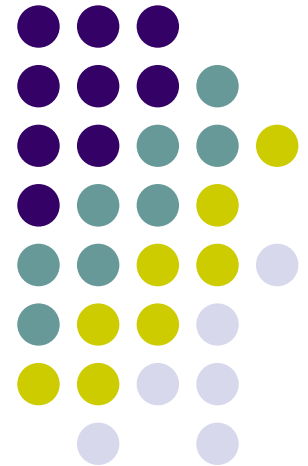


# Computational Experimentation in C2

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CCRTS 2004, San Diego



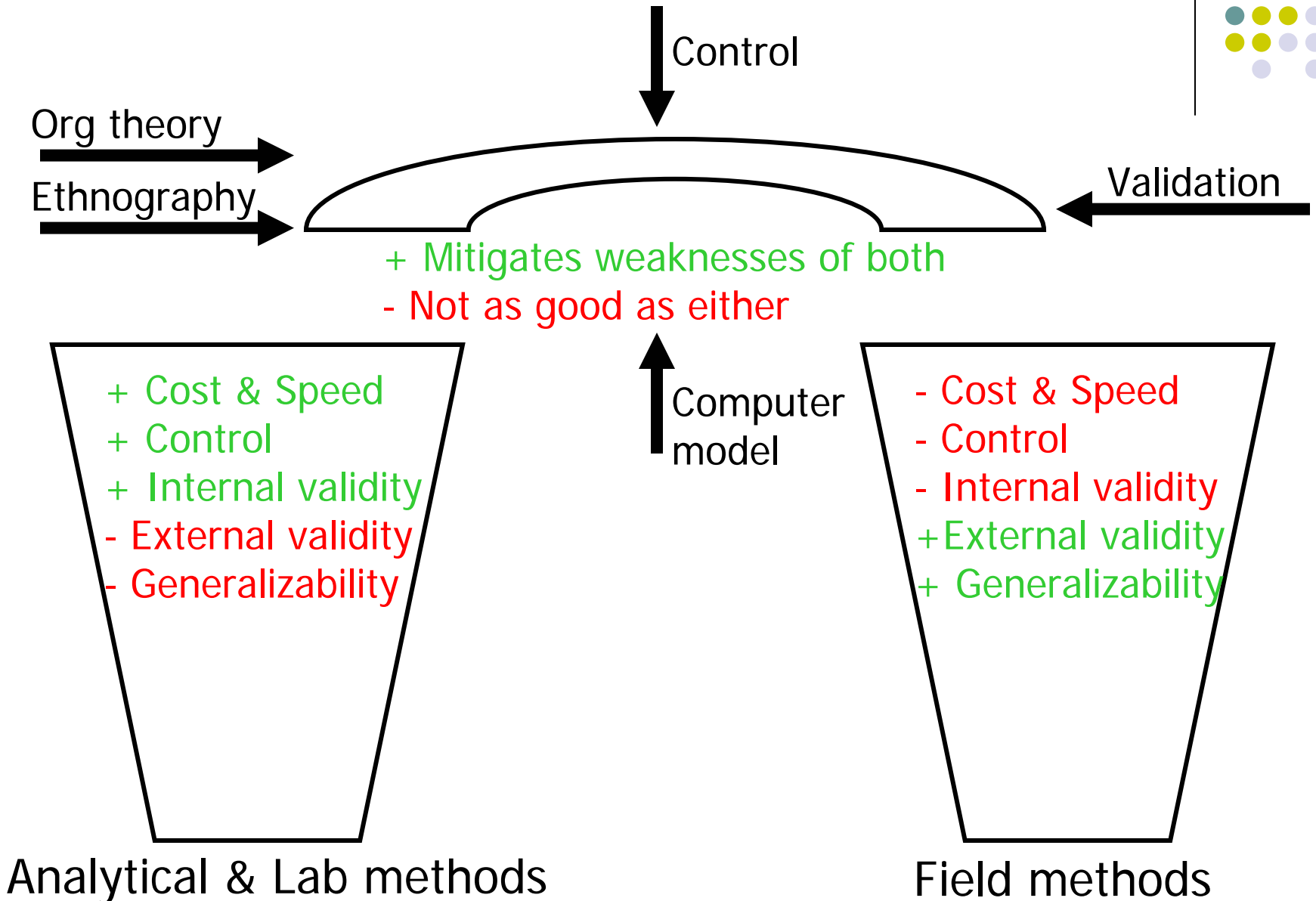
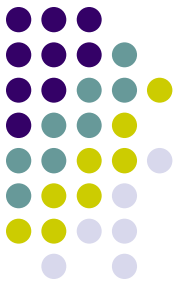
