

Modeling the Social Actor

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Abstract

This paper presents work-in-progress on a comprehensive multi-scaled, multi-disciplinary model based on the concept of a social actor - an empirically derived model of people+ICTs. This *social actor model* could help researchers approach information and communication technology (ICT) studies in a better-integrated way, if it could be formalized without losing its explanatory flexibility. The ongoing study will attempt that formalization. Using metrics derived from institutional theory, appropriate measures based on social actor concepts are being developed and related to formal models and theories of cognitive understanding and collaborative decision making to establish a better basis for reasoning about ICT-infused environments. The resultant theoretically supported, empirically grounded, social actor model will be simulated with modified ABS, in collaboration with Kathleen Carley at CMU, using scenarios developed in collaboration with RAND organization researchers and modelers.

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1. An Introduction to the Social Actor

Over the past decade, my colleagues and I have been studying the roles of information and communication technologies (ICTs) within commercial enterprises (through studies of online services and intranets) and in collaborations among research scientists in academia and industry (through a socio-technical networks study.) Through this line of research, we have developed an empirically derived and theoretically supported model of a social actor – a multi-dimensional view of organization members and their embedded uses of ICTs [Lamb & Kling, 2003]. (See Table 1.)

The social actor model characterizes scientists, professionals and organization members in ways that can help frame analyses of integration and shape practical strategies. Its primary strength is the way that it contextualizes organization members' interactions, their informational environments, and their ICTs. Within this framework, social actors are understood to be organizational entities whose interactions are simultaneously enabled and constrained by the socio-technical affiliations and environments of the organization, its members and its industry. They often have conflicting and ambiguous requirements about the activities they perform, and the socially legitimate ways in which to perform their work. This view acknowledges that the world is changing, and that globalizing phenomena strongly influence organizational relationships. Social actors' affiliations are networked, exchange-related, multiple and changing. Their environments are technical, institutional, ICT-enhanced, and expansive. Their interactions are legitimate, action enabling, constructed, and role-based. And, perhaps most importantly for this study, social actors continually “tinker with” their ICTs and reconfigure their organizational roles to reconstruct and represent themselves as competent, ICT-savvy social actors. In short, social actors are *not* just “users” of ICTs -- they effectively design ICTs “in-use.”

Table 1: Multi-dimensional View of a Social Actor

SOCIAL ACTOR DIMENSIONS	CHARACTERISTICS and BEHAVIORS of connected and situated individuals
Affiliations (Definition: organizational and professional relationships that connect an organization member to industry, national and international networks.)	Social actor relationships are shaped by networks of organizational affiliations
	Relationships are dynamic, and related informational exchanges change with “flows” of capital, labor, and other resources
	Relationships are multi-level, multi-valent, multi-network (i.e. global/local, local/global, group, organization, intergroup, interorganization, culture)
	As relationships change, interaction practices migrate within and across organizations
Environments (Definition: stabilized, regulated and/or institutionalized practices, associations and locations that circumscribe organizational action.)	Organizational environments exert technical and institutional pressures on firms and their members
	Environmental dynamics vary among industries
	ICTs are part of the organizational environment
	ICTs are part of the industry/national/global environment
Interactions (Definition: information, resources and media of exchange that organization members mobilize as they engage with members of affiliated organizations.)	Organization members seek to communicate in legitimate ways
	Organization members build, design, and develop interactions that facilitate “flow” changes
	ICTs become part of the interaction process, (“interaction technologies”) as people transform and embed available informational resources into connections and interactions
	As firm members, people perform socially embedded (role-based), highly specified actions on behalf of the firm
Identities (Definition: avowed presentations of the “self” and ascribed profiles of organization members as individual and collective entities.)	Social actor identities have an ICT use component
	ICT-enhanced networks heighten ethnic and multiple other identities (global/local tension)
	ICT-enhanced connections among firm members transcend roles (project-based)
	Social actors use ICTs to construct identities and control perceptions

2. The Social Actor as a Unit of Analysis

As people shape and are shaped through the design-in-use of ICTs, it becomes difficult (maybe even unhelpful) to separate them for study. Many information systems and communications researchers have examined ICT use in organizations, and other complex social settings. Fulk and DeSanctis [Fulk & DeSanctis, 1999], for example, have outlined organizational roles that ICTs may play, and others have modeled both people and ICT ensembles as interactive agents in emergent organizational dynamics. Much of this work has been done at either the organizational level or the individual level, including individuals as organization members. However, these units of analysis do not adequately reflect the dynamics of a small business operation, such as a single-doctor medical office, a commercial fishing boat, or a high-tech researcher/entrepreneur start-up firm.¹ In particular, while most ICT studies seem to maintain a clear separation between people and ICTs, that can be justified on many levels, our own empirically derived models depict ICTs as inextricably embedded (socially, organizationally and sometimes physically) in professional and entrepreneurial activity. In our research, we don't find people or ICTs in isolation.

