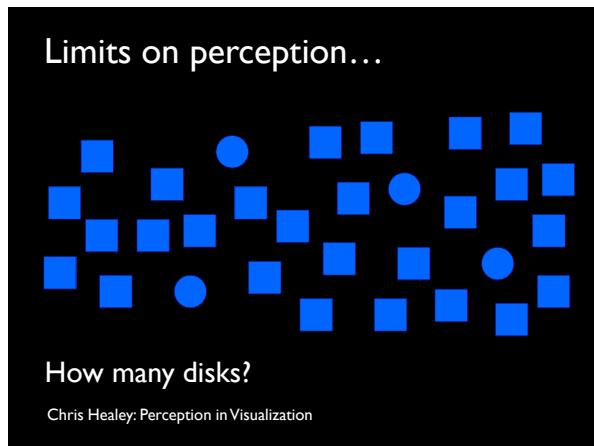


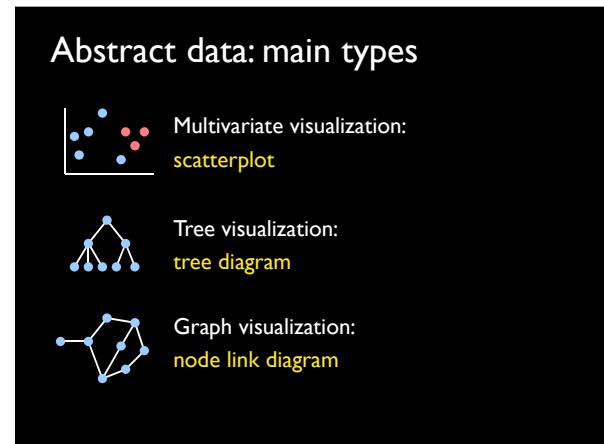
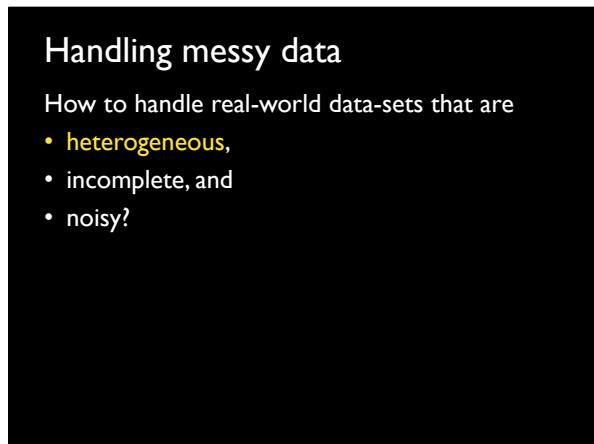
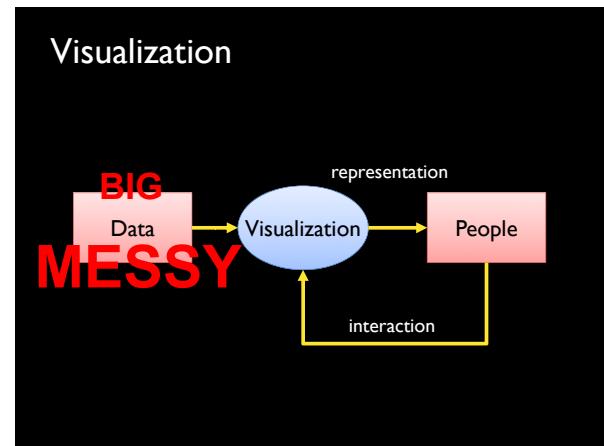
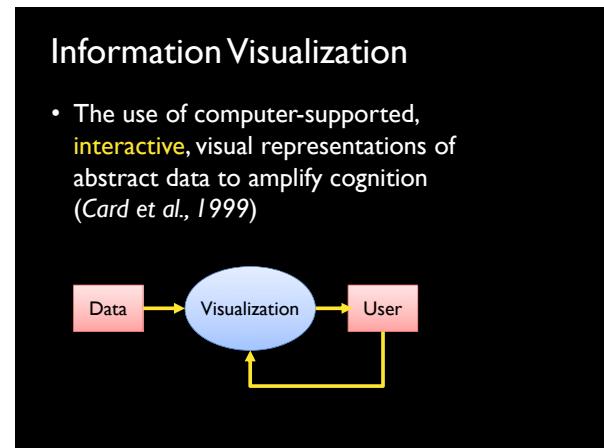
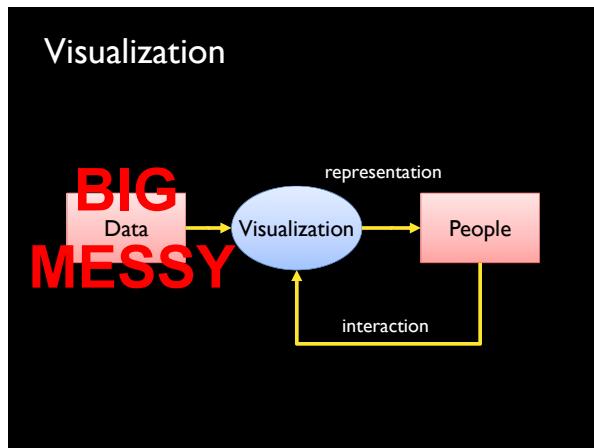
Anscombe's quartet

