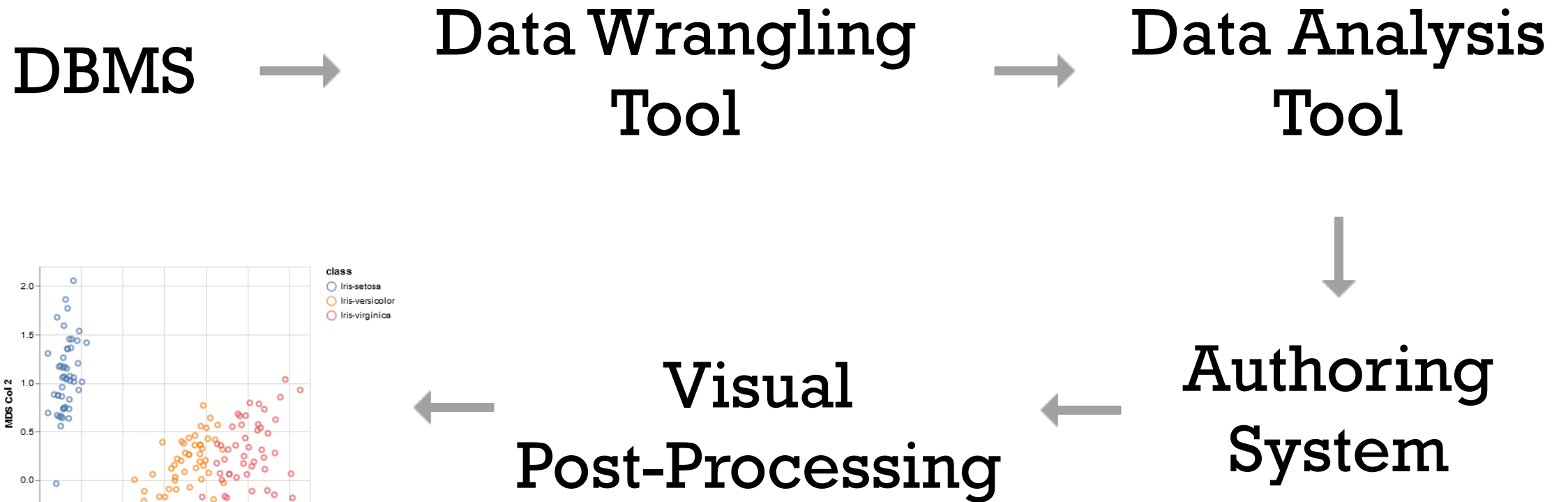


ReVize

A Library for Visualization Toolchaining with
Vega-Lite

Marius Hogräfer, Hans-Jörg Schulz

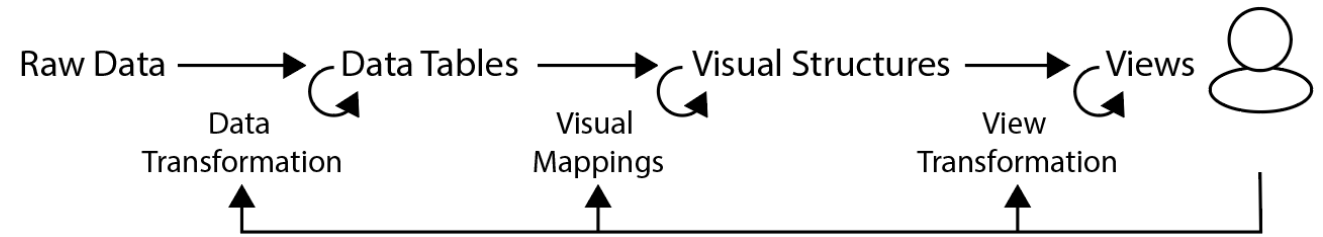




Toolchaining

Using **multiple** different tools
to author one visualization

Visualization Pipeline



DBMS



Data Wrangling
Tool



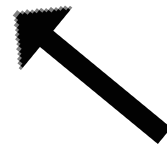
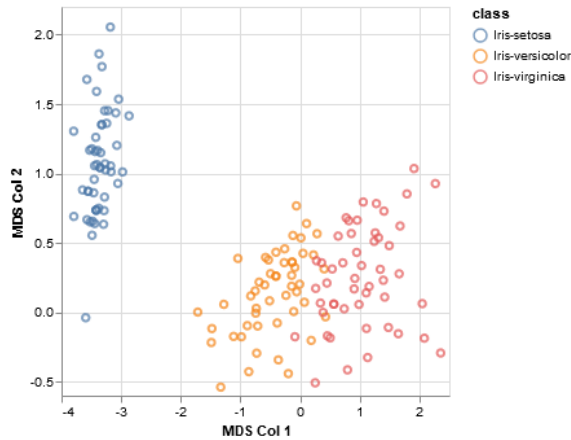
Data Analysis
Tool



