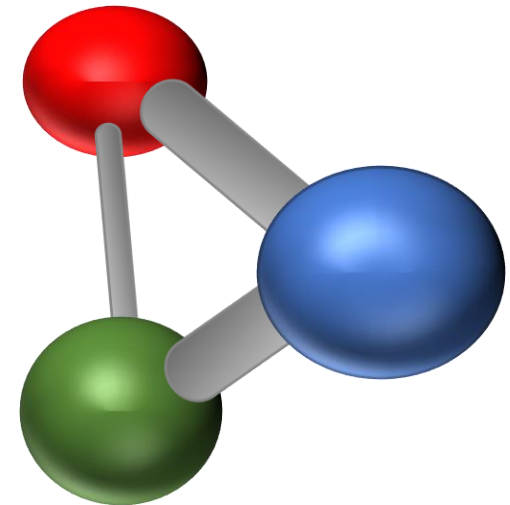


# Operationalizing the Architecture

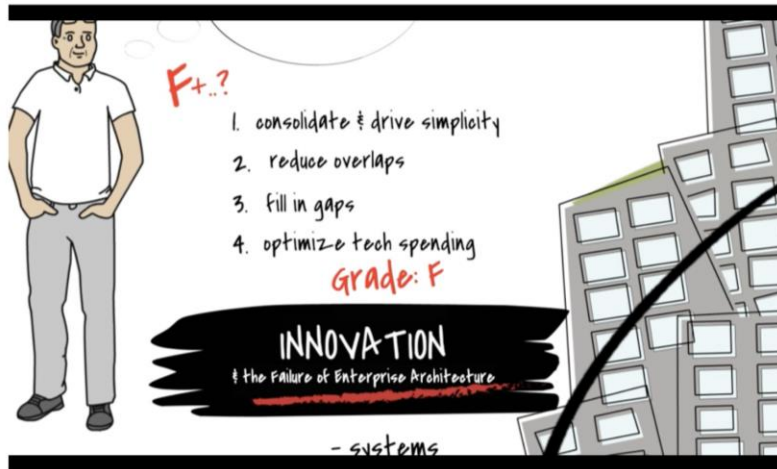
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Turning the Enterprise Architecture into an Active Mission Asset

John McDowall, Ph.D.  
BAE Systems, Inc.



# Enterprise Architecture has Failed



<https://www.futurebanktoday.net/videoblog/episode-11-innovation-and-the-failure-of-enterprise-architecture>

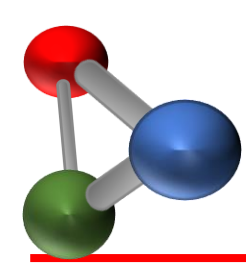


<https://www.gao.gov/products/GAO-11-902>



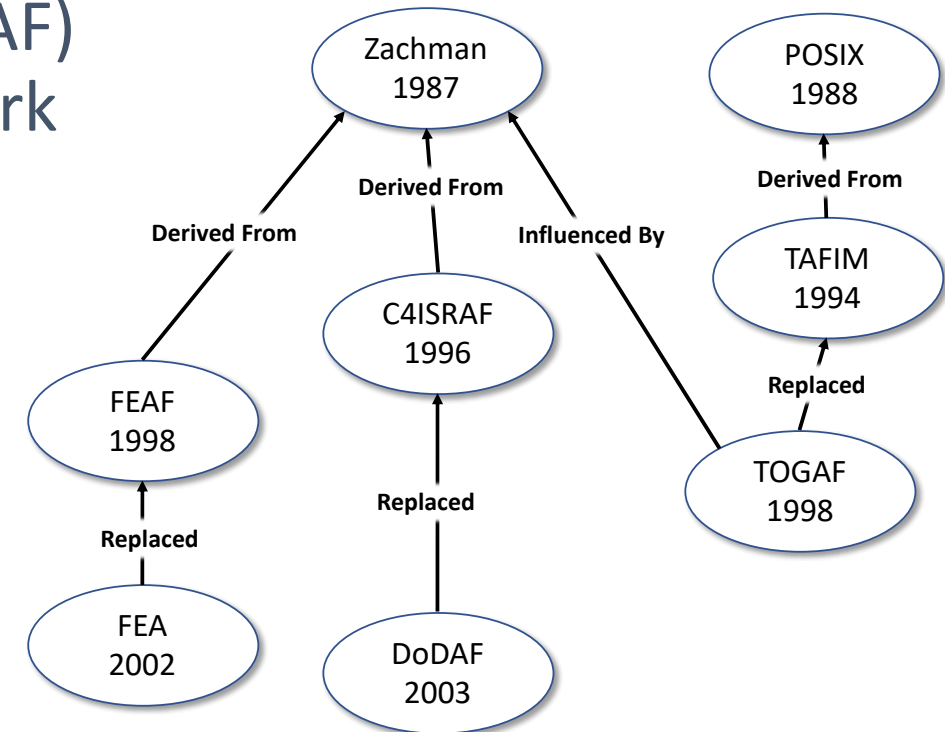
<https://www.forbes.com/sites/jasonbloomberg/2014/07/11/is-enterprise-architecture-completely-broken/#3d448ad73710>