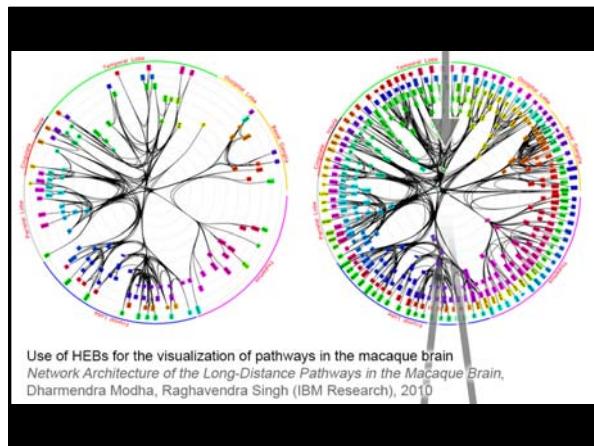
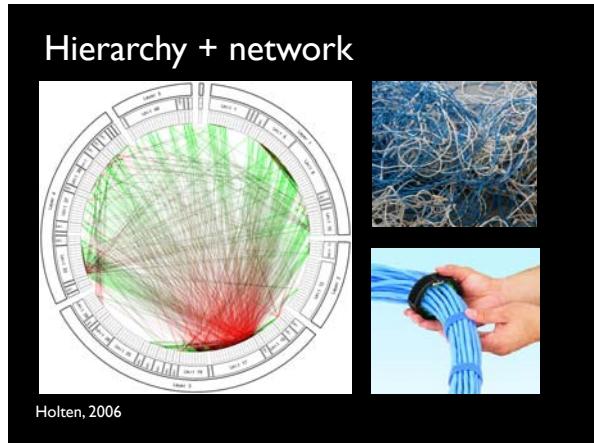
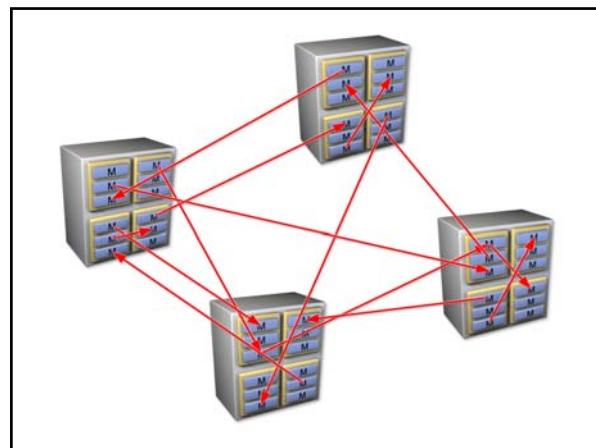
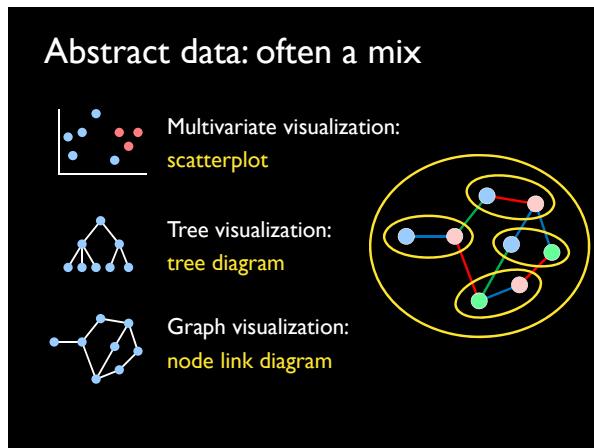
I		II		III		IV	
x_1	y_1	x_2	y_2	x_3	y_3	x_4	y_4
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

Four data-sets: same average x and y, same variance, same correlation, ...









