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Card Sorting Techniques for Domain Characterisation in Problem-driven Visualization Research

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KU Leuven, Belgium

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STADIUS
Center for Dynamical Systems, Signal Processing and Data Analytics

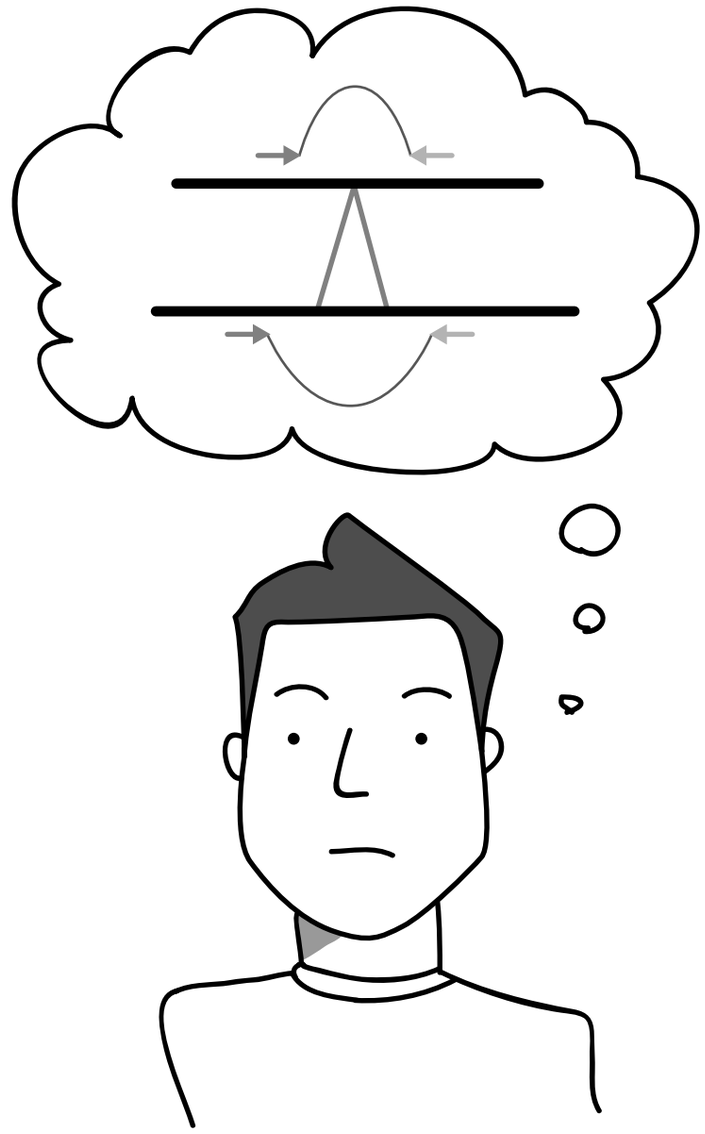
iMinds
CONNECT.INNOVATE.CREATE

Domain characterization is not easy.

Challenges

1. Domain-specific knowledge
2. Exploratory tasks
3. Establish a shared understanding of the domain problem and analysis needs
4. Foster creative thinking

vis designer



domain expert

Card sorting

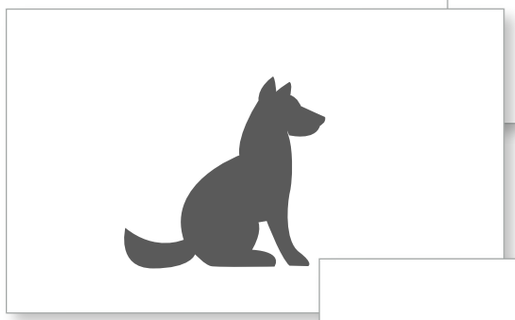
Related works in VIS

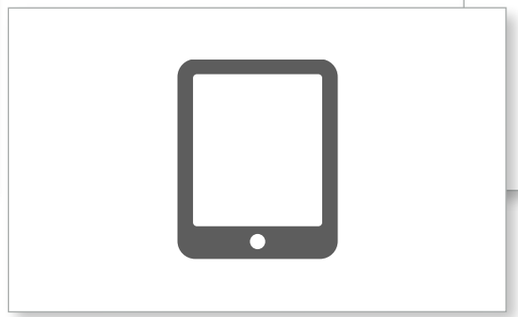
[1] D. Lloyd and J. Dykes, “Human-centered approaches in geovisualization design: Investigating multiple methods through a long-term case study,” IEEE Trans. Vis. Comput. Graph., vol. 17, no. 12, pp. 2498–2507, 2011.

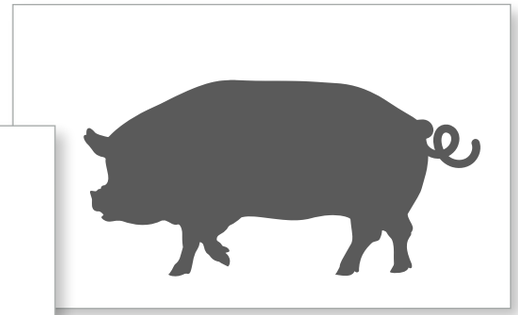
[2] S. McKenna, D. Mazur, J. Agutter, and M. Meyer, “Design activity framework for visualization design,” To Appear IEEE TVCG (Proc. InfoVis), vol. 20, no. 12, pp. 2191–2200, 2014.

