

GIS in Power Distribution System Fault Diagnosis

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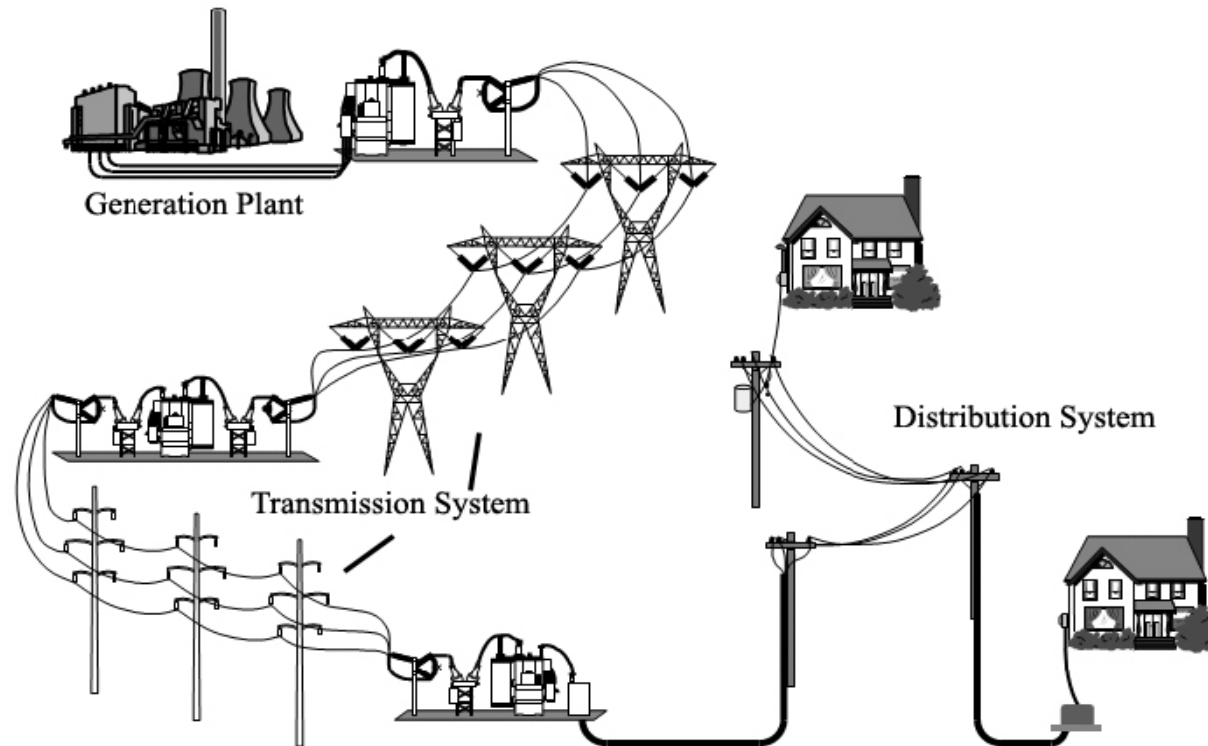
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02/08/2008

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- | Background
 - | Motivation
 - | Preliminary result
 - | Future work

