

Hypothesis Testing of Edge Organizations: Modeling the C2 Organization Design Space

ICCRTS 2007 – Organizational Issues

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Research coordinated through the Center for Edge Power.

Motivation

- ✦ Edge organization is fresh approach
- ✦ Characterize the organizational design space
- ✦ Question comparative & contingent performance
- ✦ Research problems with methods & ambiguity
- ✦ Campaign of Experimentation
- ✦ Center for Edge Power: MY, MD, MU R program



Campaign of Experimentation

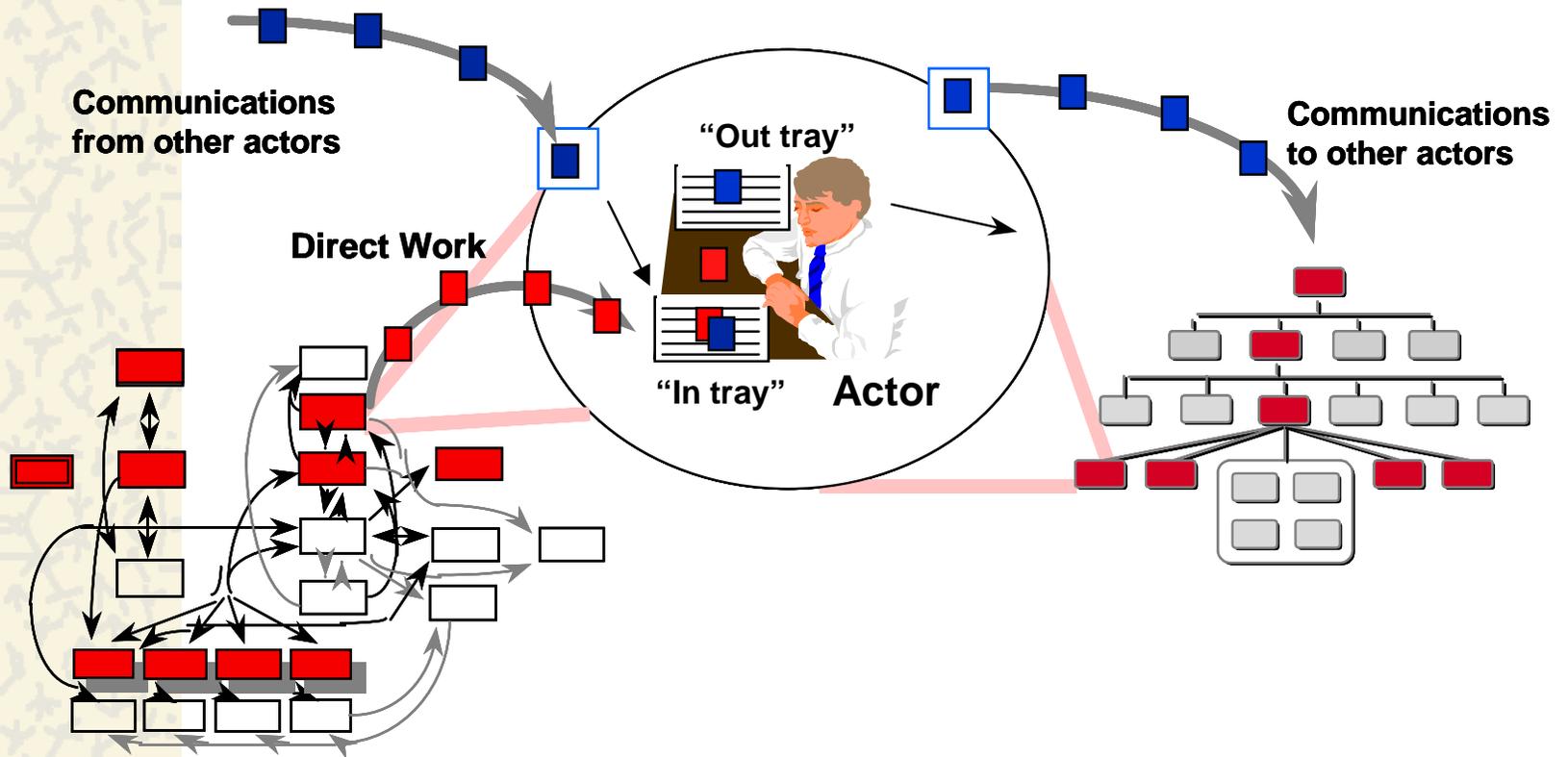
2007 – Model the organization design space, hypothesis testing