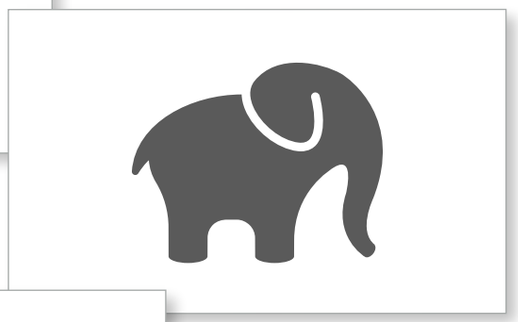
More in CS and HCI

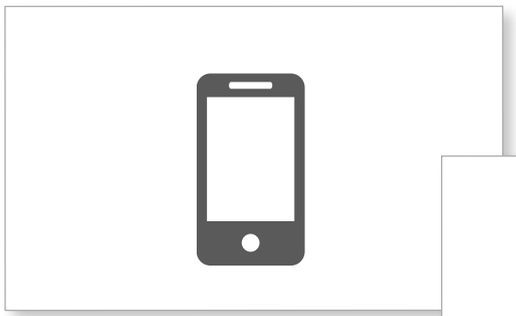
see our paper…

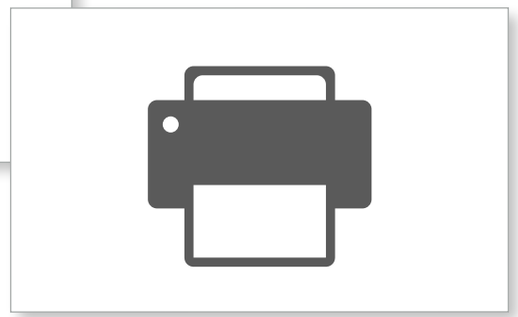


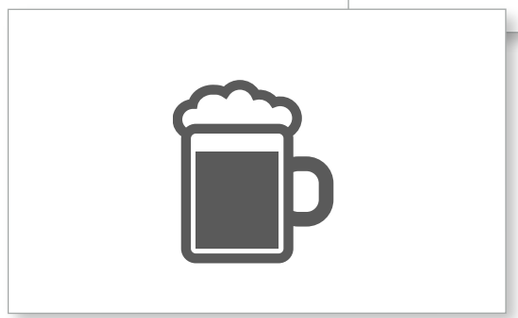


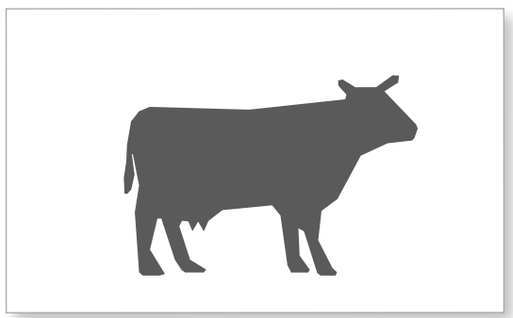


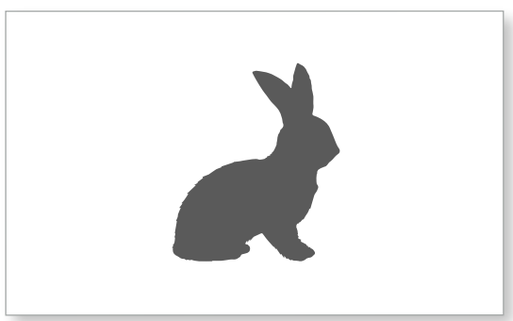












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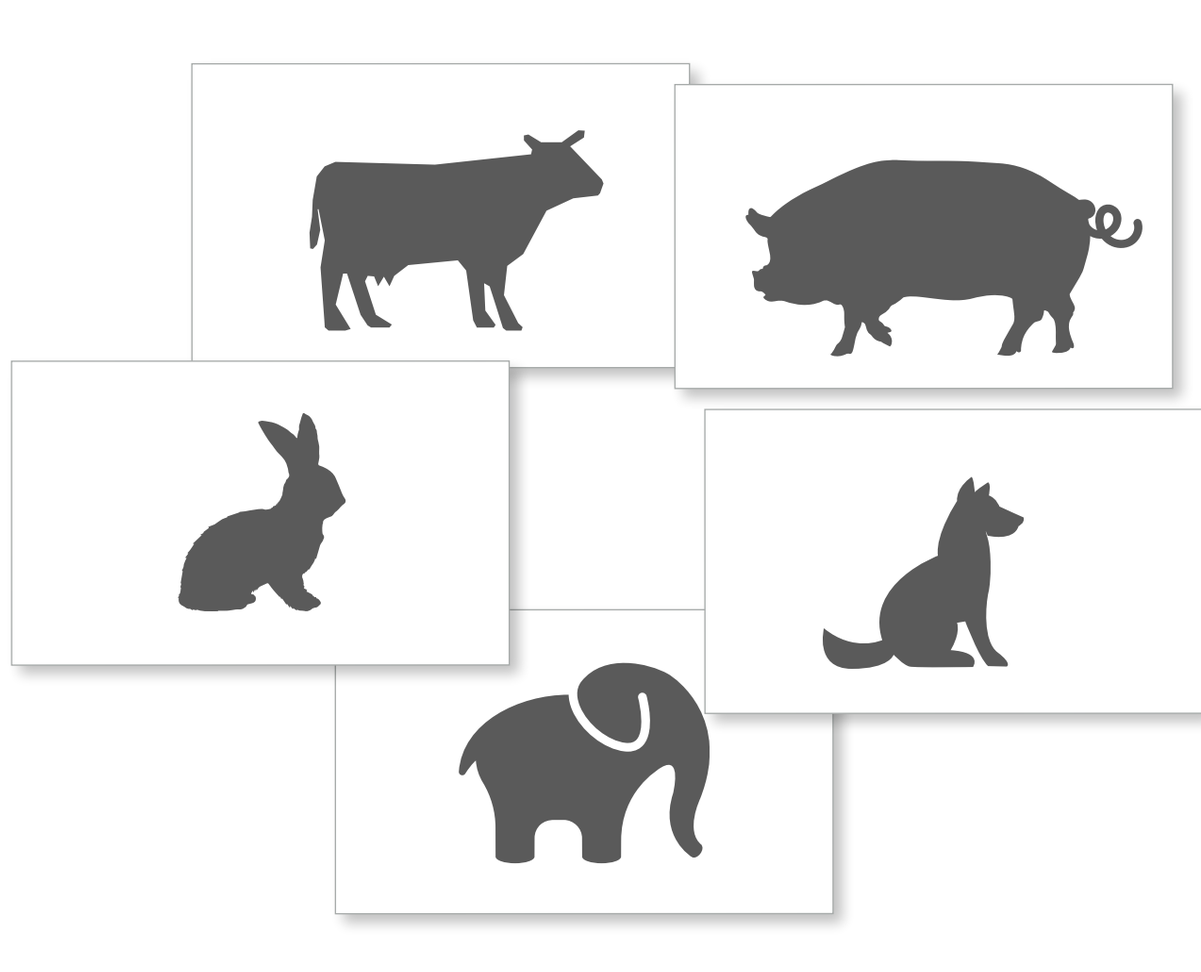