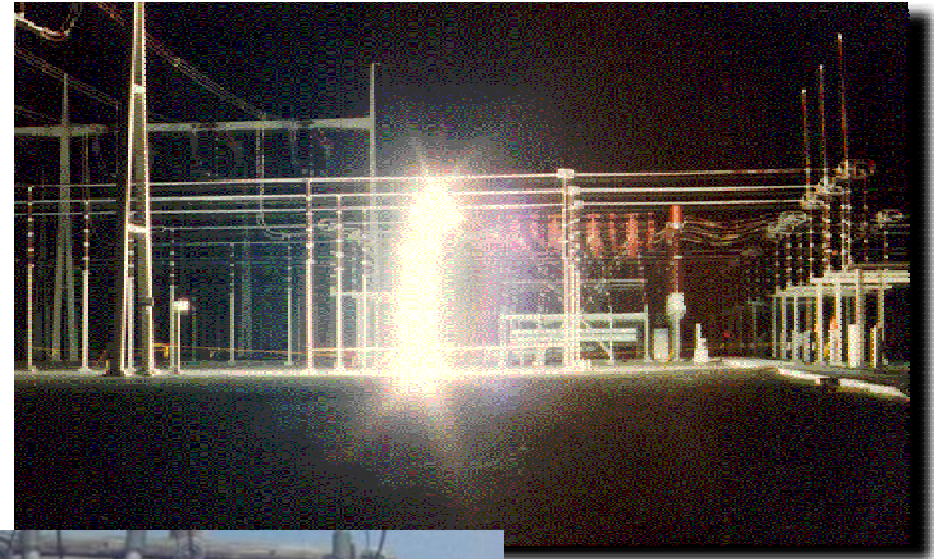
1 Power distribution system

- Connect to customers directly
- Medium to low voltage level (69~0.12kV)
- Cover various terrain with huge number of components

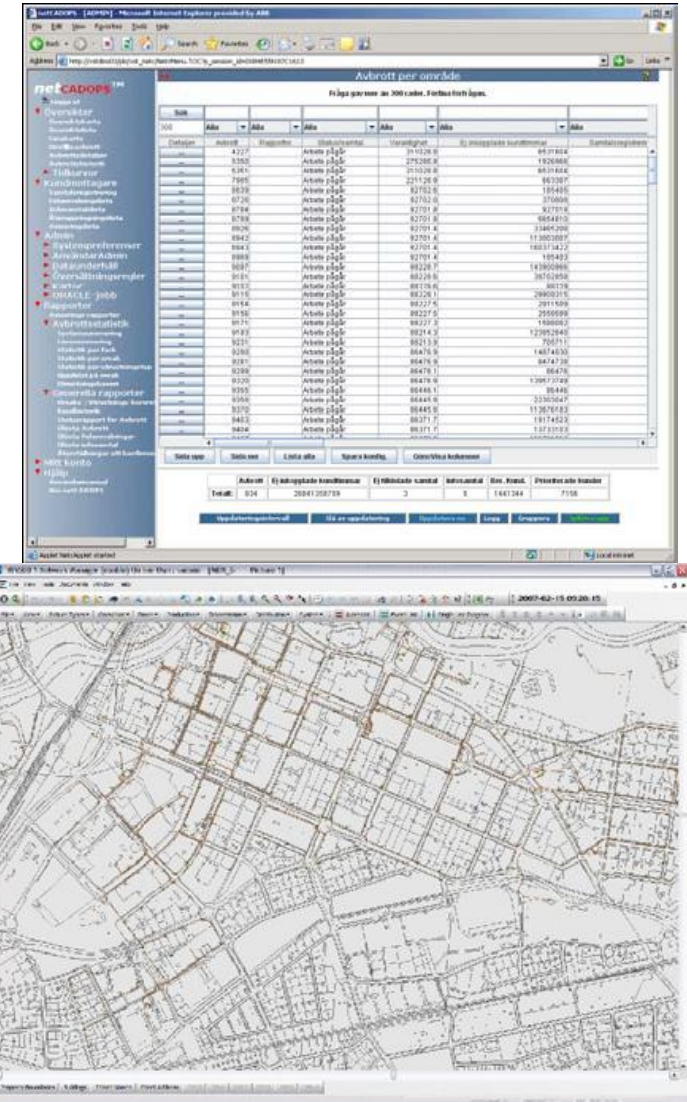


- | Fault and interruption
 - Momentary (5min)
 - Permanent

- | Fault related topics
 - Detection
 - Mitigation
 - Restoration
 - Improvement



- 1 Outage Management System (OMS)
 - Estimating location of protective devices (fuse, breaker, etc.) that opened upon failure
 - Prioritizing restoration efforts
 - Providing information on extent of outages and number of customers impacted to management, media and regulators
 - Calculation of estimation of restoration times
 - Management of crews assisting in restoration
- 1 Our focus
 - Root cause identification
 - Fault location



