An Ecological Perspective on Public Management Networks: Reconceptualizing Organizational Boundaries and Overcoming the Interdependency Challenge

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ABSTRACT: This is a paper about the theoretical foundations of public administration and its limits for the developing research area of public management networks. An ecological perspective on networks is defined and concepts explained. An ecological view of public management networks is focused on characterizing the process for individual organizations adaptation to interdependent collectives.

Keywords: Networks, network structure, collaboration, organizational ecology

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A central matter in both theory and practice in public administration today is how policies and programs are implemented across jurisdictions. The borders between organizations in a federal system are coming down and in their place are complex arrays of inter-organizational relationships, often termed networks. However, while networks may have arrived in public administration practice and scholarship there contribution to understanding public administration has been limited by the tangled assortment of disciplines, definitions and frameworks that are often used when describing and making inferences about networks (Isset et al, 2007). Moreover our understanding of networks has been limited by the historical theoretical traditions of public administration, most notably rational choice models. Rational choice models of organizations obscure the key features of networks that make networks valuable to modern practice - relationships. Relationships are the basis of the development of interdependence among organizations, defined as when two or more organizations must take each other into account if they are to accomplish their goals (Litwalk and Hylton, 1962). Interdependence is the premise upon which the need for networks derives in the modern practice of public management. However, research often overlooks the importance of connections. For instance, Mullin and Daley (2009) explain their research focus is frequency rather than quality of relationships in networks, “…like much of the literature” (p. 762). The result is a range of empirical results upon which few conclusions can be drawn and boarder theoretical concerns go unaddressed including generalizability across networks (Isset. et al, 2011). In light of this challenge, this paper serves to advance the use and application of terms and concepts from ecology to the study of public management networks. A lexicon of networks, derived from ecology, will provide a basis upon
which to build theory that is focused on the dynamics of interdependency with an end goal to increase understanding of modern governance.

The ecological perspective put forth here is not concerned with the determinants of collective action, the decision to join a network, or the factors that make networks effective. However, the later may be a byproduct of the framework put forth. Instead the purpose of this paper is to reframe how networks are considered. Rather than focusing on the individual units within in networks the call is to consider networks as a collection of individual units defined by the structure and processes that enable individual units to begin to function as a collective. In order to move towards a collective conception of networks I will first identify the traditions in public administration that make this concept difficult to appreciate I offer two reasons for the lack of relational studied: the historical heritage of public administration that attempts to denounce the political and relational aspects of administration and methodological difficulties associated with capturing interdependency in networks. Then I note some of the work in public administration that has focused on the interdependency challenge, the collaborative public management scholars. The paper is completed by the development of an ecological perspective on public networks. This paper is about developing a mindset for thinking about networks.

**Classical and Rational Models of Public Administration and the Tradition of Bureaucracy**

The classical model of public administration was espoused by Woodrow Wilson (1857). Wilson called for a science of administration divorced from politics. While the politics-administration dichotomy has not been demonstrated in practice (Svara, 1994) the view of administration as a rational science has continued to be the foundation upon which much of public management scholarship has developed. For instance, Simon (1957) advanced a science of administration based on the bounded - rational decision making process. The architecture of a
rational decision process, Simon explained, is bureaucracy. Bureaucracy has four features: (1) division of labor, (2) well defined hierarchy, (3) systems and rules, (4) procedures for how to do work, (5) impersonality, and (6) promotion based on merit (Starling, 2008, p. 308). In these ways bureaucracy provides the formal rules and procedures that allow for the rational and scientific weighting of alternatives that is necessary for a science of administration (Simon, 1957). The rational model holds that each individual organization with make choices, based on the current information they have, that will best benefit their autonomous interests. This tradition is individualistic and divorced from politics.