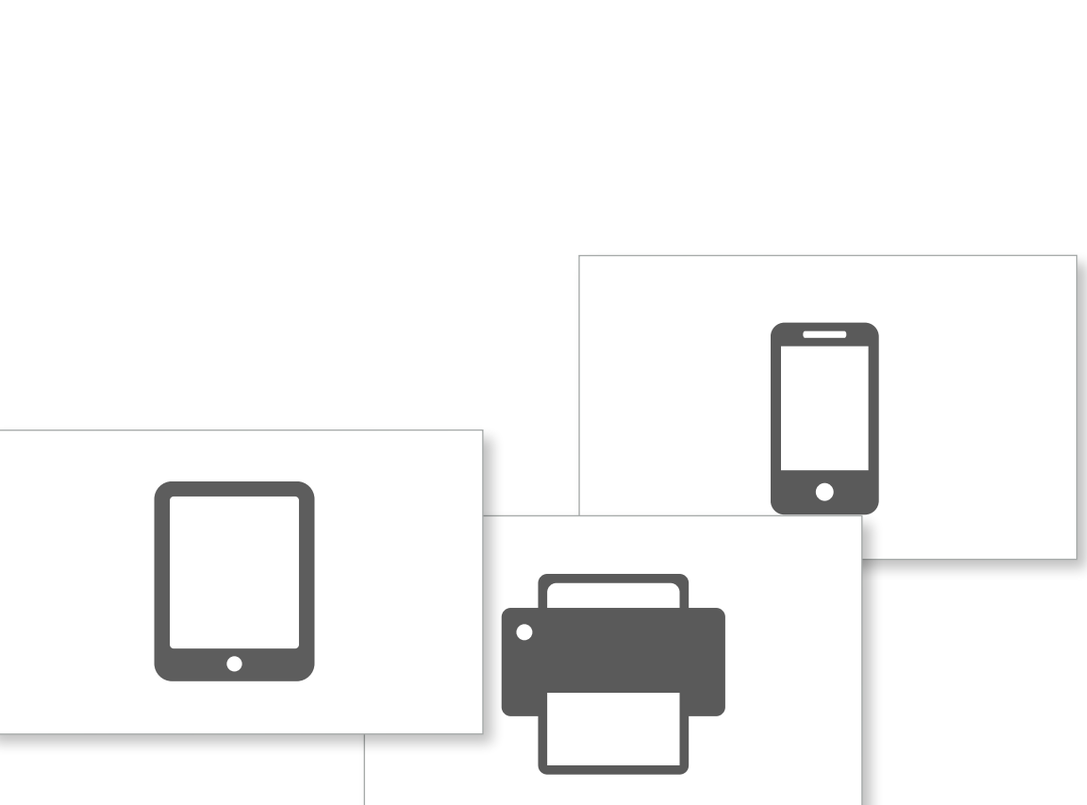

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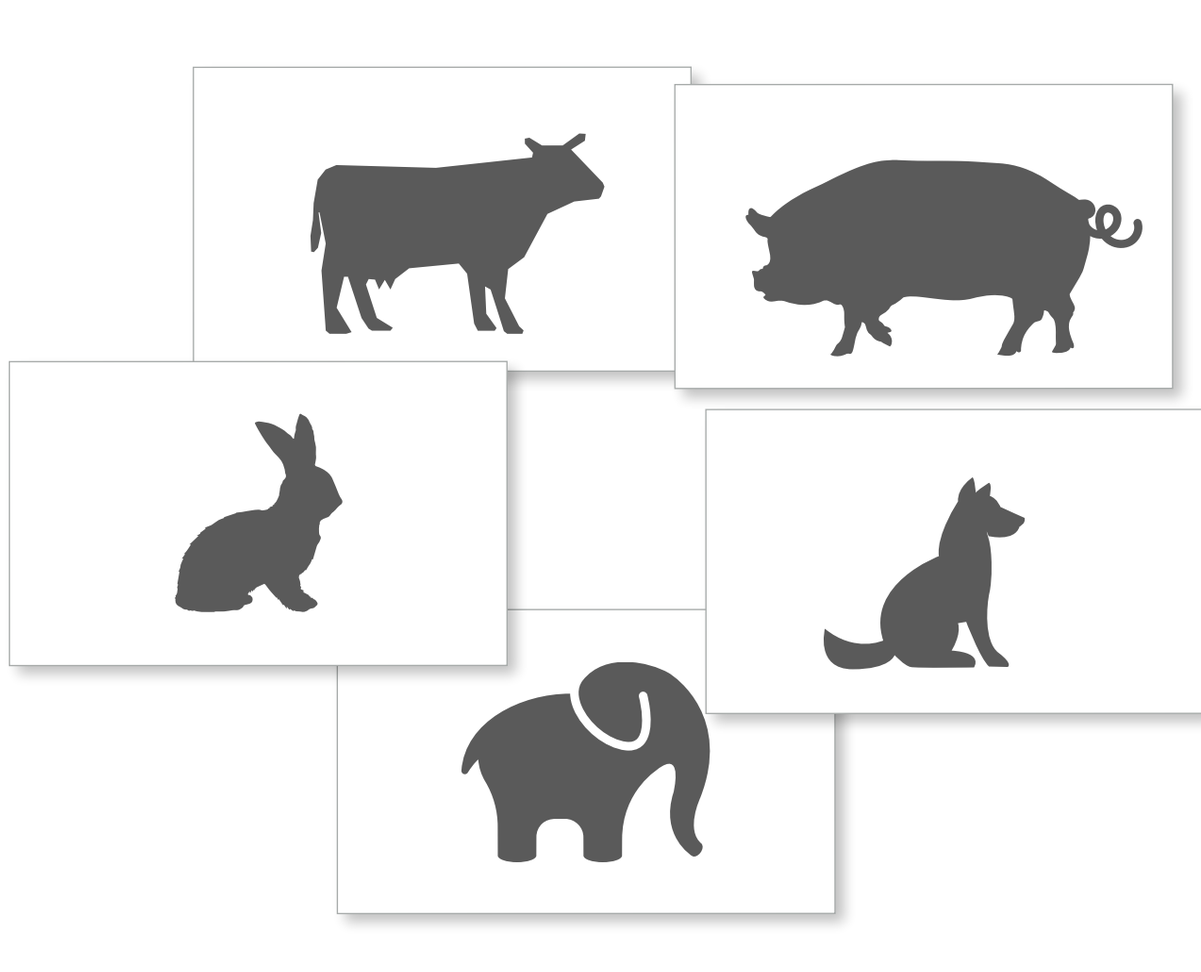

