The Modern Arc Hydro

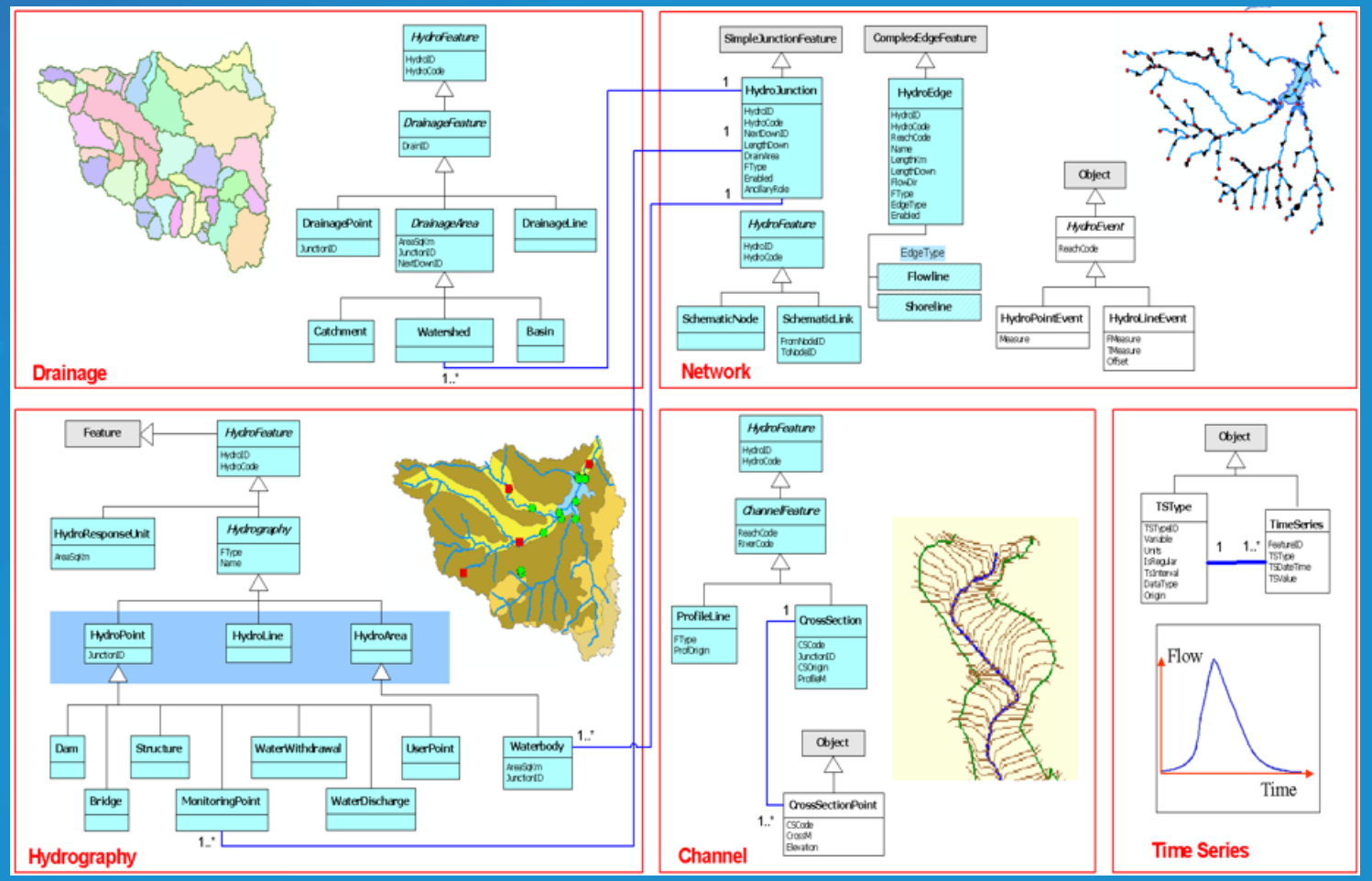
Dean Djokic

What is Arc Hydro

- Implementation of ArcGIS platform in water resources domain with focus on analytical capabilities
- Components:
  - Data model
  - Tools
  - Workflows
  - Data
  - Services
  - Best practices – building analytical systems
- Distribution – free (except premium services)
- Maintenance – 10.3.1, 10.4.1, ArcGIS Pro
  - Legacy – from 8.3 on