The rational tradition is maintained in the research of public administrators out of pragmatism. Public administration is a science first and social science second. Public administration has always been about the application of models to data in search of a better way to do things, science. Even systems and contingency models are concerned with the identifying the best way to deliver the services of public managers. Behavioral models too are for the most part concerned with the application of psychological principals to licit behavioral responses aligned with the goals of the organization (Denhardt, 2004). However, over the past two decades the bureaucracy has been blamed for many of the problems with government instead of viewed as a rational and scientific method for managing the delivery of government services (Goodsell, 2004). A rational view of networks, like the rational model of public administration, is built on the assumption that organizations and or many organizations in a network will try to make the best choices with the information they have available at any one time. However, organizations join networks with individual interests. The rational view of networks fails to recognize the innate dynamics of parochial institutions working in joined-up situations.
Networks appear as a practical response to what many view as the ineffectiveness of bureaucracy (Goldsmith and Eggers, 2004). Networks as an approach to delivering public services, beyond the use of traditional bureaucracies, emerge as a consequence of managerial, fiscal and social realities facing the public sector over the past 20 years. The National Performance Review (NPR) (Gore, 1993) called for restructuring the bureaucracies of federal agencies and increasing collaboration and partnerships with other agencies as a method to create a more responsible government (Kettl, 1994). “Banishing bureaucracy,” (Osborne and Plastrick, 1997), New Public Management (NPM) and Reinventing Government are all siren songs for the identification of organizational forms, other than bureaucracy, that will improve the quality of public programs. Central to all of these movements is a belief that bureaucracy limits the responsiveness, efficiency and effectiveness of the public sector (Fesler and Kettl, 1996). Networks emerge as a “…a response to a new administrative reality driven by social, political and economic forces” (Isset et. al., 2011, p. 160).

Since public management networks have gained in popularity several rationales for their purpose have been purported, including: (1) acquiring additional resources, (2) solving the complex problems of modern society, and (3) building capacity. Each of these explanations is based on a theory of social capital. Social capital is concerned with the “value of connections” (Borgatti and Foster, 2003, p. 993). Connection, social capital scholars explain, weaves together the disparate resources of society creating greater capacity (Putnam, 2000). Simply, a network may create more than the sum of its parts. Mandell and Keast (2007) explain that the value of networks’ lies in their ability to leverage individual resources towards a collective goal. Therefore, connections are the key feature of networks that make them an improved organizational form compared to bureaucracies. However, while the valuable attributes of
greater resources, capacity and problem solving capability of networks have been demonstrated in empirical research (Lubell et. al., 2002; Feiock, 2005; May and Winter, 2007) there is still a significant challenge, to conceive of networks as collective units rather than individual organizations overcoming challenges. While all social structures have independent interests, the intent of a networks is to develop a process of transcending individual interests in order to develop and represent a collective interest. Therefore, “A theory of networks will be focused on the degree to which individual interests have been left behind.” (Williams, 2002). However, while public administrators have been called to use network, to a great extent as a result of valuing of the capacity of social connections, the literature often fails to capture the true nature of relationships both empirically or theoretically.

Challenges to Collective Thinking

Instead of asking how do relationships shape the work of networks? Our questions are focused on individual components of networks: Who’s in the network? Who is not in the network and why? The focus is individual or ego level (Borgatti and Foster, 2003). For instance, many scholars are concerned with identifying specific roles individual organizations serve in a network (Provan and Milward, 2001; Crosby and Bryson, 2005; Moynihan, 2008; Saz-Carranza and Ospina, 2011). McGuire and Silvia (2010) ask: Why are networks formed? Feiock (2004) explains the transaction costs incurred by individual organizations when they join a network. Agranoff and McGuire (2003) identify managerial tools for working across organizations. Ego based research is fundamental to social networks, as the concern of this research area is to discover how actors are related to others actors. However, an atomistic view of organizations with in a network limits our knowledge of the functions of networks and their contributions to larger society.
In contrast, some in public administration scholars are concerned with summative
evaluations of networks, the outcomes of government by network (Bardach, 1998; Mandell,
1994; Provan and Milward, 2002). This research area is often called “whole networks” (Kiduff
and Tsai, 2003) or networks studied at the network level of analysis (as compared to the
organizational level of analysis) (Provan, Fish and Sydow, 2007). Such research is especially
important to research in public administration as public administrators want to know what value
of networks for society (Mandell, 1990). This is an exciting research area as it makes a
significant contribution to the understanding of networks as their own unique organizational
form in modern society; however, to date it is limited by theoretical and methodological issues as
well.