EuroVis 2014
The Eurographics Conference on Visualization

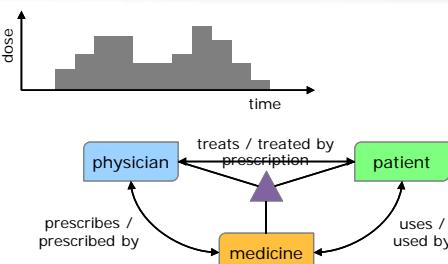


Visualization of Medicine Prescription Behavior

Paul van der Corput, Johan Arends, and Jarke J. van Wijk

TU/e Technische Universiteit Eindhoven University of Technology **Kempenhaeghe**

Problem analysis
Entities & relations



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Medicine Prescriptions
Structure of the data

Patient	Medicine	Start	End	Dose	Physician
Patient 001	Carbamazepine	Jul 10, 1991	Sep 3, 1996	1000	Jansen
Patient 002	Clobazam	Dec 16, 1995	Feb 3, 1996	20	Peeters
Patient 003	Diazepam	Jun 21, 2006	Aug 2, 2006	10	Jansen
Patient 003	Lamotrigine	May 22, 2012	Aug 14, 2013	300	De Groot

entries: ~300,000 # medicines: ~100
patients: ~30,000 # physicians: ~200

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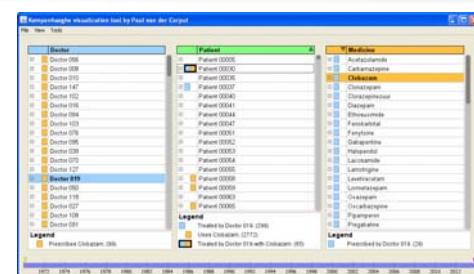
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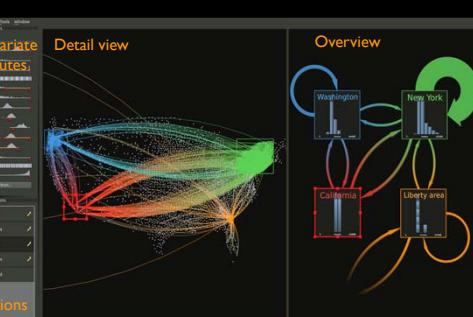
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Three Table View (3TV)
Video

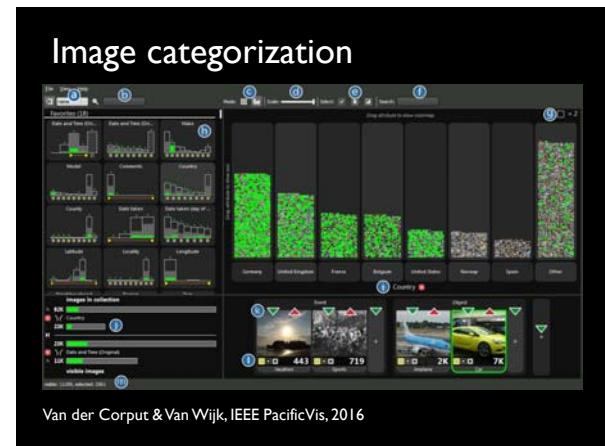
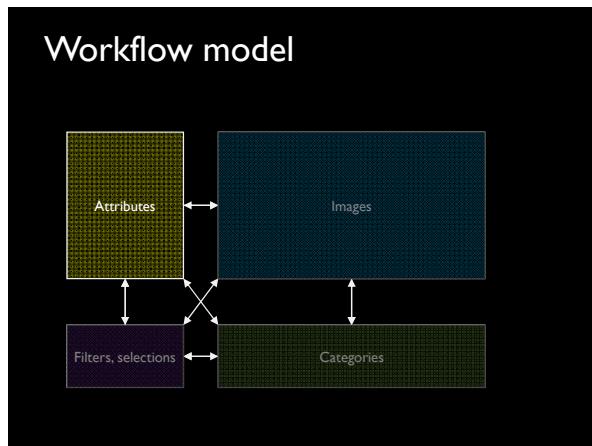
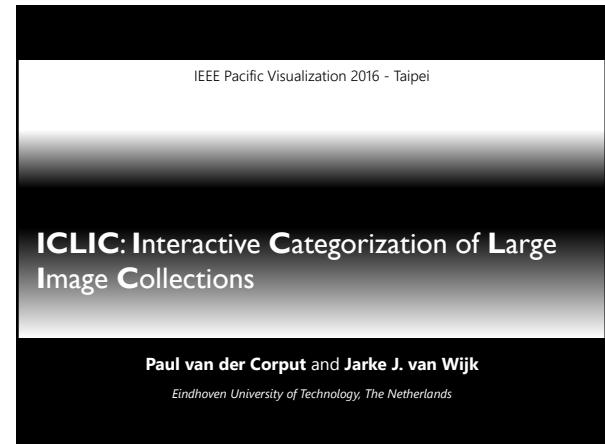