2006 – Modeled four classic, theoretically-grounded organization forms *Orr & Nissen 2006

2005 – Compared and analyzed multiple organizational forms (including Edge), hypothesis testing *Nissen 2005a

2004 – Relative advantages and disadvantage of computational experimentation *Nissen & Buettner 2004

Information Processing View



Prior Research Archetypal Classification

Design Factor *Mintzberg 1979	Machine Bureaucracy	Edge
Centralization	High	Low
Formalization	High	Low
Specialization – V	3-level	1-level
Indoctrination	High Low	Medium Medium
Unit Size / Number	1650 / 8	813 / 16
Training	Medium	Medium
Links / Info Exchanges	Few / 0.1	Many / 0.9
Control System	Meetings (2hs/day)	No Meetings
Planning & control	Action planning	Limited action planning
Number of Tasks / Degree of Concurrency	4 / Low (sequential)	16 / High (reciprocal)
Rework Link	Low	High
Archetype	<i>Machine Bureaucracy</i>	<i>Professional Adhocracy</i>

Research Design

✦ Computational tool – POWer

- Describe the 6 organization forms – the *Edge & 5* archetypes (Table 2)
- Manipulate 4 dimensions of organizations (Table 3)
 - Mission & environmental context
 - Network architecture
 - Professional competency
 - Aggregation
- Vary across 2 external contexts (Table 3)
 - Industrial Era & 21st Century scenarios

✦ Full factorial design (6 x 4 x 2)

