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E-Government: Contrasting Approaches and AlternativeInsights

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Abstract
We focus contrasting a social informatics approach with socio-political and techno-centric design approaches, using data from a study of e-government activity in criminal justice as the empirical basis. By social informatics we mean â the interdisciplinary study of the design(s), uses, and consequences of information technology that takes into account their interaction with institutional and cultural contextâ .â The empirical material comes from our ongoing studies of integrated criminal justice efforts in the United States. By integrated criminal justice we mean both the technological infrastructure and the institutional circuitry. Here we focus on San Diego, Californiaâ s Automated Regional Justice Information Sharing system (ARJIS, see www.arjis.org). In the comparison of approaches to engaging ARJIS we focus attention to differences in how human actions, the ICT, and their interactions are represented,. And, in doing this we highlight the alternative findings and interpretations that often arise from these different approaches to engaging e-government. We conclude our comparative analysis by returning to social informatics and engaging issues with improving the conceptual and methodological tool suites available, and with the importance of engaging the situated, social, and material elements of any ICT-based system.

Keywords: E-Government, social informatics, case study, institutional theory

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Introduction

Through this paper we contrast a social informatics analysis with socio-political and techno-centric design analyses. In doing so we illustrate how social informatics serves as a useful and informative analytical bridge between socio-political and techno-centric analyses of information and communications technologies (ICT). Where the techno-centric analysis focuses on design of the artifact for use, and the socio-political analysis focuses on the social processes or outcomes associated with ICT, the social analysis of computing as represented by social informatics seeks to account for both the design of the artifact and the broader social context in which it is used. Using our ongoing research into the design, development, and use of integrated criminal justice information systems (ICJS) – systems for inter-organizational collaboration and information sharing – we draw on empirical evidence to demonstrate the differences in the three analytical approaches, and to demonstrate the utility of the social informatics approach. We conclude by arguing that social informatics research is ideally situated through its ability to move beyond abstraction of the ICT artifact and discounting of the broader social context.

The techno-centric analysis reflects a recognition by Computer Science scholars of the need to engage human action and activity and is most represented in the wealth of Human-Computer Interaction (HCI) scholarship. The techno-centric approach to design of ICT as exemplified by HCI focuses on design of the material artifact with a psychological orientation towards human use of computers (c.f., (John, 2003)). Conversely, the socio-political analysis of ICT, common in the fields of Communications, Sociology, and other social sciences, is concerned with processes and outcomes of using ICT, what might or has happened and how ICT played a role in those social processes. The socio-political analysis approach to ICT tends to focus on the social context while abstracting the ICT artifact, often to a point that it becomes the proverbial black box (c.f., (Bijker, 1995; Bijker & Pinch, 2002; Klein & Kleinman, 2002)).

We further note that the findings and theories drawn from both technical and social analyses of computing (and more broadly ICT) are often disconnected from those who design, develop and implement ICT-based systems, what has been referred to as the time-space discontinuity in the study of ICT (Orlikowski, 1992). The time-space disconnect reflects an approach to ICTs where design and use are considered to be distinct and separate phases in the ICT lifecycle. In contrast to both approaches, social informatics approaches to research frame the design of ICT and its use as overlapping stages in the development of ICT, and that the social context and material artifact as inseparable.

Social informatics is one of many vibrant strands that, together, reflect social analyses of computing. By social analyses of computing we mean analysis of the ICT that accounts for both the material nature of the artifact while simultaneously accounting for the broader institutional and cultural context within which the artifact is embedded.
By social informatics we mean "the study of the design, uses, and consequences of ICTs (information and communications technologies) that takes into account their interaction with institutional and cultural contexts (Kling, 1999; Kling, Rosenbaum, & Sawyer, 2005)." Key to this definition is the premise that both the material artifact and the social context have

agency that is reflected in design and use of the ICT; and that social context and material artifact are cannot be meaningfully separated (Kling, McKim, & King, 2003). It is this conception of inseparability that distinguishes social informatics from the techno-centric and socio-political analyses of computing.

