# Governance Patterns of U.S. Public Safety Networks: Preliminary Findings from a Fuzzy Set Qualitative Comparison Analysis

*RESEARCH IN PROGRESS*

By

Jane Fedorowicz

Bentley University

Waltham, MA USA

Steve Sawyer

Syracuse University

Syracuse, NY USA

Arthur Tomasino

Bentley University

Waltham, MA USA

February 18, 2014

EXTENDED ABSTRACT

*The Public Safety Networks Study team[[1]](#footnote-1), housed at Bentley University and Syracuse University, provides an interdisciplinary perspective on the sociotechnical issues pertaining to the initiation, design, uses and successes of interorganizational systems supporting cross-agency communications and information sharing in the public sector. The results to be shared in this presentation represent the latest in a series of studies and analyses conducted by the project team. This is a work in progress.*

The paper under development extends our prior examination into configurations of design of public safety networks (PSNs), concentrating on the role governance plays. The focus of the analysis, PSNs, are inter-agency collaborations which support the development and uses of interorganizational systems to enhance information sharing and functional interoperability needs of public safety agencies engaged in law enforcement, criminal justice, and emergency response (Fedorowicz et al, 2007). More broadly, PSN are a specific form of interorganizational information-sharing system (IOS).

In this paper we extend prior work to (1) identify significant aspects of PSN governance and (2) identify patterns of PSN performance relative to their governance activities and structures. We focus here on governance because of its hypothesized importance to performance. Governance encompasses the creation and oversight of policies and processes within an organization, and may encompass organizational, resource (e.g., financing), technology and other significant decisions (Markus and Bui, 2011). In the public sector, governance also must address political mandates and input from a variety of external stakeholders such as citizens or other government levels. Specific to this study, the research question to be addressed is: *Are there patterns of governance arrangements in PSNs that impact performance?* Use of Ragin’s fsQCA technique will allow us to also determine what the patterns are, how they vary, how they are alike, and what may explain them.

Background

Historically, decisions about the structure and mission of public safety organizations have limited their ability to communicate and share information with other agencies. This inability continues even though these agencies have the information and communications technologies (ICT) in place to support sharing and interoperability. The goal of the project from which this study derives is to help these agencies realize the value of joining together to design, develop and deploy information and communications technologies to support policing, criminal justice, public safety and homeland security.

Our theoretical contributions to date include the identification of two major forms of PSNs (police-oriented and courts-oriented) (Sawyer, et al, 2013), as well as contrasting theoretical explanations regarding design decisions for both collaboration infrastructure and governance (Fedorowicz et al, 2007; Fedorowicz et al. 2014), focusing on institutional and rational choice theories (Williams et al., 2009; Williams and Fedorowicz, 2011).

We have also contributed to extant knowledge on a range of related topics, such as the applicability and use of complex adaptive systems theory to study system implementation (Tomasino, 2013; Tomasino et al., 2013), and extending a common shared service framework to include the role of public policy in public sector shared service implementations (Tomasino et al, under review; Tomasino et al, forthcoming).

On the empirical front, we have developed a state-by-state data set of U.S. PSNs to support the analysis. This includes data on 275 PSN initiatives at the state and local levels with detailed interview data on 80 of these. We have also gathered data on over 230 independent variables for each of the 50 states, which include political, demographic, public safety, police/justice, and computing issues. Finally, we conducted six extensive case studies (CapWIN, NLETS, JNET, ARJIS, Winnebago County and Clermont County) to gather detailed information about a variety of PSNs.

Method[[2]](#footnote-2)

The cases used for this analysis are drawn from the larger data set of the 275 PSNs found at the state and local levels of government (Williams et al., 2009). The primary data for these cases were gathered by a trained interviewer employed by Penn State University’s computer-assisted telephone interview (CATI) center to secure their voluntary participation. The interview protocol and instrument were designed and piloted in consort with the CATI center. Respondents took approximately 45 minutes to complete the protocol.

The survey gathered data in response to over 90 questions (some containing lengthy selection lists) about the PSN’s origin (seven questions), purpose (five questions), membership (five questions), usage (10 questions), development (five questions), technology components (18 questions), governance (six questions), performance measures (seven questions), and goals (10 questions). Given the analysis pursued, question responses were focused on categorical responses (options, scales, or often simply yes or no), with opportunities for open-ended comments.

A careful review of the quality and completeness of the survey responses found 61 of the 80 valid cases had provided responses to the questions used in this analysis. These PSNs were selected because we had been able to gather additional primary data needed for the analysis of governance and performance. Data from the 61 cases were first aggregated into the factor sets described in more detail below. These factors were then subjected to fsQCA analysis to detect whether any identifiable configurations of PSNs could be identified.

Fuzzy-Set Qualitative Comparative Analysis

For the analysis reported here we treat each PSN as a case and the variables used in the analysis are composite measures of technology architecture, governance and performance. Analysis relies on qualitative comparative analysis, a method designed specifically for understanding case-based social science research (see Ragin, 2008 and [www.fsqca.com](http://www.fsqca.com) ).

The basis of QCA is set theory and Boolean logic. The set theoretic basis means variables are characterized as belonging to sets which may or may not have commonality. The first step of QCA analysis is to assess each case’s membership in the particular sets the analyst seeks to understand – the components of PSN governance and performance. As noted above, set-theoretic approaches like QCA are premised on interdependence among variables. To assess relationships while preserving variable interdependence, QCA employs Boolean logic. In this way, QCA provides mechanisms not possible with either the more common multiple correlation approaches or the set-theoretic approaches common to most case-based research.