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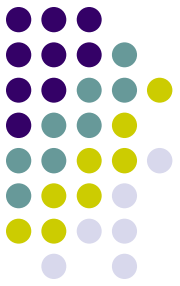
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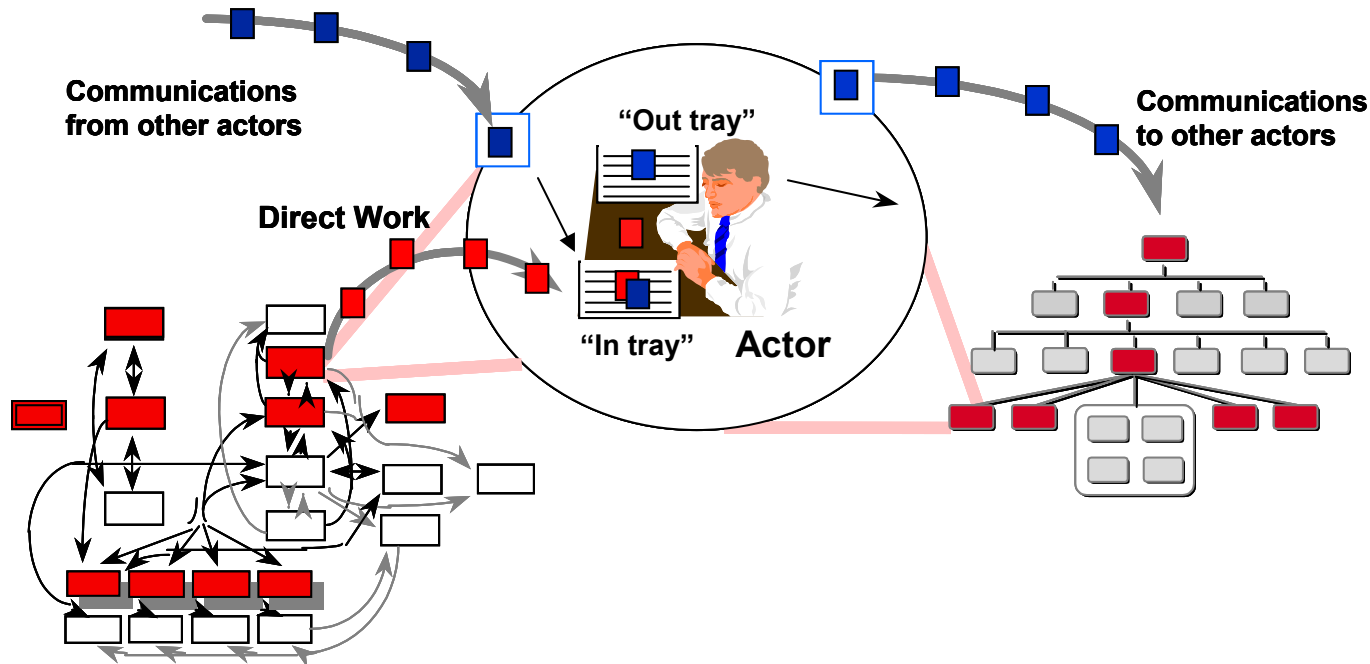
# Computational Experimentation