Authoring
System



Graphical
Editor



DBMS



Data Wrangling
Tool



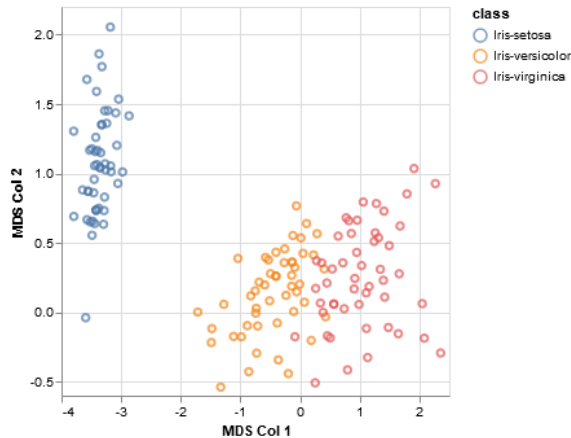
Data Analysis
Tool

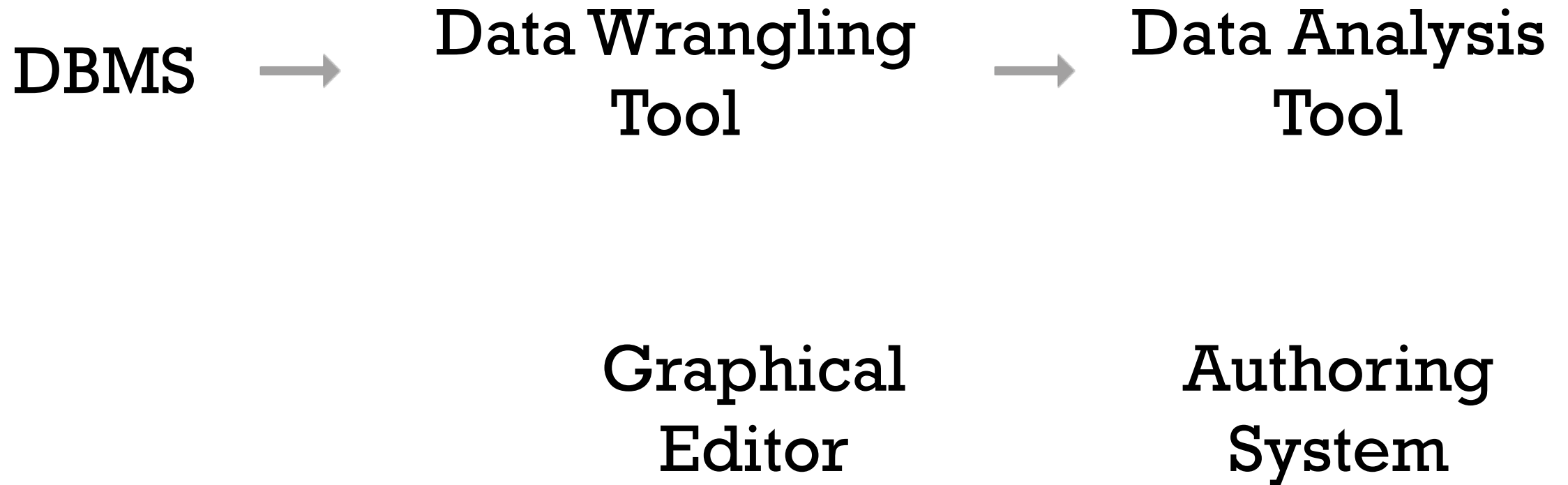


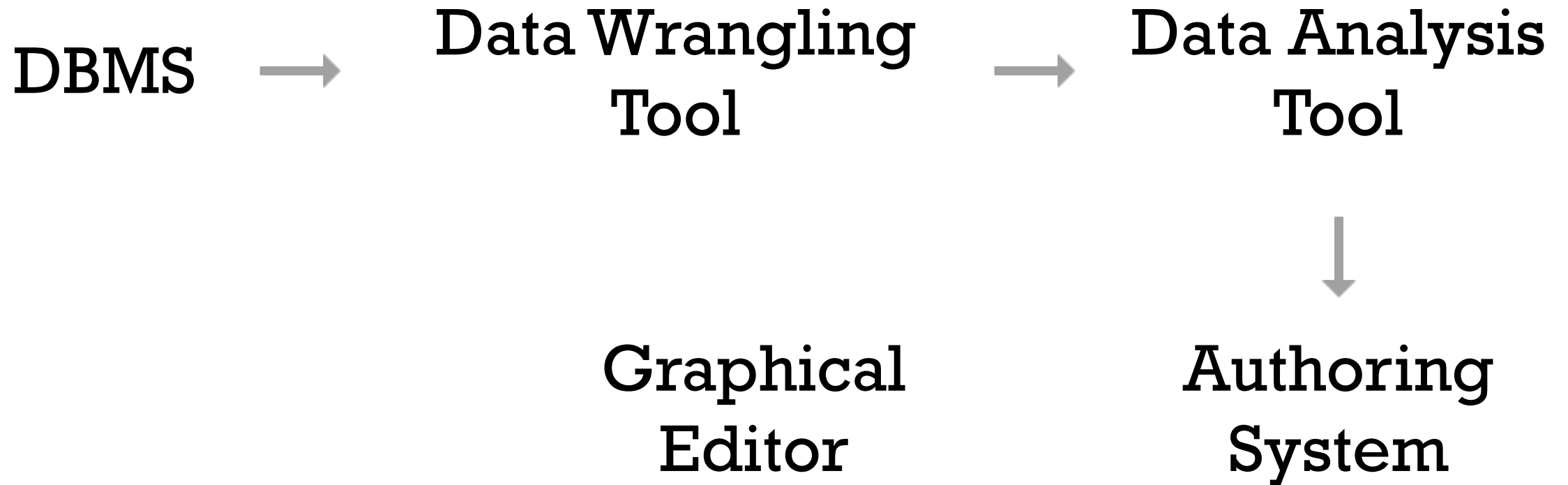
Authoring
System

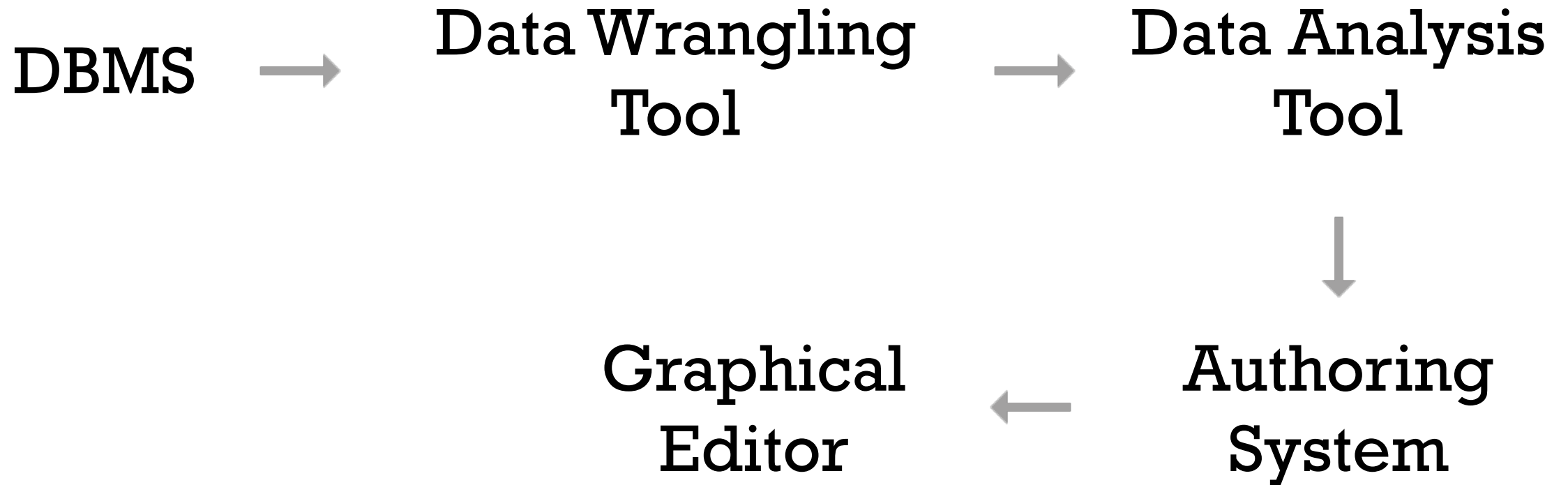


Graphical