Whole networks research does not have its own body of theories. Some draw on network
theories or network methods, which is a major critique of networks in general. Others draw on
political explanations. For instance, May and Winter (2007) argue that networks have been
canonized in public administration as improved means for public service delivery. However, the
authors suggest that such presumptions may have dramatized the positive aspects of networks at
the disadvantage of recognizing political themes. Similarly, O’Toole and Meir (2004) suggest
factors that affect network performance such as the politics of networks have been overlooked.
Agranoff and McGuire (2003), network scholars, call for more use of intergovernmental
relations theories, such as Barnard’s mutual adjustment, to explain networks. The call to study
the political aspects of networks is essentially revisiting the theories of intergovernmental
relations. Intergovernmental relations are the interaction and interrelationships between levels
and units of government in a complex multilayered (federal) system of government” (Stephens
and Wikstrom, 2007, p. 1). The problem with intergovernmental theories is a focus on power,
control and conflict as well as maintaining individual interests in a system of multiple interests, not developing and maintaining a collective interest.

Whole networks research is also marred by methodological issues. The gravest concern is boundary specification. Boundary specification is defining who is in and not in the whole network that is to be studied. At this point there is no clear theoretical explanation of how to define the boundaries of a network. Most boundaries are decisions made by the researcher relying on the context of the network (Borgatti and Foster, 2003). This limits generalizability of the study and provides no clear way forward for theorizing about whole networks. The matter of collecting data at the network level of analysis is also a methodological concern (Provan, Fish and Sydow, 2003). Good network level data has a large scope, depth and is longitudinal in nature. Good network level data is relational it includes multiple interactions over time, this requires extensive data collection. For instance, at the organizational level you may count the number of employees an organization has; for a network level analysis you would want to count the number of times employees interact over the course of some time span. Moreover, in order to generalize about a network you would have to compare multiple networks using the same large data set. The response to such extensive data collection methods has limited the quality of measurement in networks studies as well as limited the number of cross-network and longitudinal studies on networks.

In light of the lack of relational thinking about networks as well as the theoretical and methodological challenges of studying whole networks, this paper puts forth a new lexicon for thinking about networks.
Characterizing interdependency

To this point, an argument has been made that network research in public administration and management has failed to deal with the characteristics of interdependency that makes a network a unique organizational form for the delivery of public services. However, interdependency is not completely ignored in extant research. Private sector organizational theories derived from contingency theory and resource dependency often detail types of relationships. For instance, types of dependencies may include the need for: information, operations assistance, finance, and/or resources (Pfeffer and Salanick, 1978).

Defining types of relationship based on purpose has also been done in public management networks research. Agranoff (2003) examines 12 networks, and provides a typology of them based on the purpose each network serves: creating information, sharing information and pursuing action on an issue area. Milward and Provan (2006) also offer a typology of networks based on purpose. The authors offer four different types of networks: implementation networks, information diffusion networks, problem solving networks, and community capacity networks. Types of relationships based on the purpose they serve however, does not fully capture the degree or strength or the relationship as is necessary for measuring the value of social connection, types of relationships is dependence, networks relationships in public management are a function of interdependency.

Interdependency, the mutual need one organization has for another to achieve a collective goal maybe better captured in a typology by Thompson (1967) who bases a typology of dependencies on the extent of need one organization may have for another (pooled, sequential or reciprocal). Reciprocal relationships are returned relationships of a similar nature. Reciprocity captures the mutual needs of organizations in a public management network. While reciprocity
is often used in network studies its measurement is often quite rudimentary. For instance, in a survey of organizations one organization may list another as a partner of some kind. If the other agency also lists the first agency as a partner the relationship is reciprocal. More complex measure include something like an index of the length, frequency and number of exchanged emails. But reciprocity even when carefully measured does not capture the full range of relationships that may exist as well as the dynamic that is interdependency. In addition social control theorists and organizational ecologist have made significant advancements in conceiving of the importance of interdependency in inter-organizational relations (Emery and Trist, 1973; Gaus, Astley and Fombrun, 1983; Hannan and Freeman, 1977; Burt, 1992). These scholars are focused on the structure of organizational relations that inhibit the ability of a collective unit to form. Astly (1984) calls for research that examines the “Joint formulation of policy and implementation action by members of interorganizational collectives” calling this collective strategy. However little of this work has transferred to networks.