Comparison Across Forms

Industrial Era Scenario

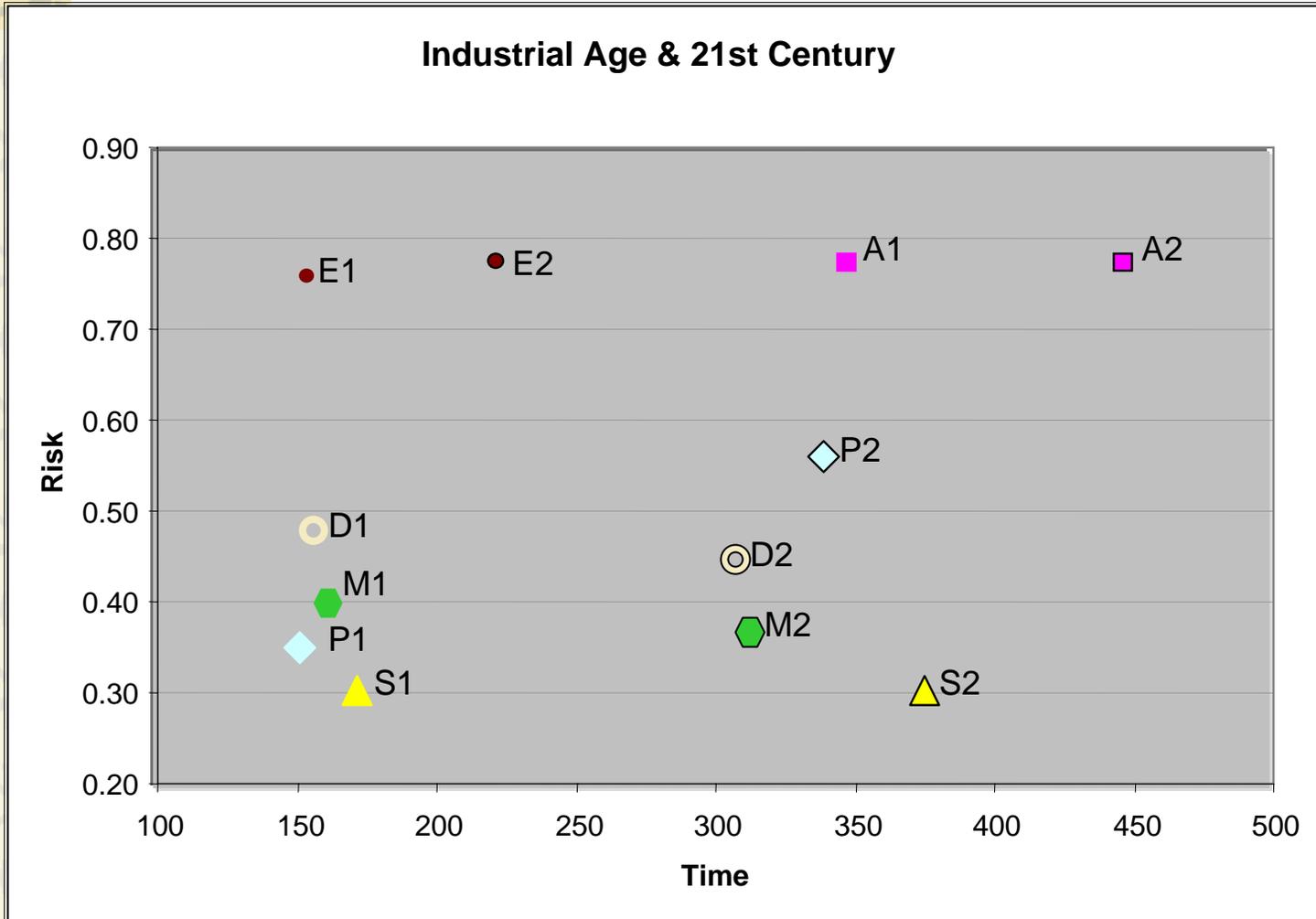
		Machine Bureaucracy	Edge	Simple Structure	Professional Bureaucracy	Divisional Form	Adhocracy
Mission & Environ- mental Context	Time (days)	161	150	168	154	157	346
	Cost (\$M)	822	655	837	603	795	1340
	Direct Work (k-days)	830	819	824	819	829	819
	Rework (k- days)	113	131	145	157	94	190
	Coordination (k-days)	13	185	31	48	15	234
	Decision Wait (k- days)	70	0	47	55	57	0
	Max Backlog (days)	18	11	9	13	19	15
	PRI	0.39	0.77	0.31	0.35	0.47	0.77

Comparison Across Forms

21st Century Scenario

		Machine Bureaucracy	Edge	Simple Structure	Professional Bureaucracy	Divisional Form	Adhocracy
Mission & Environmental Context	Time (days)	313	220	375	342	308	446
	Cost (\$M)	1625	972	1940	1537	1568	1816
	Direct Work (k- days)	830	819	819	819	819	819
	Rework (k-days)	429	168	645	520	391	194
	Coordinati on (k- days)	40	227	103	371	49	245
	Decision Wait (k- days)	193	0	225	212	168	0
	Max Backlog (days)	28	16	28	32	30	20
	PRI	0.36	0.78	0.30	0.57	0.45	0.77