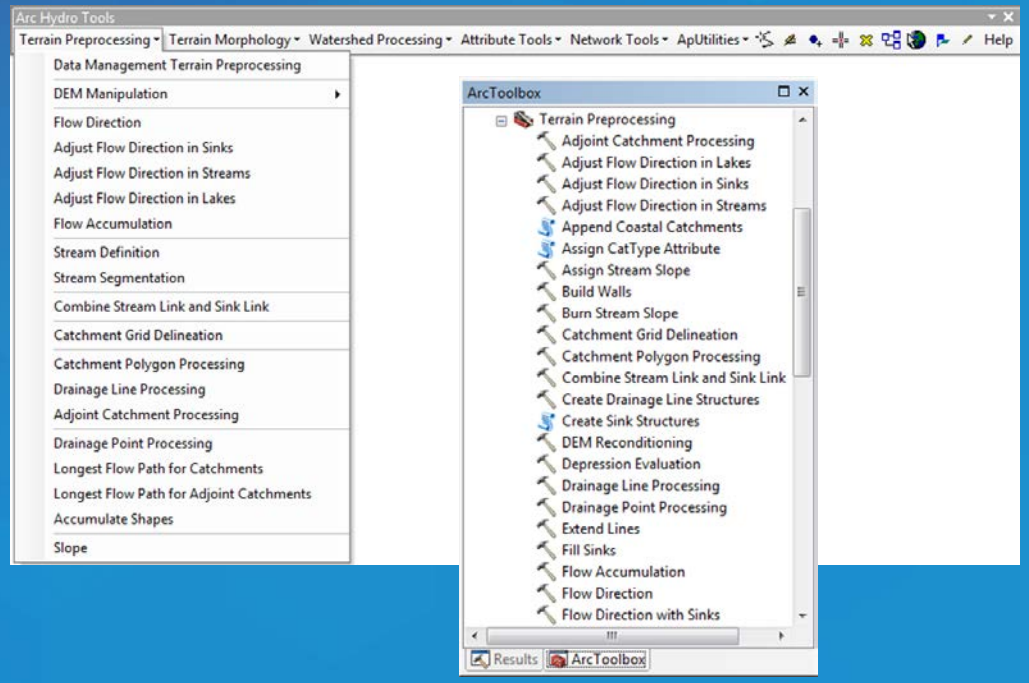
Data model

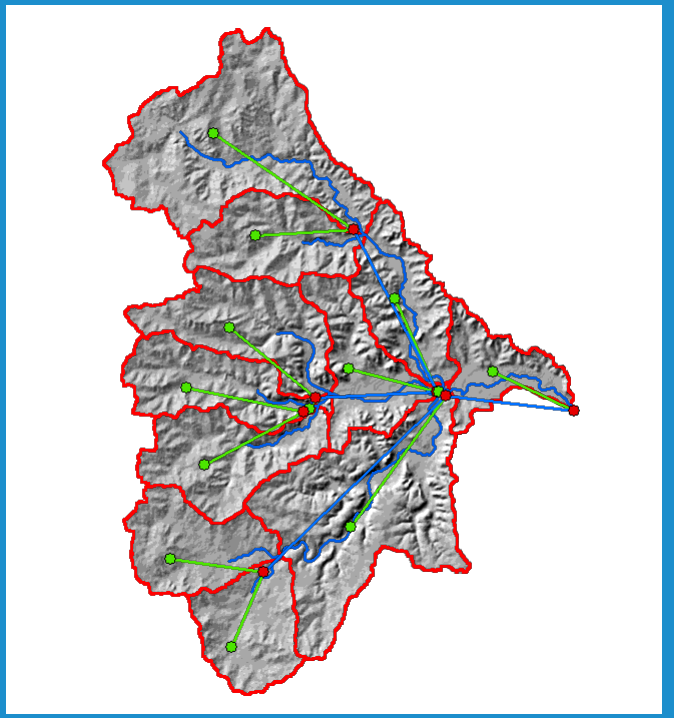
- **Simplicity**
  - Unique identifiers
  - Relationships
- **Stability**
- **Extensibility**
- **Needs driven**
  - Tools
  - User needs