Editor









DBMS



**Data Wrangling
Tool**



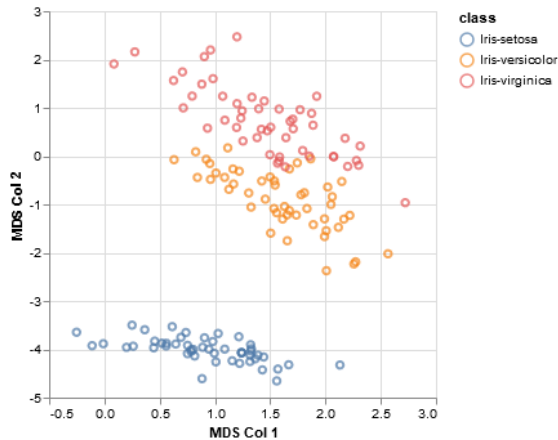
**Data Analysis
Tool**

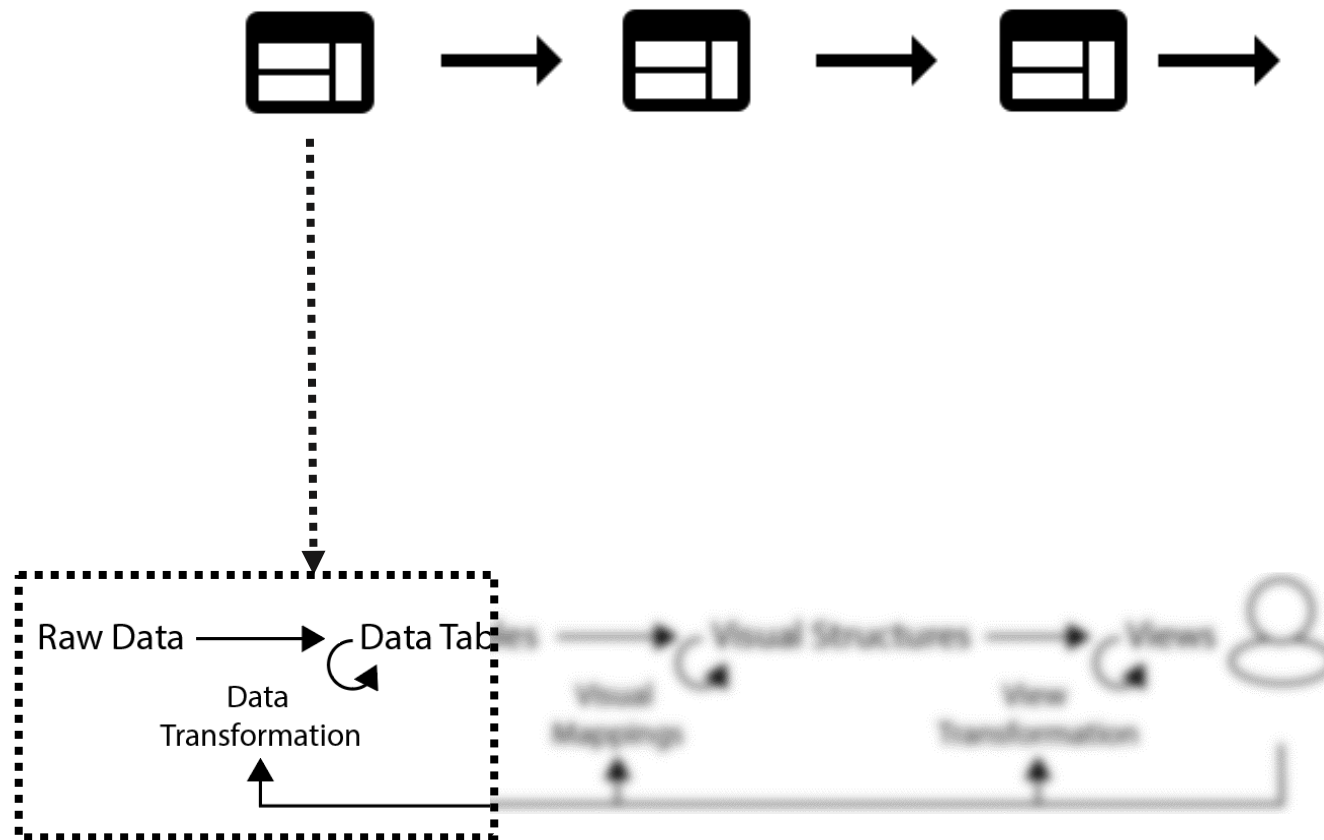


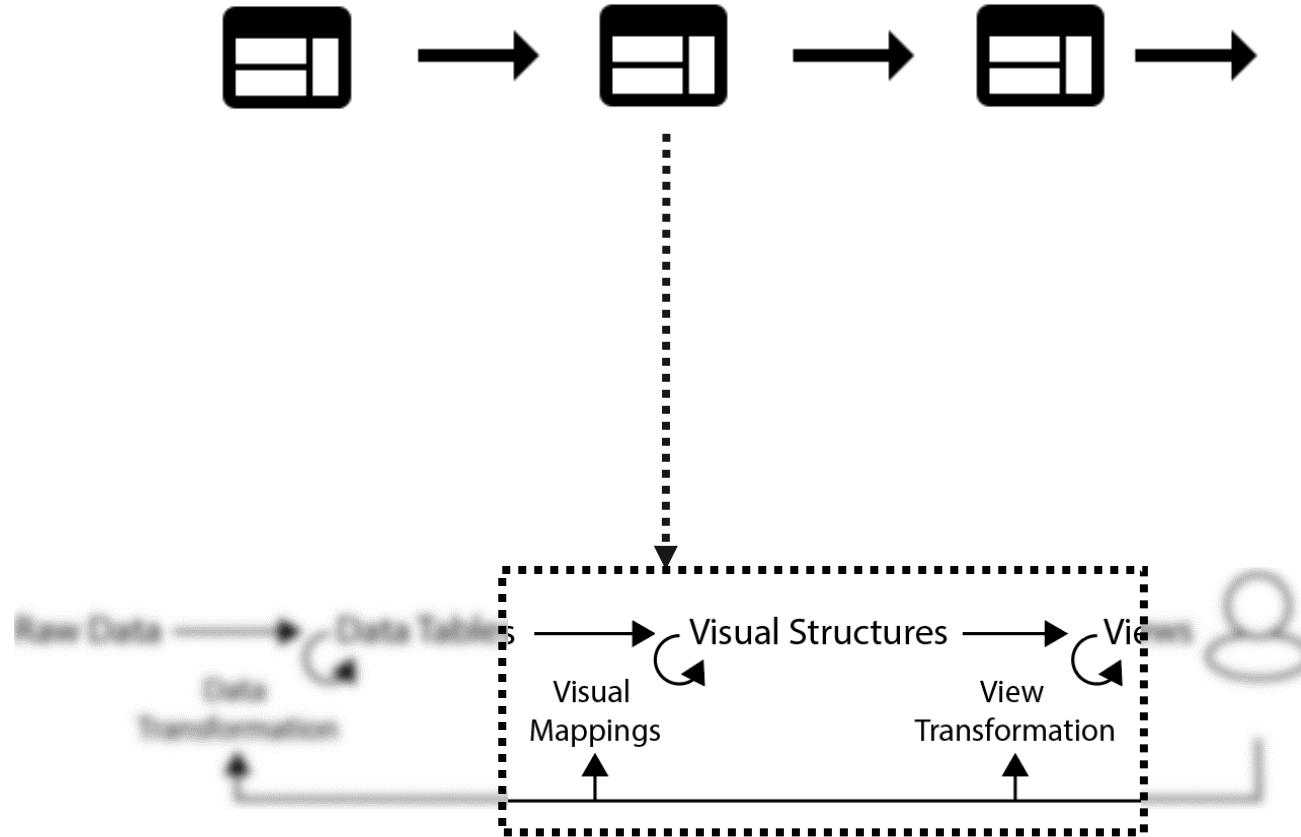
**Authoring
System**



**Graphical
Editor**





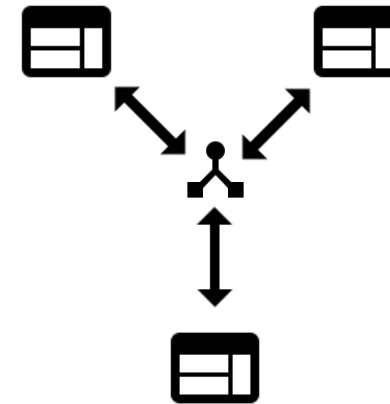