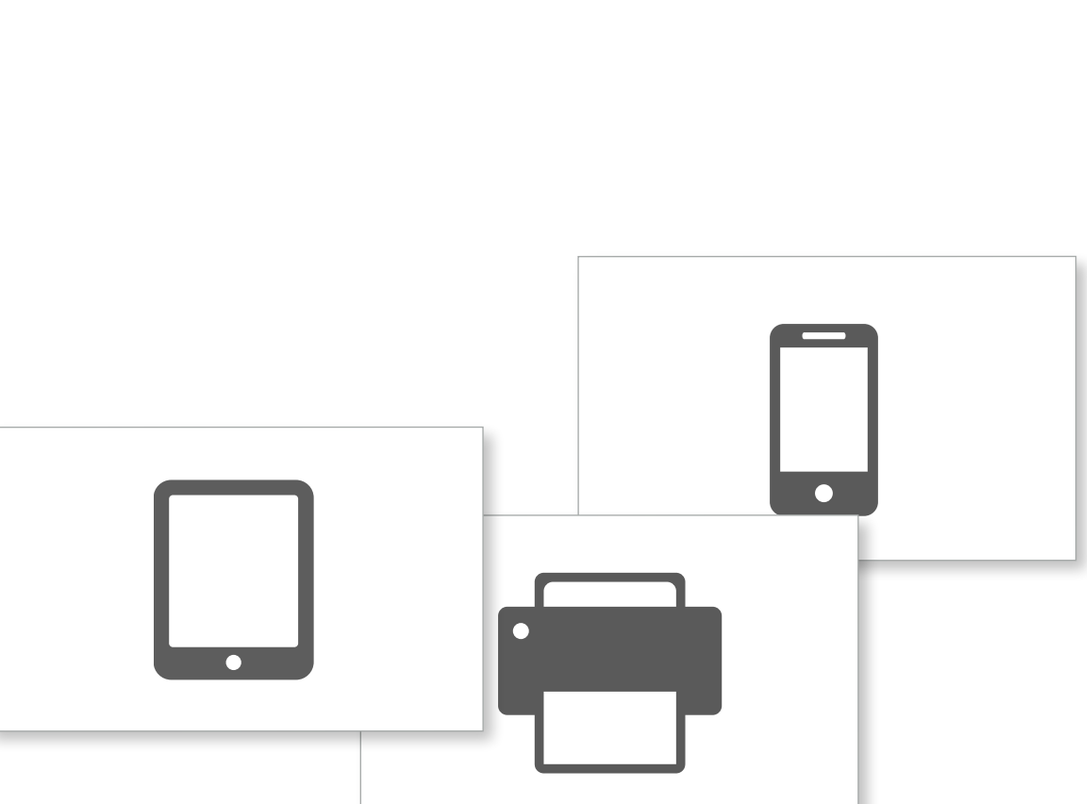

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Transportations

Animals

Technology

Drinks

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Card sorting

1. *Open* card sorting
   - goal: to elicit tacit categorisation of items
   - generative

Transportations

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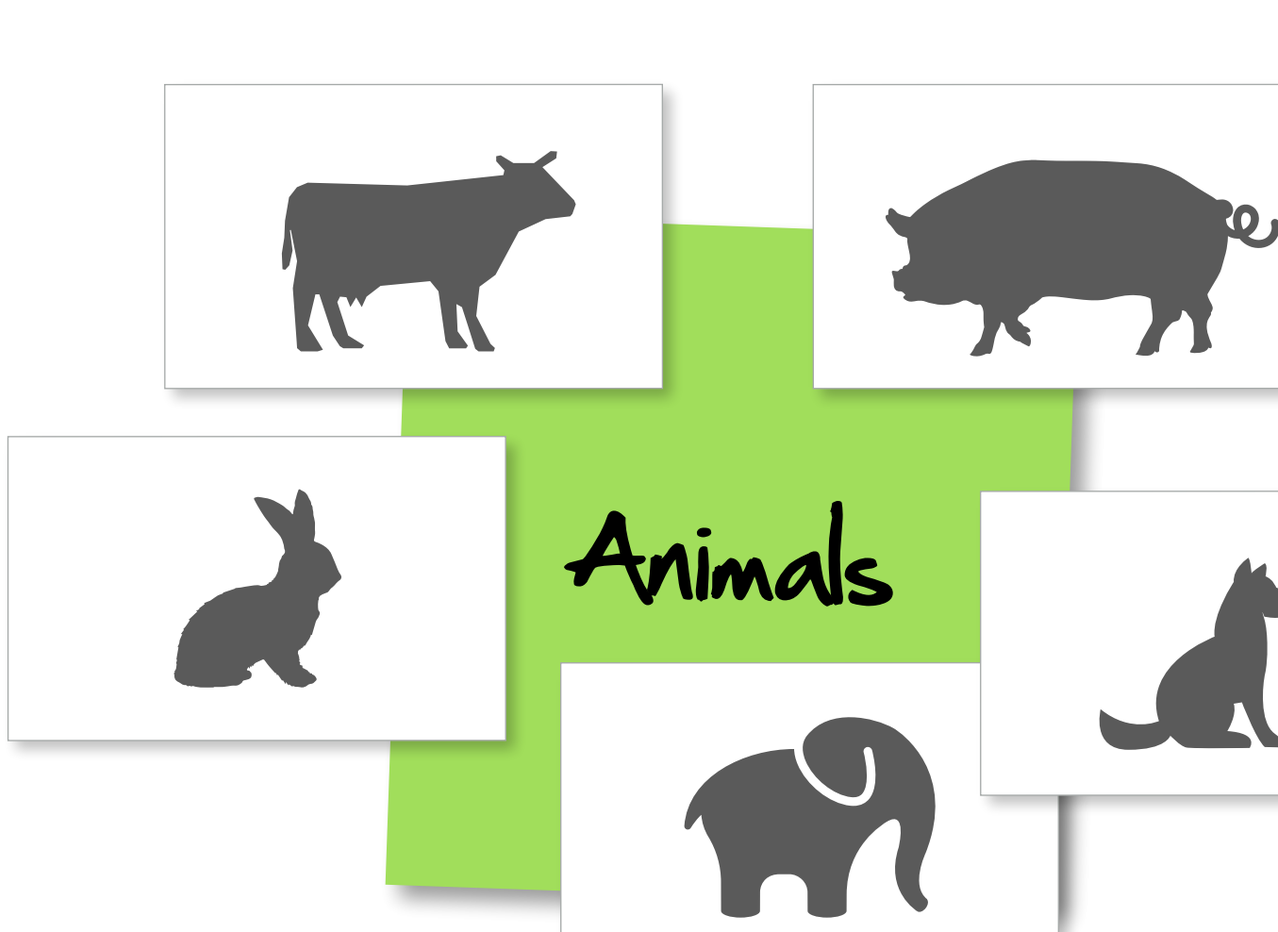