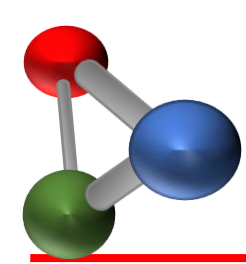
But why?



# Why EA Failed #1: Flawed Frameworks

- 1987: Zachman Architecture Framework (ZAF) was born as a system architecture framework
  - Enterprises have changed since 1987
  - Software development has changed even more
    - Services
    - Agile
    - DevOps
- All common EA frameworks descend from Zachman
  - All assume top-down design
  - All assume centralized control



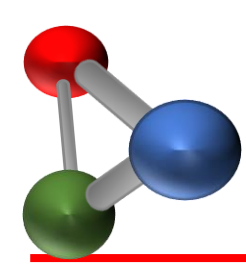


# Why EA Failed #2: Development Cycles

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- POM cycle: 2 years
  - Every department and many agencies have independent budgets
  - No control of \$\$ = no conformance
- Fielding cycle: 3-7+ years (AFTER development!)
  - 10 years or more before a change in EA is fully implemented in the field
  - This dooms traditional EA approaches

**Bonus: No effective conformance strategy**

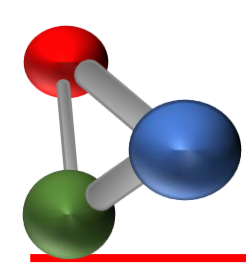


# Consequences of Failure

- Interoperability problems persist
- Little data / interface standardization
  - Limited visibility into available interfaces
  - Mandated specifications rarely implemented
- No understanding of enterprise data flow / use



**The patient is not getting better**



# A Recipe for Success

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- Transform architecture from a design activity to an operational management activity
  - Monitor behavior
  - Test for conformance
  - Adjust to changing conditions
  
- Stop trying to understand implementation details
  - Establish measurable & enforceable enterprise goals
  - Publish rules & constraints
  - Monitor and adjust

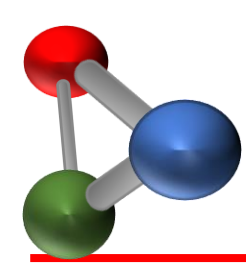
**The enterprise is a Complex Adaptive System—TREAT IT THAT WAY!**