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Multivariate network visualization



Van den Elzen & Van Wijk, IEEE InfoVis 2014

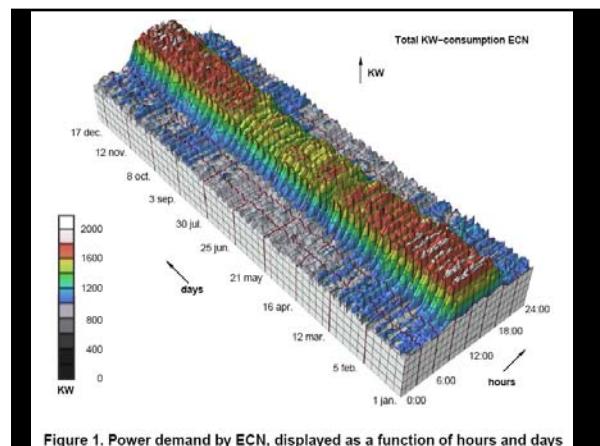
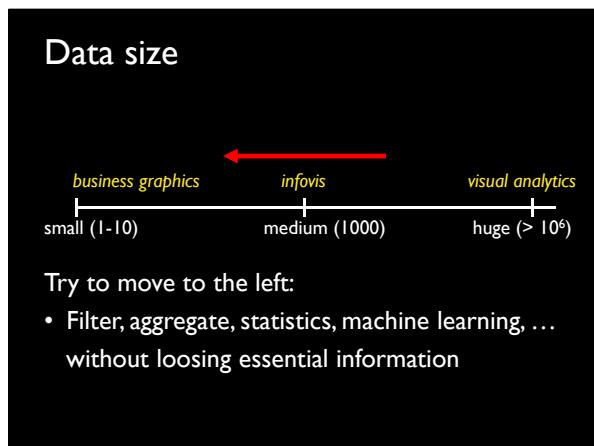
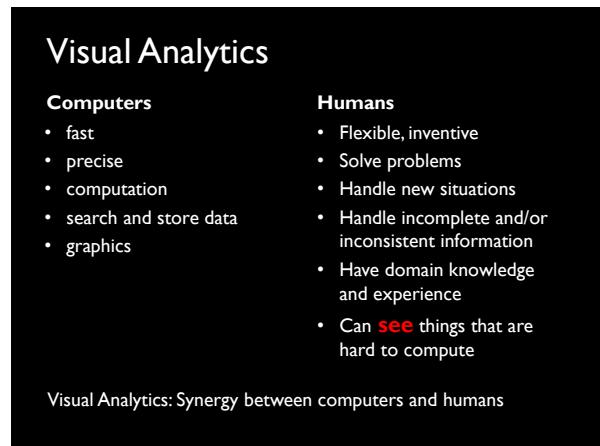
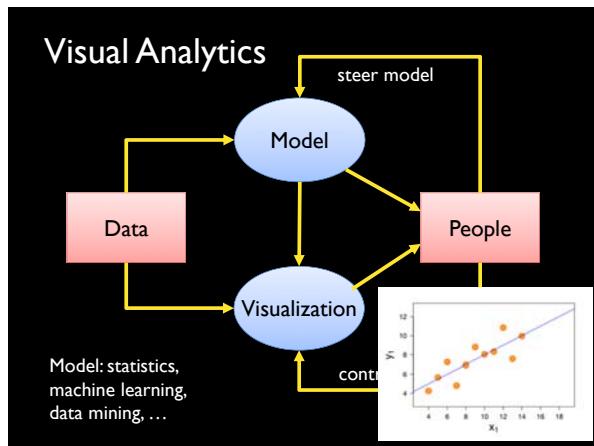
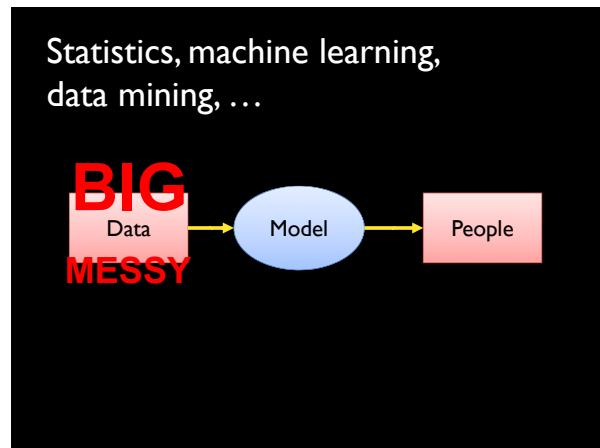
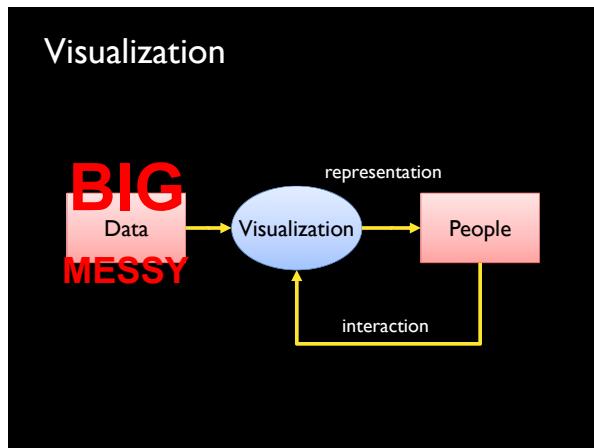


