# Thinking from the System Architecture: A Better Methodology for Capture of Collaborative Knowledge

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# Outline

- Background
- Current Trends
- Design Challenges
- Proposed Architecture

# Who are we?

- GTRI: *applied research arm of Georgia Tech*
- Our Group: *design and apply systems engineering methodologies and tools to early stage design problems*
    - *conceptual design*
    - *strategic decision making*
    - *requirements analysis, etc.*

What stops virtual teams from solving problems with models?

*and then*

How might virtual teams make better use of existing models?

## What is problem solving?

- Telling a story to
  - accomplish a goal
  - answer a question

## How might we tell such a story?

- Identify a problem/(re)phrase the question
- Propose solutions

# What is a model?

## \ˈmä-dəl\

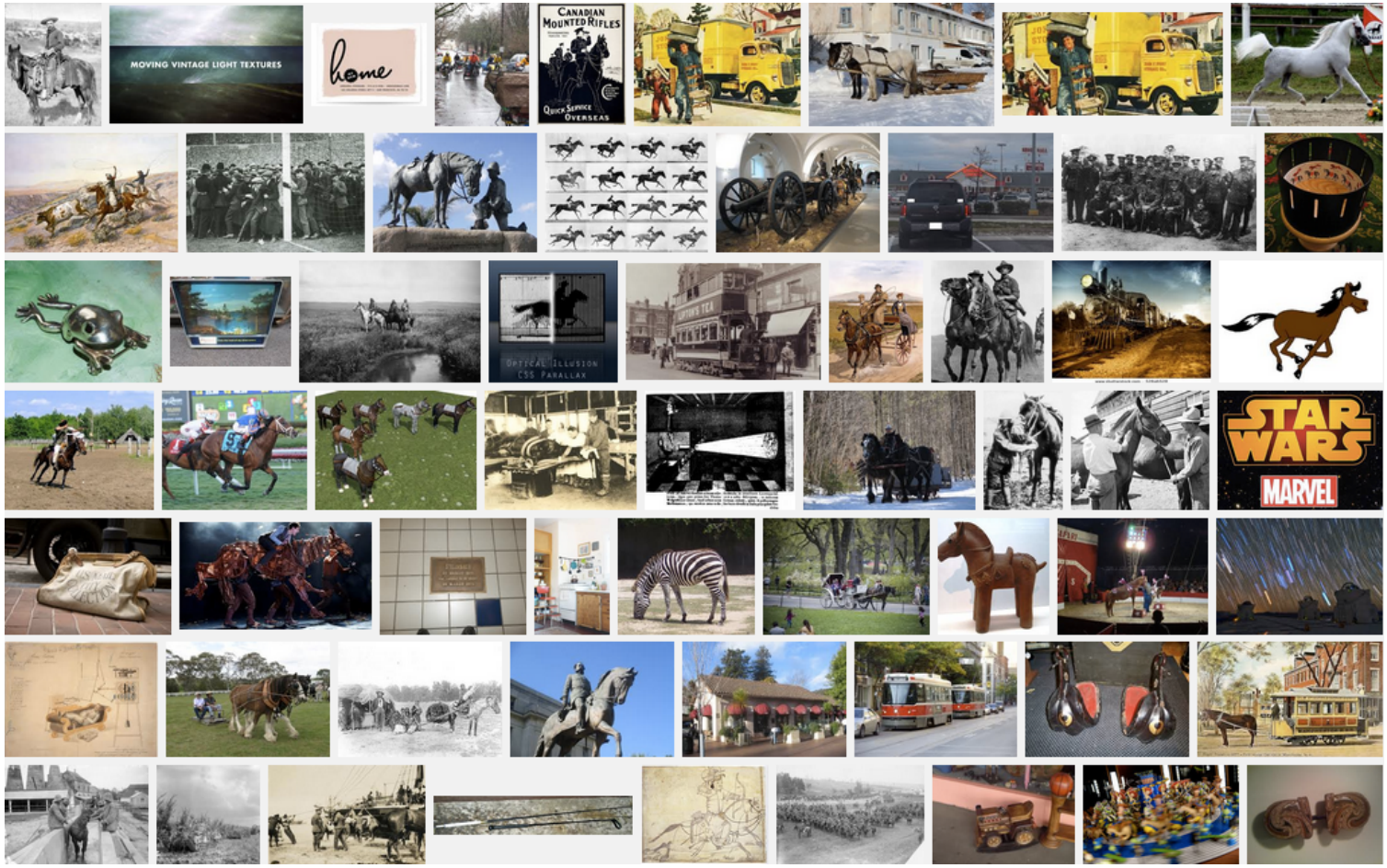
*"a system of postulates, data, and inferences presented as a mathematical description of an entity or state of affairs" – Merriam Webster (http://www.merriam-webster.com/dictionary/model)*

