Motivations
- Accessibility: Should be accessible to those without programming experience
- Performance: Take advantage of low-level optimizations
- Adaptability: Work with many algorithms and technologies at once

Design Principles: Interactive Development
- Want to be able to view low-level change impacts
- Requires recompiling and/or observing source code changes
- Observe changes throughout pipeline

Design Principles: Debugging
- Typically challenging to debug a multi-stage pipeline
- Idea: Have “ports” in and out of each stage to view intermediate data
- Different data types can support different views

Design Principles: Documentation
- Tends to be targeted at developers, but vis designers need access
- Suggest incorporating it into the API designers use
- Tailor documentation appropriately

Design Principles: Testing
- Unit testing often used for low-level code
- Open that option up to high-level designers
- Need to compensate for hardware differences

Design Principles: Interoperability
- For performance reasons, want access to computing platforms like OpenGL, OpenCL, CUDA
- Algorithms in one system can’t easily interact with others
- This can be a challenge with new technology not being compatible with existing algorithms

Inviwo Implementation: Interactive Development
- Integrated editor allows for low-level code changes that are immediately reflected in the output

Inviwo Implementation: Debugging
- Inspect output from each processor in the pipeline

Inviwo Implementation: Testing
- Different computing systems can be chained together
- Get the low level optimizations of each

Inviwo Implementation: Interoperability
- Different computing systems can be chained together
- Get the low level optimizations of each

Inviwo Demo Video
https://www.youtube.com/watch?v=9yZWjxIV6QQ

Highlights
- Already shows good adoption
- Open source
- Extensible and user friendly

Highlights
- Supports software engineering good practices:
  - Debugger support
  - Documentation integration
  - Unit and integration/regression testing support
Paper Critiques

- Almost no discussion of their own limitations
- Seemed to oversell some points
  - Default implementation of port debugging
  - Running Inviwo tests on the same machine

Questions/Discussion