In this paper we contrast a social informatics approach to both techno-centric and socio-political analyses. In doing this we illustrate that a social informatics approach provides useful insights for both designers and policy-makers (see Table 1). To illustrate our comparison, we draw on empirical evidence from our study of integrated criminal justices systems (ICJS) to provide a basis of a comparison of the three approaches to the study of e-governance systems. ICJS are both technological and organizational systems designed for the purpose of facilitating the sharing of information and inter-organizational collaboration among criminal justice agencies. Because of the technological and social complexity of integrated criminal justice systems, they are ideally suited for a social informatics analyses.

Focus on artifact design: the techno-centric approach

The techno-centric view of ICT is characteristic of a significant body of research coming out of the fields Human-Computer Interaction and, more broadly, Computer Science. The general focus of the techno-centric view of ICT is in the design of the artifact with a minimalist accounting of the larger socio-cultural context within which the artifact will processes, and task analysis, with the goal of modeling these processes for the purposes of better design of the artifact[1].

Examples of techno-centric type of research include Goals, Operators, Methods, and Selectors (GOMS) modeling of task performance, and situational awareness modeling of computer interfaces (c.f., (Endsley, 1995; John, 2003)). A GOMS models is used to evaluate expert performance of basic tasks based on the Human Information Processing model of human cognition. This approach characterized human cognition as analogous to the operation of a computer.

Even those theoretical frames that attempt to take a more ecological accounting of computing tend to limit human agency to cognitive processes. For example, situational awareness research seeks to understand human cognitive limits in terms of processing environmental cues and to design systems that maximize human cognitive ability (Endsley, 2000). Situated Cognition theory focuses on how human cognitive processes emerge in a specific contextual use of an artifact (Nardi, 1992). Distributed Cognition theory seeks a functional-system level understanding of the interaction between human and artifact reduce the social to low-level cognitive processes with the intent of identifying how cognition is distributed across multiple actors and artifacts (Nardi, 1992; Perry, 2003). While each of these theories seeks to move beyond atomic cognitive processes and account for context, the focus remains primarily on psychological and physiological processes in context and how to design ICTs in a manner that aligns with those processes.

[1] For more information on current research trends in the HCI community, we recommend consulting the proceedings of the annual Association of Computing Machinery Computer-Human Interaction (CHI) special interest group conference proceedings (http://sigchi.org/). We recognize that the HCI community has increasingly moved towards a more ecological approach to ICT design, in large part as a result of dissatisfaction with what are viewed as models that are too contextually lean (e.g., Dourish, 2005) however we contend that the scholarly emphasis in HCI remains largely focused on design of the computing artifact.

While there seems to be an increasing attention to the larger social context and more complex interactions than person-to-computer, the techno-centric analyses of computing as exemplified by HCI research is focused primarily on the design of the material artifact. Where human behavior is considered, it is framed in a psychological or physiological manner. Issues of social structure and the role of social structure are under-unaddressed. This discounting of the larger socio-political context in the techno-centric research reflects an epistemological position that seeks to generate models of human behavior and designs that can be generalized.

Social processes, structures, and the socio-political analysis of ICT

The socio-political analysis of technology is characterized by social theories of technology such as the social construction of technology (SCOT) or structuration, institutional, political economy, actor-network theory (and other social shaping of technology or SST) theories. These theories seek to focus either on the social determination of technology explicitly (e.g., SCOT) or focus on the social nature, processes or characteristics of technology while giving some account to the structural nature of technology.

An example of the SCOT approach is Simpson's (Simpson, 2004) proposal for identifying the causes of Internet commercialization using a Gramscian analysis. Specifically, Simpson proposes that the processes in which the Internet has been commercialized can be explained by identifying and examining key social groups (such as the World Intellectual Property Organization – WIPO; and the Internet Corporation for Assigned Names and Numbers – ICANN) as key players in establishing a commercialization ethic. The Internet as a technology is only allowed a brief historical description, and no account for the role the technical features of Internet as a meta-network is provided as a possible contributor to the Internet commercialization movement.

In terms of the SST focus, Ducheneaut's (Ducheneaut, 2002) study of the social impacts of e-mail in organizations provides an instructive example. In this study, the author examines the ways in which the introduction of e-mail into an organization impacts such social processes such as power games. Ducheneaut explicitly calls for a socio-technical analysis "in which social and structural factors and technical factors to influence the nature of work." However, there is no detailing of the technical properties of electronic mail in this paper and no agency is given to those technical properties in the analysis.

