

Visualization of Tactical Networks

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Agenda

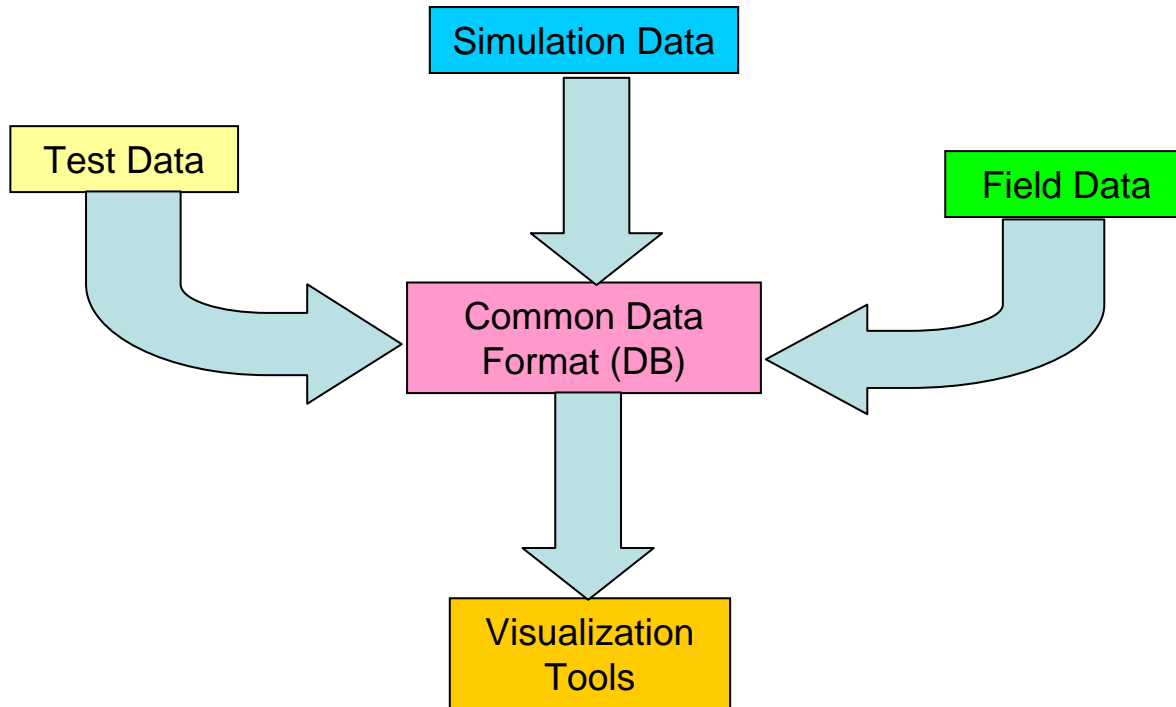
- Motivation
- Visualization Tool Characteristics
- Status & Future Directions

Motivation

- Agile Communications provides systems engineering support throughout lifecycle of tactical communications systems
 - Design
 - Development
 - Integration and test
 - Field tests, data collection and analysis
 - Modeling and simulation at all points
- Visualization of tactical network behavior at all stages of development and fielding is important
 - Visualization of actual networks
 - Visualization of simulated networks
 - Visualization of both for Hardware-In-The-Loop and Software-In-The-Loop (HITL/SITL)
- Tactical characteristics include mobility, dynamic links, attrition

Motivation

- Visualization tool needs to be driven by data from multiple sources



**Common Visual Output
Simplifies Analysis**

Motivation

- Challenge is to use a common visualization tool and methodology for all forms of data (real and simulated networks)
- One solution is to define visualization in terms of the data objects and interfaces, not specific tools for collecting data
 - XML/database approach
 - Other approaches
- Specific implementation will depend on project requirements
 - What is the objective of the visualization?
 - Is real time required?
 - Is post-processing playback required?
- Our current work requires playback of both simulated and real data not necessarily in real time – future work may require real time

Visualization Tool Characteristics

- The following table summarizes some relevant characteristics for selecting visualization tools

Characteristic	Comments
Operating System Support	Portability Desired
Development Environment	C/C++/Java Typically Preferred (common language)
Interface Environment	Open API's; XML
Technical Support	Fielded systems require 7/24
2D and 3D Graphics	Capability to support both desired
Mathematical Analysis	Display of metrics in visualization important
Map Display	Must be able to display all standard map/terrain formats
Mobility	Must support mobile nodes including airborne
Internal Architecture	Object oriented
Object Display	Dynamic access to object attributes
Visual Smartness	Icons, Layering, Zoom, etc.
Costs	Development License vs. Runtime License

Status & Future Directions

- Selected a tool (ESRI's ArcView) for our purposes
- Have almost completed first version for displaying tactical networks
 - Uses data from a DB (data can be drawn from multiple sources)
 - Displays position, movement, connectivity, node status
 - Displays some relevant network metrics
 - Uses map and terrain backgrounds for geographic context and relevance
- Future directions (depending on funding)
 - Scalability
 - Additional metrics and filters
 - Near real time