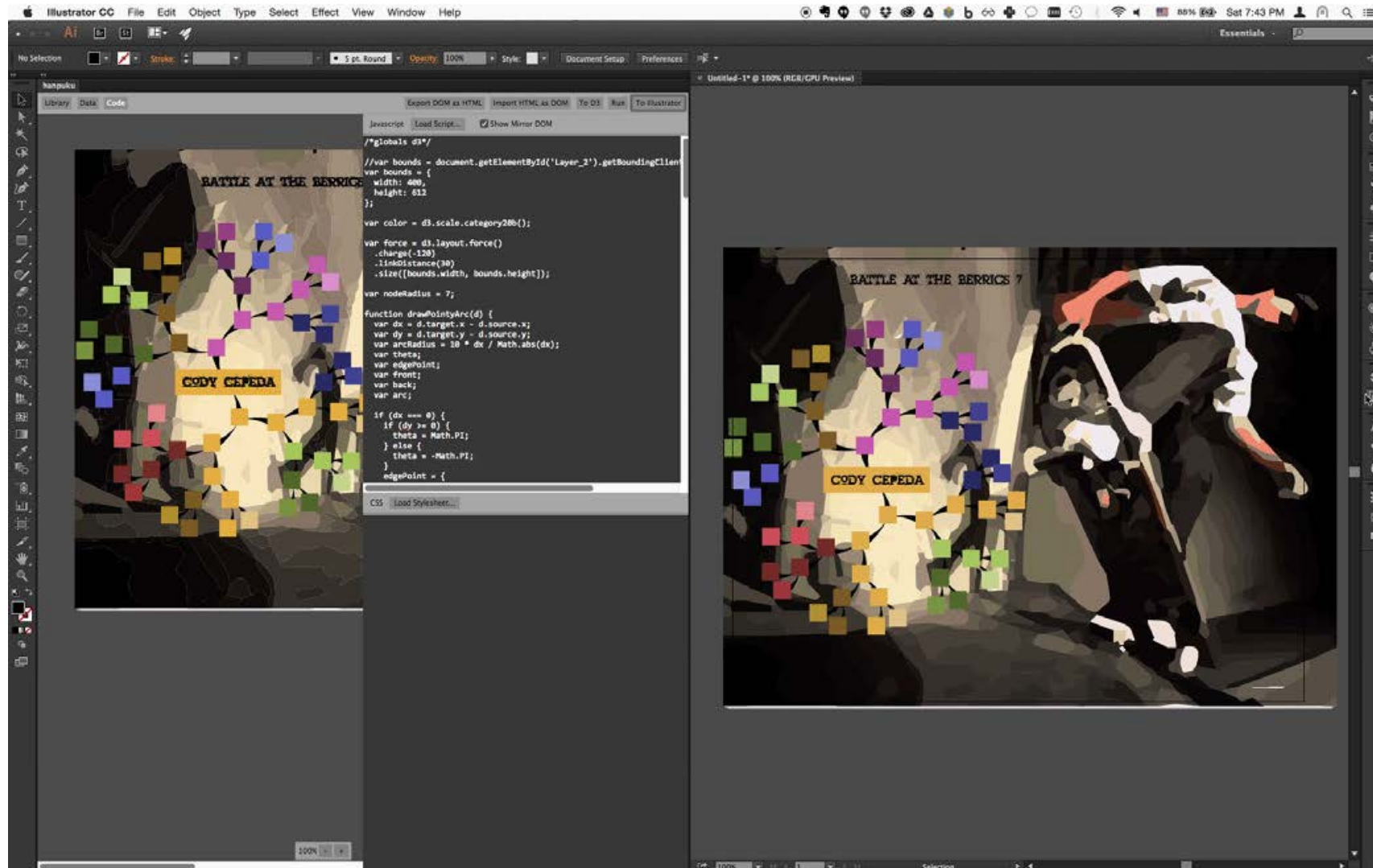
Existing Approaches



Consecutive

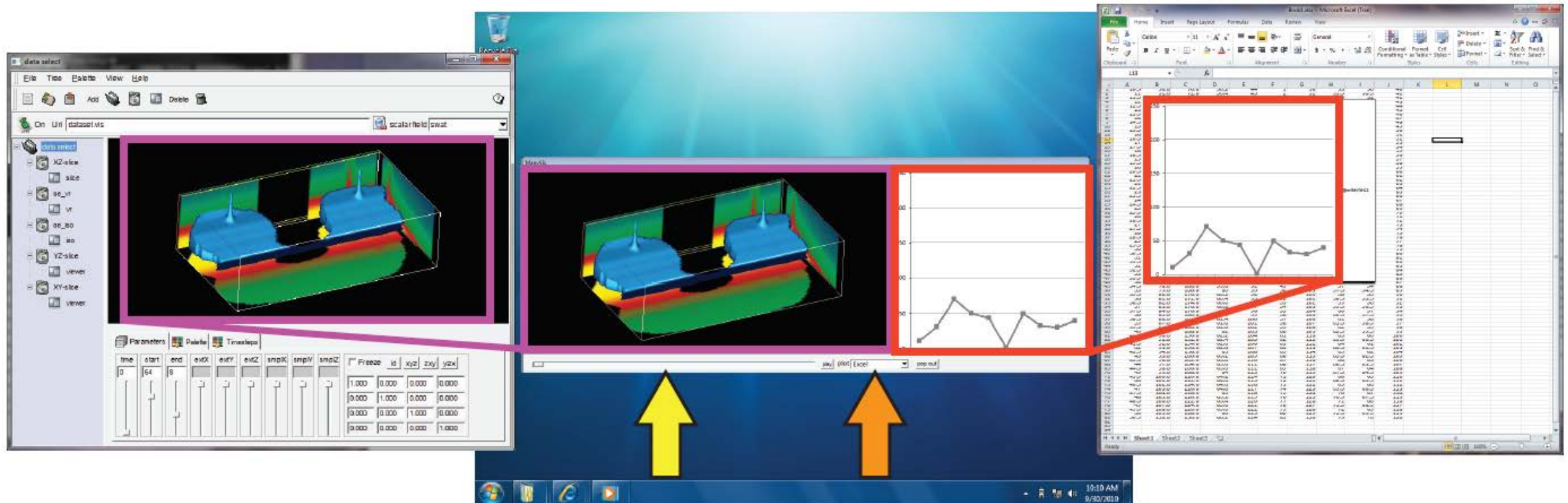


Parallel



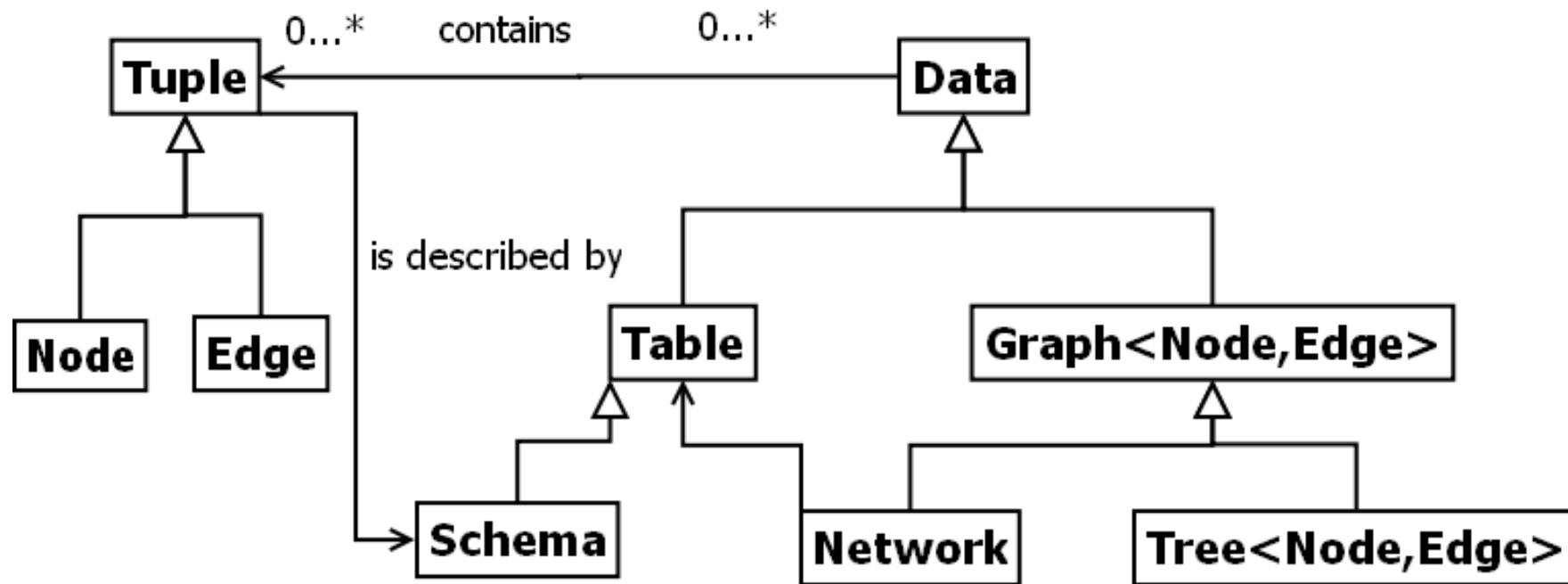
ManyVis

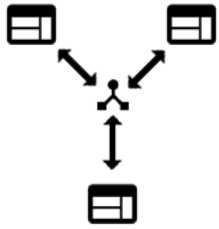
[RSD13*]



Obvious Framework

[FHBW11]