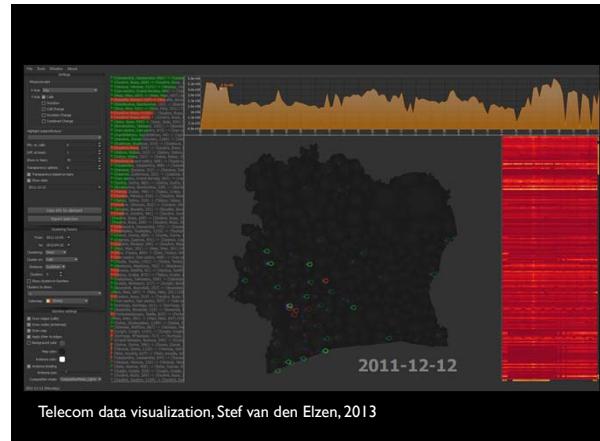
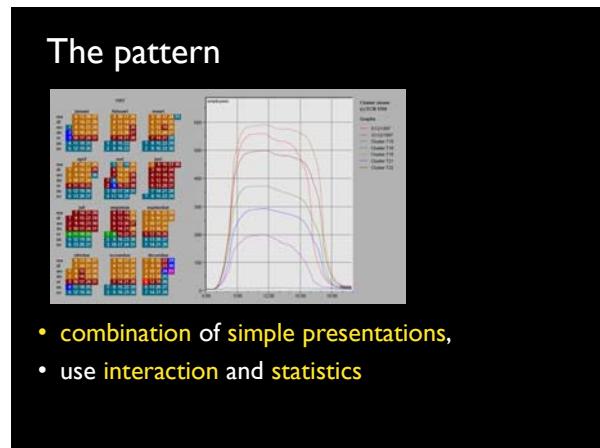
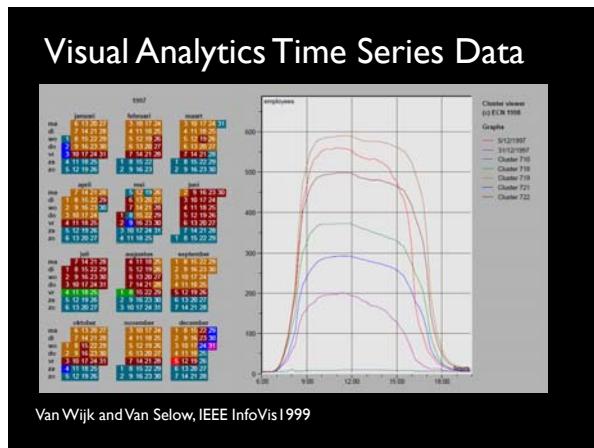
Dealing with messy data