Tools

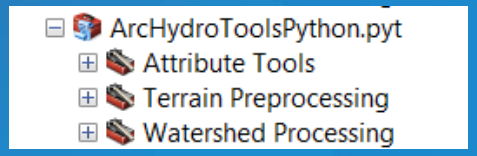
- 250+ tools developed over many years (>15)
  - Community driven development (projects)
  - Esri maintenance & support
- Build foundation for analytical capabilities

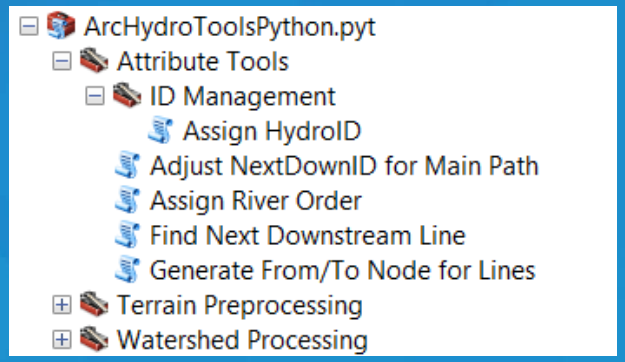


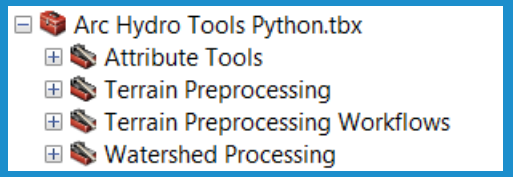


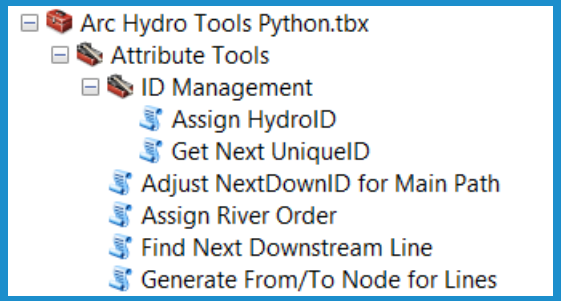
Tools

- **Move to Python (.pyt, py + tbx)**
  - **Openness**
  - **Move forward (Pro)**
  - **Ease of dissemination (*)**









Tools

- Modularization – blocks of functionality grouped into single collection
  - Terrain preprocessing for watershed delineation and characterization
  - Flood analyses and visualization
- Automated testing
  - Functionality/upgrades
  - Scalability