Mandell (1994) is among the network scholars that try to capture interdependency. Mandell suggests a continuum or relationships from weak to strong, with the main variable, differentiating networks on the spectrum, being the “degree to which the individual members remains separate and autonomous, or, form a new, combined unit for long term change and interaction” (p. 280). Weak relationships are those where members have loose linkages, their actions are “simultaneous or coordinated” (p. 280). Each unit acts independently and operations within each organization does not differ drastically from those they usually undertake. At the other end of the continuum are networks with tight linkages. Tight linkages mean the organizations in the network are committed to major system changes. In this continuum Mandell (1994) is capturing the essence of interdependency the ability to negate individual interests in
favor of developing a collective interest. Similarly, Keast et. al. (2007) suggests there is a continuum of networks types based on the three “c’s:” cooperative, coordinative and collaborative. In addition to tight verse loose based on the individual interests the three cs are based on maintain of autonomy of interests and interaction. Cooperative networks are composed of relationships that are developed to share information and expertise among independent actors. Interaction is limited. One example is social workers that share routine information about methods and practices for dealing with clients (Mandell and Keast, 2009). Coordinated networks are said to be focused on the efficient delivery of services (Mandell and Keast, 2009). Each organization in a network is expected to maintain its own individual interests and goals (Kickert et. al., 1997). However, coordinated networks go beyond just sharing information (cooperation). The actors interact. For instance, in the work of Provan and Milward (1995, 2001) on mental health care organizations, multiple organizations interact in order to identify the best way to treat all of the needs of a mental patient. But, coordination does not require that the goals or actions of the individual organization be displaced by the network goals or actions. It only requires that organizations engage with other organizations to meet the network goals in addition to their own goal. Coordination also does not require that the network actors co-labor (Mandell and Keast, 2009). Both cooperation and coordination are in stark contrast to collaboration. Collaboration requires shared goals and extensive interaction among the component parts. Collaboration is a process (Bingham and O’Leary, 2006) of developing a unified collective goal and co-laboring on the activity of meeting that goal.

**Figure 1: Continuum of Relationships in Networks**

<table>
<thead>
<tr>
<th>Species of Networks</th>
<th>Degree of Relationship Interaction</th>
<th>Degree of autonomy maintained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation</td>
<td>Low Interaction</td>
<td>Autonomy maintained</td>
</tr>
<tr>
<td>Coordination</td>
<td>Medium Interaction</td>
<td>Autonomy maintained</td>
</tr>
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<td>--------------</td>
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<td>---------------------</td>
</tr>
<tr>
<td>Collaboration</td>
<td>High Interaction</td>
<td>Autonomy is not maintained.</td>
</tr>
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</table>

While each of these authors contribute a great deal in theorizing about interdependency in networks they do not offer an integrated theory of the importance of relationships to public management networks.

Also closely associated with the concern of this paper, characterizing interdependency as a process among varied organizational units is the literature on collaboration itself. Collaboration is a type of relationship that may exist when organizations work together to meet a similar goal. Bardach (1998) describes collaboration as “Any joint activity by two or more agencies that is intended to increase public value by working together rather than separately” (p. 8). Most often, however, collaboration is described as a process. Collaboration is when organizations are “Engaged in entirely new domains of organized action that themselves process inputs into output that transcend the individual member’s contribution” (Mandell, 1994, p. 112). Gray (1989, 2000) describes collaboration as process in which different parties explore solutions that go beyond their own limited vision. More recently, authors from Maxwell School at the University of Syracuse. Have defined collaborative governance as:

…the processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished (Emerson et. al., 2011, p. 2).

All of these definitions share many similarities. Most significantly collaboration is a complex process; it requires multiple agents and the development of relationships. Emerson et. al. (2011) describes the process as composed of three “collaborative dynamics.” Collaborative dynamics
are the antecedents to collaborative action. Collaborative dynamics are the necessary conditions for collaboration to happen. Emerson et. al. (2011) identifies three collaborative dynamics:

1. “principled engagement”,
2. “shared motivation” and the
3. “capacity for joint action” (p. 6).