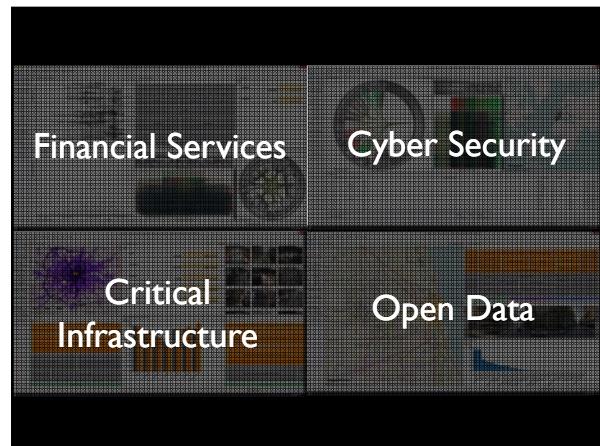
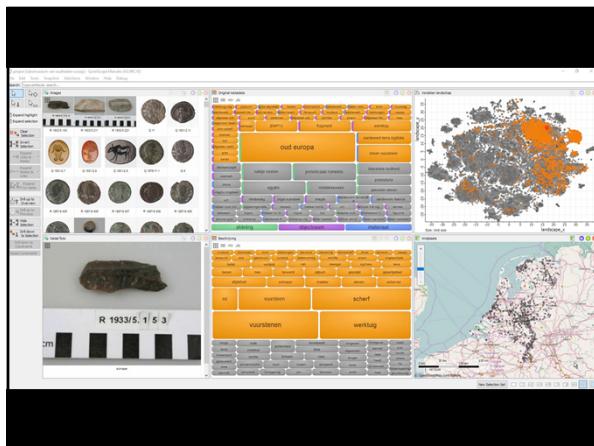
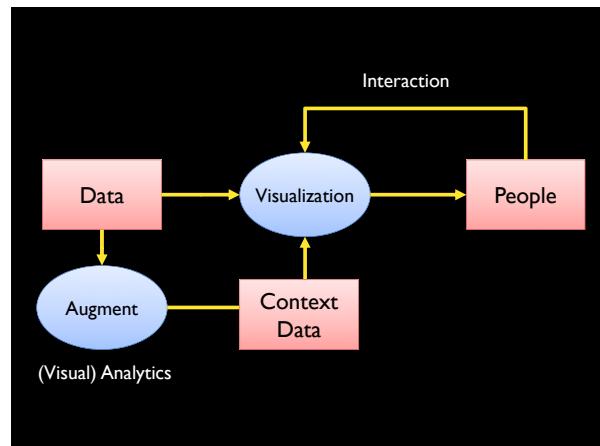
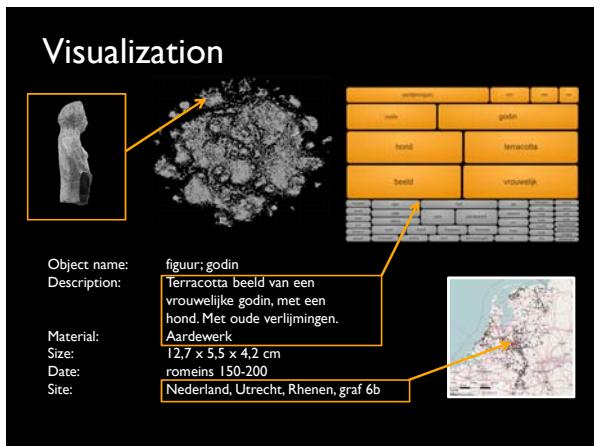
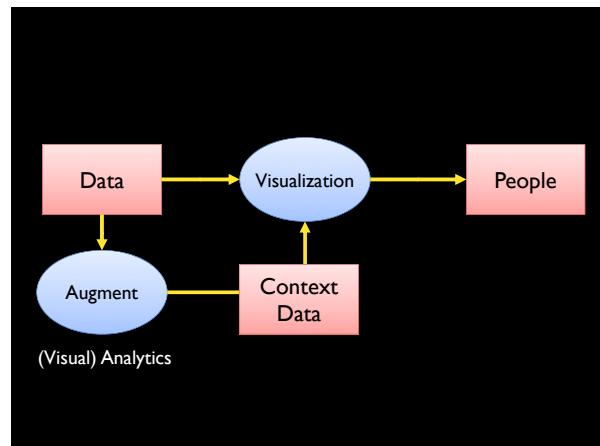
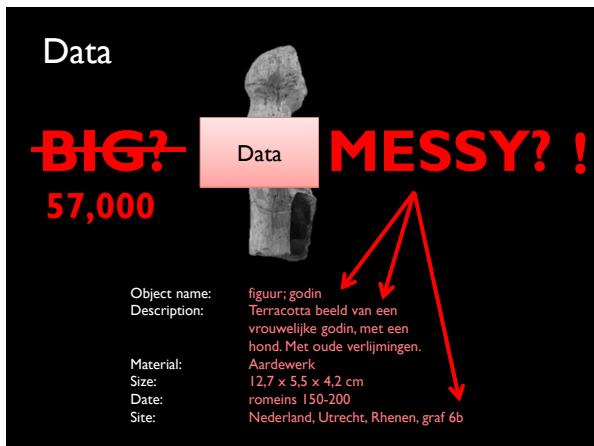
Custom cases can be solved, using a combination of **simple presentations**, **interaction** and **statistics**

Generic challenges:

- How to scale up?
- How to generalize?