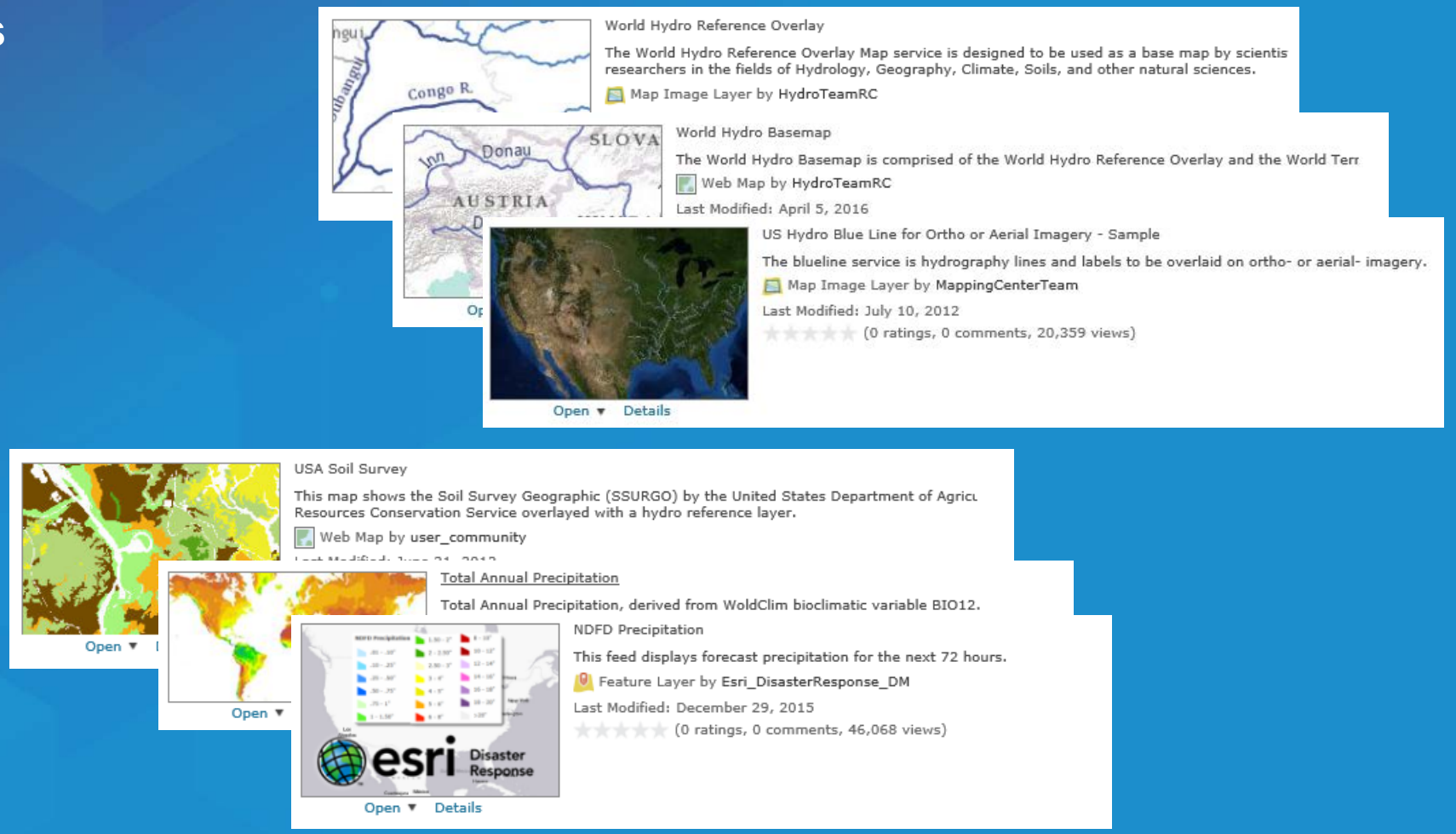
No	Tool	Execution	Comparison	CPU (s)
1	FlowDirection 1	Pass	Pass	67.6
2	FlowAccumulation 1	Pass	Pass	86.3
3	Stream definition	Pass	Fail	128.3
4	Stream segmentation	Pass	Pass	63.9
5	CatchmentGridDelineation	Pass	Pass	48.0
6	DrainageLineProcessing	Pass	Pass	105.3
7	CatchmentPolygonProcessing	Pass	Pass	63.7
8	AdjointCatchmentProcessing	Pass	Fail	224.1
9	DrainageLineProcessing	Pass	Pass	90.1
10	AppendCoastalCatchments	Pass	Fail	120.0

User interaction

- User interaction – sharing experiences, techniques, best practices
  - GeoNet
    - User communication
    - Communication with users
- Tool/code/documentation dissemination
  - Transition from ftp to:
    - GitHUB
    - Scripts