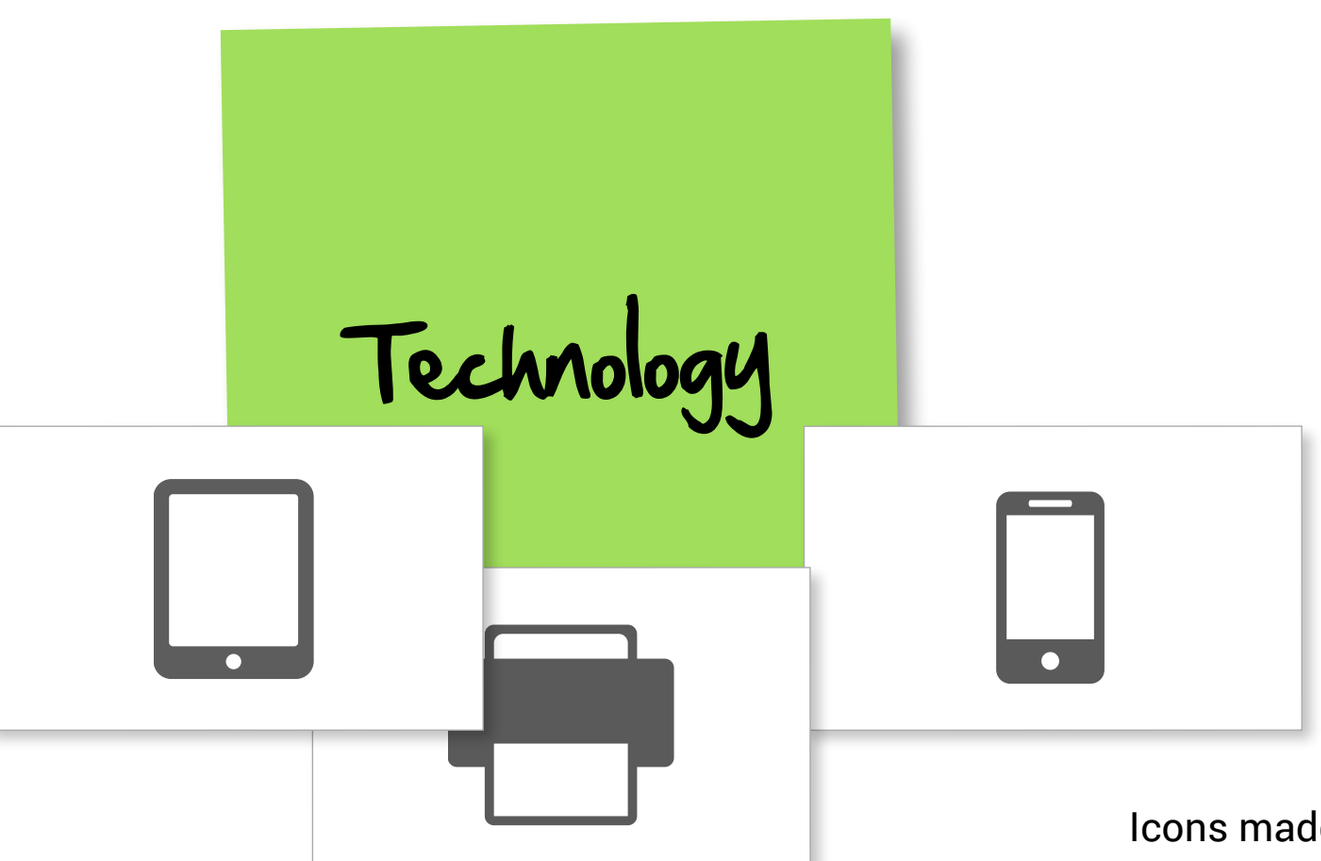

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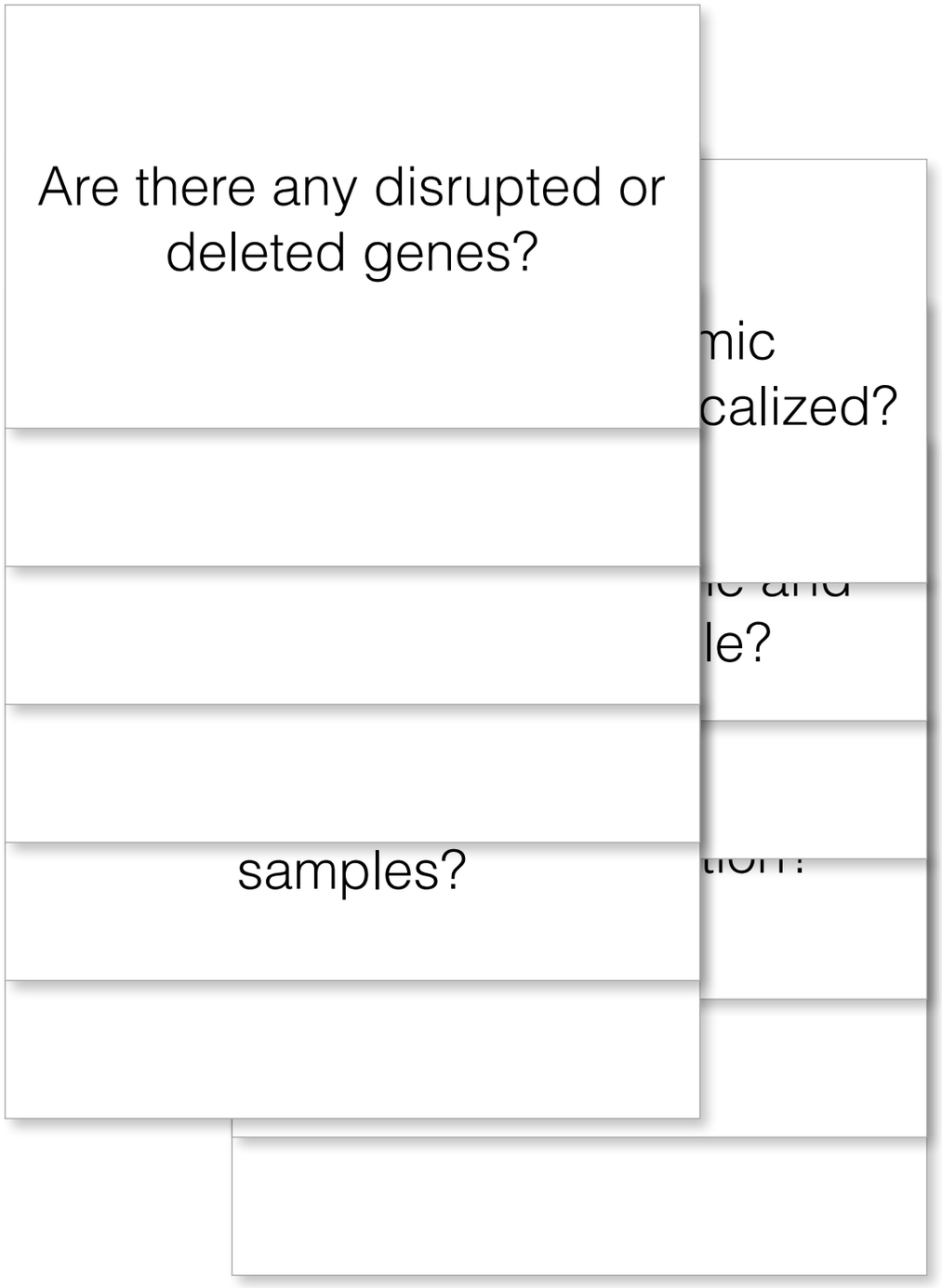
Card sorting types

1. *Open* card sorting
   - goal: to elicit tacit categorisation of items
   - generative
2. *Closed* card sorting
   - goal: to evaluate the assignment of items to categories
   - evaluative