More broadly, most socio-political analyses take the opposite approach as the techno-centric, focusing instead on the social ramifications and construction of ICTs in social context. Though ICT's presence or uses drive the research agenda, the actual artifact remains largely black-boxed; what is often termed a "nominal" accounting of technology[2].

While both the techno-centric and socio-political analyses offer important insights, in isolation neither provides robust insight into the mutually constituted relationship among people, context and the design development, deployment and uses of ICT. It is this incompleteness that represents the opportunity for a social informatics approach to bridge the

[2] Unlike the shift in techno-centric analyses to a more ecological view, we do not see a similar but opposite shift in the socio-political view to account for the material properties of the technological artifact; instead the socio-political analyses remain largely focused on the social to the exclusion of the technical. Other scholars have made this observation; for example Winner and Orlikowski and Iacono.

analytical gap and provide key understanding of the ways in which the material properties of the artifact and the larger social context interact to comprise an information and communication technology.

Striking a balance: the Social Informatics approach

Three principles guide the social informatics approach to the study of ICT: (1) ICTs are non-linear entities; (2) ICTs are non-deterministic; and (3) the social and the technical that comprise the ICT cannot be meaningfully separated (Dutton & Dukerich, 1991; Kling, McKim, & King, 2003; Kling & Scaachi, 1982b; Sawyer & Eschenfelder, 2002; Sawyer & Tapia, 2002).

The primary conceptualization of ICTs in Social Informatics research is that of a complex, non-linear system comprised of social context and technological artifact: ICTs are sociotechnical systems (Dutton, Dukerich, & Harquail, 1994; Kling & Scaachi, 1982b). Rob Kling, who is credited with initiating Social Informatics as an intellectual movement in the United States, conceptualized this non-linear view of ICTs in a number of iterations. Initially, he along with Scaachi (Kling & Scaachi, 1980) identified this view as the "interactionist view" of technology. The interactionist view of technology was one of a number of views of technology counter to the structural view and viewed users as situated social actors, use of technology was socially constructed and conveyed social meanings (Kling & Scaachi, 1980).

Two years later, Kling & Scaachi (Kling & Scaachi, 1982a)expanded and refined the concept of ICTs to a web model of computing. The web model was an even more explicit rejection of the structural/discrete-entity/linear view of ICTs. Key to this concept of ICTs was the idea of the production lattice, which was later identified by Horton et al. (Horton, Davenport, & Wood-Harper, 2005) as one of Kling's "five big ideas." The idea of the production lattice was that of a network of networks (in this sense the concept is similar to Actor Network Theory), both social and technical. The web model of computing was an ensemble view of ICT where the computing resource comprised a combination of hardware, software, techniques, capabilities, benefits, costs, and requirements (Kling & Scaachi, 1982a, 1982b).

Kling's final iteration of the non-linear conceptualization of information and communications technologies was the Socio-Technical Interaction Network (Kling, McKim, & King, 2003) (Kling, McKim, & King, 2003). STIN networks were a logical extension of the web model of computing. STIN models, like its predecessors, attempted to capture the complex nature of ICTs as a socio-technical system by providing a modeling technique to do so. Key to this modeling process was an intention to capture both the relevant social and technological groups that shaped design and use of the technical artifact, but the choice points and decisions that are inherent to the design of ICT (Kling, McKim, & King, 2003).

Whether one refers to ICTs as a web model or socio-technical interaction network is largely a matter of choice. Both terms include the core principle of social-informatics research: that ICTs are non-linear systems. This non-linear view of technology is key to the anti-determinist view Kling was such a staunch opponent of (Kling, 1999). It is conceptually linked to the next core principle of Social Informatics: the inseparability of the material artifact and the social context of ICTs.

As might be expected with an ensemble view of technology, the social informaticist views the technological artifact and the its social context as not meaningfully separable (Kling,

McKim, & King, 2003). Another way of characterizing this relationship between social context and material artifact is as a mutually constitutive relationship. Visualizing this concept of technology conveys that the influence is bidirectional. It is this bidirectional relationship that differentiates Social Informatics from deterministic, unidirectional views of technology such as technological determinism, social shaping of technology, and the social construction of technology (c.f., (Bimber, 1990; Klein & Kleinman, 2002; Williams & Aasheim, 2005)).