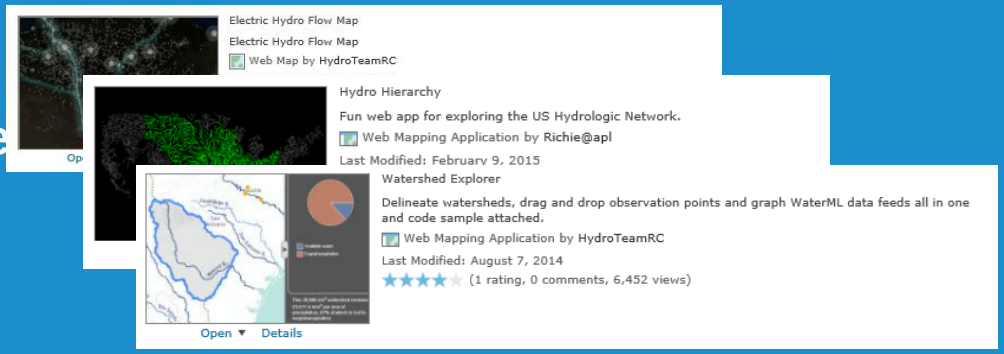
Services

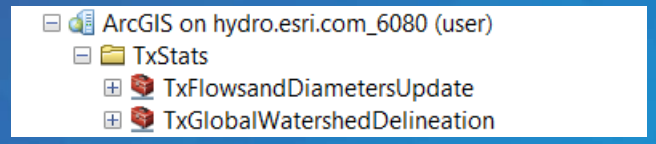
- Base maps
- Data

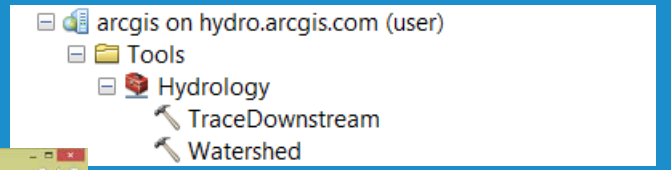


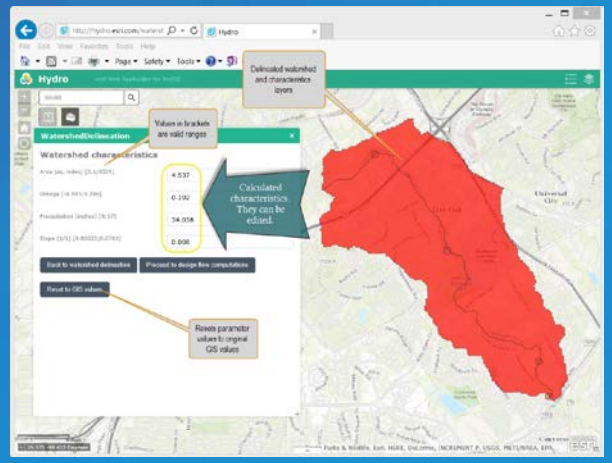
Services/Apps

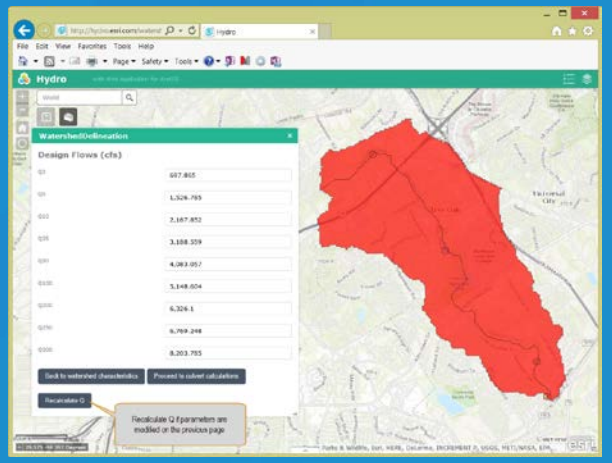
- **Analytical services (global 90m, USA 30m):**
  - **Watershed delineation (http://hydrology.esri.com/wate**
  - **Downstream tracing**
  - **BYO – leverage existing or develop yours**