Parallel

Tool Iteration

All aspects of visualization are shared

Generally designed for specific toolchains

Coding effort for each tool that joins the toolchain

Consecutive



Decentralized

No adaptation of mediator to tools necessary

Lossy file formats

Tool-specific shared model

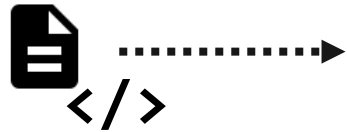
but

Our Approach

Exchanging a full model of the
visualization pipeline between all tools

Using a declarative visualization grammar

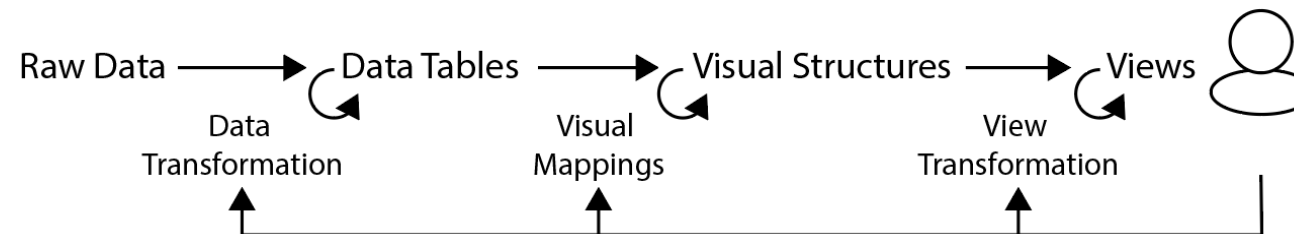




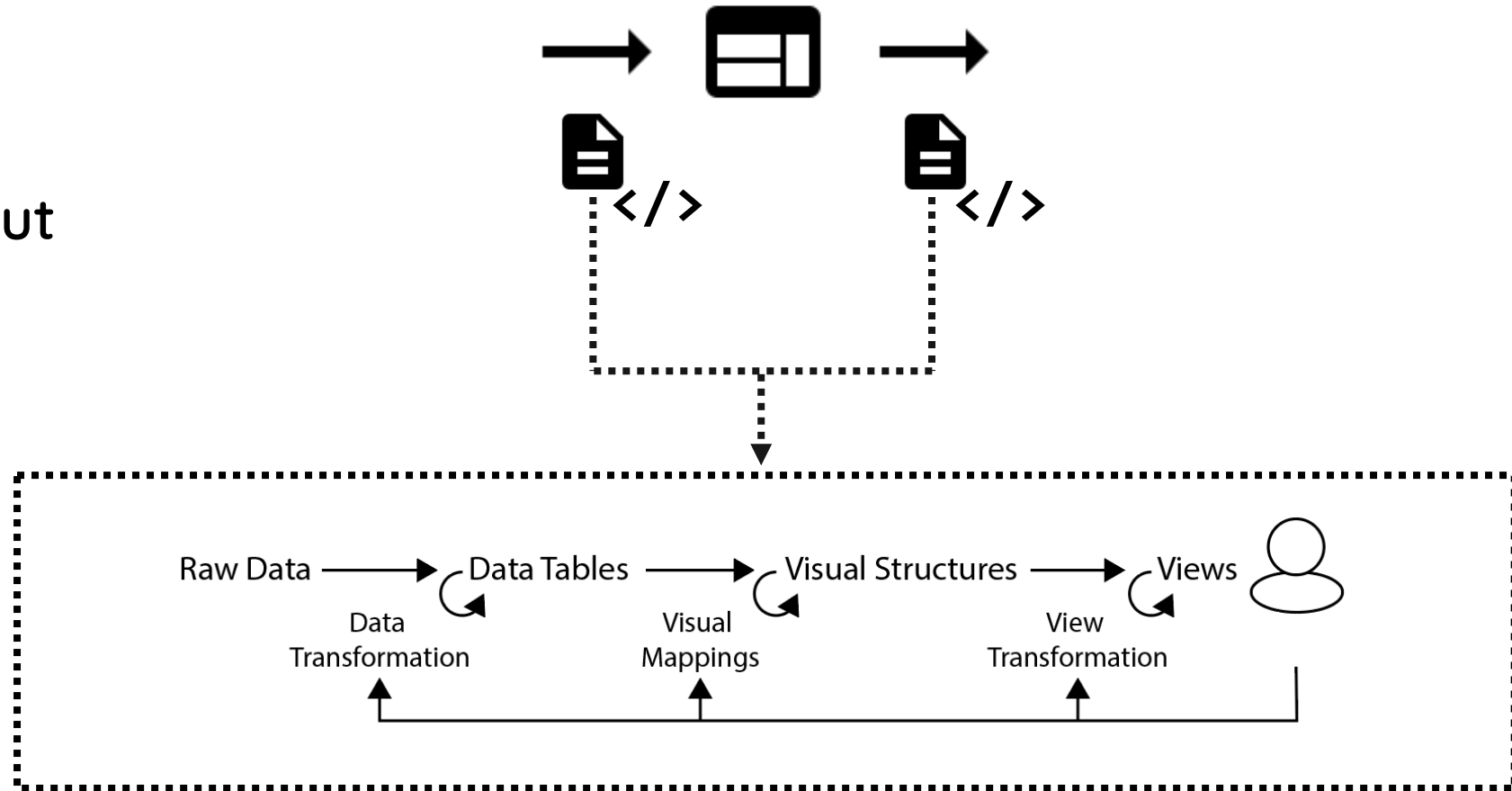
```
<visualization>
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    <transformation>
      <operation type="MDS" "parameters="dim:2,iteration:4"/>
    </transformation>
  </source>

  <visualEncoding>
    <visualMark type="circle" data="myData">
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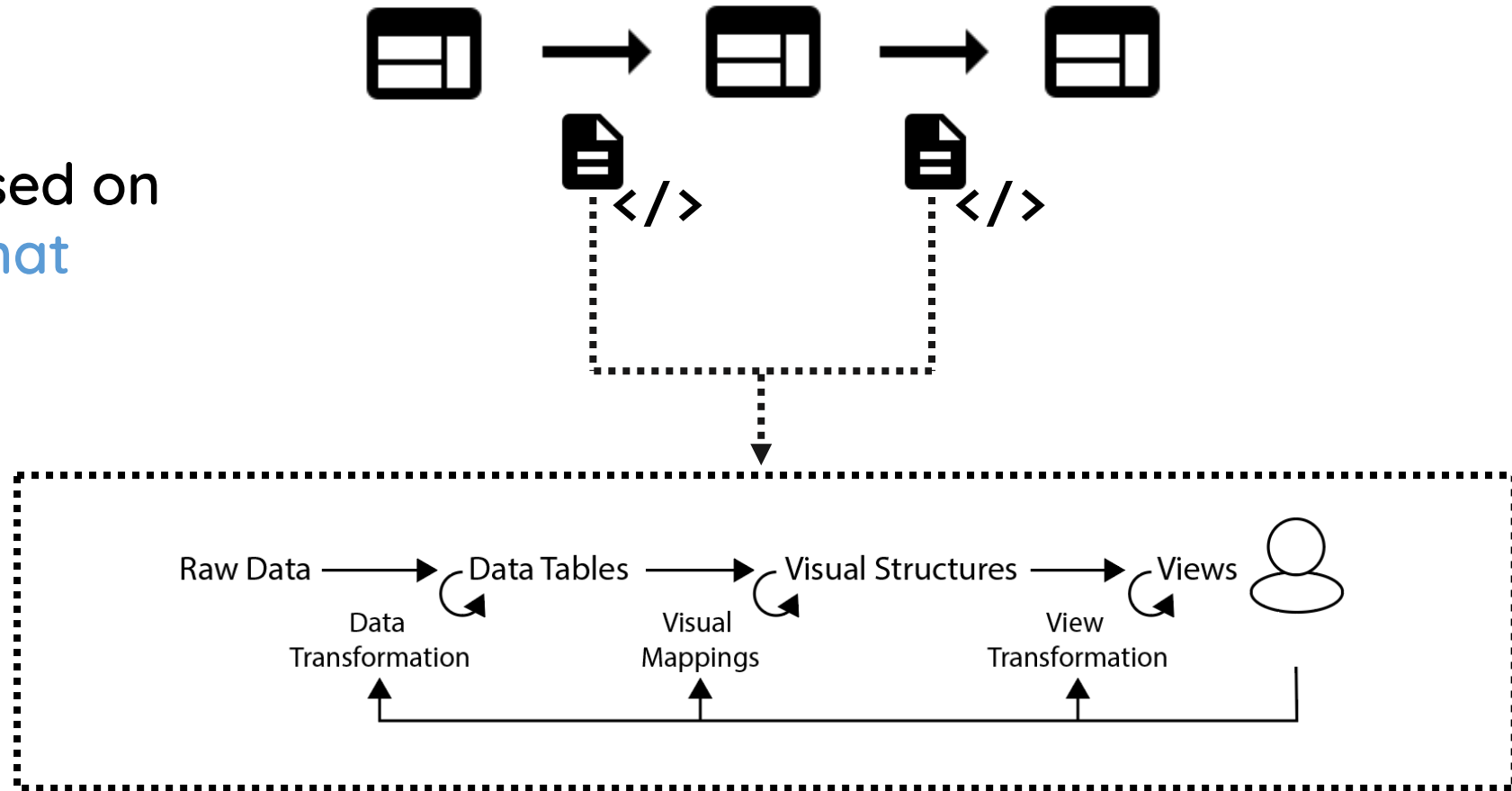
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```



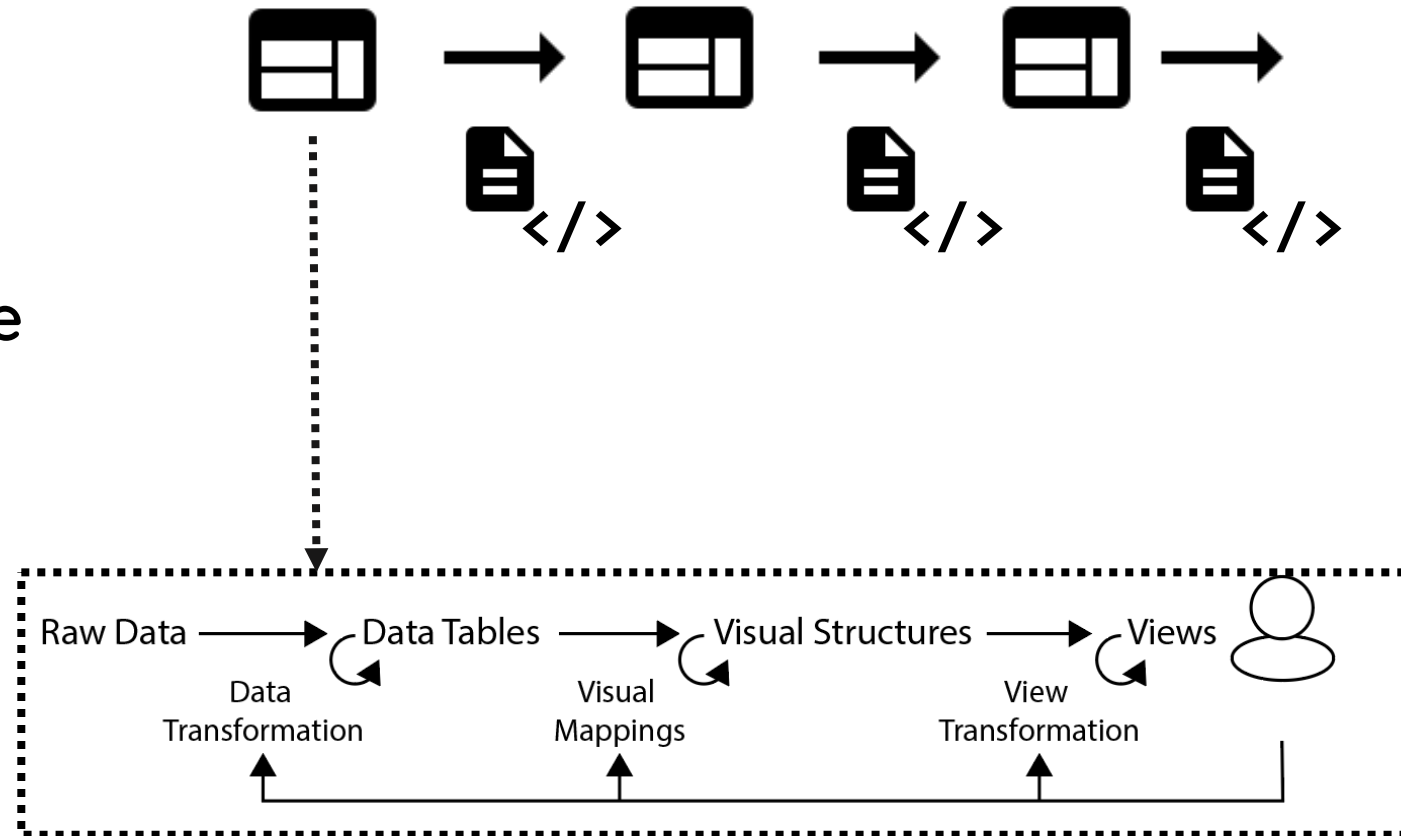
Symmetric input and output formats



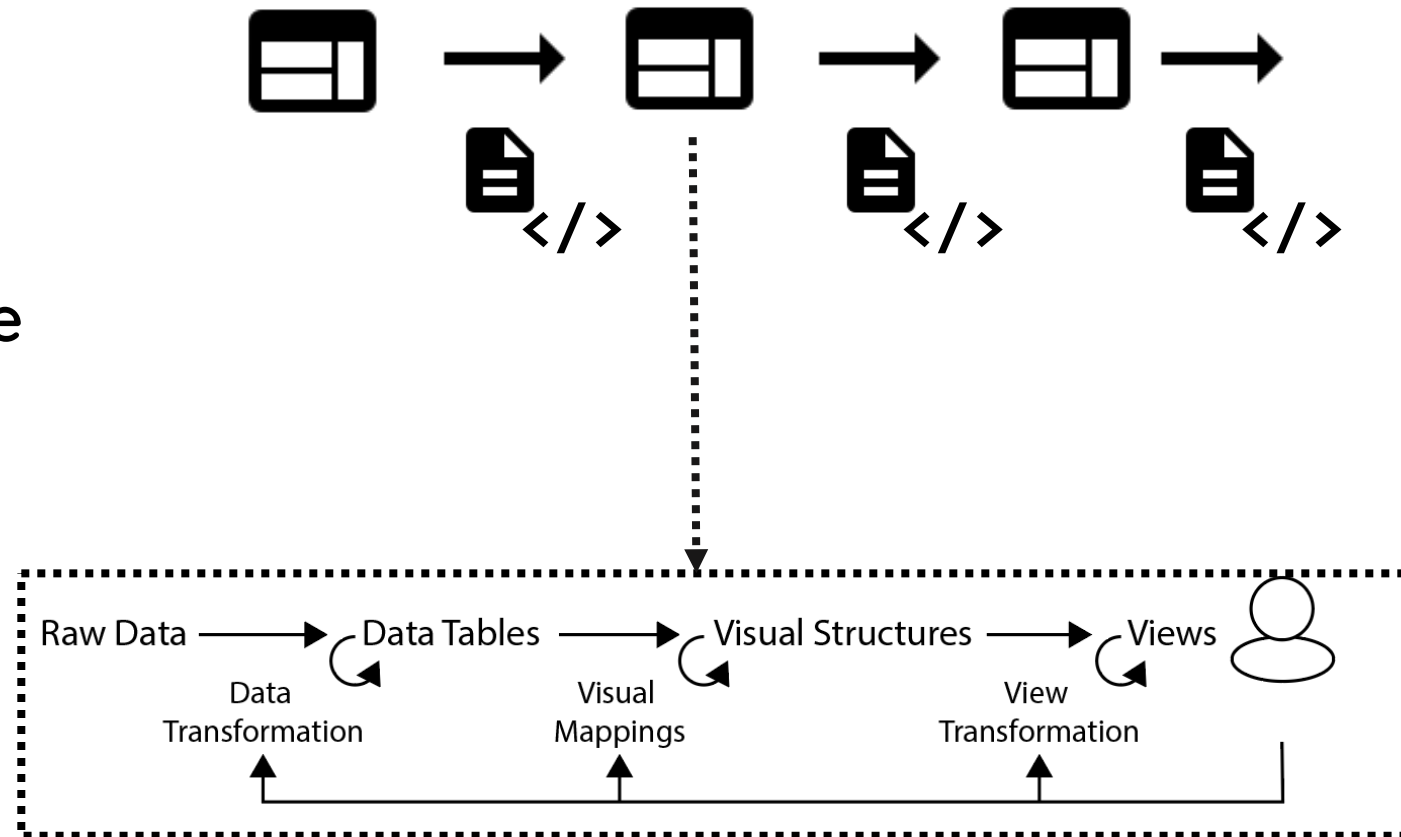
