Information Inequality: An Interdisciplinary Perspective on the Social, Technological, and Political Origins and Impacts of Unequal Access to Information

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Abstract

Information inequality, as the unequal distribution of access to and use of information in society and its associated causes and consequences, significantly impacts individuals and society. Distributions of information are unequal both within communities and between communities. A variety of factors produce unequal access to information, including: policies that specifically constrain availability and limit use, technological mediums and infrastructure that support and constrain access, educational discrepancies that differentiate between individuals' ability to use

or understand information and technology, economic differences that impact individuals' potential to acquire or use information or technologies that gate information, and cultural or social differences that differentiate between potential accesses, users, or controllers of information.

This paper examines how policy and information communication technology (ICT) impact information inequality, as well as what the consequences of these constraints are. A topical review of information inequality literature is presented, identifying gaps in the understanding of how information inequality is situated in social, political, economic, and technological contexts. A systematic review of seminal works in social informatics is also included, so as to develop a sociotechnical construction of inequality to address this gap. Applicable methods are discussed and the review concludes by identifying key research gaps and implications. This paper concludes with a discussion of the significance of research on information inequality.

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1. Introduction

In the current information society, information and information technology increasingly impact the lives of individuals. Access to—as the availability of, awareness of, and the ability to use—information impacts employment and earning potential (Lievrouw & Farb, 2003), political participation (Jaeger, 2007), social opportunities (Di Maggio, Hargittai, Celeste, & Shafer, 2004; Neckerman, 2004), and educational opportunities (Halford & Savage, 2010). Information is pervasive and impacts all aspects of individual lives and society.

The role of information in a robust democracy is often argued to be critical (Jaeger, 2007). For example, the UN's Millennium Development goals state that:

> Access to information and communication build on these internationally recognized rights and together encompass the core principles of democratic governance: participation, transparency and accountability. … It is essential to create and strengthen communication mechanisms that enable poor people to influence national and local government policy and practice. (UNDP, 2003, iii)

These arguments are consistent with historic political theories that an informed citizenry is fundamental to a functioning democracy (e.g. Jefferson, 1799). However, little empirical research examining relationships between individuals' use of information and information and communication technologies (ICT) and their political participation, most often democratic participation, deeply explores information issues, focusing instead on participation (Dervin, 1994; Jaeger, 2007). Information access is distributed in an unequal way (Meyer & Kraft, 2000; Yu, 2006; 2011), making it a critical component of information inequality, and political participation is certainly non-uniform (McLeod, Scheufele, & Moy, 1999), thus the relationship

between information access and participation becomes an issue bridging interactions between information and political inequality. Some preliminary research has found that access to the Internet does not lead to participation in politics among previously non-participating individuals, but that it does increase participation among previously participating individuals, thus driving sociopolitical divides further apart (Di Maggio, Hargittai, Celeste, & Shafer, 2004) and implying a complex relationship between information and participation variables.

In order to sustain democracy (Dervin, 1994; Lievrouw, 1994), encourage economic development (Bhargava, 2010; Gripenberg, et al., 2004; Kamwendo, 2008; Saleh, 2011), promote justice (Papaioannou, 2011), and support sociocultural institutions in multicultural civic society (Fichman & Sanfilippo, 2013), equitable access to socially important and public sector information is desirable. Yet, increasingly information access and literacy face challenges, barriers, and unequal opportunities (Hudson, 2012; Yu, 2006). As a result, information inequality is increasing (James, 2011; Yu, 2006), in a trend consistent with other rates and measures of inequality (Neckerman, 2004).

Understanding the relationships between inequalities is thus an important prerequisite to developing sustainable solutions to problems of information inequality because they are interrelated. Including analysis of information inequality is critical, because as Di Maggio, Hargittai, Celeste, and Shafer (2004) wrote,

> Information is a centrally important determinant of life chances; inequality in access to and use of information is a systematic source of social inequality; and cumulative patterns of disadvantage in access to different types of information may have cumulative consequences (p.391).