To move beyond the limitations of prior studies, we have begun to refine the construct of people + ICTs as a unit of analysis (i.e. **the social actor**), and to develop a more formal model of social actor dynamics. As a working unit of analysis, a social actor might be comprised of people + ICTs in the following ways:

- a professional individual + his/her support staff + ICTs, in their working environment
- variations on project-based workgroups using ICT ensembles in organizational settings
- variations on community-based interest groups using ICT ensembles in regional settings
- an organization + its industry affiliations + industry-specific ICT infrastructures

These representations of the social actor are complex, and they attempt to encompass micro and macro dynamics in ways that cannot rely on linear approaches to formal modeling. We believe, however, that one very promising way to predict and prescribe the activities of professionals and entrepreneurs in specific contexts, is by refining the social actor model through institutional theory extensions to agent-based modeling systems -- thus, preserving the model's richness, while increasing its predictability.

3. Linking the Social Actor to Model-able Theoretical Concepts

To develop social actor metrics that can be simulated, we have used existing data sets of semi-structured interviews from our prior and ongoing studies to identify qualitative categories and candidate measures that characterize the projects, the informants, their activities and their uses of ICTs. Currently, we are reviewing the literature on process and variance measures developed by researchers whose work has been guided by institutional theory, in order to relate them to the candidate social actor measures derived from our dataset. (See Table 2 for an example of how *theoretical concepts* represented in the literature on scientific networks and collaboration have been linked to **[model-able dynamics]** within the Affiliations dimension of the social actor model.) At the conclusion of this process, we will have developed an integrated set of descriptive measures, processes and behaviors that can be modeled in existing (and modified) ABS.

¹ Some classifications show that small and medium-sized businesses comprise up to 98% of all commercial enterprise.

Preliminary analyses using this approach have further characterized the four dimensions of a social actor in institutional theory terms; and have developed detailed process descriptions of, for example, the ways in which boundary-spanners in healthcare organizations co-construct ICTs and organizational processes of goal alignment through their self-monitoring efforts (see Section 4.) In this and similar analyses, we have begun to link collaboration-related concepts from the literature with confirming examples of social actor characteristics and key process descriptions from our own data.

Table 2: Conceptual Links to One Dimension of a Social Actor in Scientific Collaborations

SOCIAL ACTOR DIMENSIONS and CHARACTERISTICS	Related Collaboration Metrics with Conceptual Institutional Foundations	Collaboration concept examples from empirical research literature
AFFILIATIONS		
Social actor relationships are shaped by networks of organizational affiliations	<i>Network centrality and connectedness</i> [Network contact models]	Oceanographers who are peripheral benefit more from online data accessibility [Hesse et al., 1993].
Relationships are dynamic, and related informational exchanges change with "flows" of capital, labor, and other resources	<i>Matthew effect; institutional circuitry</i> [Diffusion models]	Allocation of rewards to scientists affects the flow of ideas and findings through scientific communication networks [Merton, 1968].
Relationships are multi-level, multi-valent, multi-network (i.e. global/local, local/global, group, organization, intergroup, interorganization, culture)	<i>Geographic and functional distances</i> [Normative isomorphism]	Traditional co-located work groups minimize geographic and functional distances so members can interact easily [Krackhardt, 1992].
As relationships change, interaction practices migrate within and across organizations	<i>Strong ties and weak ties; enrollment</i> [Mimetic isomorphism]	New alliances may consist of relatively weak ties, but they form a pool of potential advisors and collaborators [Granovetter, 1973].

4. Boundary Spanning: A Candidate Metric for Social Actor Modeling

The following example should help readers understand how theoretically supported metrics can be derived from the research methodology described above. During data collection and concurrent analysis in our recent studies of intranets in healthcare organizations [Lamb, 2004], our attention focused on boundaries, boundary-spanners and embedded ICTs. After iterative analyses, we developed a processual description of ICT shaping in healthcare organizations that relates ideas about knowledge workers, goal alignment, ICT design-in-use, boundary-spanning and self-monitoring in ways that make it a good candidate for social actor simulation modeling and further metric development (see Figure 1.)

Briefly, the diagram shows how complex goals, like the conflicting requirements for low cost and high quality in healthcare organizations, may be achieved through the self-monitoring efforts of boundary-spanners. In our study at HMO (a pseudonym), we linked the activity of three types of bound-spanners (physician/researchers, physician/managers, physician/ICTs developers) to show how their activities coordinated the development of clinical practice guidelines (CPG) *and CPG implementation through the design-in-use of existing ICT infrastructure*. As knowledge workers, they represent a new kind of agent (whether as corporate professionals or managerial technicians) who act in concert with an ICT-infused organizational infrastructure -- *in ways that go beyond simple agency theory explanations of principals, agents and monitoring*. These boundary spanners are critical to achieving goal alignment in organizational settings because, motivated by self-monitoring incentives or tendencies, they co-construct expanded roles and organizational structures that incorporate ICTs (like intranets and hospital management information systems with automated "active guidelines" alert mechanisms) into the ways of working at HMO. Self-monitoring practices can, thereafter, be more easily adopted by other

physicians in ways that foster goal alignment with external regulations as well as internal quality targets. In other words, in an effort to monitor their own practice outcomes, these boundary-spanners have extended the organizational infrastructure for monitoring *all* physicians at HMO and for improving evidence-based clinical practice [Lamb, 2004].