Toolchains based on exchange format



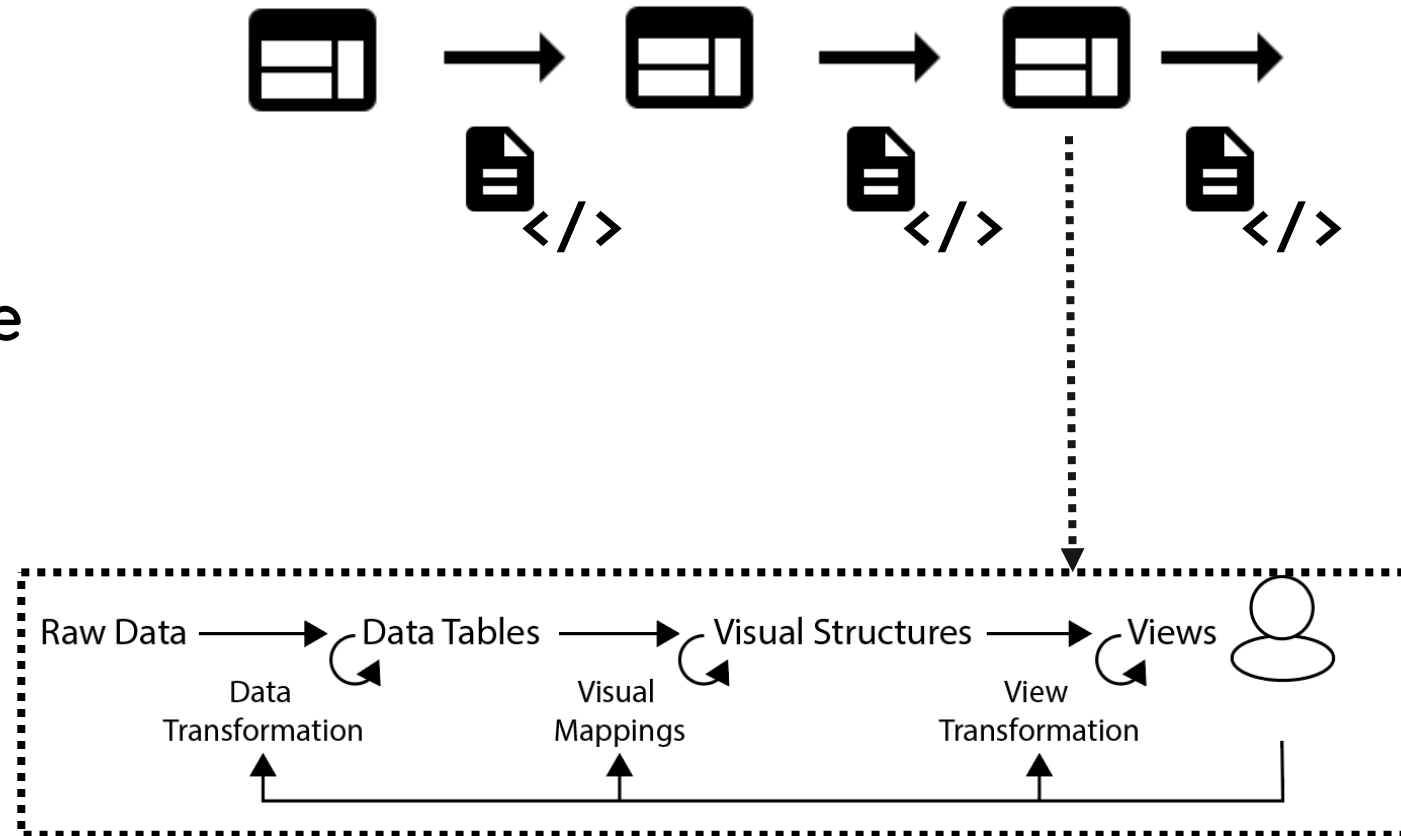
Every tool has
full command over
visualization pipeline



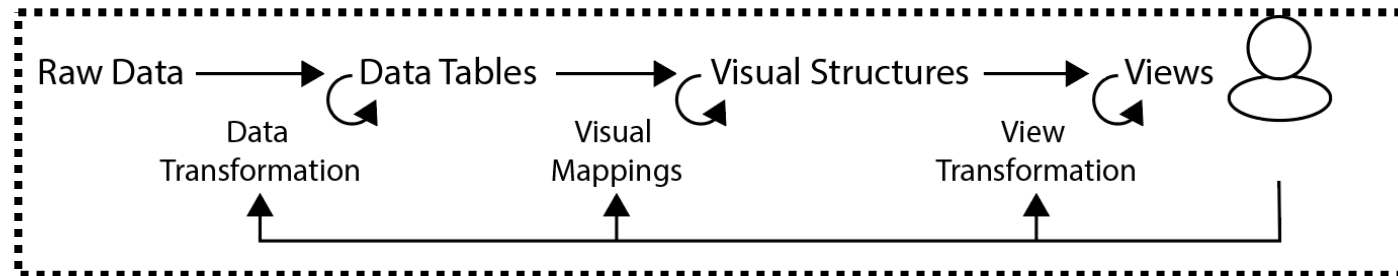
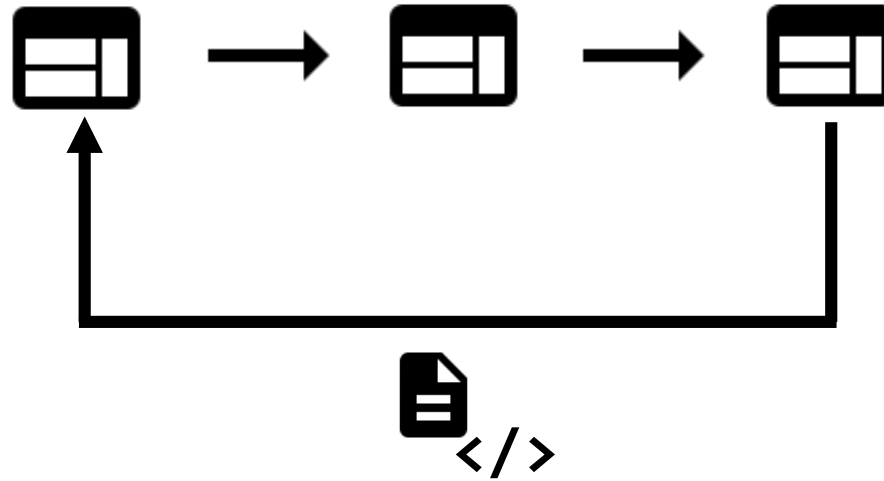
Every tool has
full command over
visualization pipeline



Every tool has
full command over
visualization pipeline



Supports
tool iteration



Why has this not been done before?

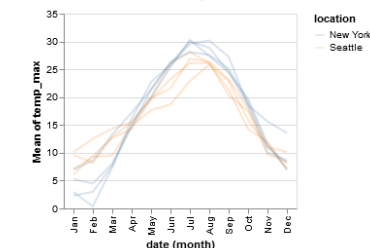
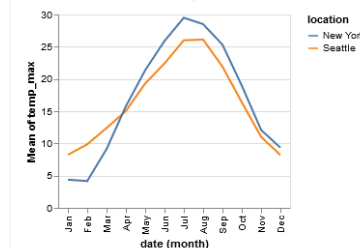
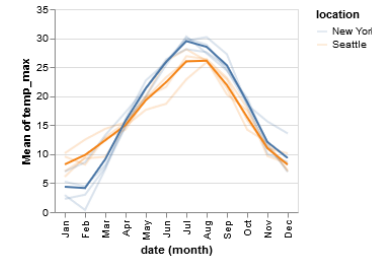
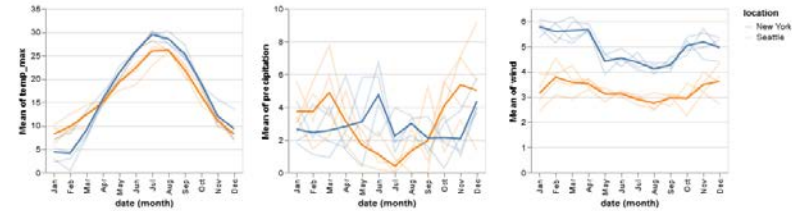
Few tools **export** to visualization grammars

No tool allows **importing** from declarative grammars

ReVize

A Library for Visualization Toolchaining
with Vega-Lite 

Import ()

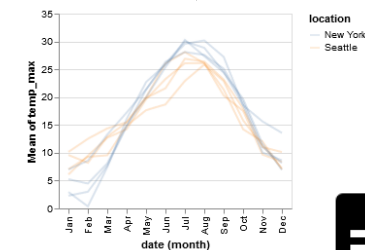
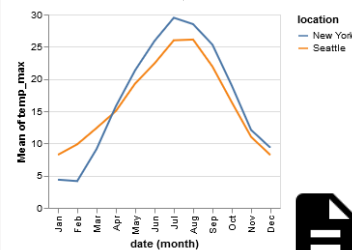
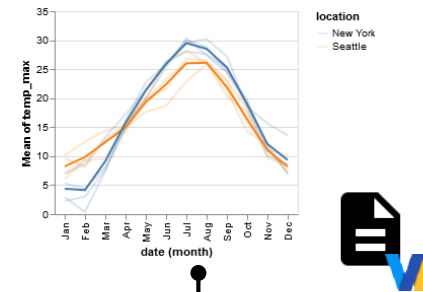
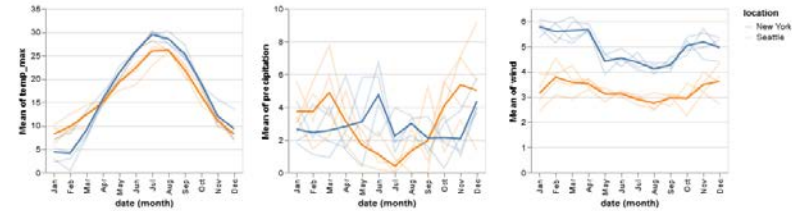


Hierarchical View Decomposition

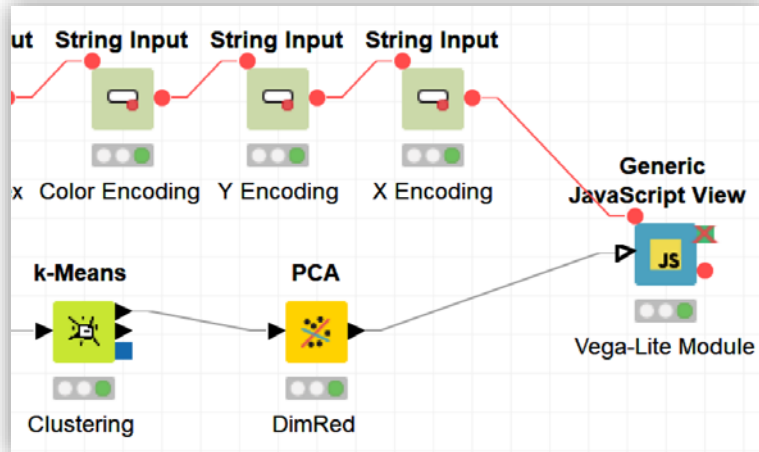
Import ()



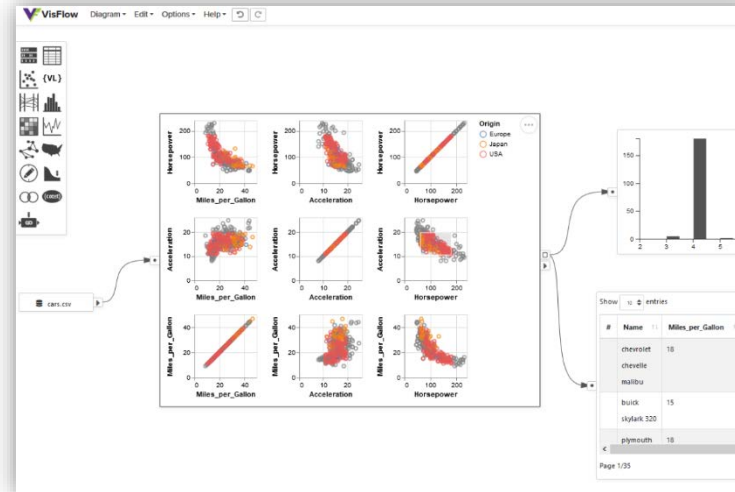