With a technologically deterministic view, the single direction of influence or the shaping process is from the technology to the social context. With a socially deterministic view, technology is the output of unidirectional social processes. These views of technology suffer from opposite but similar deficiencies according to the social informaticist. Technological determinism fundamentally fails to account for the impact of social process on the development of technology. Social determinism fails to account for the way in which the material and historical properties of the technological artifact shape and constrain the development and use of technology. Both views also fail to account for the way in which technology is shaped through use.

The principle of the inseparability of artifact and social context is reflected throughout social informatics research. As previously mentioned, Kling et al. (Kling, McKim, & King, 2003)explicitly state this in their theory of STIN models. Kling and Robert Lamb also incorporated this principle into their theory of users as social actors (Lamb & Kling, 2003). Markus & Robey (Markus & Robey, 1988) used the term "emergent" view to very effectively capture the mutually constitutive and processual nature of ICTs, and Orlikowski's (Orlikowski, 2000) employing of structuration theory effectively articulated the mutual constitution in her concept of technology in practice. The ensemble view of ICTs and the mutually-constitutive view of ICTs are the two sides that make up the coin. Without both core principles, it is very difficult if not impossible to adhere to either.

The third core principle of Social Informatics is that design and use of ICTs results in complex, often unanticipated and paradoxical effects (Markus & Robey, 1988; Sawyer & Eschenfelder, 2002; Sawyer & Tapia, 2002). There are two primary elements to this principle. One is that the principle reflects a non-deterministic view of ICTs or a rejection of the rational, discrete-entity, structural views of ICTs. Because the material artifact and the social context are inseparable, the impact of ICTs are highly contextual. Two, because of the mutually constitutive relationship between the artifact and context is inherently complex, the outcomes of the relationship process are often difficult to predict.
For example, Sawyer and Tapia (Sawyer & Tapia, 2002; Sawyer, Tapia, Pesheck, & Davenport, 2004) found that the implementation of ICTs can effect the power distributions in organizations. Kling (Kling, 1999) in his seminal piece, pointed to a multitude of examples in the literature of cases where ICT implementation had unanticipated consequences. Edwards examining the evolution of computerization in the military, banking, and as it relates to gender articulated a multitude of ways in which both the process and results of computerization varied from the expected course.

These three principles: the ensemble view of technology, the mutually constitutive nature of social context and material artifact, and the non-deterministic nature of technology are core to Social Informatics research. In order to understand the true nature of ICT, one must account for both the agency of the physical artifact, and the broader social context in which it is used. This epistemological commitment is premised on the foundational theoretical concept that

ICTS are an ensemble of mutually constitutive social and technical elements (Lamb & Kling, 2003; Markus & Robey, 1988).

By taking this ensemble view of technology in which the both the material artifact and the broader social context have agency in the design and use of ICT allows social informatics researchers to take a view that ICTs are neither socially nor technologically determined. Avoiding a deterministic analysis of computing is a critical element of Kling's writing as he conceptualized social informatics and built a coalition of like minded scholars. The design and use of ICTs is neither exclusively social – e.g., the product of a few relevant social actors, nor is ICT design and use exclusively technological – e.g., the creation of neutral, predictable tools. It is this mutual orientation of physical artifact and social context that distinguishes SI from the techno-centric analysis of technology and the socio-political analysis of technology.

To summarize (see also Table 1), we argue that social informatics as an intellectual framework for the study of ICT provides a valuable analytical bridge between the techno-centric and socio-political analyses of ICT. Whereas the techno-centric approach focuses on the design process with a limited accounting of the larger social context, and the socio-political approach deemphasizes and abstracts the material properties of the artifact, the social informatics analysis attempts to account for both the larger social context and the material properties of the artifact. By accounting for the both the social context and the technological artifact, a social informatics analysis avoids the time-space disconnect common to other approaches and provides insight into the nature of information and communications technologies as they are used in situ.