Step 1: Preparation

Step 1: Preparation

inquiry-based cards



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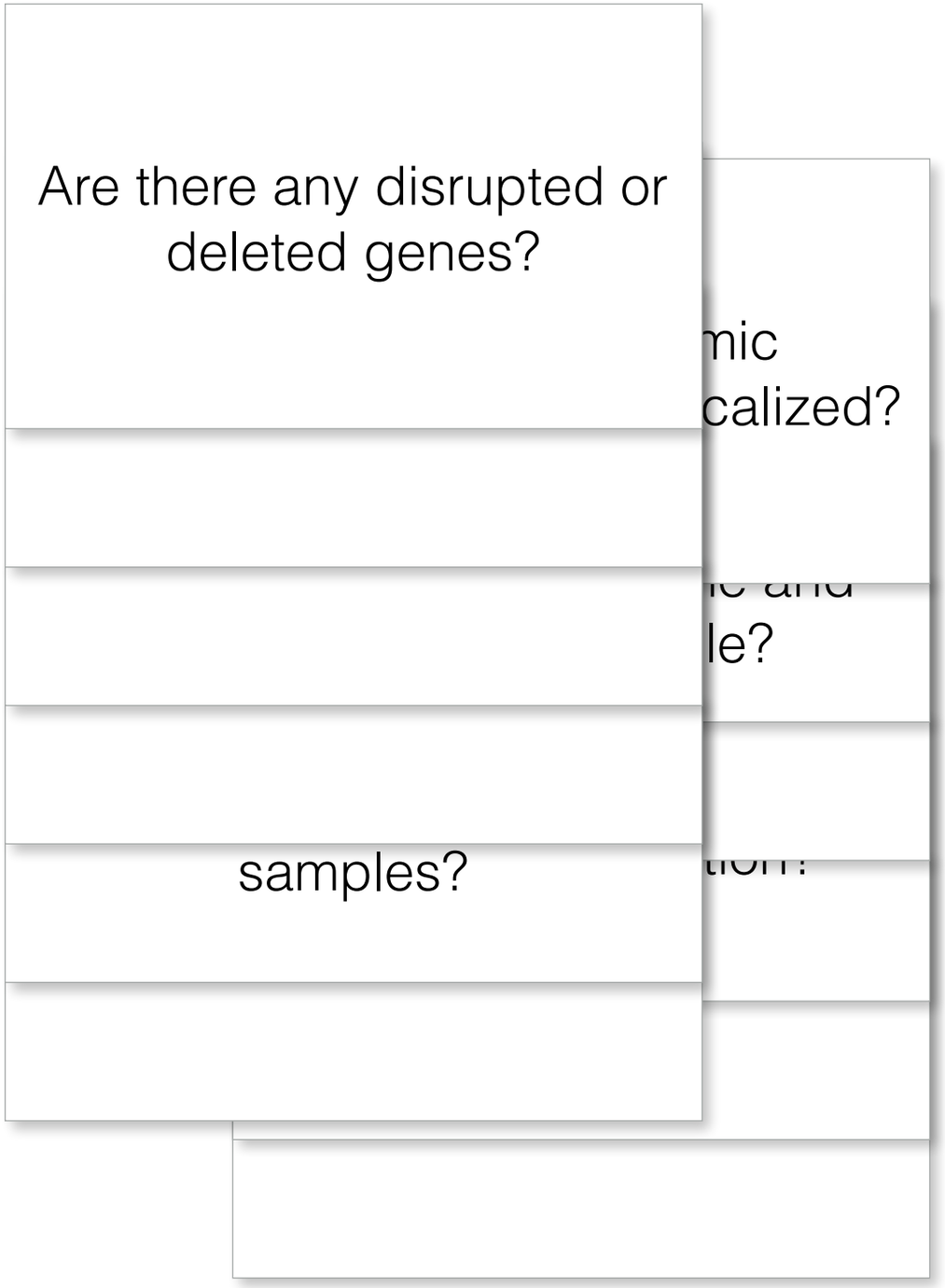
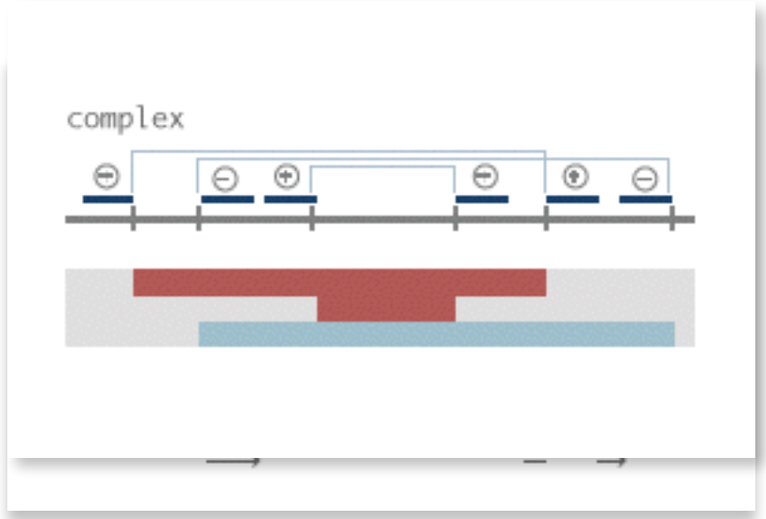
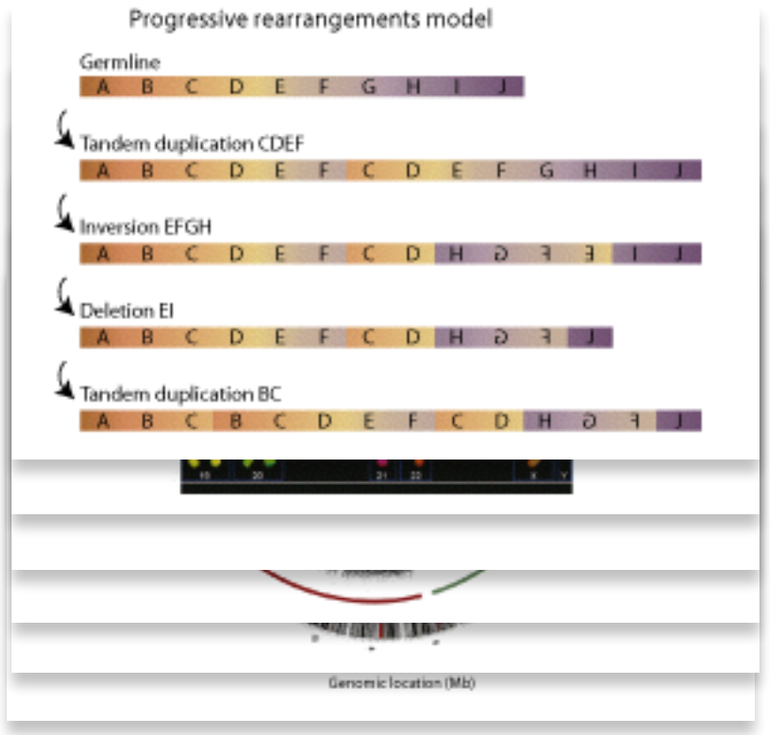