Visualization Reuse



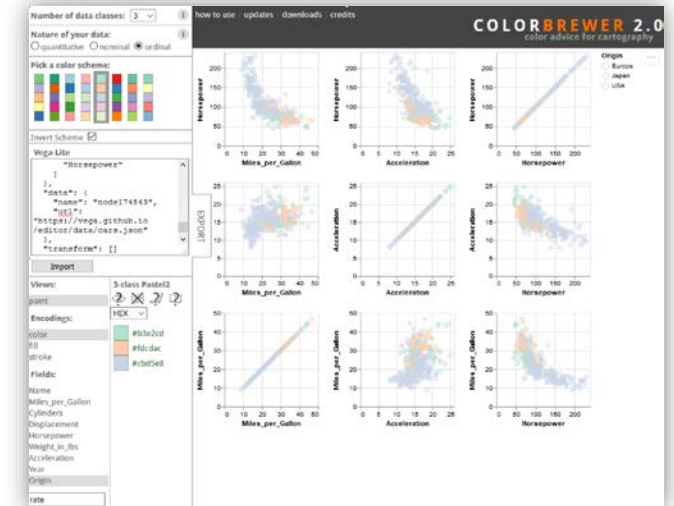
Example Scenario



KNIME



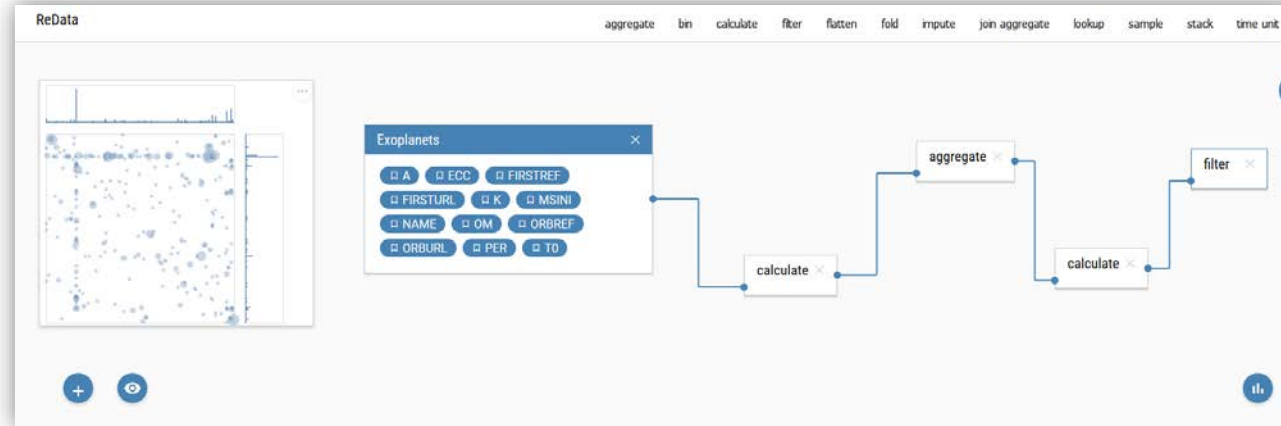
VisFlow



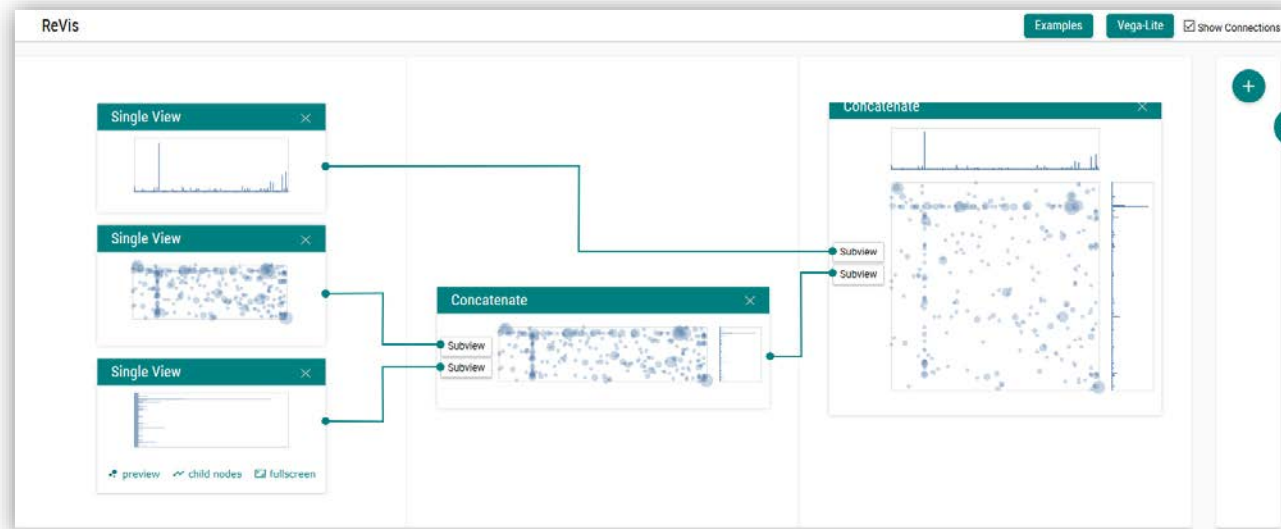
ColorBrewer

Demo Video

Built with ReVize

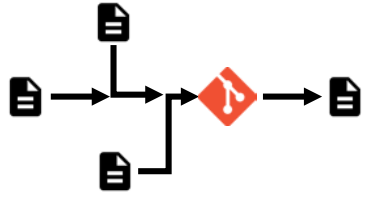


ReData

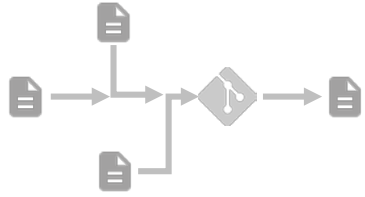


ReVisualize

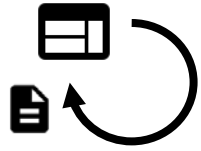
Additional Benefits



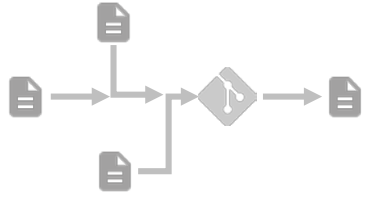
Line-based diff for **versioning control**



Line-based diff for versioning control



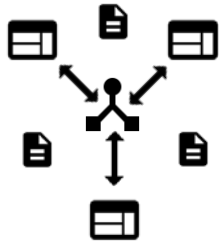
Using a visualization grammar to for project
persistence in visualization tools



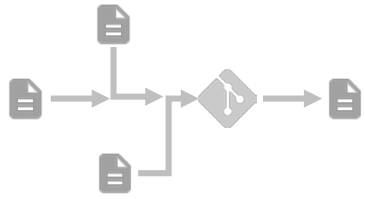
Line-based diff for versioning control



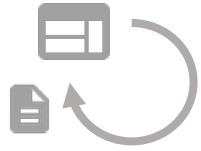
Using a visualization grammar to for project persistence in visualization tools



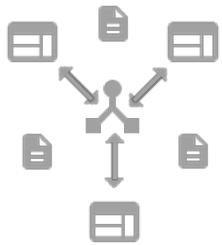
Content-based approach can be implemented for **mediated toolchaining**



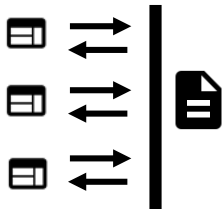
Line-based diff for versioning control