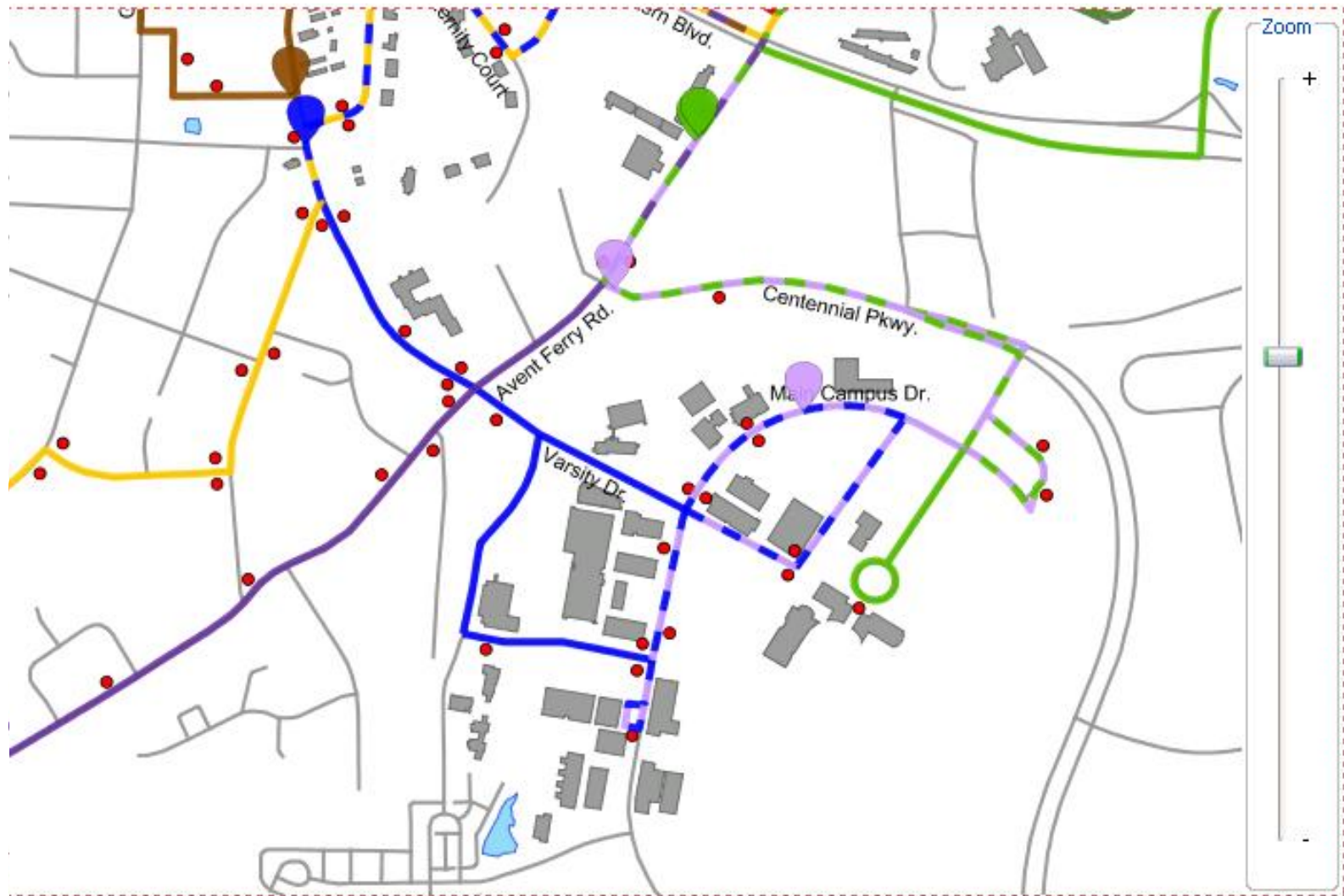
- | Geographic information
 - Data and associated attributes which are spatially referenced to the Earth
 - *What is where*
- | Geographic information system
 - Capture, integrate, store, edit, analyze, share, and display
 - Hardware, Software, data, person, procedure