Information inequality, while encompassing many aspects of information asymmetry, can be

taken simply as "inequality in access to and use of information" (Di Maggio, Hargittai, Celeste, & Shafer, 2004, p.391). Much like educational inequality, information inequality is often born of differences in socioeconomic factors and has significant impacts on individuals' participation in economic and political activities, thereby producing social stratification.

Information inequality, including but not limited to the digital divide, is associated with a variety of social, political, and economic inequalities. The digital divide can be understood as encompassing three distinct aspects: disparities in Internet access between developed and developing countries, social differences between digitally information rich and poor within countries and communities, and political inequalities between those who do and do not use digital democratic resources (Norris, 2001). In this sense, the digital divide encompasses the same patterns of implications as information inequality, yet concerns only digitally mediated information inequality.

Digital divide narratives are often either socially (e.g. Epstein, Nisbet, & Gillespie, 2011) or technologically deterministic (e.g. Bertot, 2003). However, social informatics asserts that perspectives that seek quick technological fixes or do not anticipate socially unequal outcomes are uninformed and illogical. Certainly social informatics perspectives have been employed to study the problem (e.g. Halford & Savage, 2010), yet most are only locally situated (e.g. Kvasny, 2006). It is time to examine the problem from an appropriately holistic perspective. The problems are larger than Internet access; they are about information and societies, often mediated by ICTs, and are situated in a political context, constrained by various institutions. Unequal access to information impacts development and democracy in serious ways.

Information inequality is thus the more fundamental problem, compared with the digital divide, despite the increased attention to digital inequality. Information inequality has been

examined in the past, but not to the extent that is sufficient to understand the subordinate inequality that is the digital divide. Furthermore, there is suggestion that informational inequalities underlie and contribute to other inequalities; information serves as social and economic currency and incomplete information or information inequalities disadvantage individuals and social groups (Nilsen, 2010).

However, it is impossible to solve these problems without understanding how they are created. One realization of incomplete and unequal information is barriers to information access and dissemination. Barriers can be social, cultural, economic, technological, political, or cognitive in nature.

Barriers to information access and dissemination prevent information transfer or flow. Barriers are specific iterations of intervening variables within information seeking behavior and use processes (Wilson, 1999), as well as limits on information use (Świgoń, 2011). They can be structural gaps, environmental externalities, mediating technologies, and actors serving gatekeeping functions; environmental externalities, as contextual dynamics, also serve as barriers constraining access (Barzilai-Nahon, 2009; Świgoń, 2011).

One of the most important consequences of barriers is information inequality (Juergensmeyer & Bishop, 1985; Świgoń, 2011; Wilson, 1999). It has been argued that information inequality has primarily been conceptualized and analyzed in highly specific and uncritical ways (Meyer & Kraft, 2000), though significant theorization has been given to associated issues of the digital divide and information access and use. Meyer and Kraft (2000), however, have defined and empirically validated a theory of information inequality that extends beyond the digital divide. In this theory, individual actors are both information rich and information poor based on the circumstances, environmentally dynamic contexts both shape and

interact with social constraints, and inequality is context dependent (Meyer & Kraft, 2000). This theory can be operationalized at individual, community, and societal levels and employs a social informatics perspective to conceptualize inequalities in context.

Building on theory, information inequalities can lead to other unequal distributions and inequities (James, 2011; Lievrouw & Farb, 2003; Stanton-Salazar & Dornbusch, 1995), including socioeconomic disparities, opportunity inequities, inordinate political clout, and cultural distinctions (Lievrouw & Farb, 2003). Inequitable social distributions and information inequalities often overlap in the populations affected which impacts participation in political systems (Jimenez-Martinez, 2006). The information available to and used by an individual impacts many other aspects of their life (Yu, 2011) and the information distribution itself is seemingly shaped by a combination of many complicated factors, including policy (Jaeger, 2007), which itself "involves an extremely complex set of elements" (Sabatier, 2007, p.3).