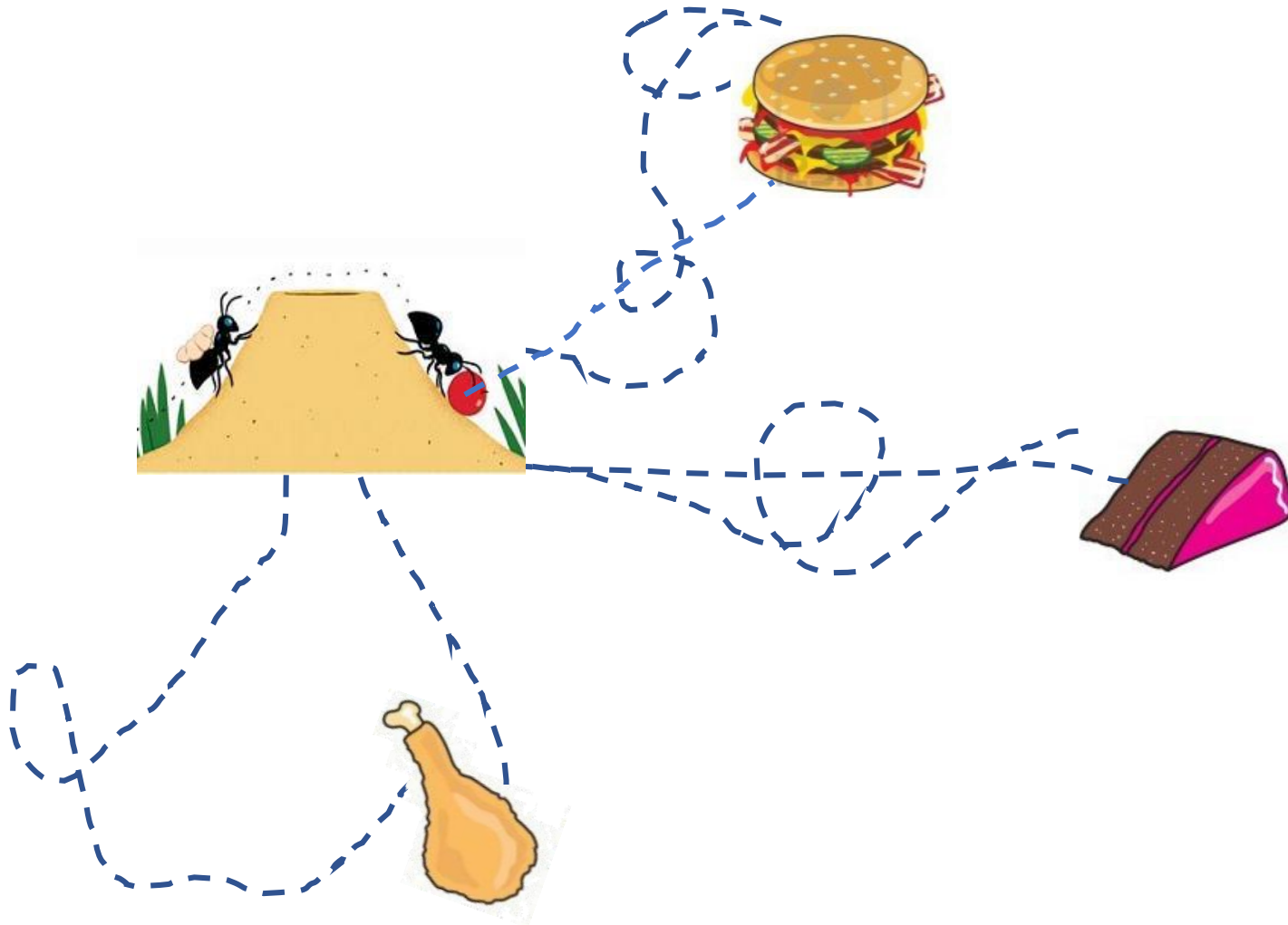
# Characteristics of Complex Adaptive Systems

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- The whole is more than the sum of the parts
  - Each of the parts may be perfectly understood
  - Behavior of the whole is not readily predictable
- Emergent behaviors arise from many independent actors
- Respond to changes in the environment
  - Changes in individual behavior
  - Changes in external factors

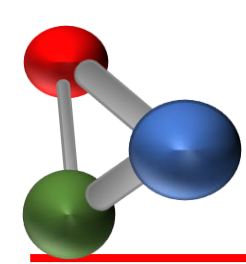


# Example: Ant Hill



- No ant can do math
- An ant colony can find the shortest path between the ant hill and every food source
- Humans could not do this efficiently until Edsgar Dijkstra published his algorithm in 1959





