Visualization, DD2257

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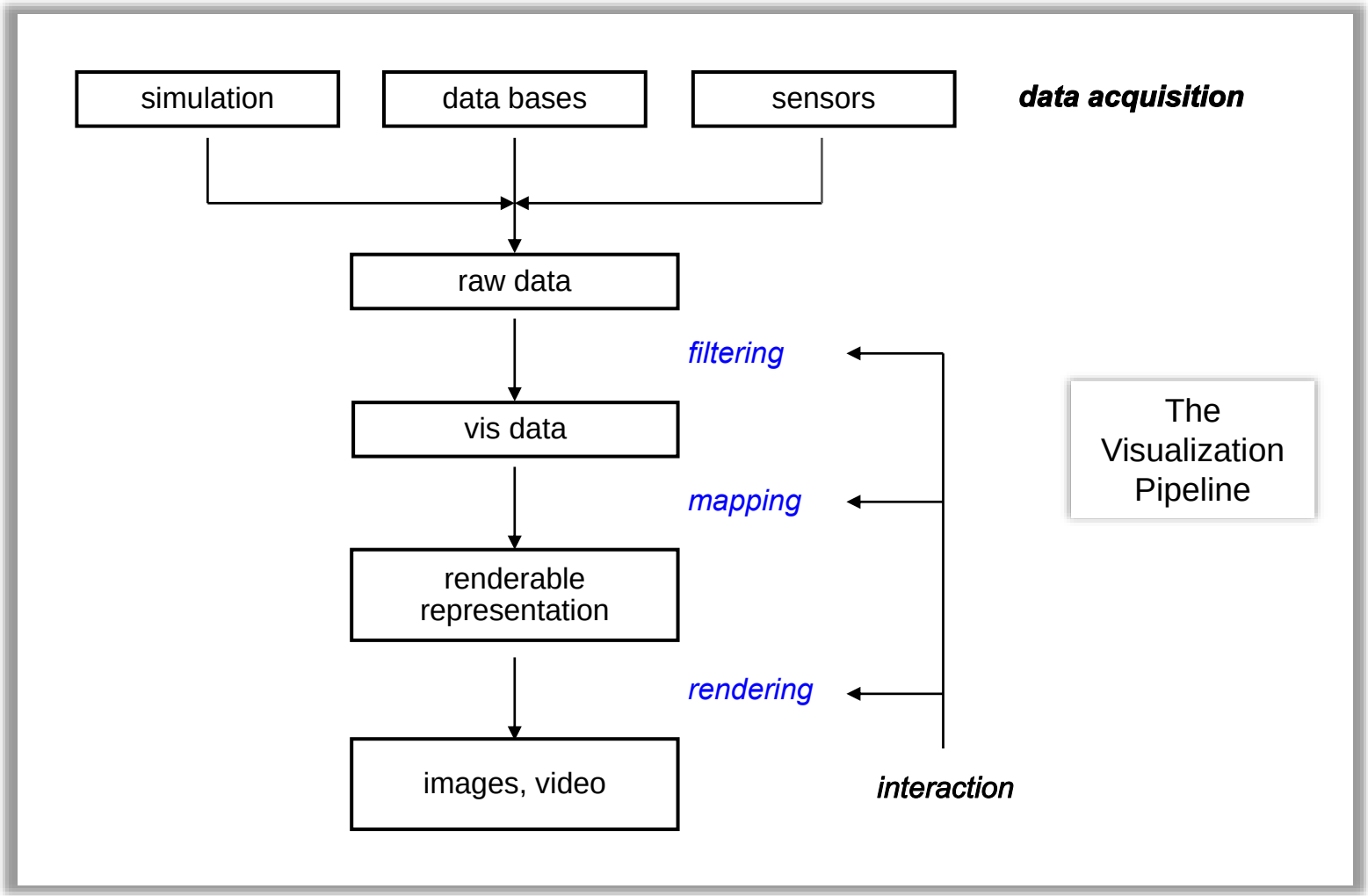
The Visualization Pipeline