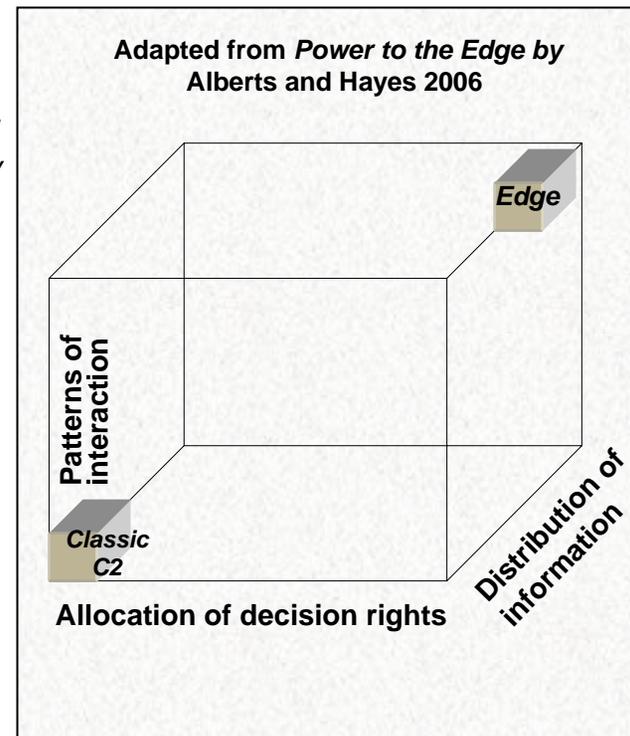
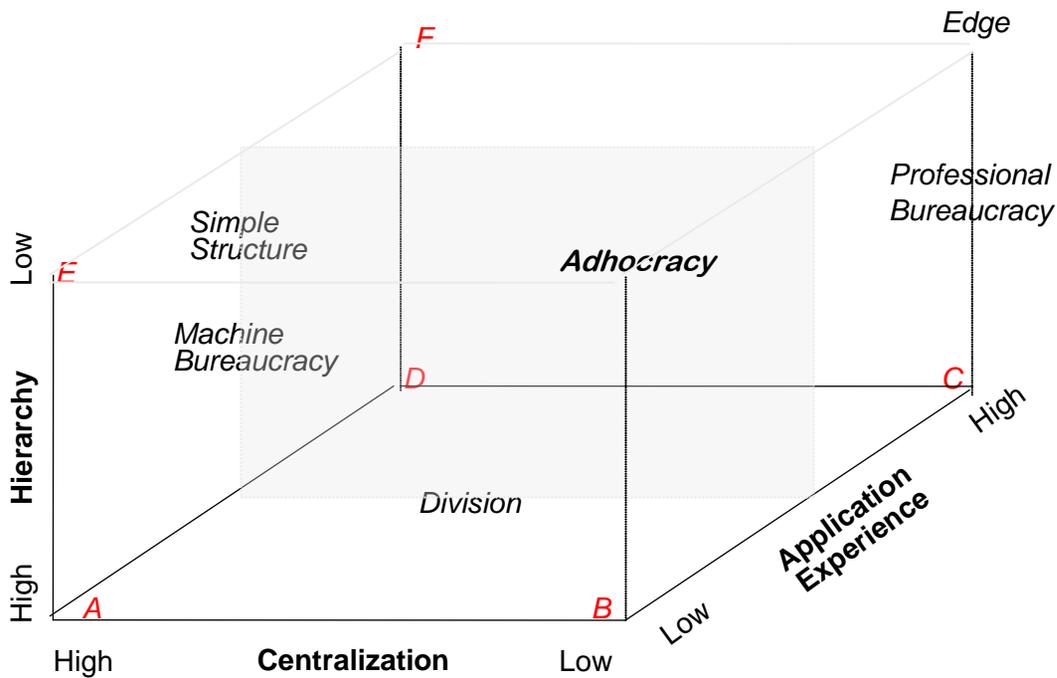
Time – Risk Performance Summary



Comparison Across Experimental Manipulations

21 st Century		Machine Bureaucracy	Edge	Simple Structure	Professional Bureaucracy	Divisional Form	Adhocracy
Mission & Environmental Context	Time (days)	313	220	375	342	308	446
	Cost (\$M)	1625	972	1940	1537	1568	1816
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	Decision Wait (k-days)	193	0	225	212	168	0
	Max Backlog (days)	28	16	28	32	30	20
	PRI	0.36	0.78	0.30	0.57	0.45	0.77
Combined Network Architecture & Professional Competency	Time (days)	288	148	430	238	463	315
	Cost (\$M)	1133	684	2202	1135	1133	1335
	Direct Work (k-days)	830	819	819	819	819	819
	Rework (k-days)	291	144	1000	457	282	183
	Coordination (k-days)	47	214	357	381	81	237
	Decision Wait (k-days)	123	0	370	187	93	0
	Max Backlog (days)	36	14	28	23	64	17
	PRI	0.46	0.78	0.36	0.57	0.63	0.77