Information inequality and social inequality have a significant impact on the lives of individuals and trends in social, political, and economic outcomes, rendering certain actors and communities advantaged, while marginalizing others (Di Maggio & Garip, 2012; Yu, 2011). Within the dynamic nature of inequalities, those who are privileged in terms of economic, social, and political status often use their influence over policy and ICT to control access to information. This reinforces their advantage and the status quo, driving a wedge to further exacerbate differences between extremes, leaving the marginalized further from privilege, as they are often without the means to overcome barriers to access.

Disadvantaged communities and groups receive less scholarly attention, in addition to often receiving less public and political attention (Neckerman & Torche, 2007), which results in part from the structural nature of disadvantages (Di Maggio & Garip, 2012). Relationships

between information and socio-political inequalities are complex and evidently mediated by policy in certain contexts (Di Maggio & Garip, 2012; Yu, 2011), yet few scholars consider the relationship holistically and instead focus inquiry within one domain (Yu, 2011).

The political implications of information inequality are significant because policies and institutions are often produced to constrain access and those who most need increased access are those with lowest levels of access regarding participation, which limits their participation in the policy making process (Blakemore & Craglia, 2007; Murdock & Golding, 1989). Furthermore, there is also call from policy scholars to better incorporate information into conceptualizations of the policy environment (Workman, Jones, & Jochim, 2009). In order to better understand social and informational inequalities, increased attention must be given toward integrating policy perspectives into theory, so as to specify whether these inequalities are influencers of, influenced by, or mediated by policy and the policy process in relationship to one another.

The policy process unites many actors, including: bureaucratic agencies and institutions, interest groups, and lawmakers (Sabatier, 2007). The complex and networked interactions between these actors have significant social impact and are constrained by the information available regarding the policy issues (Di Maggio & Garip, 2012). Information thus becomes an important variable in the policy making process as it informs participants decisions and interests, as well as being constrained by policy changes. Increased scholarly attention toward this relationship can positively inform policy makers and stakeholders by making explicit the implicit consequences and externalities of their actions and decisions.

As analyzing information inequality in isolation ignores important policy dimensions, this paper incorporates the Social Construction of Target Groups framework, which adds a political perspective that is aware of social context and is consistent with social informatics

assumptions that are critical to an integrated, interdisciplinary understanding of information inequality.

Access to information is thus shaped by a combination of social and technical variables, making it a concept best studied from a perspective sensitive to the complex nature of sociotechnical construction in dynamic contexts. Social informatics is precisely such a perspective, as a scholarly tradition of questioning the assumptions surrounding decisions and uses of information technology (Fichman, Sanfilippo, & Rosenbaum, forthcoming), which meets the requirements presented by Lievrouw (1994) for future studies of information inequality and the role of information in sociopolitical contexts. However, few social informaticists have considered such issues as their primary problem of interest, though notable studies exist (e.g. Courtright, 2004; 2005), and few scholars of information inequality and the digital divide address their problems of interest from this perspective, with exceptions included in section 2.2.2 (e.g. Halford & Savage, 2010; Mutula, 2005). This is a notable gap, given the correspondence between the nature of the problem and social informatics approaches. It is thus useful to examine seminal social informatics works to understand what concepts, findings, and approaches are applicable to the development of a social informatics approach to the study of information inequality.

Considering information inequality in a larger context, problems can be broadly translated into a general question of how information inequality is established between individuals, corporations, and governments under sociopolitical constraints. Current understanding of this complex, interdisciplinary problem can be examined through the following research questions:

1. How does information inequality relate to other inequalities, such as social, political, and economic inequalities?
2. How does policy contribute to information inequality?
3. How do ICTs contribute to information inequality?
4. What are the social, political, and technical consequences of unequal access to information?

