

# Technical and Social Determinants of Information Security in Local E-Government

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# Research Question

- What makes information of e-government more or less secure?
- The extent to which technical, organizational, and environmental dimensions of online services affect information security?

# Motivation

- Information security issues - a prominent barrier to the advancement of e-government (Lambrinondakis 2003, Edmiston 2003).
- IPCE survey: moderate level of actual electronic data breach and managers' concerns in U.S. local governments

Survey Question: Has your organization experienced unintended or accidental electronic disclosure of organization information?

No	629 (73%)	Secure (1)
Yes or DK	238 (27%)	Insecure (0)

# Motivation

Survey Question: Organization is unable to effectively ensure the electronic security of our documents and data?

Disagree	659 (74%)	Secure (1)
Agree or neutral	228 (26%)	Insecure (0)

- Despite existing information security issues, only a few empirical studies exist; most of them are technical
- Little research on technical/social mechanism influencing security outcomes → call for a socio-technical approach

# Scope of Study

- E-government: government's use of information and communication technologies to deliver information and services to citizens through the Internet (Reddick 2009)
- US local governments
  - unit of analysis: department of local government

# Information Security

- Information Security as an Outcome
  - Protection from unauthorized access/use/disclosure
- Secure technical systems + awareness/compliance of members
  - assessed by objective/subjective measures ;  
unawareness (DK)

# Technical Dimension

- Technical complexity: the number of distinct technical machines and methods simultaneously operated to produce the service
- complex system literature asserts the more complex systems are, the higher the chance of system errors occur (Perrow 1984, 1994; Schneier 1993).

*H1. Organizations with higher technical complexity will be less likely to secure their information*

# Organizational Dimension

- Organization structure and internal policy are related to coordination burdens (scott 2003); Coordination burdens are negatively related to security (Wood 1986;Baccarrini 1996; Xia and Lee2005) ;

*H2: organizations with clear internal security policy will be more likely to secure information.*

*H3. More departmentalized; more task-specialized; more centralized orgs will be less likely to secure information*