Organization Design Space



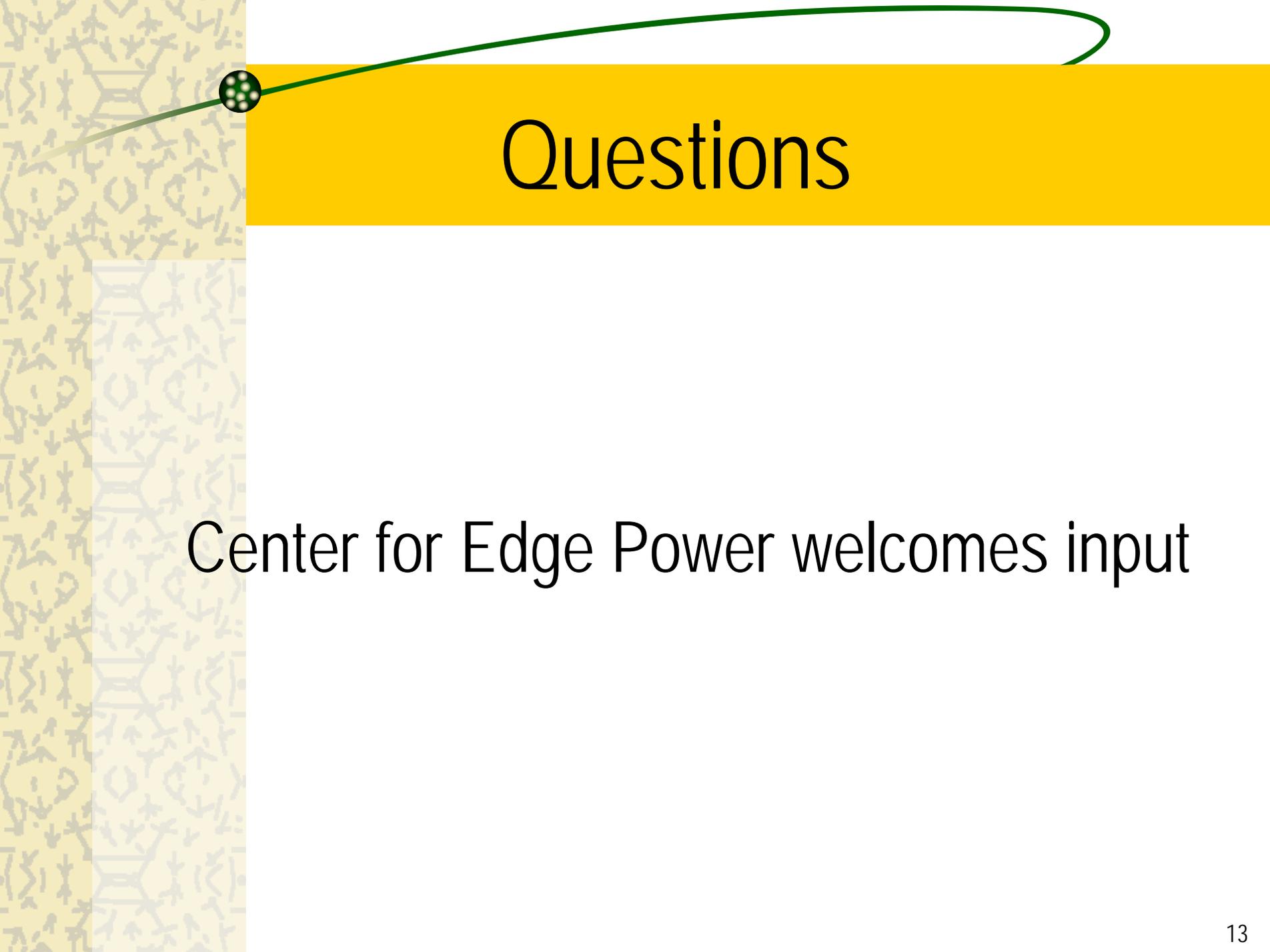
Contribution & Future Research

✦ Contribution

- Grounds the *Edge* form in well-established organization theory
- Articulation of the organization design space
- Inform decision makers regarding the effects of change

✦ Future research

- Identify the other “extreme” organization forms and other hybrids
- Develop a mechanism for weighing and comparing performance across multiple dimensions
- Continue to validate parameters and performance



Questions

Center for Edge Power welcomes input