picture cards



new visual encoding ideas



from literature

Step 1: Preparation

inquiry-based cards

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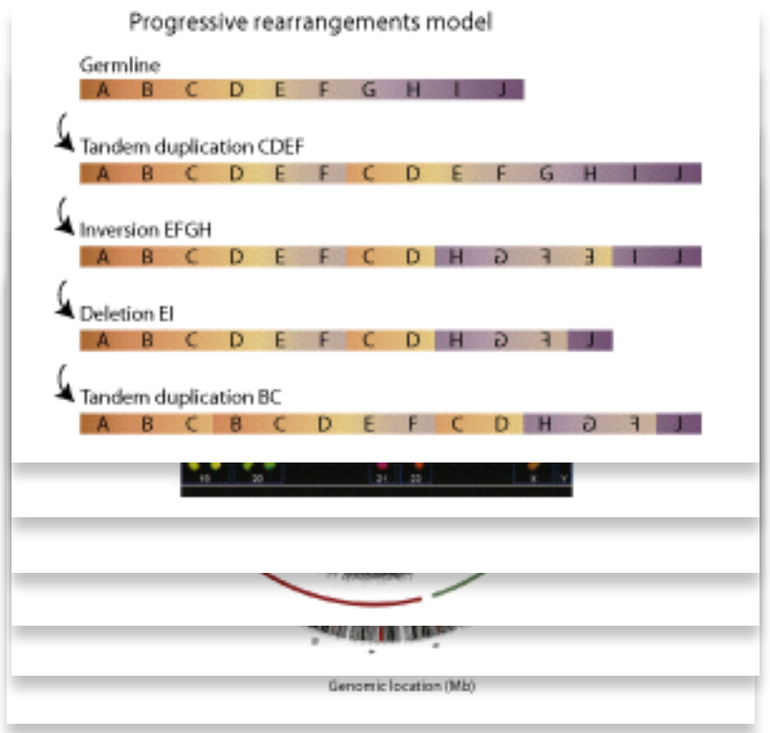
samples?

picture cards

V1

new visual encoding ideas



from literature

Step 2: Execution

1. open card sorting by yourself
2. repeat with the same/different cards with the same/ different user
   - “front-line analyst” vs. “gate keeper” [Sedlmair et al. 2012]

Step 3: Analysis

1. careful observation during the sorting exercise
2. analysis of criteria and categories (open)
3. analysis of assigned cards (open/close)

Case study

- Structural variations of human cancer genome
- user: computational biologists

	1	2	3	4
who:	designer	user	user	user
type:	open	open	closed	closed
cards:	inquiry	inquiry	inquiry	picture

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Genomic Resolution

Genome

Chromosome

Segment

Feature

M. Meyer, T. Munzner, and H. Pfister, “MizBee: A multiscale synteny browsers,” in IEEE Transactions on Visualization and Computer Graphics, 2009, vol. 15, no. October, pp. 897–904.

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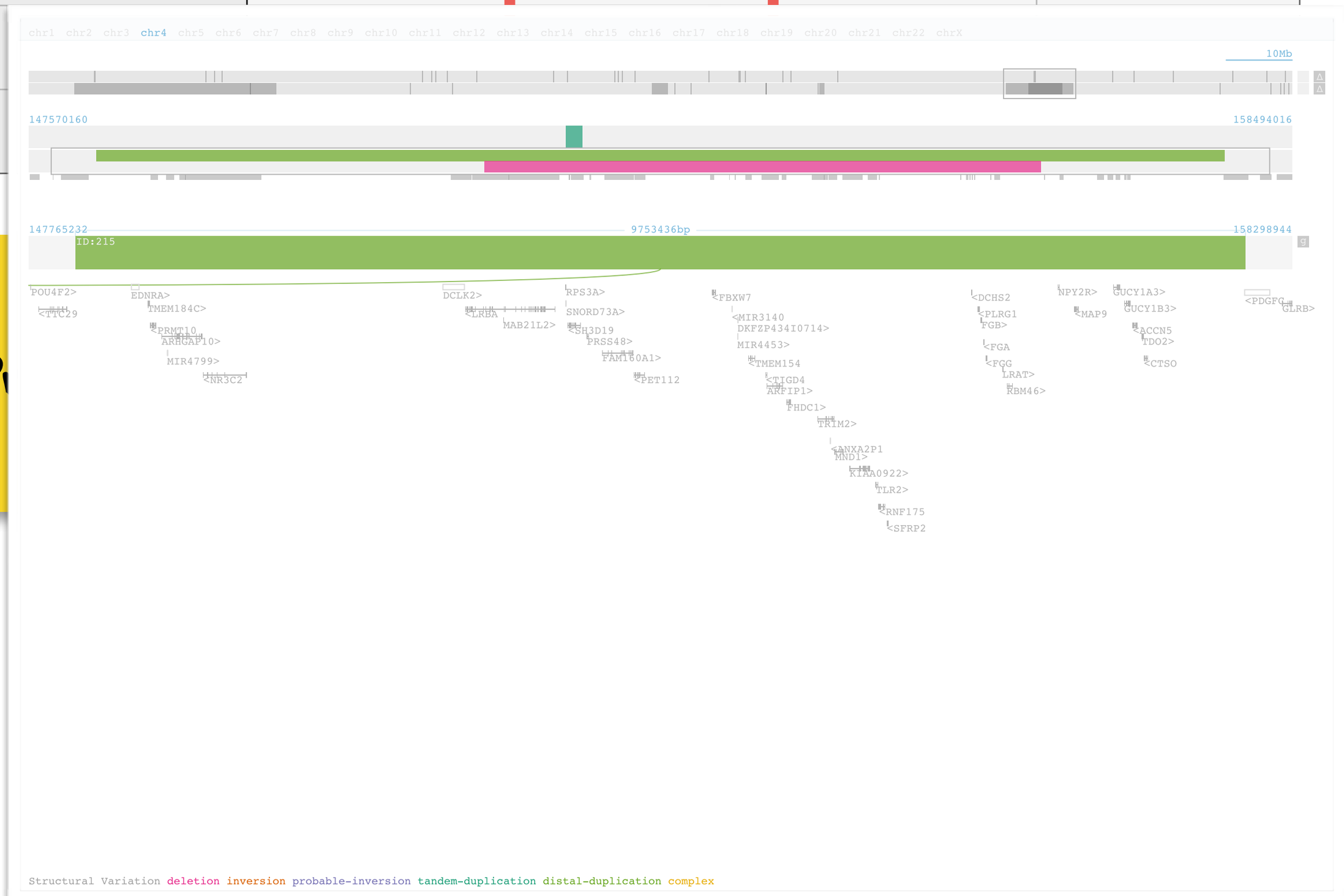
Process

Primary Analysis

In depth Analysis

Impact Validation

	1	2	3	4
who:	designer	user	user	user



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Genomic Resolution

Genome

How does the pattern of structural variation compare between the reference genome and tumour sample?

Chromosome

How does the pattern of SV compare between the normal and the tumour samples?