Principled engagement is the act of including actors in the network as well as providing them a role in the initiative without creating power differentials. Shared motivation is the recognition of need that each organization has to have for the other organization in order to create collaboration and a communal sense of the issue. The capacity for joint action is the complex interactions, including joint decision making and co-laboring that agencies may engage in, in order to deliver on the shared goal. Together these three dynamics are focused on the process by where individual goals are transcended in favor of collective goals and when new and innovative solutions can be generated – networks, from the perspective put forth here. However, collaboration as a literature has divorced itself from networks. Few empirical collaboration studies draw on network analysis for instance (). The importance of integrating collaboration with networks studies cannot be understated. Networks studies provide the empirical measures of the structure of networks that can then be used to enable understanding of how collaboration is developed a truly integrated perspective as compared to the piecemeal research we have today. Also, few collaboration studies specify when collaboration has been achieved. More often they describe different steps and characteristics of these steps in the process ()

Identifying and measuring relationships is a challenge. The interdependency challenge is to conceive of networks as inherently relational as compared to atomistic and dynamic as compared to static. Overcoming the interdependency challenge will require scholars to draw from new disciplines, collect extensive data and think differently about the way public
administration works in both theory and practice. Overcoming the interdependency challenge, however, will tear down the borders between scholars and practitioners, and between individual interests and collective interests in order to provide a more accurate picture of public administration. The next section of this paper will provide a way forward, a way of thinking about networks that is relational and integrates what we know about interdependency so far.

**An Ecology of Public Management Networks**

Ecology is the scientific study of the interactions between organisms and their environments. All organisms are intimately tied to all surroundings - interdependent. Ecology focuses on the web of complex relations that exist between all of the component parts of an ecosystem. While chemistry is focused on the molecule and biology the organism, ecology is focused on relationships - transactions between molecule and organism, organism and population, population and community, community and ecosystem. Darwin (1872) in *Origins of Species* asserted that no species could be added or subtracted without having complex and interrelated effects on all other parts of an ecosystem. An ecological perspective has no borders between parts only relationships, some meaningful others less meaningful but all of them consequential for the system as a whole.

Human ecology like ecology is concerned with the dynamics of interacting parts of the human system. It expects that systems shape the environment and the environment shape the system. This is similar to Giddens (1984) Structuration Theory that notes the cyclical relationships between structure and processes. While human ecology cannot explain all phenomena it does allow the researcher to draw on a broad and well developed theoretical field that links parts of a system together. The focus is the collective as compared to the individual, adaptive as compared to static processes and incorporates an aura of collectivism that is
necessary for a network to thrive. Astley and Fombrun (1983) note that human ecology is about the “…joint mobilization of resources and formulation of action within collectives of organisms” (p. 578)

**Organizations as Organisms**

Networks are collections of units, either individuals or organizations that come together to serve a purpose that they could not alone. Organizations are to be conceived as organisms. They are individual, complex systems. The goal of an organism is survival; however, organisms must gather energy for survival. Therefore their survival is to a large extent exogenous to the organism itself, a matter of other organisms producing energy that they can consume. Therefore a great deal of organism energy expenditure is on identifying outside sources of energy for them to consume. Why organisms need energy is not the concern here nor is explaining how they identify energy to consume. The intent of seeing the organization as an organism is to demonstrate that interdependency is inherent to the system. All organisms are intertwined.

Organisms can vary significantly in terms of structure and endogenous processes. Some organisms are similar other very different. Similar organisms are defined as a species. Multiple species may interact in the process of energy flow; however some relationship are meaningful and consequential other less relevant. That means the boundaries of a network, a collection of organizations, (some of the same species; some not) can be based on the same parameters that ecologists would use to define a community.

**Networks as Communities of Organizations**

A community is defined as the collection of multiple species across a certain space or time. The parameters of space and or time are based on the identification of flow of energy across species. The energy flow process is a cycling of energy through multiple organisms.
Therefore identifying a community of organisms (or a network comprised of organizations) is a function of identifying how energy flows among the organisms. The boundary specification problem in whole networks is to a large extent solved by identifying the energy of interest (resources, information etc.). Once a community is identified then the flow of energy can be classified.