Table 1: Three approaches to studying ICT

Element	Techno-Centric	Socio-political	Social Informatics
Human	Individual users or groups Behave rationally and predictably Motivated by task	Key decision-makers Social institutions, Subjects of social structure	Complex agents with multiple motivations Users of ICT is second Embedded in multiple socio-technical networks
Technology	Tool	Nominal or Proxy	Ensemble
Interactions	Direct effects Predictable Deterministic	Unidirectional effects Under-specified relationships	Ensemble: Direct and indirect effects Reciprocal direction of effects
Context	Simple/naive	Rich but unidirectional (all that matters)	Reciprocal relationship with ICT
Insights from analysis	Artifact design	Policy for, or practice of, social action	Artifact design guidance Policy or practice for social action

Comparison of Approaches

We now draw on our ongoing research into the design of ICTs for inter-organizational collaboration and information sharing in criminal justice. Integrated criminal justice information systems (ICJS) are particularly appropriate to social informatics research because the systems are both technologically and organizationally/culturally complex. This complexity restricts the utility of approaches that are heavily biases either technologically (techno-centric) or socially (socio-political) in favor of approaches that can effectively account for both the technical and the social (social informatics).

ICJ Background

Information and communication technologies have long played a role in law enforcement from basic systems of pushpins and maps to modern records management and computer-aided dispatch systems (Ratcliffe, 2004). Because of the federalist system in the U.S. most of these ICTs have been developed in isolation on an ad hoc basis to address the needs of the particular agency developing the system (National Association of State Chief Information Officers (NASCIO), 2003). The result of this pattern of ICT development has been a lack of system integration and inability for individual agencies to share information either horizontally across jurisdictions (e.g., with agencies at the same level of jurisdiction generally separated geographically) or vertically across jurisdictions (e.g., from the local to the state to the federal level). Resolving the integration issue has prioritized in the aftermath of the attacks on 9/11 (Shelby, 2002) and again reemphasized during and after the Katrina disaster.

A large number of initiatives to ICJS are ongoing in the U.S., at a variety of levels of governance. Examples include the ARJIS system (see www.arjis.org, in the San Diego, CA, metropolitan region), JNET (see www.pajnet.state.pa.us, for the Commonwealth of Pennsylvania), and CAPWIN (see www.capwin.org, for the Washington DC, Virginia and Maryland metropolitan region). Consistent with historical practice, each of these systems has taken a unique approach to the problem of integration. For example, some initiatives such as ARJIS have sought to build on existing governmental and technological infrastructure, while others such as CapWIN have created new infrastructure. Our research seeks to examine and compare these initiatives and derive insight into the interaction of technology and institutional context, and to inform current and future ICJS initiatives through a set of empirically derived designed principles. Here, we focus on one initiative, ARJIS, as the basis for comparing approaches to studying this ICT.

ARJIS

Here we summarize ongoing work focused on the Automated Regional Justice Information System (ARJIS), an integrated criminal justice system being developed in the San Diego metropolitan region. ARJIS is at once a technological infrastructure, a suite of applications, and an organization. In turn ARJIS is embedded in the US federal, state, and county governance structures, policing, criminal justice, and homeland security contexts. Moreover, ARJIS is a showcase of both enduring legacy computing and advances in ICT and mobile computing infrastructure.

Technologically the ARJIS is built around a mainframe system in operation since the 1980's. The ARJIS system includes over 2,500 workstations and printers, and 10,000 registered

users. Over 35,000 transactions each day access the 2.9 million recorded incidents, 5 million digital photos, and 4.4 million map that are stored in a series of heterogeneous and distributed databases. Applications include a global query of multiple databases, remote access via hand-held wireless devices, and an officer notification system.

Central to the ARJIS system is a two-decades old legacy IBM mainframe system containing over 10,000 lines of code. The significant resources invested in this system prohibit ARJIS from simply abandoning it in favor of a new system built on modern technology. However, because of its advanced age as a computer system (finding programmers to maintain the system is becoming increasingly difficult), ARJIS needs to develop new systems to serve as an eventual replacement.

This approach requires that ARJIS stakeholders and the ARJIS leadership address issues of data ownership and standardization. Because of its size, the legacy system plays a predominant role in this process: individual agency systems attaching to the integrated system must conform to ARJIS data standards (e.g., use the same data dictionary, codes, etc.). However, criminal justice agencies have historically taken a myopic view of information ownership and management, with turf protection being a real source of problems in system development (General Accounting Office, 2004).