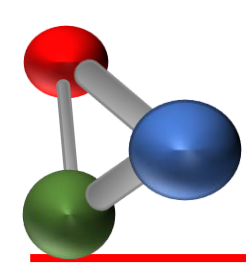
# The DoD Enterprise is a CAS

- Department of Defense
  - 4 Services
  - 25+ Agencies / Field Activities
  - 4M+ individuals
  - 1000s of systems
- Examples of emergent behaviors in the enterprise
  - Users employing a system differently than expected
  - Workarounds to bypass a problematic system



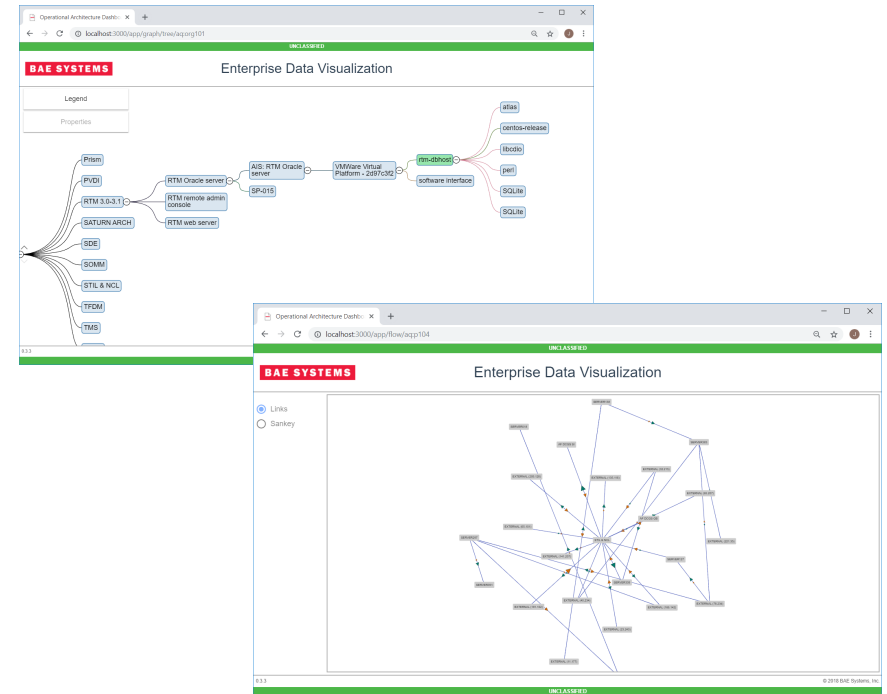
German 88mm anti-aircraft artillery employed as anti-tank gun (WWII)

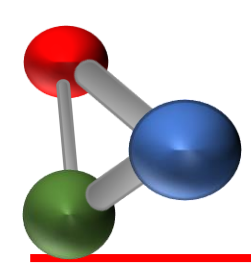
**The enterprise will evolve faster than we can design it**



