



# Hypothesis Testing of Edge Organizations – Part I

IC2RTS 2005 Edge Organizations Track

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Research coordinated through the Center for Edge Power.

# Motivation

- ✦ Edge organization is fresh OD approach
- ✦ Question comparative & contingent performance
- ✦ Research problems with methods & ambiguity
- ✦ Computational experimentation as bridge method
- ✦ Center for Edge Power: MY, MD, MU R program
- ✦ This study:
  - Phase 1 – model specification & exp design
  - Set up computational experimentation & field research

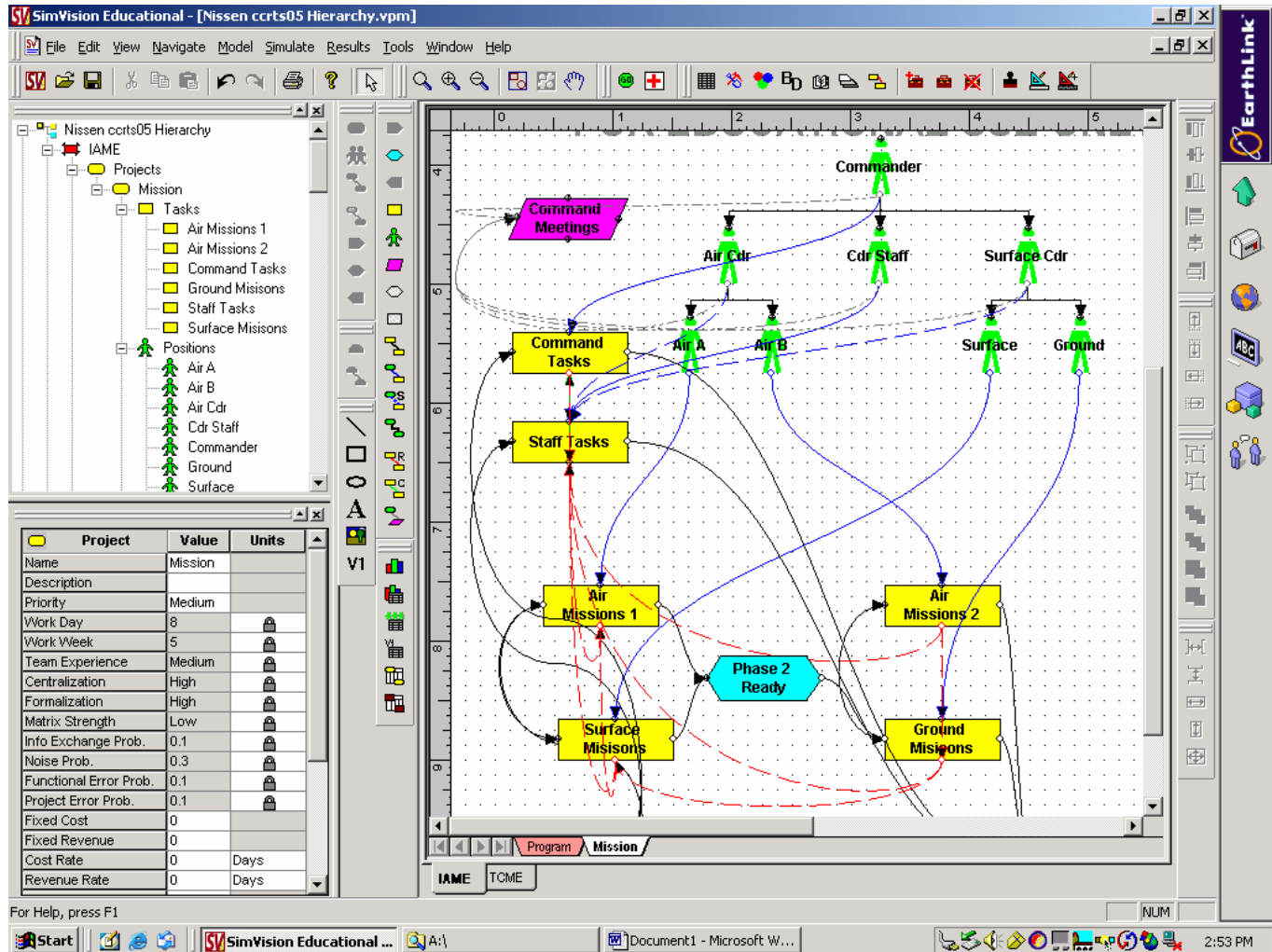
# Archetypal Classification

**Table 2 Classification\* of Hierarchy & Edge Organizations**

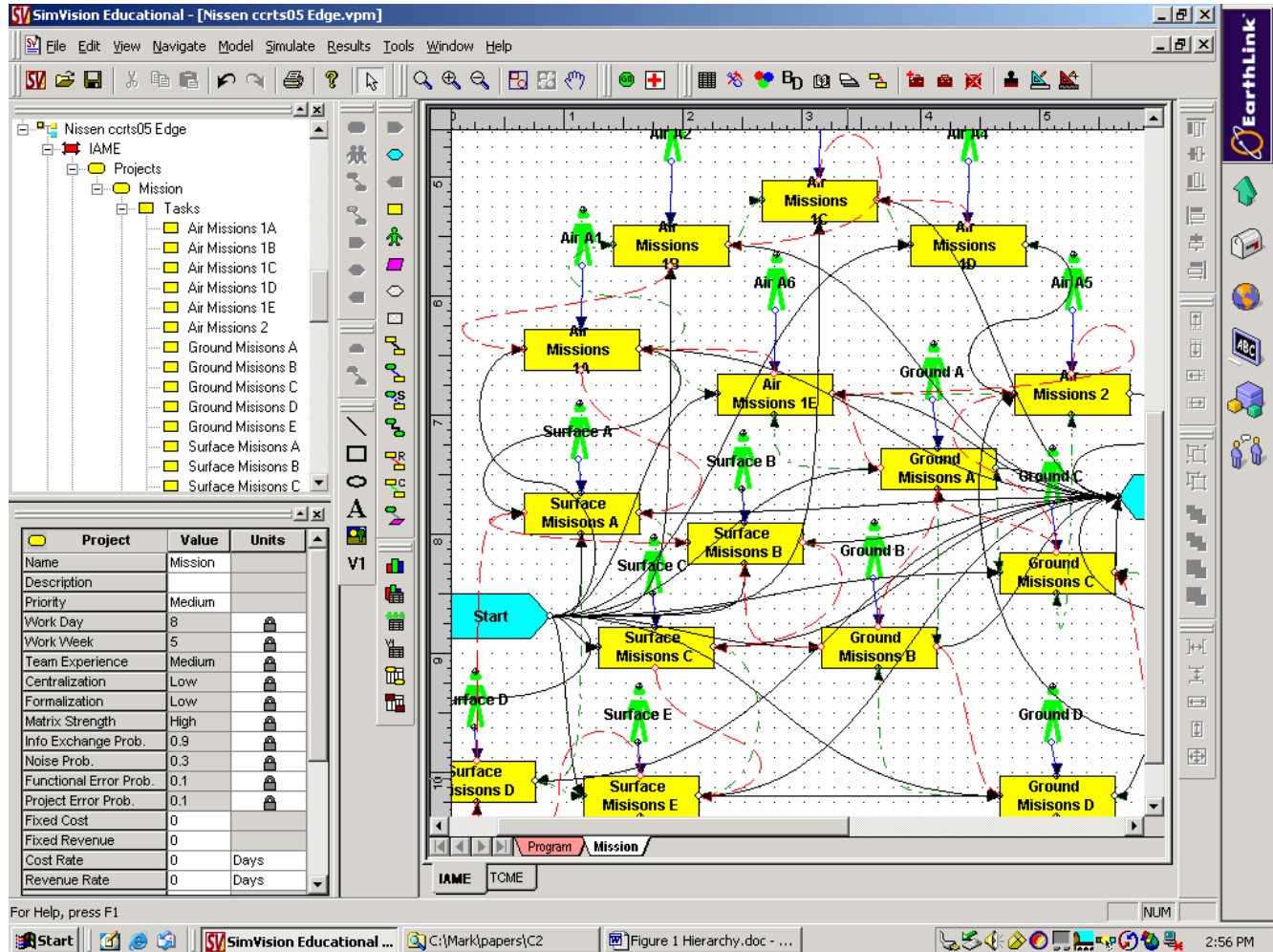
<b>Design Factor</b>	<b>Hierarchy</b>	<b>Edge</b>
Coordination	Work standards	Mutual adjustment (Adhocracy)
Specialization – H	High	Low (Simple Structure)
Specialization – V	High	Low (Professional Bureaucracy)
Training & indoc	High	High (Professional Bureaucracy)
Formalization	High	Low (Simple Structure, Professional Bureaucracy, Adhocracy)
Grouping	Function	Market & function (Adhocracy & Professional Bureaucracy)
Unit size	Large	Small (Adhocracy)
Planning & control	Action planning	Limited action planning (Adhocracy)
Liaison	Few	Many throughout (Adhocracy)
Decentralization	Centralized	Selective decentralization (Adhocracy)
Archetype	<i>Machine Bureaucracy</i>	<i>Professional Adhocracy</i>