very important

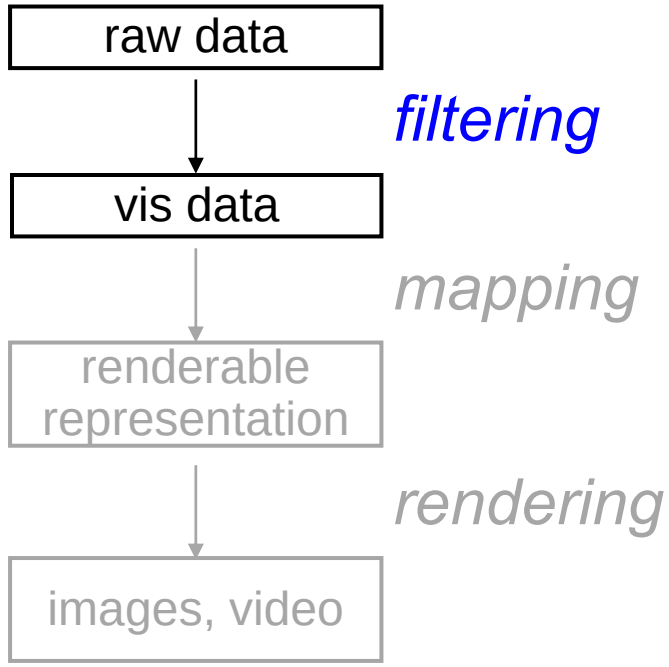
The process of converting data to images contains the steps:

- Filtering
- Mapping
- Rendering



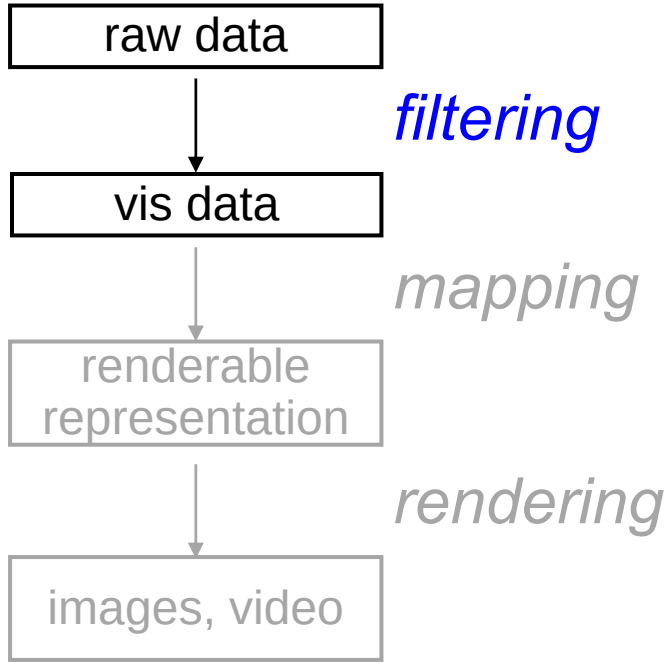
Filtering:

- starts with raw data
- raw data is prepared for the visualization
- result is filtered data which go to the mapping step
- ➔ data to data map



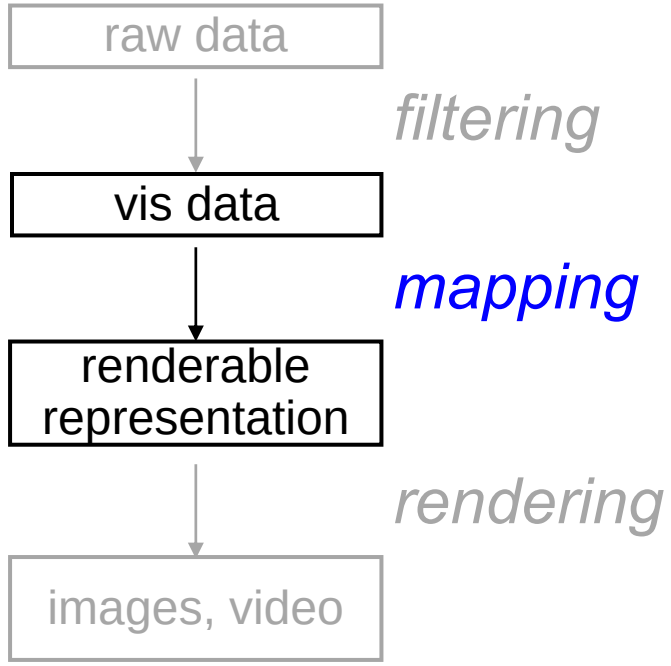
Operations for filtering:

- **completing/cleaning the data set**
  - if data values are missing
  - if data values are outliers
- **reduce data set**
  - remove non-relevant data by certain criteria
- **smoothing data**
  - apply filter and smoothing operators
- **compute characteristic properties of the data**
  - gradients
  - extreme values
  - metadata
- **apply conversions**
  - imperial ➔ metric
  - customary ➔ metric



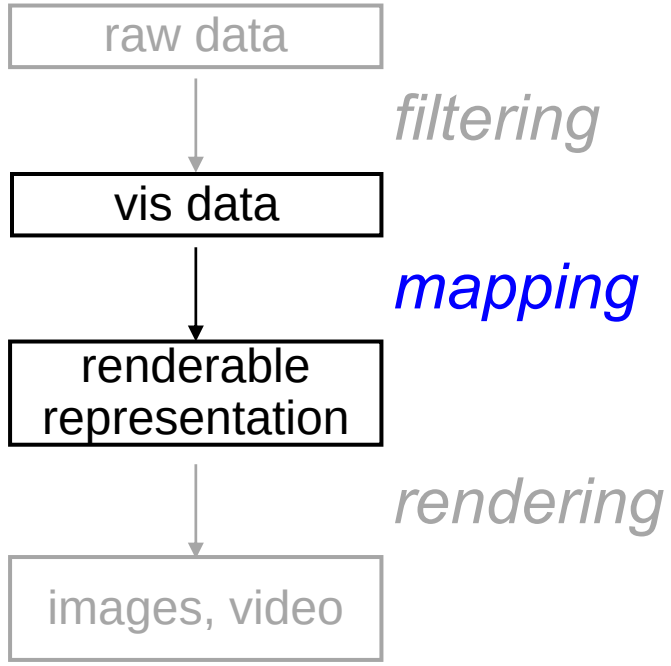
Mapping:

- conversion of the data into renderable 2D or 3D graphical primitives and their attributes (e.g. creating a polygon list or a triangular mesh)
- consider expressiveness, efficiency, appropriateness
- ➔ data to geometry map



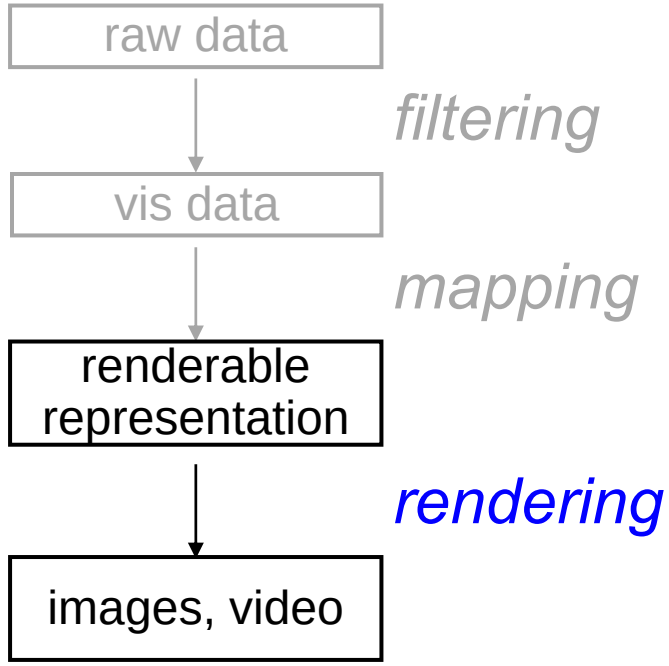
To find good mappings, theories, algorithms and guidelines from different disciplines are used:

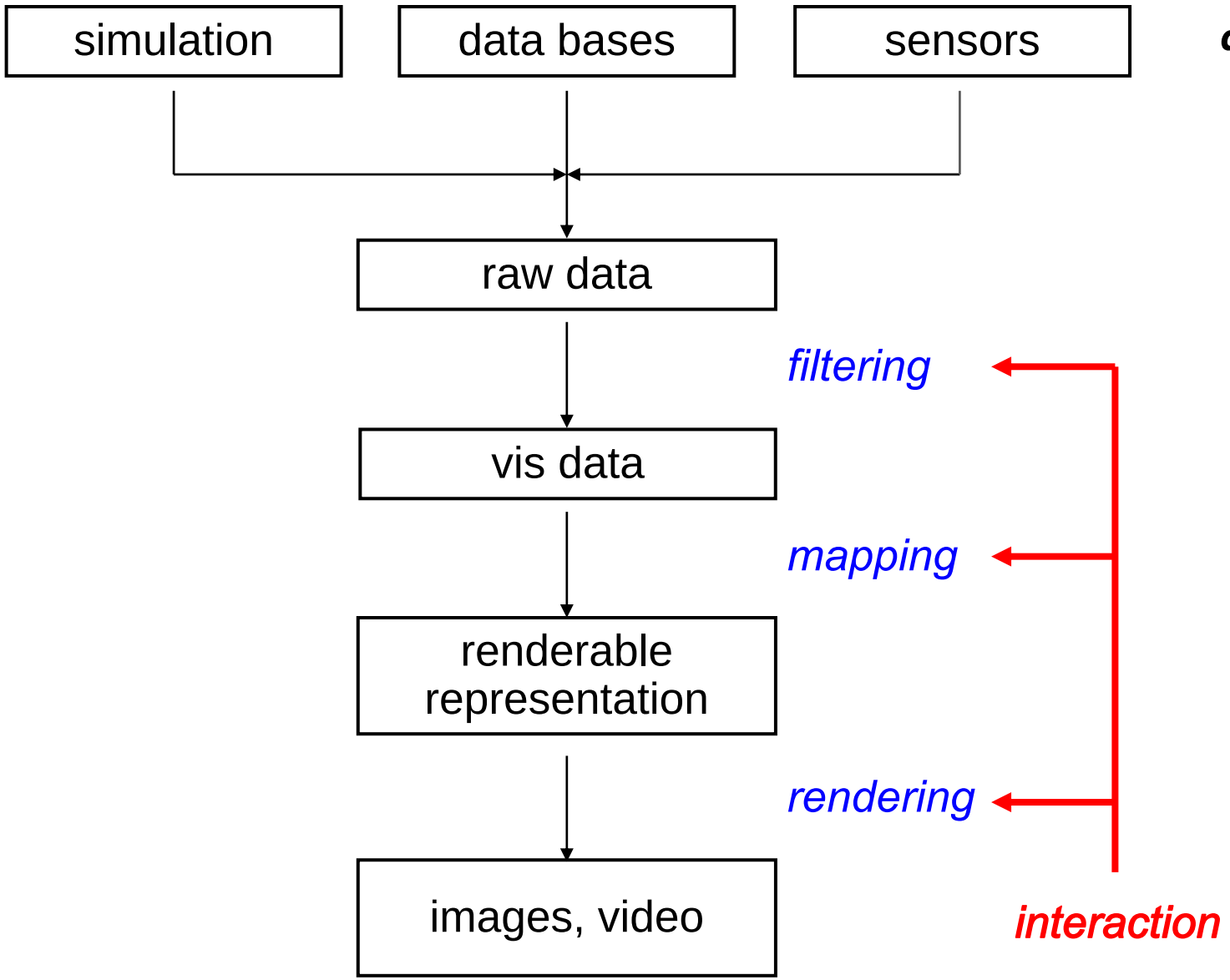
- computer graphics
- computer vision
- perception theory
- user interface design
- information processing
- psychology
- arts