ARJIS has adopted what we term to be an organic approach to system and application design (Tyworth & Sawyer, 2006). This design approach is at once both strategic – with a broad overall design goal and plan – and tactical – with individual applications being developed on a per request basis. It is a design approach that is both directed and flexible, reflecting more a stakeholder service model of computing than a technology-centered systems architecture model (such as enterprise computing adherents advocate).

To address the issue of data ownership and management, the ARJIS approach has been to allow participating agencies to retain ownership of their data while requiring conformance to published standards on sharing (format and content). This means that individual agencies retain control over access and use of data. Simultaneously ARJIS leadership can steer those agencies towards integration by requiring conformance as a prerequisite for inclusion.

Because of the resources invested in the mainframe system, ARJIS management has the strategic goal of currently developing a web services based system in parallel to the existing mainframe system with the goal of eventual replacement of the mainframe system. At the same time, ARJIS management is exploring the possibilities of adding access to new systems such as access to pawn information and geographic information system (GIS) tracking of sex offenders. This development approach allows ARJIS management to direct system development towards a larger goal of system integration while simultaneously deliver services on an as needed basis as long as they are consistent with the larger design goal.

ARJIS is a system that arises and evolves within institutionally complex milieu. The ARJIS system spans multiple political and operational jurisdictions. ARJIS is horizontally jurisdiction-spanning because it (the organization and the system) spans numerous local jurisdictions such as the San Diego and Carlsbad Police Departments among many others. Vertical jurisdiction spanning results from ARJIS' spanning of multiple of government including the San Diego Sheriff's Office (county), the California Highway Patrol (state), and the U.S. Border Patrol (federal) (Scanlon, 2004). More than ten law enforcement agencies, with over 10,000 law enforcement officers, policing a population of over 38 million citizens

(about 12% of the total US population), are participants in the ARJIS system (Bureau of Justice Statistics, 2000).

To address this complexity, a joint powers agreement (JPA) was adopted that establishes a unique ARJIS organization. The ARJIS organization is attached to the county governance structure (SANDAG). Organizationally ARJIS is independent of the individual agencies that participate in the system, yet it responsible to them as a customer service provider. Decision making authority is distributed across the participating agencies through participation the committee process, giving individual agencies a sense of voice in the design process. The ARJIS management team plays both a broker and a leader role. The ARJIS management team brokers negotiations between individual agencies participating in the system and between ARJIS as a whole and policymakers, vendors, and funding sources. The team provides leadership by guiding the decision-making process so that decisions are made consistent with the larger organizational and technological strategic goals.

Operationally, ARJIS is used for a range of activities. Police on routine (or shift) patrols access ARJIS via in-car laptop systems using mobile connectivity, typically with queries about vehicles and drivers. Detectives and investigators engage ARJIS for similar queries, and also for incident information, detailed records of particular protagonists, and other documents. They often engage ARJIS via mobile connections (including public network access). Crime analysts, sitting at powerful and fixed location workstations, use ARJIS data for crime mapping, trend analysis, reporting and mapping functions. Most police units, ARJIS leadership, and other entities (such as SANDAG and the FBI) routinely access ARJIS for management reporting, usage analysis, and other administrative tasks. Simply, it is hard to characterize ARJIS as used in a particular way or by a particular group.

Comparison

With the background of ARJIS as basis, we return to the three approaches (see Table 2). In doing this we illustrate the alternative conceptualizations and insights that the techno-centric, socio-political and social informatics perspectives highlight.

Table 2: ARJIS from Three Perspectives

Element	Techno-Centric	Socio-political	Social Informatics
Human	Focus on police officer's uses Create scenarios of use Characterize information needs	Engage policing as an institution (powered). Note growing roles (and debates) relative to information access, surveillance, and other discourses on security	Identify multiple stakeholders (ARJIS, police, jurisdictions) Identify various contexts of uses (patrol, investigation, analysis). Identify how various people engage uses as social actors (agency guided in part by role played).