\* See Mintzberg (1979)

# Hierarchy Model



# Edge Model



# Experimental Design

**Table 4 Manipulations of Experimental Factors**

<b>Manipulation</b>	<b>Industrial Age</b>	<b>21<sup>st</sup> Century</b>
Mission & Environmental Context (P1, 5)	<ul style="list-style-type: none"> <li>- Medium complexity</li> <li>- Med <i>requirement complexity</i></li> <li>- Med <i>solution complexity</i></li> <li>- Med <i>uncertainty</i></li> <li>- Conventional tasks</li> <li>- Same <i>FEP</i></li> <li>- Same <i>PEP</i></li> </ul>	<ul style="list-style-type: none"> <li>- High complexity</li> <li>- High <i>requirement complexity</i></li> <li>- High <i>solution complexity</i></li> <li>- High <i>uncertainty</i></li> <li>- Challenging tasks</li> <li>- Higher <i>FEP</i></li> <li>- Higher <i>PEP</i></li> </ul>
Network Architecture (P2, 3)	<ul style="list-style-type: none"> <li>- Stovepiped</li> <li>- Hierarchy settings</li> <li>- Low bandwidth</li> <li>- <i>Noise</i> (0.3)</li> </ul>	<ul style="list-style-type: none"> <li>- Networked</li> <li>- Edge settings</li> <li>- High bandwidth</li> <li>- <i>Noise</i> (0.01)</li> </ul>
Professional Competency (P2, 4)	<ul style="list-style-type: none"> <li>- Cumulative learning</li> <li>- Higher <i>application experience</i></li> <li>- Personnel rotation</li> <li>- Lower <i>skill level</i></li> <li>- Low <i>team experience</i></li> </ul>	<ul style="list-style-type: none"> <li>- Marginal learning</li> <li>- Lower <i>application experience</i></li> <li>- Personnel rotation</li> <li>- Higher <i>skill level</i></li> <li>- High <i>team experience</i></li> </ul>



# Preliminary Results

**Table 5 Preliminary Experimental Results\***

<b>Measure</b>	<b>Hierarchy Organization: Industrial Age (HOIA)</b>	<b>Edge Organization: Industrial Age (EOIA)</b>	<b>Hierarchy Organization: 21<sup>st</sup> Century (HOTC)</b>	<b>Edge Organization: 21<sup>st</sup> Century (EOTC)</b>
Duration	227 days	223 days	314 days	235 days
Cost	\$12B	\$9B	\$16B	\$10B
Project Risk	0.36	0.78	0.36	0.78
Max Backlog	24 days (Commander)	14 days (Ground A)	27 days (Commander)	16 days (Ground A)
Work Volume	830K days	819K days	830K days	819K days
Rework Volume	131K days	113K days	422K days	166K days
Coordination Volume	15K days	186K days	40K days	227K days
Decision Wait Volume	62K days	0K days	184K days	0K days

\* 1 x 2 x 2

# Contributions

- ✦ Illustrate use & utility of comp exp in mil C2
- ✦ Root Edge org characteristics in Org Theory
- ✦ Characterize “new” Edge form theoretically
- ✦ Publish semi-formal model of Edge org
- ✦ ID fundamental tension: cost vs. risk
- ✦ Reveal comparative performance & contingency in C2
- ✦ Establish basis for hypothesis testing of Edge orgs



# Limitations & Future Research

## ⚡ Limitations

- Bridge research method, interpretation & judgment
- C2 is relatively new domain for VDT

## ⚡ Future research

- Complete full-factorial & comprehensive field of experiments
- Fieldwork for model validation, calibration, extension
- Complementary studies ongoing & planned
- Center for Edge Power welcomes informed input