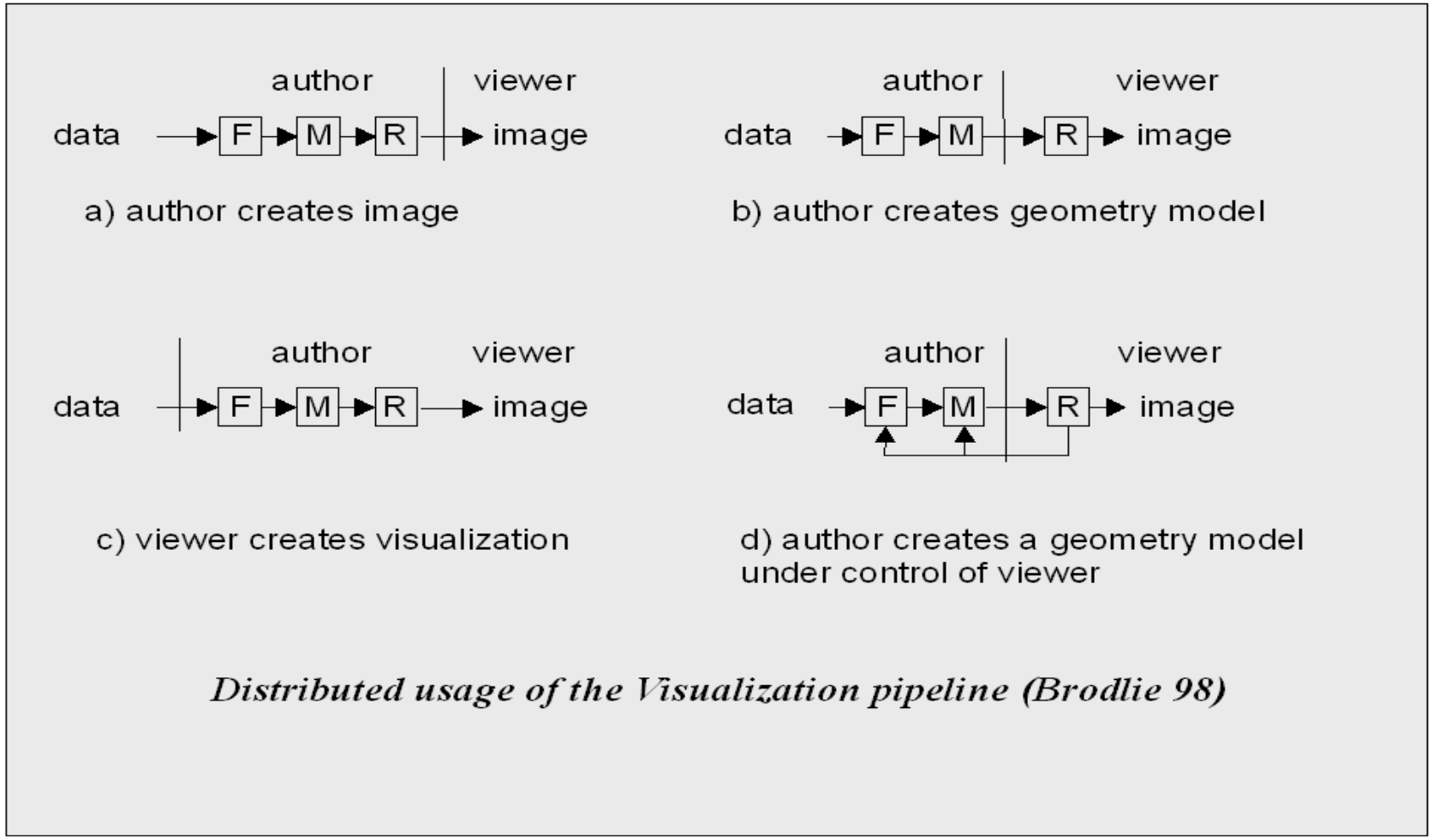
Rendering:

- Generating a 2D image, video, stereo image
- ➔ geometry to image map

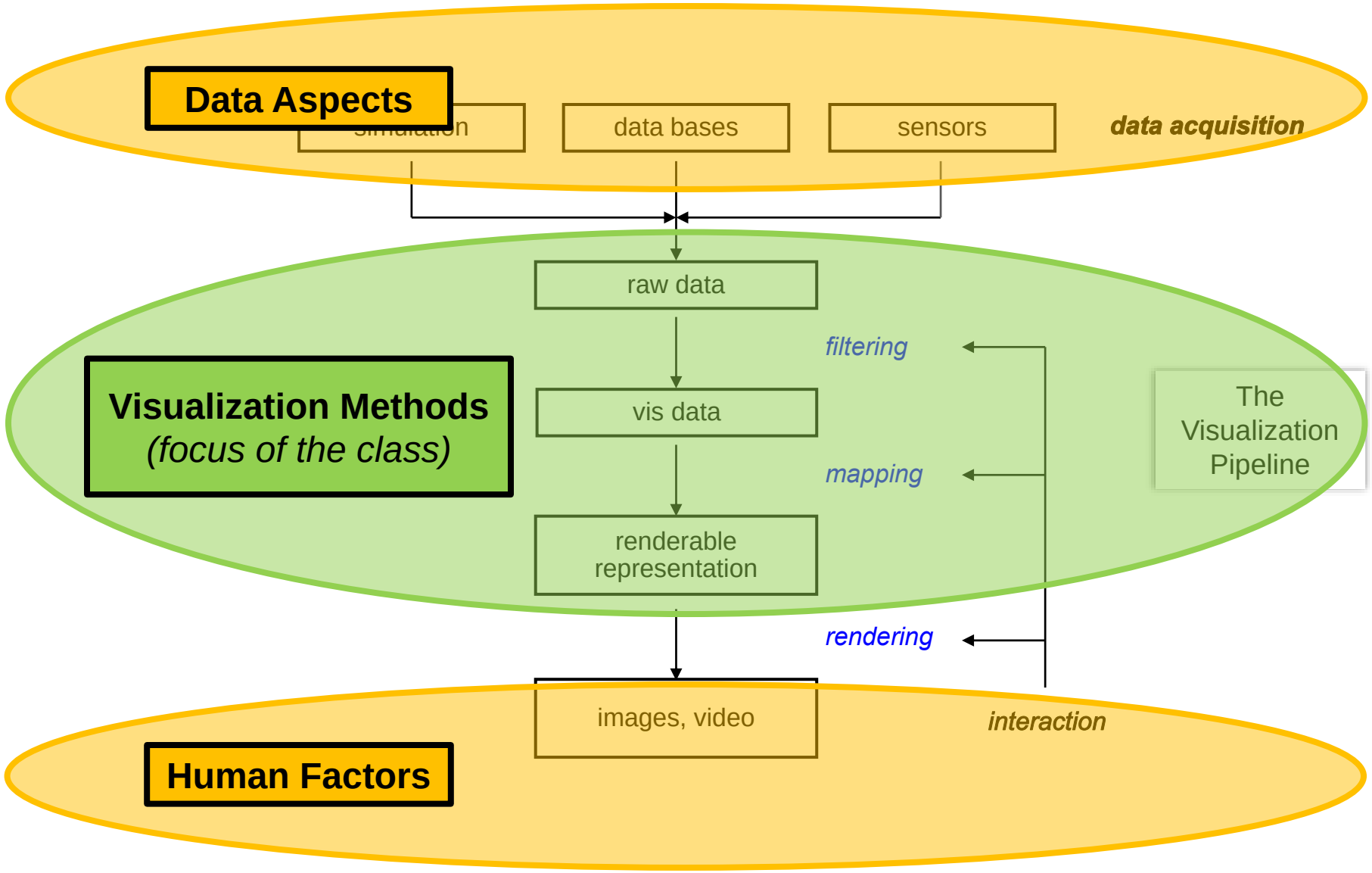



simulation
data bases
sensors
data acquisition
raw data
filtering
vis data
mapping
renderable representation
rendering
images, video
interaction

The visualization pipeline can be processed in a distributed environment, which gives the following distinction:



Distributed usage of the Visualization pipeline (Brodlie 98)


Data Aspects
simulation
data bases
sensors
data acquisition
raw data
filtering
Visualization Methods
(focus of the class)
vis data
mapping
The Visualization Pipeline
renderable representation
rendering
images, video
interaction
Human Factors

Summary

- Visualization pipeline
  - filtering
  - mapping
  - rendering
- Interaction allows to manipulate the parameters of each stage
- Can be applied to distributed settings