Developing QCA analysis requires strong conceptual grounding at three different points in the analysis in order to develop and interpret the findings: (1) forming the variables to be studied, (2) calibrating set membership for each case and its variables, and (3) identifying possible configurations among set relationships. Strong conceptual grounding is made even more necessary if partial membership of cases is permitted based on fuzzy set (fs) membership criteria for QCA. That is, fsQCA analysis extends set-theoretic analysis by allowing for partial membership (making a set’s boundaries fuzzy) with assessing the particular arrangements of a PSN’s governance components relative to membership in the set of high performing PSNs.

Preliminary Results

Given our extensive experience studying the PSN phenomenon, we suspected there might be groupings around their IOS’ purposes and functions. Thus, initial analysis focused on identifying patterns among organizational processes and particular types of data supplied to PSN users. Doing this confirmed that two distinct subsets of PSNs – court-oriented and police-oriented PSNs - were different enough as to support separate analyses within the technology architecture configuration study (Sawyer et al. 2013). Because these two subsets were detected based on the intended use and functionality of the PSNs and not on their technology, the groupings are considered to be sufficiently generic to warrant separate investigation in the governance analysis.

We collected data on four governance functions (technology, resource, organizational and stakeholder), performance of the governance function, and PSN performance metrics. Technology governance encompasses approving strategic ICT plans, prioritizing ICT projects, developing and monitoring architecture plans and standards compliance, identifying functional requirements, setting service level agreements, and specifying data access policies. Resource governance comprises budget approval, monitoring financial performance and pricing decisions. Organizational governance covers key staffing decisions and IT procurement. Stakeholder governance includes PSN membership decisions and stakeholder satisfaction evaluation.

The results to be shared in the presentation will help us better explain the relationships among the four governance functions and several measures of PSN governance effectiveness and PSN performance. The results also show the impact of governmental mandates (i.e., mandated vs. elective PSN initiation) and organizational structure (i.e., an informal group, a subunit, or a separate organization) on governance and performance.

As part of the presentation we will detail the calibration of the measures, the construction of truth tables, the configurational paths that arise, and interpretation of the resulting paths.

## References

Brooks, J., Bodeau, D., & Fedorowicz, J. (2013) Network Management in Emergency Response: Articulation Practices of State-Level Managers – Interweaving Up, Down and Sideways. *Administration & Society, 45*(8), 911-948.

Fedorowicz, J., Gogan, J. L., & Williams, C. B. (2007). A Collaborative Network for First Responders: Lessons from the CapWIN Case. *Government Information Quarterly, 24(4)*, 785-807.

Fedorowicz, J., Sawyer, S., Williams, C., Markus, M., Dias, M., Tyworth, M., Jacobson, D., Gantman, S., Tomasino, A., & Schrier, R. (forthcoming 2014). Design Observations for Interagency Collaboration. *Government Information Quarterly*.

Gantman, S. (2011). IT Outsourcing in the Public Sector: A Literature Analysis. *Journal of Global Information Technology Management*.

Markus, M. L., & Bui, Q. (2011). Going Concerns: The Governance of Interorganizational Coordination Hubs. *Journal of Management Information Systems*.

Ragin, C.C. (2008) *Redesigning Social Inquiry*, University of Chicago Press, Chicago.

Sawyer, S., Schrier, R., Fedorowicz, J., Dias, M., Williams, C. B., Tyworth, M. (2013). US Public Safety Networks: Architectural Patterns and Performance. *Information Polity, 18*(2), 139-156.

Tomasino, A. (2013) *The Use of Complexity Theory and Strange Attractors to Understand and Explain Information System Development,*  doctoral dissertation, Bentley University.

Tomasino, A., Fedorowicz, J., Williams, C. B. (Under review) Taking Shared Services Out of the “Back-Office”: Safety Critical Shared Services.

Tomasino, A., Fedorowicz, J., Williams, C., Gentner, A., & Hughes, T. (forthcoming). Embracing System Complexity: Lessons Learned from Winnebago County’s Shared Service Center Collaboration. *MIS Quarterly Executive*. June 2014.

Williams, C. B., & Fedorowicz, J. (2011). Rational Choice and Institutional Factors Underpinning State-level Interagency Collaboration Initiatives. *Transforming Government: People, Process and Policy, 6*(1), 13-26.

Williams, C. B., Fedorowicz, J., Sawyer, S., Dias, M., Jacobson, D., Tyworth, M., and Vilvovsky, S. (2009) “The Formation of Inter-Organizational Information Sharing Networks in Public Safety: Cartographic Insights on Rational Choice and Institutional Explanations.” *Information Polity*, Vol. 14, Nos. 1-2, pp. 13-29.

Williams, C. B., Gogan, J. L., & Fedorowicz, J. (2005). Public Safety and Cross-Boundary Data Sharing: Lessons from the CapWIN Project. *IEEE Computer, 38(12)*, 28.

1. The team includes M. Lynne Markus, Christine B. Williams, Sonia Gantman (Vilvovsky), Martin Dias, Mike Tyworth, and Dax Jacobson. This work was supported by National Science Foundation grants 0852688 & 0534877 and by a grant from the IBM Center for the Business of Government. See [www.PublicSafetyNetworksStudy.org](http://www.PublicSafetyNetworksStudy.org) for more information. [↑](#footnote-ref-1)
2. The methods and fsQCA sections are adapted from (Sawyer et al, 2013). [↑](#footnote-ref-2)