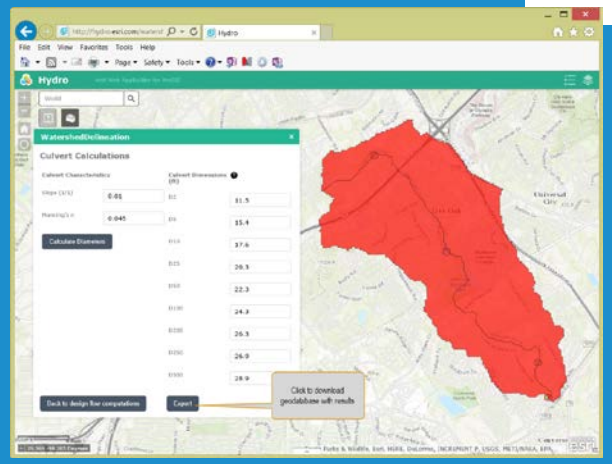












Functional blocks

- Focused:
  - Tools
  - Workflows
  - Services
- Areas:
  - Terrain processing for watershed delineation and characterization
    - Support for global services
    - Use for local higher resolution terrains
  - Flood analyses and visualization
    - Planning
    - Forecasting

Terrain processing for watershed delineation and characterization

- Tools
- Workflows
- Services
- Areas:
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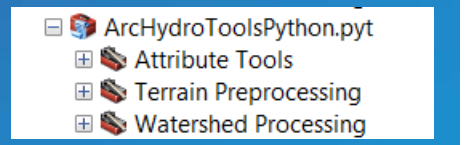
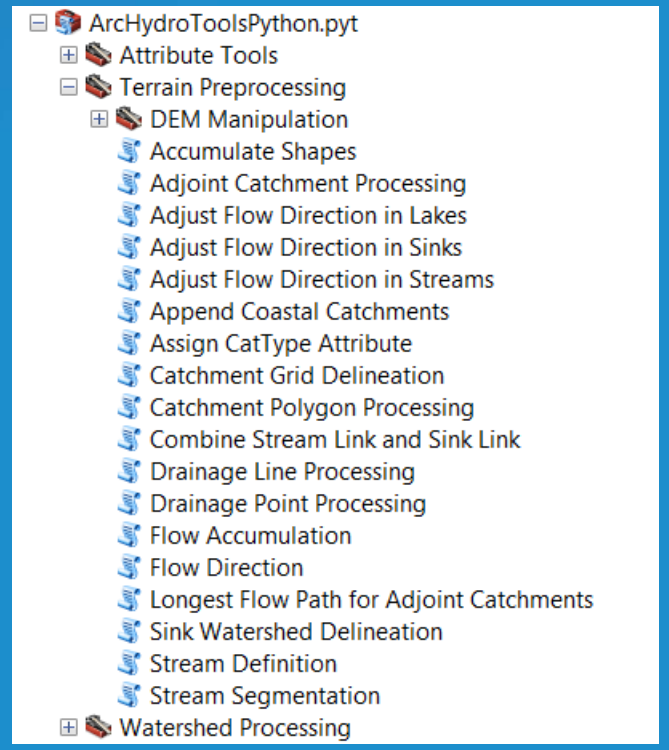
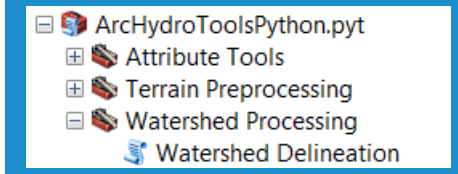
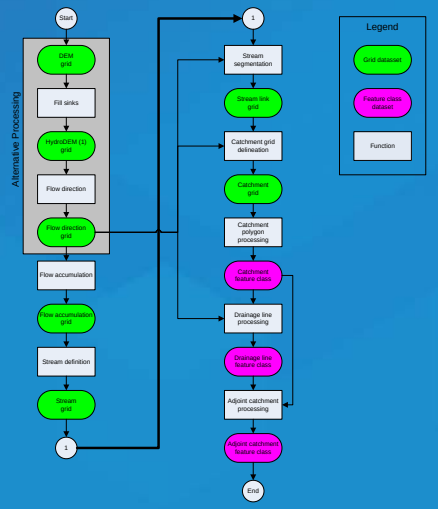
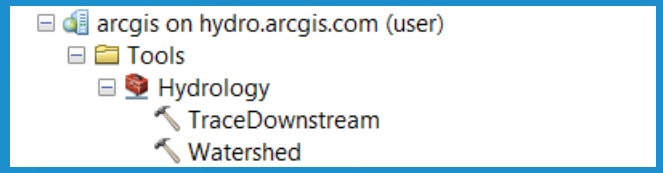
  - Use for local higher resolution terrains