# VDT Modeling



- Agent-based models
  - Semi-formal – complement NL
  - Ontological: ODs + WFs (+ IFs + KFs)
  - Computational: work volume (direct, coord, rework)
  - Model organizations of large size & complexity

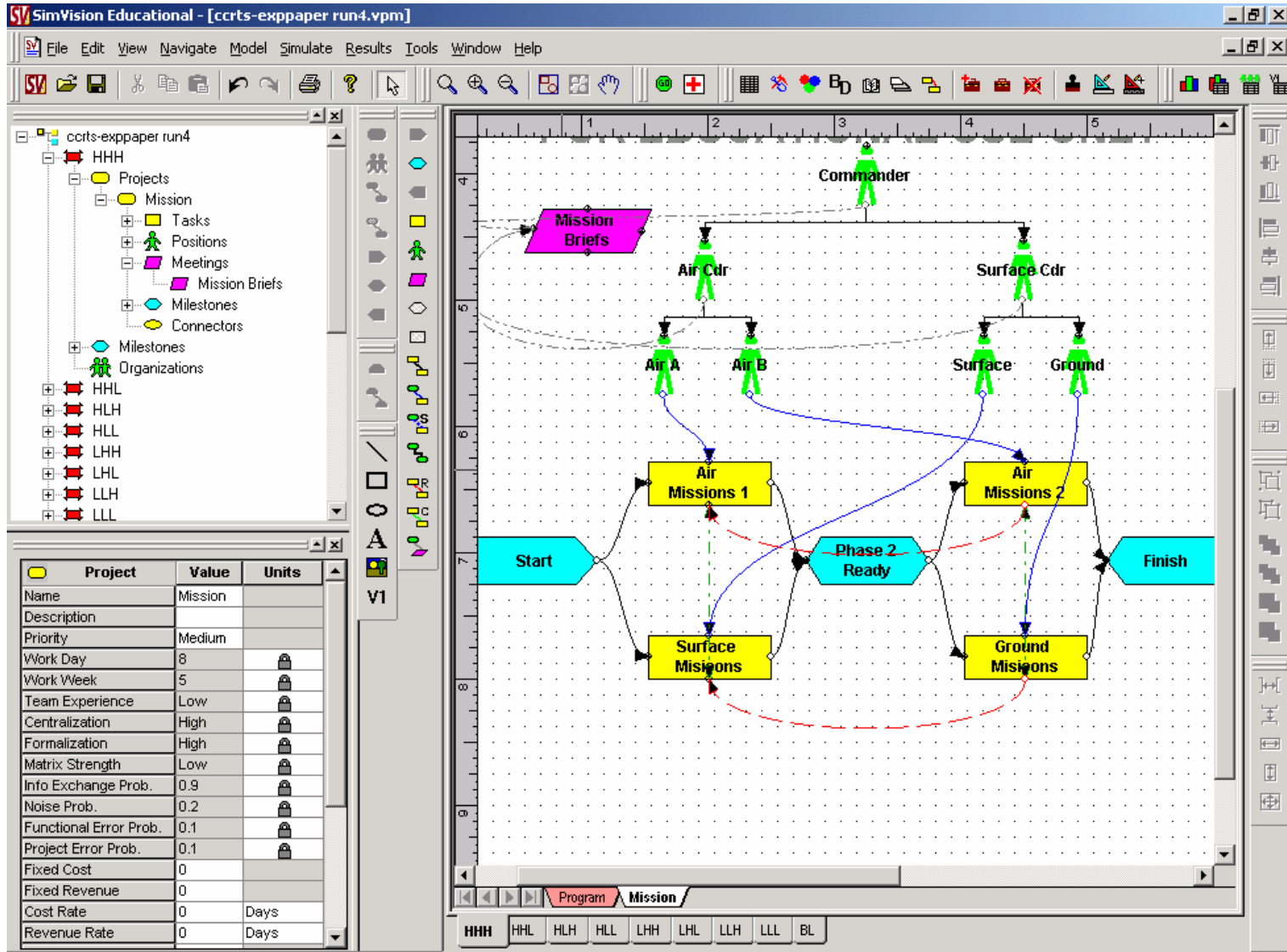
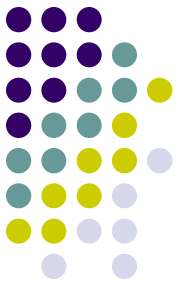


# Research Design



- VDT Model: high-level C2 organization
  - Generic but representative
  - Focus on modeling & experimentation
- IVs
  - Bureaucracy (central, formal, levels, meetings)
  - Coord load (interdep, comm, noise, project level)
  - Knowledge inventory (skill level, capability match)
- DVs
  - Mission duration (elapsed time to completion)
  - Mission risk (work left incomplete at end)
- Full-factorial
  - 8 simulation scenarios
  - Monte Carlo – 100 runs each