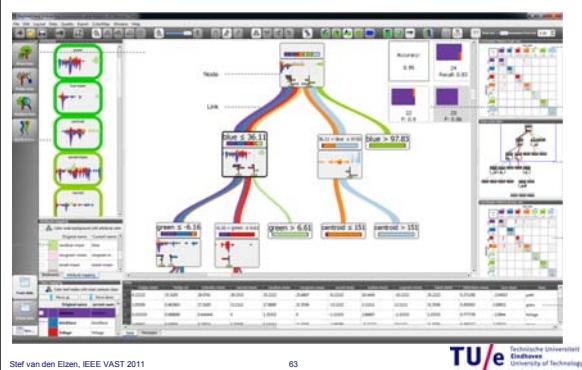




Dealing with models

- How to define ML/DM models?
 - What model, what parameter settings?
 - Which features of the data?

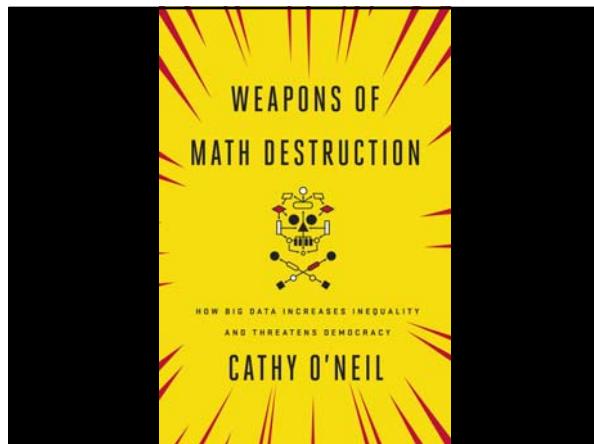
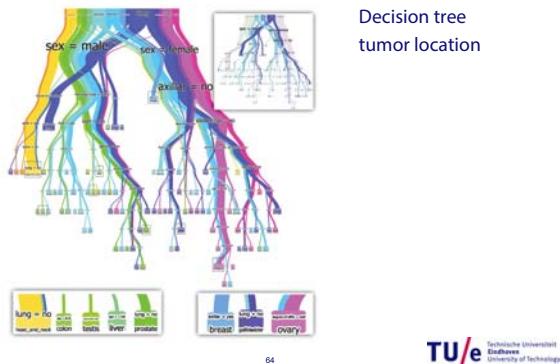
BaobabView