			Frame ARJIS in operational, political and technical contexts
Technology	Attend to functional and interface issues	View as information sharing system	Depict devices, applications data structures and their evolution together
Interactions	Improve interface design for better access /reporting.	Focus on power and control of police to 'others'	Among stakeholders and systems, at multiple levels
Context	Simplified in scenarios	Detailed socio-political analyses	Design and uses trade-offs viz. operational issues, political issues, development issues
Insights from analysis	Focus on improved input/output and more easily used interfaces/ devices	Information sharing and reporting policies and effects	Artifact design guidance Operational guidance Policy guidance

In the techno-centric model, ARJIS would typically be characterized as a series of scenarios that represent some task or set of activities that users of ARJIS (e.g., police officers) would engage. These scenarios would be developed in consort with users and perhaps draw on extended field work and secondary data. The outcome of these studies would be to improve the design of the systems or their access via more useful interfaces and perhaps more usable devices. The design orientation may or may not engage the larger context: if it does, the context would be seen as impacting the technical activity of design.

In the socio-political approach, a detailed analysis of the social and political milieu would be developed through secondary data and field work. ARJIS would be framed in this analysis as a form of information sharing and the merits of this sharing, its use of resources, and the consequence of sharing (or not) would be the focus. Details of the ARJIS systems itself would be seconded to the debates on policy implications, governance and oversight.

A social informatics approach engages both the larger context and the particulars of the ARJIS system. Again, data may be gathered through both secondary data and field work. Depending on the particular theoretical frame, the context will be depicted in cultural, historical, socio-political, socio-economic, institutional (or combinations of) ways. The particular technological elements of ARJIS will be framed in terms of devices, applications, information structures, specific standards, and perhaps as architectural or functional representations. In our short depiction, we identified governance strategies, political processes, revenue generation, operational uses of devices and applications, issues with information structures, and development practices.

Through this simple comparative analysis we noted in passing that the methods may not differentiate the approaches. The difference lies in the characterization of the context, conceptualizations of human action, depictions of technology (ICT/computing) and the representation of interaction among these elements.

Social Informatics' Value

Social informatics provides a valuable analytical bridge between the techno-centric analysis – which is socially lean – and the socio-political analysis which simplifies the roles that particular features and functions of ICT play in their design and use. We illustrated that ARJIS' users are social actors instead of simplistic rational ones (techno-centric); the material properties of technology matter and technology is not just a product or tool of social processes (socio-political); and information and communications technologies are complex, multi-directional networks of uses, actors, and contexts – not linear, deterministic entities (techno-centric and socio-political).

Our argument is not that the techno-centric or socio-political approaches are without value; we see each as contributing to our understanding of the design and use of ICTs (see also Kling, 2000). Rather we see both the techno-centric and socio-political analyses as containing significant gaps, and social informatics as an approach to fill those gaps – serving as a bridge to the time-space disconnect that too often separates the designers of ICT-based systems from those who study and report on their uses. Any approach that can bridge this time-space disconnect will likely increase our understanding of ICTs and improve their design and use.

We note however that the social informatics approach presents a number of methodological and epistemological challenges, two of which we engage here. Perhaps the foremost challenge is the premise that the social and technical are inseparable. Such a premise makes effective modeling of ICTs difficult, and precise analysis even more so. For if they are truly inseparable, how do we identify that which is social and that which is technical? It may be that that we are forced to study the social and the technical sequentially rather than simultaneously and attempt to recombine them in our analysis. The risk with this approach however is overemphasis on either the social or technical dimension, and in fact much of the social informatics research published to date tends to privilege the social.

Two, the social informatics view of ICT as non-linear, non-deterministic, and context-sensitive systems makes developing specific principles that can be generalized extremely difficult. Unlike the techno-centric approach with its epistemological emphasis on abstract models of human behavior and specific design techniques; principles emerging from social informatics research are likely to be high-level and relatively vague[3].

Conclusion

In spite of these and other challenges, we believe that social informatics presents a rich opportunity for scholars to study the design and use of information and communications technology. In particular there is significant opportunity to develop existing or new theories of ICTs…

[3] In fact, this is precisely the point of social informatics research: when embedded in context, contextually-lean models often fail. As a result, social informatics seeks to generate more contextually flexible models of ICTs and their use.

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