Background – GIS examples



Background – GIS examples



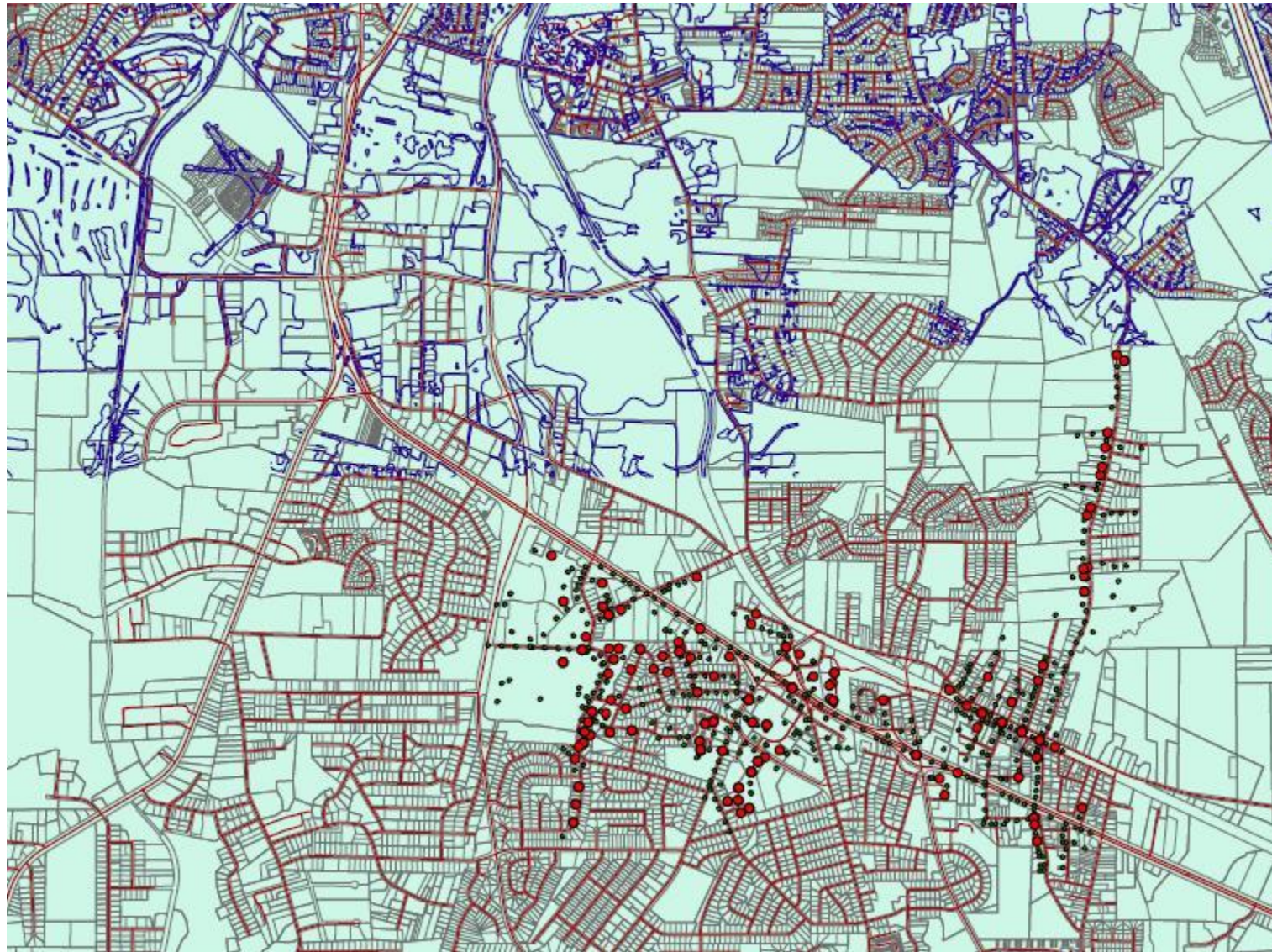
- | | | |
|--|---|--|
|  Avent Ferry Rt #1 |  Engineering Rt #3 |  Westgrove Rt #4 |
|  Varsity Rt #5 |  Carter Finley Rt #6 |  Wolflink Shuttle Rt #7 |
|  Southeast Loop Rt #8 |  Greek Court Rt #9 |  Village Link Rt #11 |