# VDT C2 Model



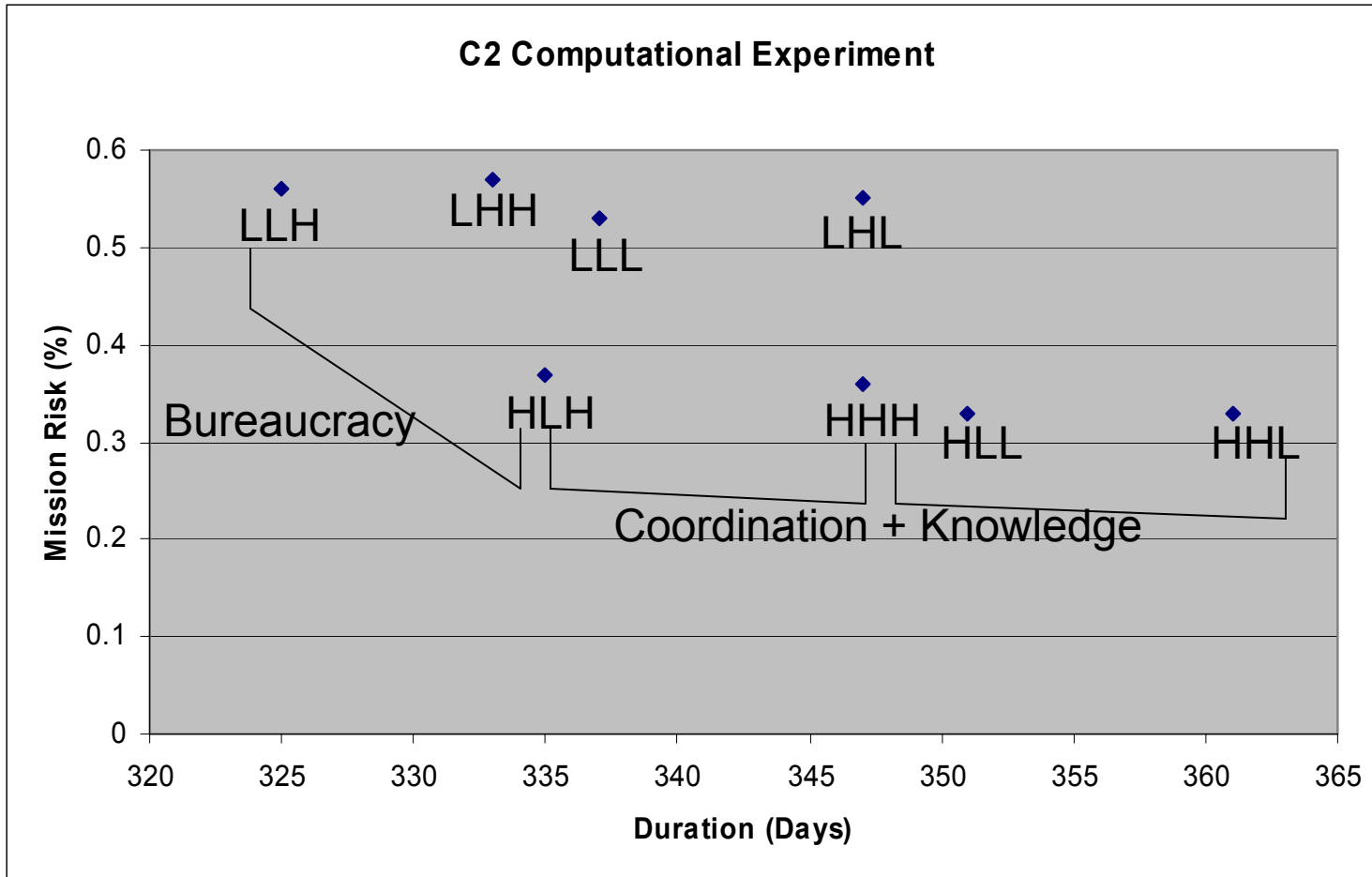
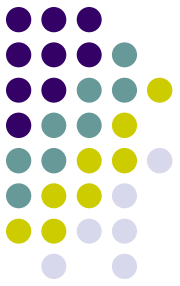
# Experimental Results



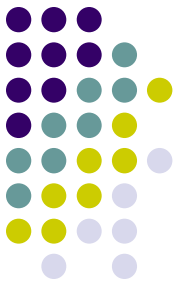
| Trial | Duration       | Risk          |
|-------|----------------|---------------|
| HHH   | 347 ***        | 36 *          |
| HHL   | <b>361</b> *** | 33 ***        |
| HLH   | 335 ***        | 37 ***        |
| HLL   | 351 ***        | <b>33</b> *** |
| LHH   | 333 ***        | <b>57</b> *** |
| LHL   | 347 ***        | 55 ***        |
| LLH   | <b>325</b> *** | 56 ***        |
| LLL   | 337 ***        | 53 ***        |