Segment

What is the sequence of structurally altered region?

Feature

Are there any exonic deletion or duplications?

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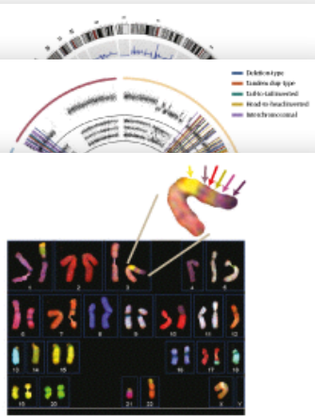

Chromosome

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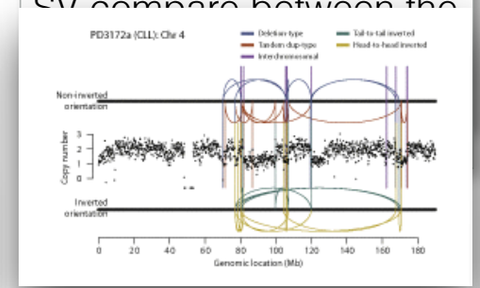

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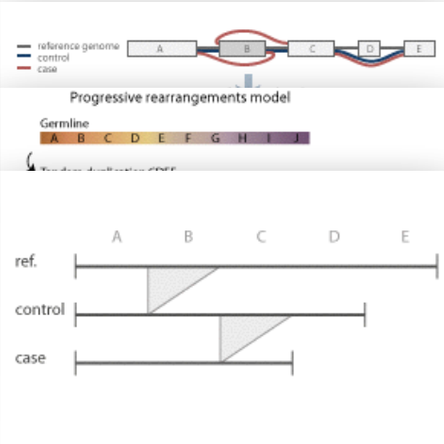

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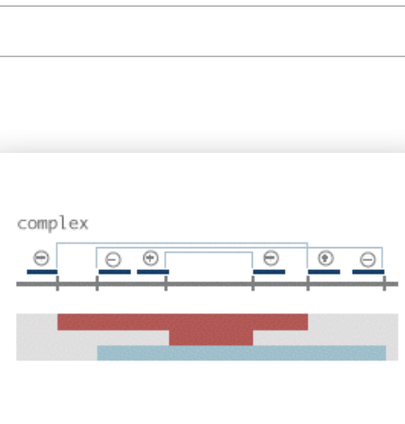

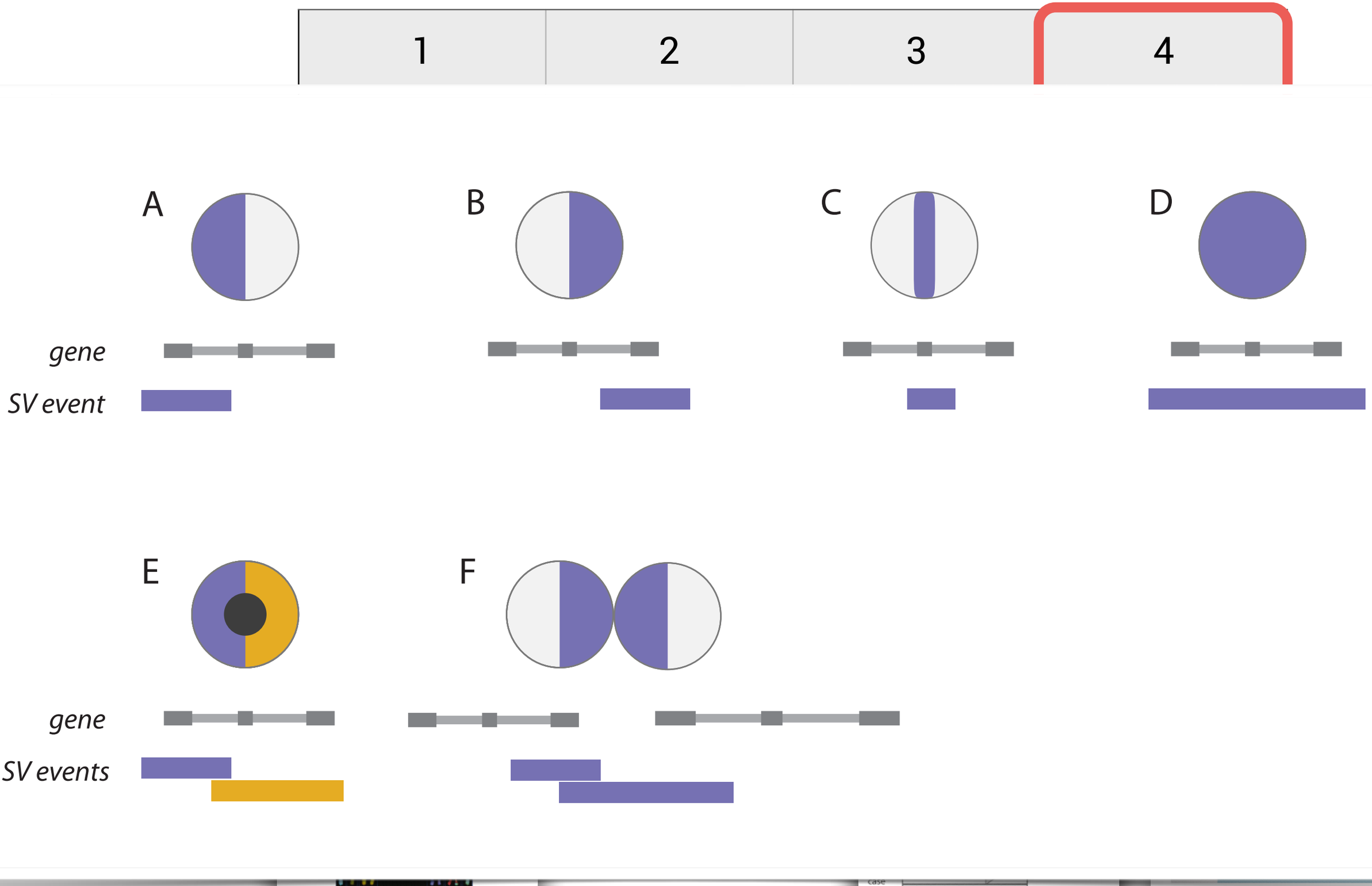

R. Sakai, M. Moisse, J. Reumers, and J. Aerts, “Pipit: visualizing functional impacts of structural variations.,” Bioinformatics, vol. 29, no. 17, pp. 2206–7, Sep. 2013.

Take home message

1. Card sorting is a simple and flexible method.
2. Card sorting exercises can be *generative* or *evaluative.*
3. The distilling process of card preparation helps to understand the context as well as the relationships of analysis tasks.
4. Card sorting can be useful for the domain characterisation in a problem-driven visualization research.

Acknowledgements

Dept. of Oncology, KU Leuven

Matthieu Moisse

Joke Reumers

Thank you!