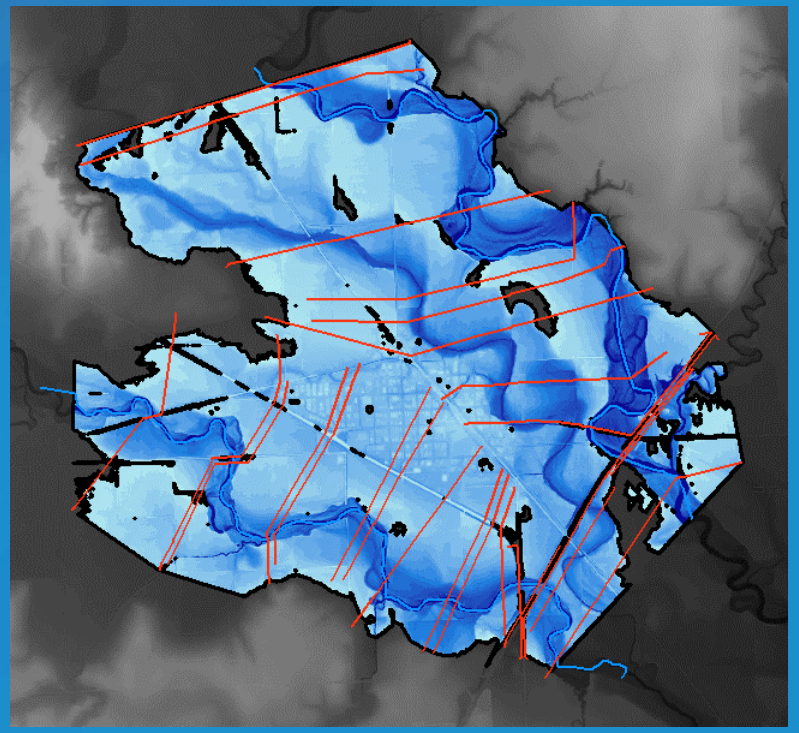






Flood analyses and visualization

- Tools
- Workflows
- Services
- Areas:
  - Planning
  - Forecasting



- Cross-Section Characterization
  - Assign Hydrology River Properties to Cross-section
  - Assign River Slope to Cross-section
  - Calculate 3D Cross-section Characteristics
  - Calculate Manning's N for Cross-section
  - Calculate Normal Depth
  - Calculate Potential Q
  - Define 3D Cross-section from 2D
- Floodplain Delineation
  - Calculate WSE for Selected Model
  - Create 3D Stream WSE Line
  - Create 3D WSE Stream Line Grid
  - Derive BFE - no smoothing
  - Derive BFE - with smoothing
  - Derive Extended BFE - No Smoothing
  - Find Intersect Points
  - Flood from Cross-Section
  - Flood from Stream WSE Py
  - Interpolate WSE at Cross-Sections
  - Merge Cross-Section Feature Classes
  - Select WSE To Process
- Map to Map
  - Export to DSS
  - Flood From Stream WSE
  - GeoRAS to Flood
  - HMS to GeoRAS
  - Import from DSS
  - Run HMS
  - Run RAS
  - SDF to XML
  - Stream WSE From Point WSE Measurements
  - Update RAS Flow