\*\*\* significant at 99%; \*\* significant at 95%; \* significant at 90%

# Results – Scatter Plot



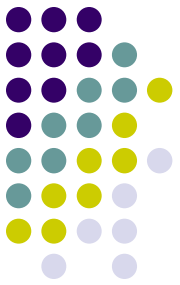
# Implications



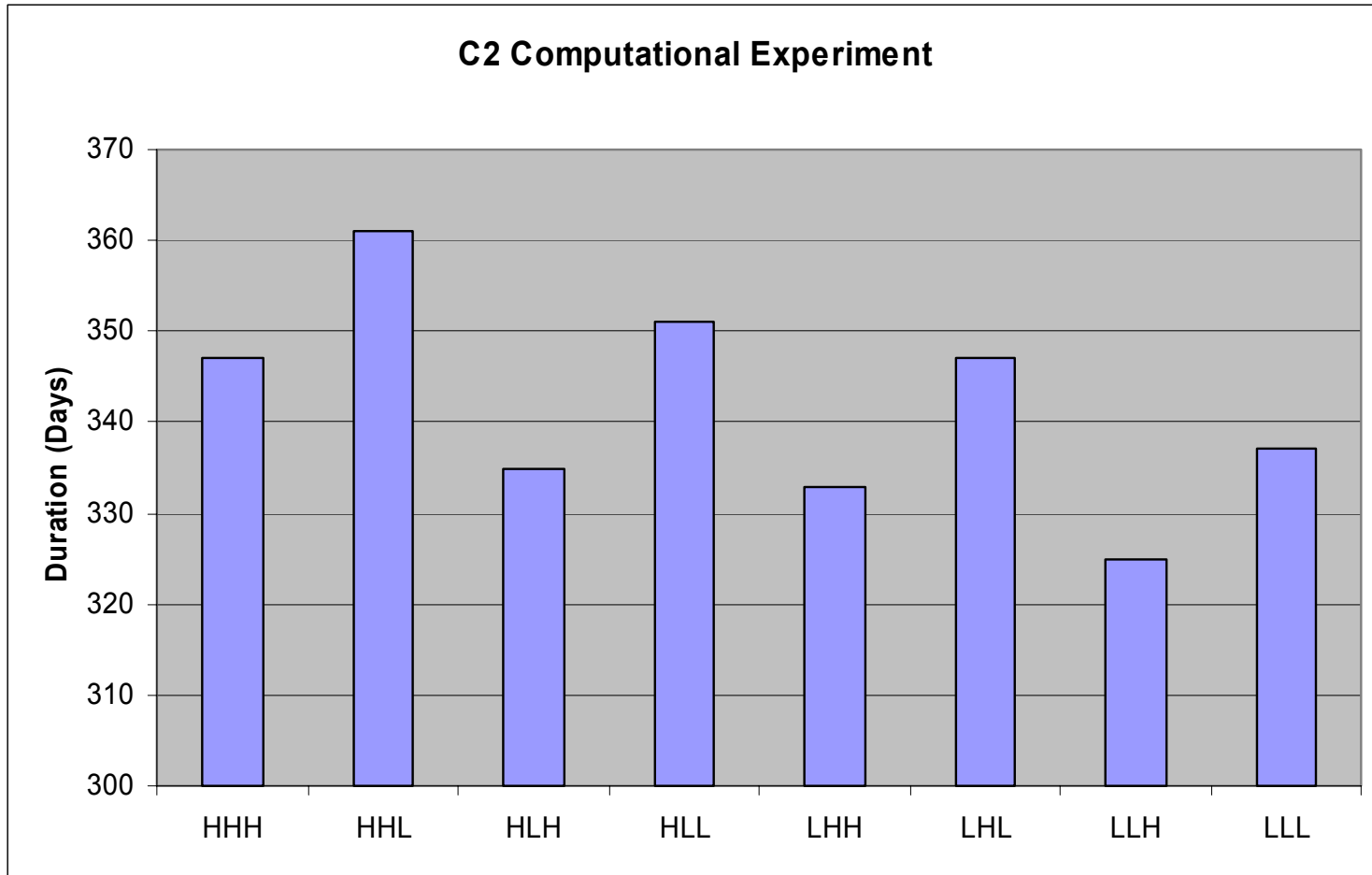
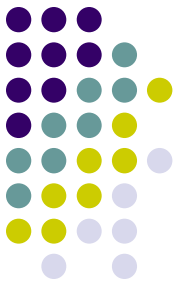
- Organization is contingent
- Tension between performance measures
- Assess computationally
- Complement lab & field methods
- Implications for practice & research

# Questions?

- Thank you.
- [MNissen@nps.edu](mailto:MNissen@nps.edu)



# Results – Duration



# Results – Risk