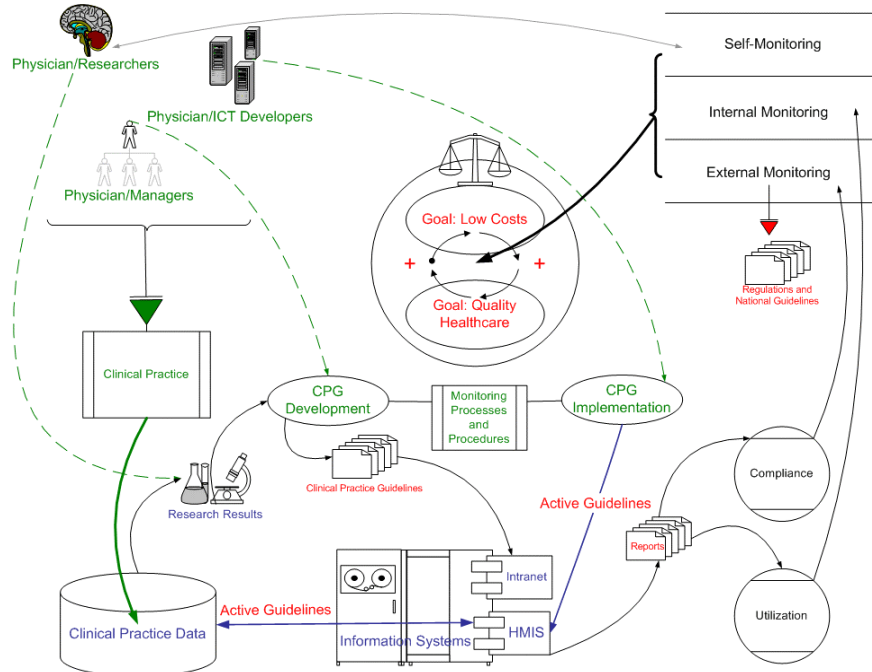


Figure 1: CPG (clinical practice guidelines) development and implementation at HMO.

While this diagram is highly specific to one large healthcare organization, it foregrounds a key aspect of boundary-spanners – that they are also high self-monitors. This is well-known in the literature of organizational psychology [Caldwell & O'Reilly, 1982], but the organization-wide effects of self-monitoring are not easily articulated. Our analysis shows how high self-monitoring boundary-spanners help to build the structures that induce self-monitoring in others (as Foucault [Foucault, 1977] tells us, and Carley [Carley, 1991] has confirmed); *and* it links that activity to goal-aligned gains for the organization. This one example draws insights from a number of social actor characteristics (e.g. the multi-valent relationships of boundary-spanners; cognitive, normative and regulative isomorphic influences; ICTs as part of the organizational environment; the co-construction of roles and ICT infrastructures) and shows how these characteristics may be inter-related and interdependent. In an extension of our work with industry scientists, we are beginning to see how organizations might also be modeled as boundary-spanners – particularly high-tech R&D hybrid organizations that populate the classification area between "academic research units" and "commercially viable firms" [Lamb & Davidson, 2004]. The dynamics of boundary-spanning also seem to explain ad-hoc cooperation for environmental protection among commercial fishermen, recreational users, and local governing bodies in our summer pilot study of marine protected areas in Hawaii [Lamb & Maurin, 2004]. Taken together, these studies suggest that "boundary-spanning" would make a good candidate metric for modeling social actors in an ABS like CONSTRUCT, and our collaboration analysis (partially shown in Table 2) provides a set of measures and concepts that we can use to formulate a preliminary rule basis.

5. CONSTRUCTing the Social Actor

Our next steps in this study will be to explore the capabilities of existing ABS to model our emergent social actor metrics, beginning with CONSTRUCT. Because Carley's CONSTRUCT [cf. Schreiber et al., 2004] is theoretically anchored to structuration theory, it can easily accommodate institutionalist concepts – both perspectives engage the agency/structure debate in dualistic ways. The software that models agents as ‘decision-making units’ can be modified where needed to model social actor agents as ‘action-taking units’ in institutionally constrained settings. The routines that support symbolic interactionist concepts are already compatible with new institutionalist approaches, and the routines based on social information processing theory can be adapted to incorporate measures that model the environments and affiliations dimensions of a social actor.

Our interest in presenting our work at this early stage to conference participants is to solicit feedback about our approach, and also to raise awareness and generate helpful critique of the social actor model, more generally. Through a lens of social actor concepts and candidate metrics, we have begun to re-examine the complex processes of collaboration and organizational change that we observed in prior research. This lens conflates people and their ICTs by providing an integrated view of the co-construction of organizational roles, processes and ICT infrastructures. By simulating the interactions of people+ICTs at multiple levels of analysis, we expect to conceptualize social actors as a new unit of analysis – one that might not correspond to traditional notions of individuals, groups, or organizations, but rather to communities of practice that cross conceptual boundaries in irregular ways. We think that this could be a valuable approach for organizational researchers and policymakers, and we would welcome the opportunity to debate its merits.

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