# How do you get a model to tell stories?

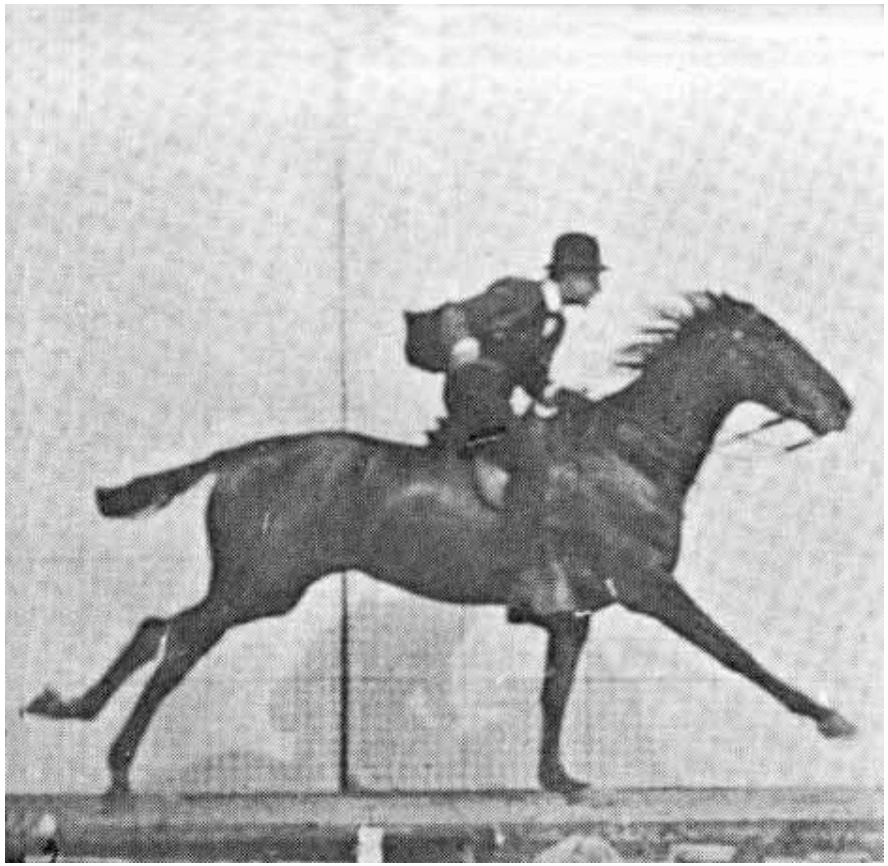
- Select a model
  - Find a model
  - Create a model
- Execute the model
- Fuzz the model
  - statistical charaterizations