I Advantages

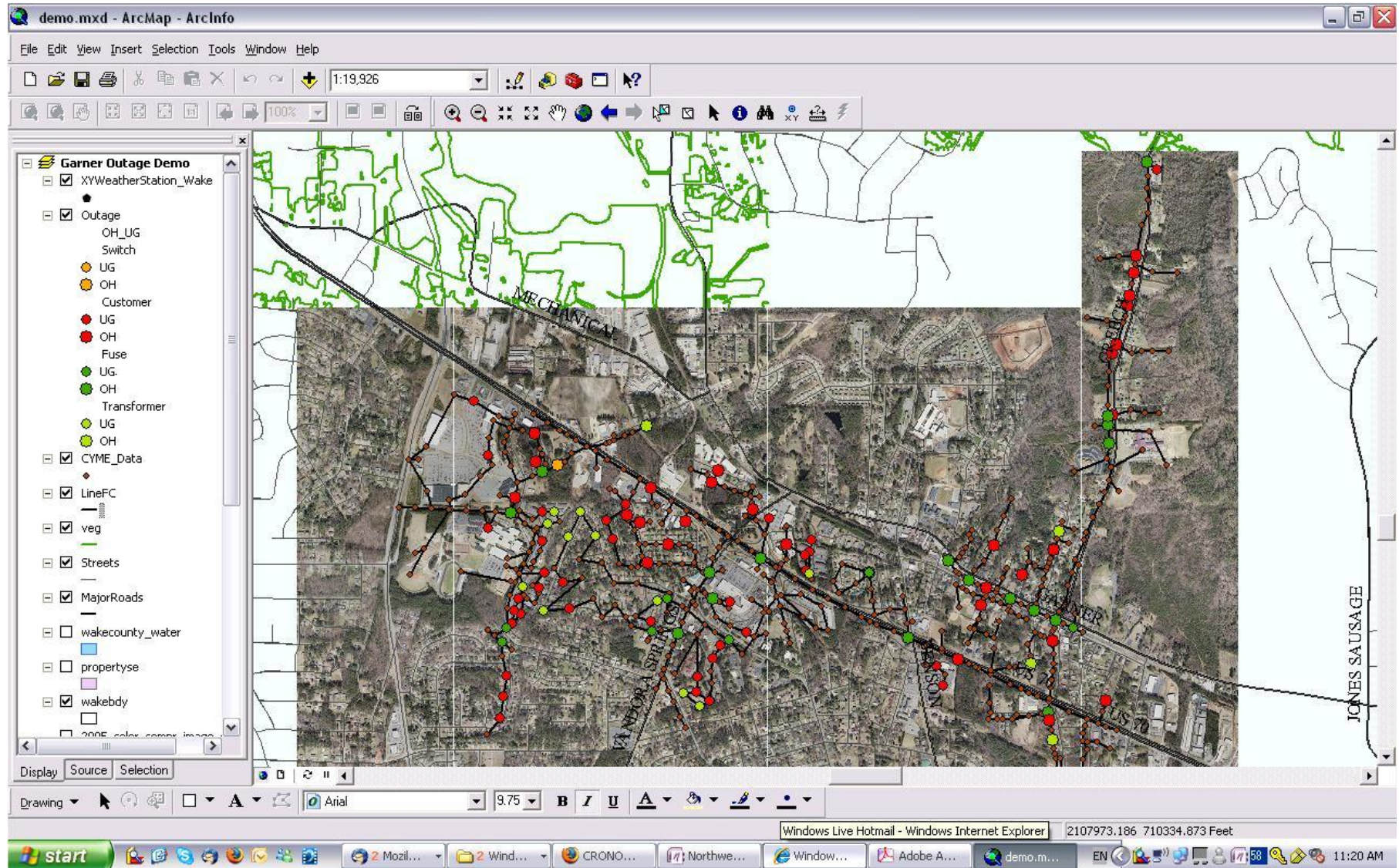
- New dimension and more detailed information
- Flexibility in analysis
- Visualization tool

I Feasibility

- Research background
 - » Outage cause analysis and identification by Dr. Chow
 - » Biologically inspired fault cause identification by Dr. Xu
- Ready-to-use tools
- Large amount of data
 - » Power system data from utility
 - » Public data from government agency



Preliminary results – Visualization



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- | Find the most helpful data attribute in fault diagnosis
 - | Cluster outage record based on both geo-info and outage characteristics
 - | Small world model

Questions?