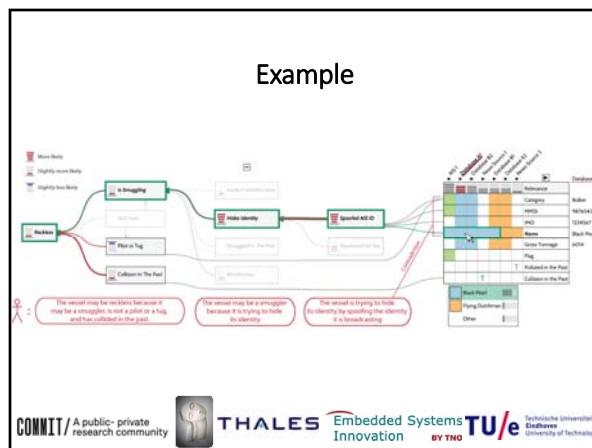
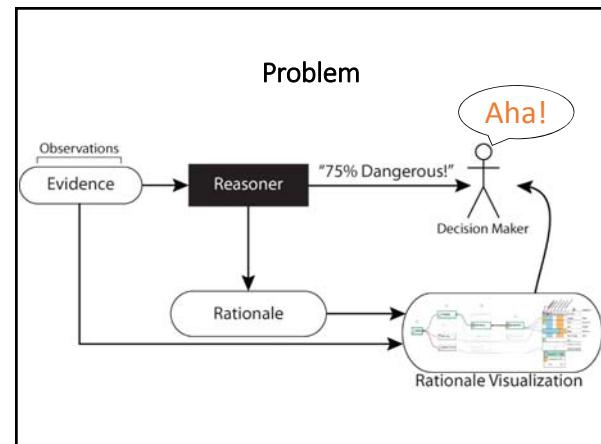
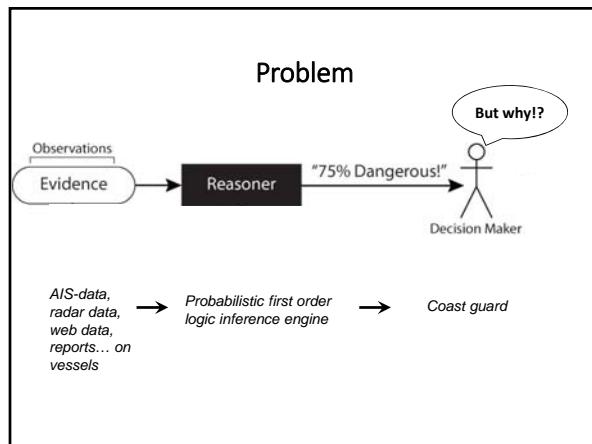
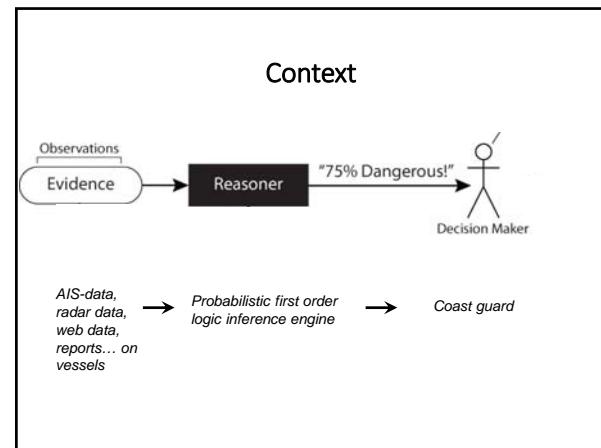
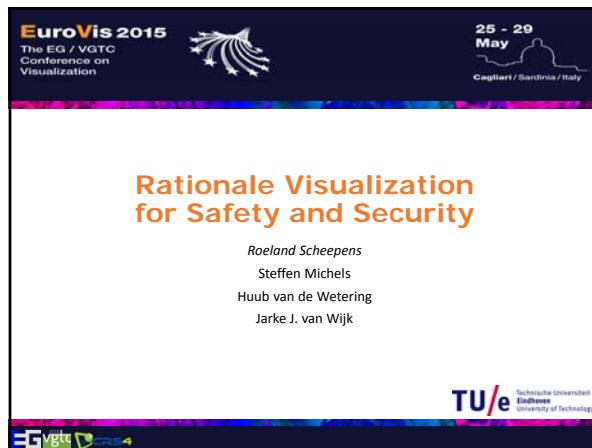


Dealing with models

- How to define ML/DM models?
 - What model, what parameter settings?
 - Which features of the data?
- How to understand the result?
- *How to make the black box transparent?*

BaobabView



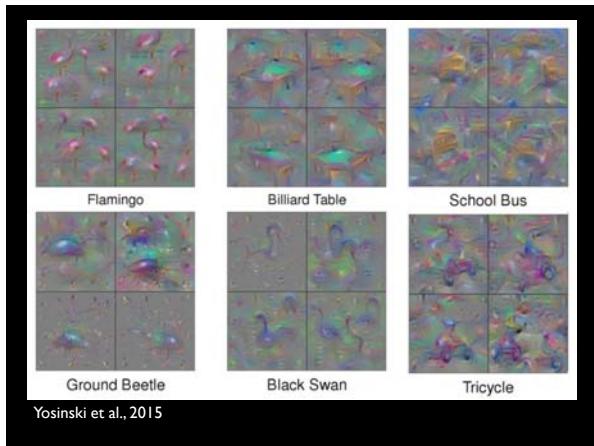


How to understand a model?

Custom cases can be solved, using a combination of simple presentations, interaction and statistics

Challenges:

- How to scale?
- How to generalize?
- Can we understand neural networks...?



Conclusions

Data and models can be dealt with, using a combination of simple presentations, interaction and statistics / ML / DM

and with smart students and a lot of effort!

Challenges:

- How to scale?
- How to generalize?
- *How to develop custom solutions efficiently?*

Thank you!