# Create a model

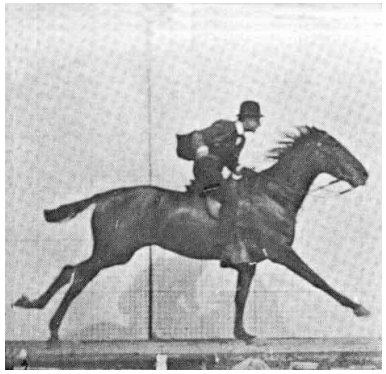
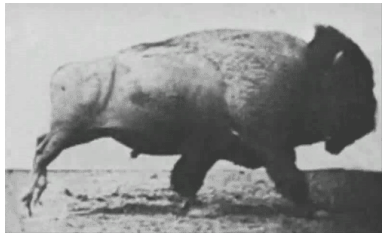
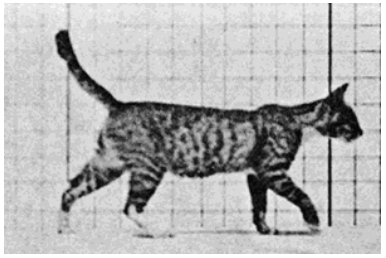
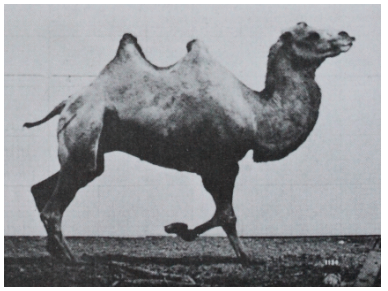
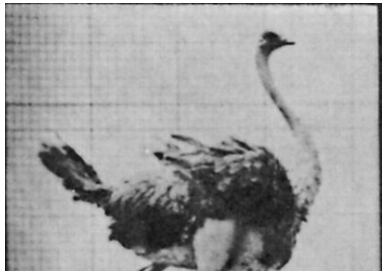
# Find a model


MOVING VINTAGE LIGHT TEXTURES
home
CANADIAN MOUNTED RIFLES
QUICK SERVICE OVERSEAS
STAR WARS
MARVEL

# Execute the model



# Fuzz the model

# Where are the gaps in *de facto* "modeling" tools?

- Office Productivity Tools
  - over-general, static
  - siloed
  - requires human intrepretation
- Domain-specific Modeling Environments
  - tool complexity and interoperability
- Brainstorming Tools
  - static

# User experience trends... for modeling?

- **Collaboration vs History**
  - Google Drive (https://support.google.com/drive/answer/2424384?hl=en)
  - Github (http://github.com)
- **Curated Semantic Search**
  - Wolfram Alpha (http://www.wolframalpha.com/)
- **Transclusions**
  - Compendium (http://compendium.open.ac.uk/institute/tools/tools.htm)
  - SysML (Papyrus) (http://www.eclipse.org/papyrus/)

# Backend opportunities for Problem-Solving Tools

- **Semantic Exploitation**
  - Apache Stanbol (https://stanbol.apache.org/)
- **Data Representation**
  - Blaze (http://blaze.pydata.org)
  - JSON-LD (http://json-ld.org/)
  - OSLC (http://open-services.net/)
- **Data Curation**
  - Linked Data Package Manager (https://registry.standardanalytics.io/)

# How can we model the context of problem solving?

- users & roles
- tools used
- history
- reuse
- model execution & impact
- outputs: documents, outlines & presentations