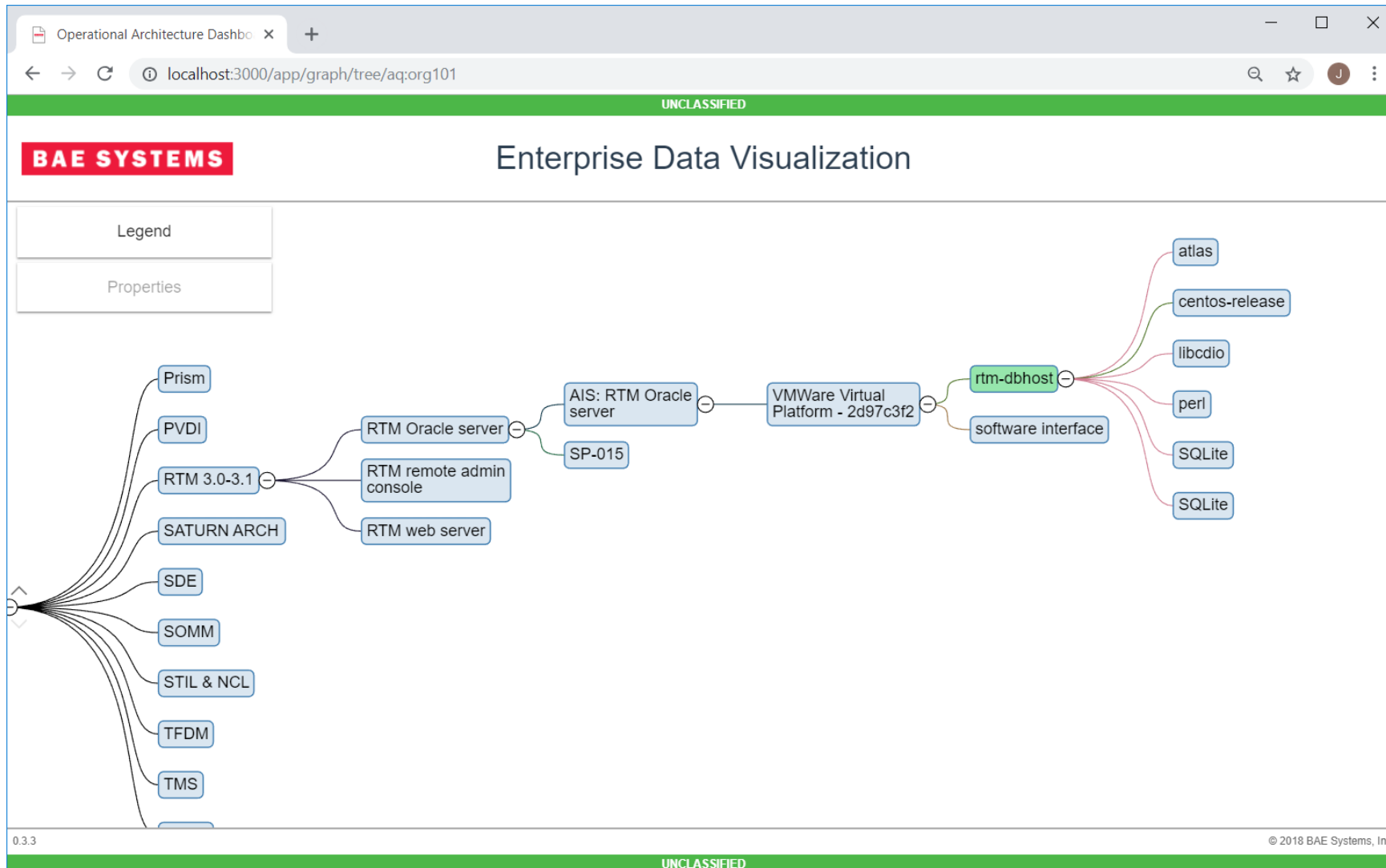
# Proof of Concept

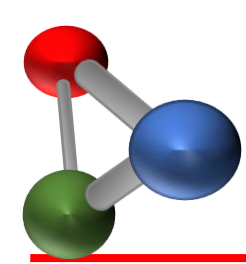
- Created on JWICS
  - Using existing data
    - NO MANUAL DATA CALLS!
    - No additional data gathering
    - Using currently deployed monitoring tools (RMF)
  - Using existing software
    - COTS
    - Open Source
- Implemented on unclass for demonstration purposes (notional data based on operational data)