Using a visualization grammar to for project persistence in visualization tools

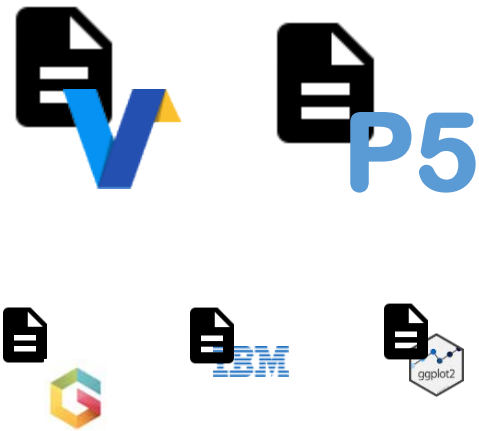


Content-based approach can be implemented for mediated toolchaining

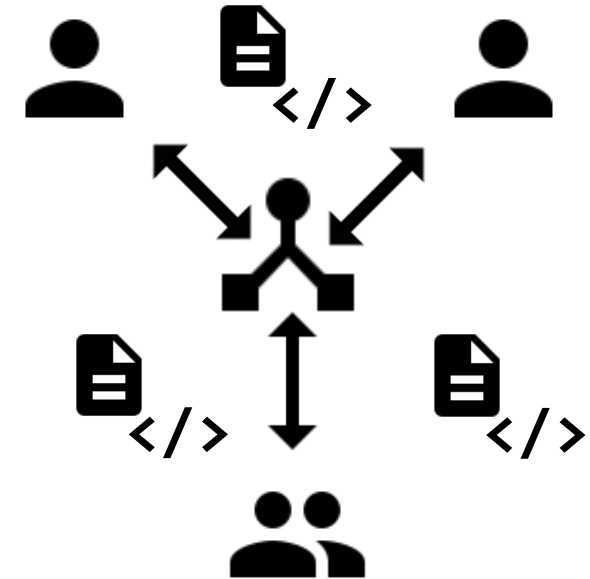


Unix-like specialized visualization tools instead of monolithic systems

Open Challenges



Toolchaining with other
visualization grammars



Access control to parts of
visualization pipeline?

Conclusion

Visualization toolchaining

Partial models of visualization pipeline

Declarative Visualization Grammars

ReVize

ReVize: A Library for Visualization Toolchaining with Vega-Lite

Marius Hognräfer, Hans-Jörg Schulz



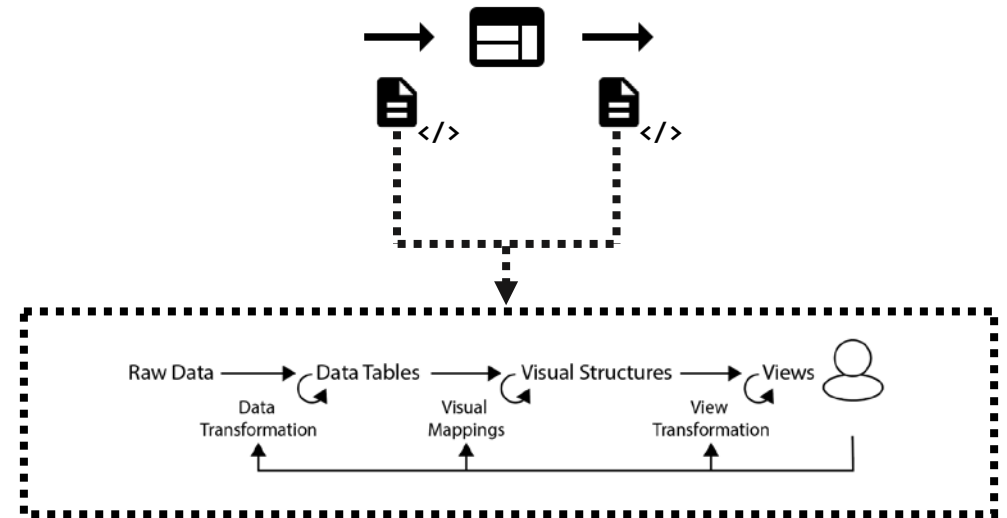
@Mahog



mhograefer@cs.au.dk



<https://vis-au.github.io/toolchaining>



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- Guozheng Li, Min Tian, Qinmei Xu, Wentao Zhang, Michael McGuffin & Xiaoru Yuan GoTree: A Grammar of Tree Visualizations IEEE Transactions on Visualization and Computer Graphics, 2019

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