# Pilot Implementation: PMASE Tools

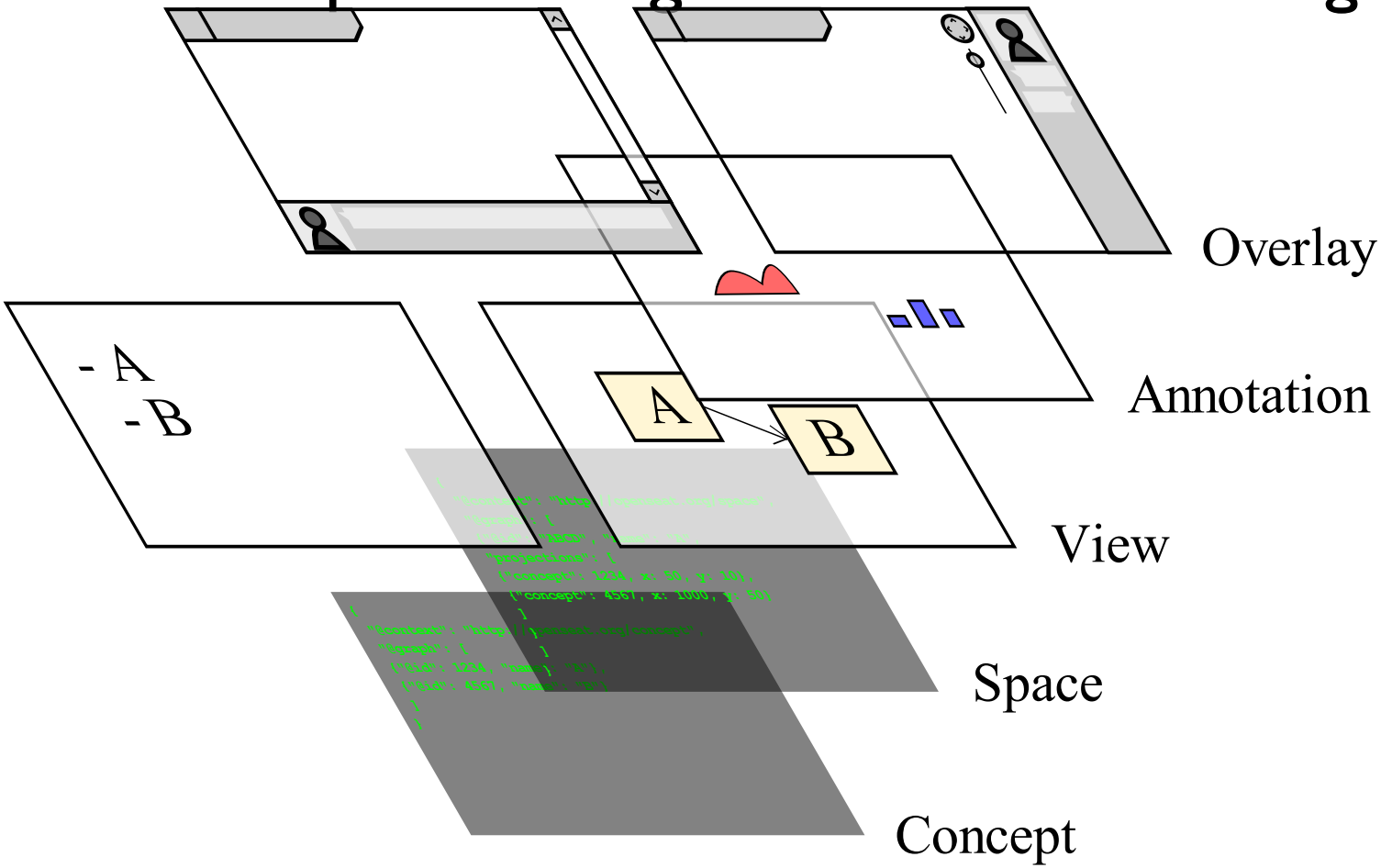
- Professional Masters of Applied Systems Engineering (http://pmase.gatech.edu) **@ Georgia Tech**
- **First-Week Activity**
  - **Pitch: 1-slide Presentation & 1-page Whitepaper**
  - **Downselect: Vote & Form teams (3-5 students per group)**
  - **Requirements Analysis: Use Cases & Stakeholders**
  - **Solution: Functional & Physical Decomposition, AoA**
  - **Outbrief: Final Presentation & Report**
- Status Quo Tools
  - **Office Tools: Word, Excel, PowerPoint**
  - **MagicDraw**

# OpenSEAT

The *Open Systems Engineering & Architecture Toolkit*

- **Web-based, Multi-user, Concurrent editing**
- **Mobile-first**
- **Open Source, Open Community**
  - **MIT Licensed**
  -  openseat (http://github.com/openseat)

# How does OpenSEAT organize models for sharing?



# Initial Conceptual Models

- Qualitative Models
  - Affinity
  - Interrelationship
  - Tree
  - Matrix
  - Prioritization
- System Models

# Initial Contextual Documentation Models

- Research Models
  - Annotation
- Narrative Models
  - Storyboard
  - Document
- Management Models
  - Projects
  - Users

# What are the key components of OpenSEAT?

# Questions?