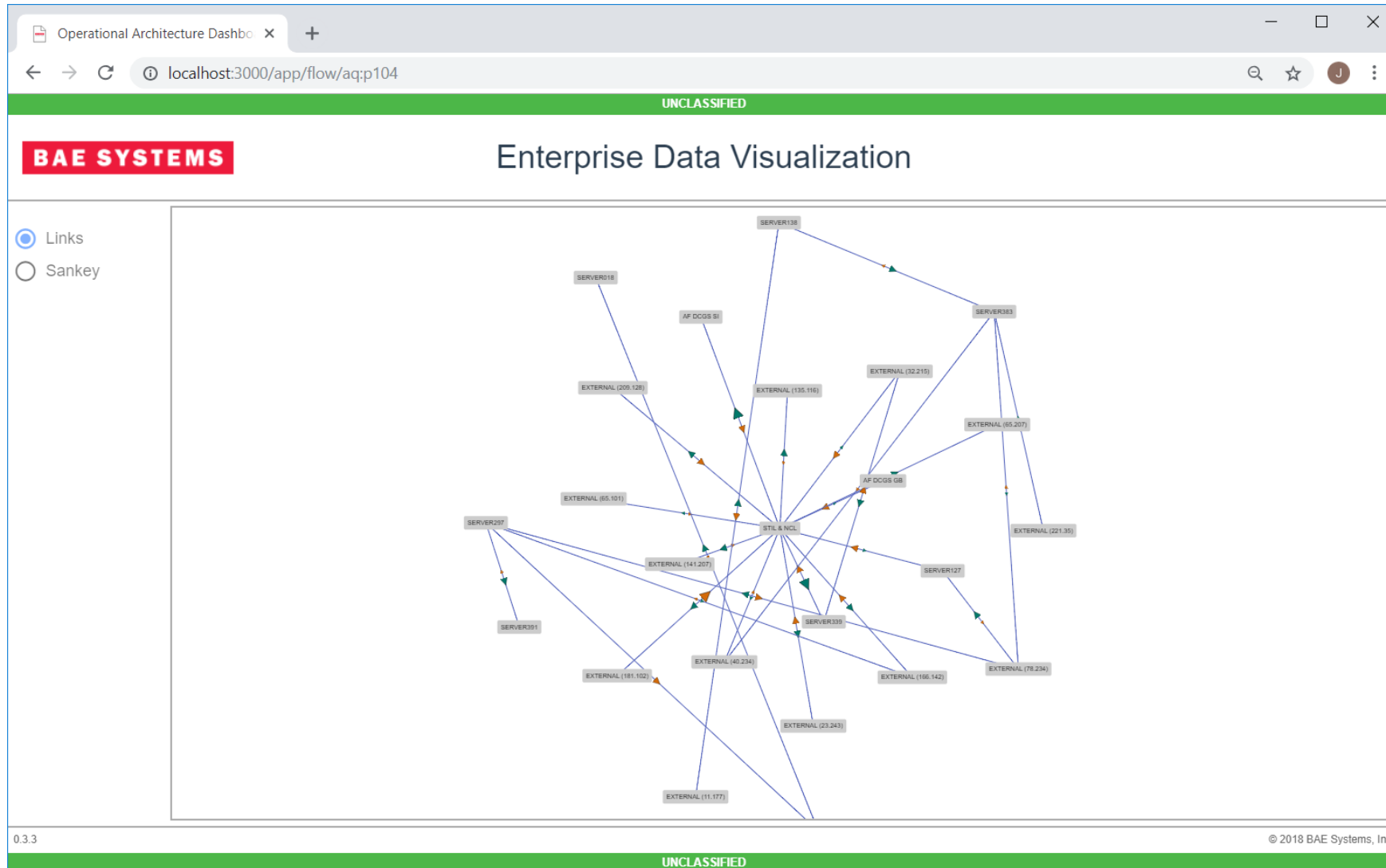


# Insight Into Operational System Behavior

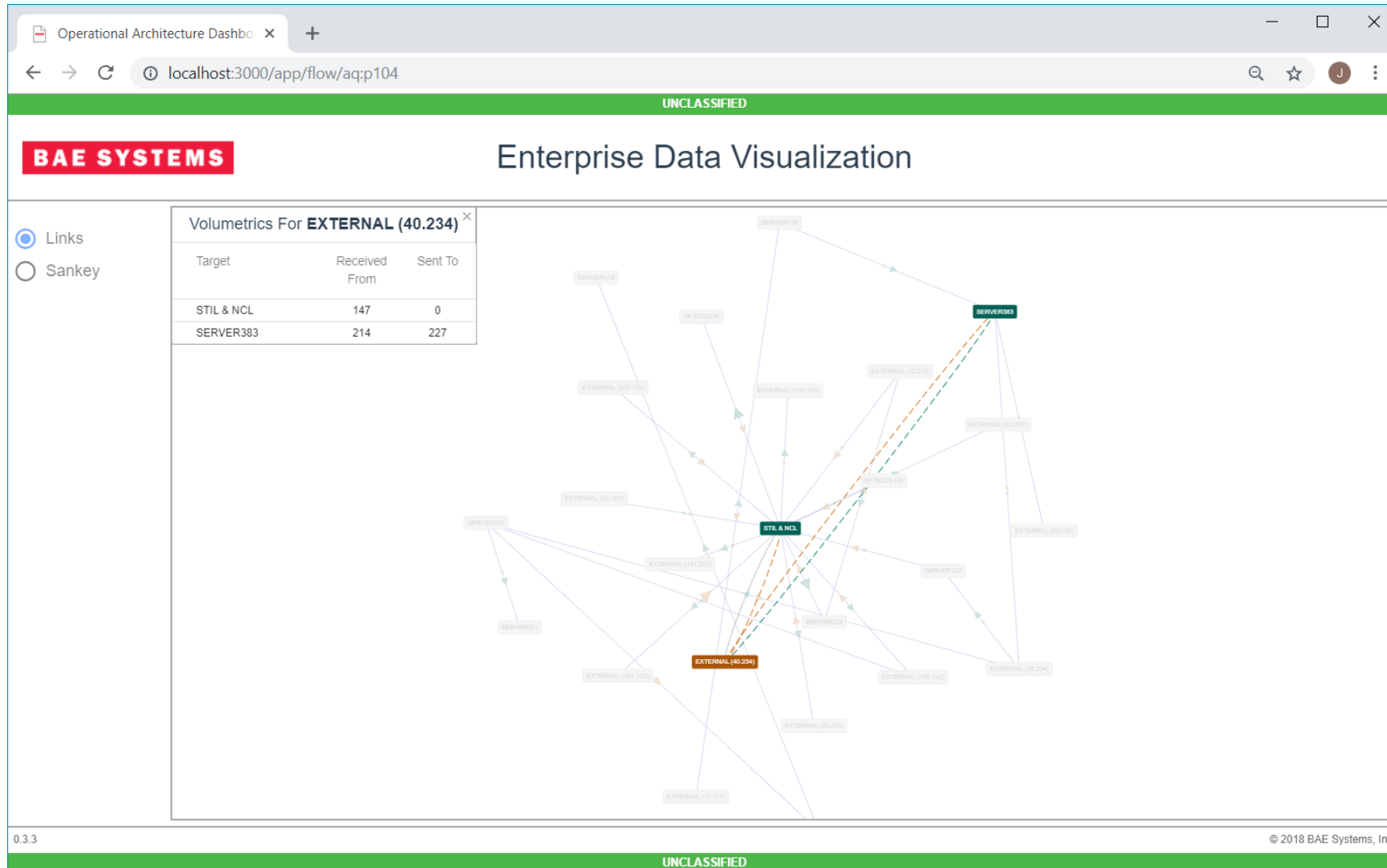


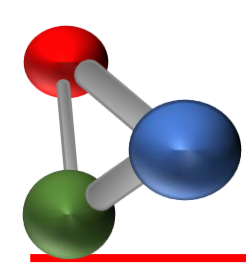


# Visibility Into Enterprise Data Flow



# Details About Data Producers and Consumers



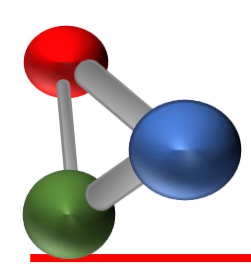


# Summary

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- We need to reform the practice of enterprise architecture
  - Stop focusing on paperwork
  - Focus on *operations* instead of *designs*
- Enforce through continuous monitoring & testing
  - Observe and measure mission capabilities / user behavior
  - Establish testable conformance criteria
  - Apply resources to solving *observed* problems

**We can make EA an effective operational tool**



# Questions

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