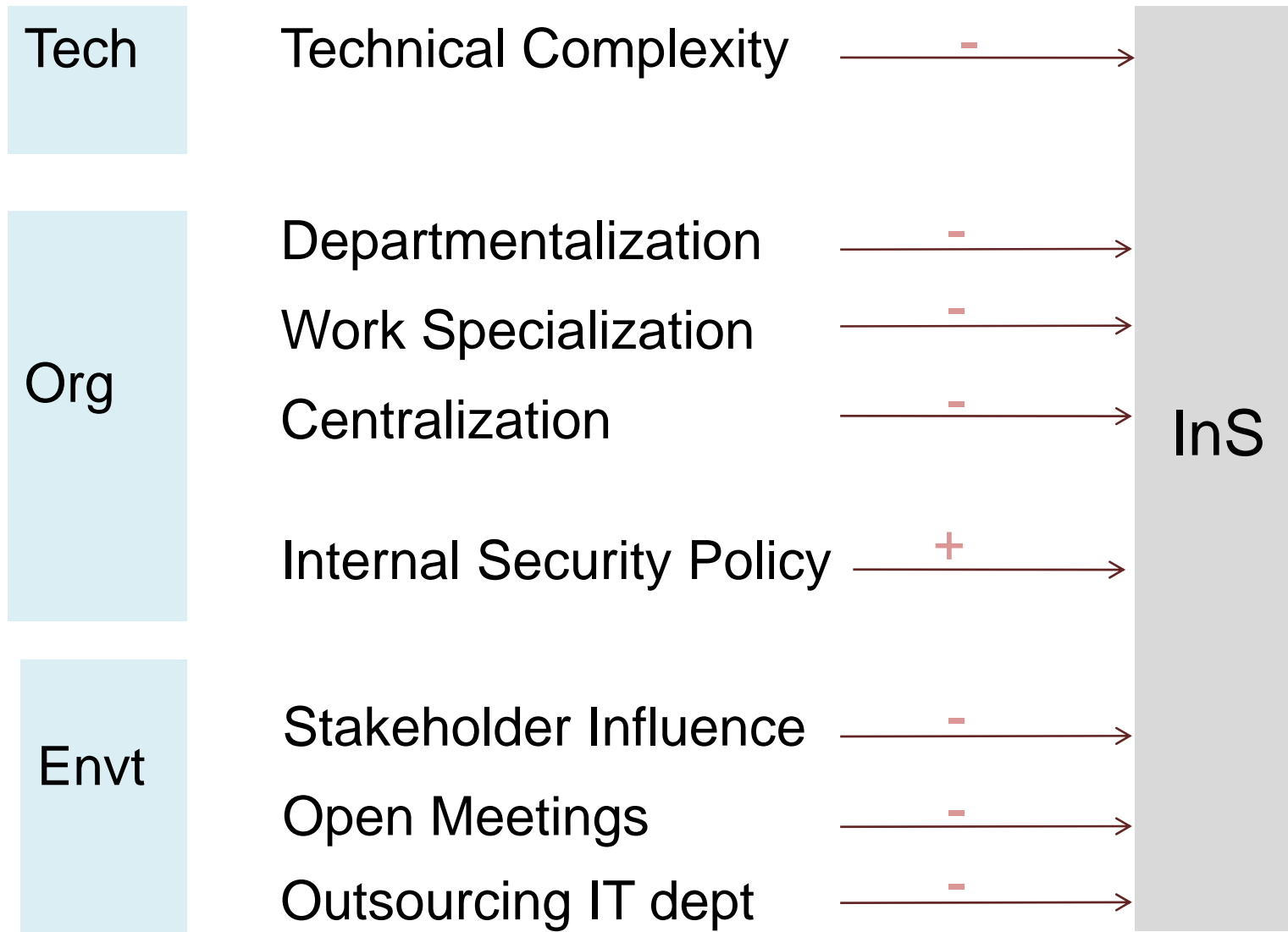
# Environmental Dimension

- External Involvement and influence to lower organizational control over its resources (Pfeffer and Salancik 1978) / and information (Iambrinoudakis et al 2003; Paquette et al 2010)

*H4: Organizations with larger stakeholder influence will be less likely to secure information*

*H5. Organizations that outsource IT services; that have more open meetings to the public will be less likely to secure information*

# Model on Information Security (InS)



# Data and Method

- Survey Data:
  - 5 departmental chiefs in 500 local governments (population size from 25K to 250K); Final sample size = 902 (RR: 31.9%)
- Dependent Variable : Information Security (InS)
  - Objective InS: absence of electronic data breach accident
  - Subjective InS: manager's perception on org capacity to secure electronic info
- Method: logistic regression
  - *dependent variable: binary (secure/insecure)*

## Data and Method

- Independent Variable
  - *Technical Complexity*: no. of online media used
  - *Org Departmentalization*: presence of IT dept / lawyer
  - *Org Work Specialization*: agreement on work specialization
  - *Org Centralization*: index from 3 Qs on decision-making ( $\alpha=0.75$ )
  - *Org InS Policy*: index from 3 Qs on security policy ( $\alpha=0.77$ )
  - *Envnt Influence*: index from 4 Qs on external stakeholder influence
  - *Envnt Involvement*: contracting-out of IT department /  
% of meeting open to the public
- Controls: Org Size; Internet Use %; Contracting-out %; Dept Types

# Security Findings

Subjective  
Security

Objective  
Security

Tech

Technical Complexity

(-)

Org

Departmentalization

(-)

Work Specialization

(-)

Centralized Decision

(-)

Internal Security Policy

(+)

Envt

Stakeholder Influence

Open Meetings

(+)

Outsourcing IT dept

(-)

# Findings

		Objective InS	Subjective InS
Tech	Technical Complexity	- 0.10 (0.04)**	0.06 (0.05)
Org	Departmentalization		
	IT department	- 0.65 (0.21)***	- 0.08 (0.21)
	Lawyer	- 0.06 (0.21)	- 0.03 (0.22)
	Work Specialization	- 0.03 (0.11)	- 0.08 (0.12)
	Centralized Decision-making	- 0.46 (0.14)***	- 0.27 (0.14)*
	Internal Security Policy	0.17 (0.14)	0.91 (0.14)***
Envt	External involvement in		
	Open meetings	0.01(0.00)**	0.00 (0.00)
	Contracting-out of IT dept	0.03 (0.39)	- 0.70 (0.37)**
	Stakeholders influence	- 0.06 (0.14)	0.03 (0.15)
N		626	626
p> chi2		0.000	0.000
LR chi2		46.97	94.96

\*\*\*P<0.01: \*\*P<0.05: \*P<0.10

# Conclusion

- All technical, organizational, & environmental dimensions of online services are found to partially influence security outcomes of local government
- Technical complexity, and complex organizational structures can lower security outcomes
  - especially, decision-making structures may matter for InS
- Organizational arrangements for external involvement can be important than the external influence *per se*

## Discussion

- Unexpected findings on the positive effects of open meetings on security outcomes
  - may be related to capacity issues
- Different findings for objective vs. subjective InS
  - may need different frameworks
- Future study agenda: refined model of organizational complexity-security relation; extended model on environmental determinants