**The Flow of Energy**

The flow of energy can be described and classified two ways. The first way to classify energy flow (ties among organizations in a network) is in pyramids that depict the dissipation of energy as it flows through the system. As energy flows through a system it is consumed by organisms, organisms in turn release energy but there is a net loss of energy each time an organism consumes. A pyramid structure depicts who is a consumer and who is a producer with organisms that produce energy on the bottom and consumers of energy that do not produce much energy (tertiary consumers) are on the top.

*Figure 2: Energy Flow Pyramid based on Odum (1971)*

Classifying organisms into a pyramid schema based on consumption and production has in another form already been incorporated into the current network literature, specifically in the work of Provan and Milward (2001) on governance structure, and identifying the roles.
organizations serve in facilitating the work of a network. However, the pyramid model provides a lexicon (types of consumers) for identifying organizations roles in the whole system that can be shared across networks.

The other way that ties, flows can be classified is by how the relationship affects each organism in the system. Ecologists describe five different types of relationships based on how the use of energy by one organism affects the other:

- **Mutualism** – both organisms benefit
- **Commensalism** – one organism benefits the other is unaffected
- **Parasitism** – one organism benefits the other is harmed
- **Competition** – neither organism benefits
- **Neutralism** – both organisms are unaffected

(Based on Spellman, 2008, p. 54)

These terms describe the relational effect of energy flow through a system. They provide a means for describing how energy flow affects the whole system. This concept provides the building block for the next concept.

The most important ecological concept for the study of networks is that of communal adaptation. Organisms inhabiting a specified community are likely to make communal adaptations; adaptations that support the ongoing maintenance of the community (as compared to stability of the individual organism). Because all species in a community need energy some would argue that across a community similar species will compete for the energy they need to survive. However, within communities, organisms may make communal adaptations. These are adaptations that allow the species to co-exist; the consumption of one unit of energy by one organism will not limit the consumption of energy by another organism (mutualism – both organizations benefit). This is the underlying assumption for the importance of diversity in all systems. Vogt et. al. (1997) explain the concept this way:
…if species differ in traits, then systems that are more biologically diverse will be more “stable” or resistant to change, because they are more likely to contain some species that can survive during a given environmental perturbation. …surviving species compensate for those that are reduced or lost by disturbances…the implication is that biological diversity should contribute to ecosystem resistance to disturbance or the ability to remain functionally unchanged in the face of a perturbation.” (p. 58-59).

Communal adaptations are not adaptations that make units more alike (as population ecologists hold) but adaptations that make the parts of the system, organisms, function more easily together. The adjustment of an organism to its community occurs not through the independent action of many individuals but through coordination of units within the community. Therefore a key reference point for network scholars should be identifying the point at which individual organizations make adaptation to their own system (genetic adaptations) in order to maximize the flow of energy to all members of the community. An ecological perspective on networks will identify the individual transformations that units make in order to be part of the collective. This will require organizations to use cues from the environment, other organisms, about how to adapt.

Conclusions

The implications for networks from an ecological perspective are as follows:

- The unit of analysis should be energy flow, not the collective network or the individual organization.
- Boundaries of a network are specified by identifying where the flow of energy ends or become redundant.
- The key feature of a network is the establishment of a collective
- The establishment of a collective is function of individual units in the collective making adaptations to support the flow of energy through the network
How an ecological perspective improves network studies is as follows:

- Provides rich theories of interdependency
- Provides terminology to describe systems as relational
- Limits data collection by providing a set of concepts that are significant to the study of networks.

An ecological view of networks is focused upon relationships among diverse units; relationships are defined by how energy (the key resources in the network) flows through each organization. Flow of energy can be characterized into a pyramid demonstrating the value of each organization to the system or by how organizations relate to each other in the transfer of energy. These characterizations of energy flow help to begin to see the network as a relational unit. The most important concept that ecology provides is communal adaptation - when organisms make an adaptation so that energy flows (relationships/ties) is maximized for a collective benefit. The focus is when individual allegiances are lost in favor of forming a new collective allegiance. Distinct modes or mechanisms for feedback that initiate adaptation is also an interesting area of study.
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