In order to address these questions, works associated with inequality issues, as well as underlying the primary tenants of these approaches are reviewed, in order to construct a robust framework for analysis of information inequality. The literature sampled for this paper includes works by notable scholars in social informatics, social informatics and policy scholarship with implications for information inequality, and papers concerning information inequality; the sample does not exhaustively review scholarship on the digital divide, as the emphasis within this paper is on information generally, rather than digital information access.

This qualifying paper includes an extensive literature review, designed to both contextualize and deconstruct current understanding of information inequality. The review is divided into the following sections: an introduction to inequality as the key concept, findings, theories and variables, and methodologies to support inquiries into inequality. An implications section conceptually integrates the political, social, and technical constraints on access to information, with the subsequent effects of unequal access on each of these domains. Finally, the paper concludes an agenda for inequality research and a discussion of its significance.

2. Literature Review

Scholars across the social sciences, including in information science, have conceptualized inequality in a variety of ways. Thus it is necessary to consider the ranges of definitions for inequality: variance, advantage, disadvantage, difference, exclusion, discrimination, or marginalization, among other distinctions. Certainly, these characterizations are interrelated, yet their uses have strong implications for studies employing them.

Variance and difference provide the most encompassing views of inequality, in that considering how distributions vary across a population or groups differ from one another depends on data and concern about all levels, including highest, lowest, and average. Variance and difference are distinct concepts, beyond semantics, with respect to units, as they refer to comparisons between or within individuals or aggregates respectively; this has implications for quantitative analysis, as the variables are either continuous or discrete (Litchfield, 1999).

Less encompassing are distinctions between advantage and disadvantage, which often compare extremes without focusing on aspects of the middle of the distribution, and in some cases focus on only one end of the extreme. Consideration of elites, in the way that they have disproportionate access to information or control of the economy (Rahman Kahn, 2012), versus consideration of the disadvantaged, in the way that capitalist regimes and historical institutionalisms of path dependence (Wolff & De-Shalit, 2013), often shape popular perceptions of inequality. Sen's capability theory is commonly used to assess opportunities to change an individuals' position within this dichotomy (e.g. Zheng & Walsham, 2008; Wolff & De-Shalit, 2013). Focus on the bottom end of distributions provides the most complex array of related concepts and capability theory thus illustrates how exclusion can occur in that the disadvantaged are systematically prevented from the participation afforded the advantaged (Zheng & Walsham,

2008). Discrimination extends beyond exclusion in that the disadvantaged are targeted by actions rather than systematic differences (Feagin & Eckberg, 1980; Zheng & Walsham, 2008).

Phinney, Horenezyk, Liebkind, and Vedder (2001) provide a typology that distinguishes between integration, assimilation, separation, and marginalization, as acculturation strategies that are at once socially selected and imposed upon minority groups, though they specifically considered immigrants. They describe the distinction as one based on two factors: "Is it considered to be of value to maintain one's cultural heritage? Is it considered to be of value to develop relationships with the larger society?" (p.495). Integration occurs when both conditions are met and marginalization occurs when neither condition is met, while assimilation and separation result from fulfillment of one factor but not the other.

Furthermore, inequality can be considered as absolute, experienced unequal distributions, as well as more subjective, perceived unequal distributions, in comparison to others, at both the group and individual levels (Litchfield, 1999). This makes clear definition of what aspects of inequality are being studied highly important.

Table 1. Conceptualizations of Inequality

Approach to Conceptualizing Inequality	**Definition**
Variance	Variance refers to inequalities as the relative spread of distributions within a group or population (Litchfield, 1999).
Difference	Difference refers to inequalities as gaps between individuals and groups in a distribution (Litchfield, 1999).
Advantage	Advantages represent disproportionate distribution social resources within unequal distributions and are often studied by focusing on elites (Rahman Khan, 2012).
Disadvantage	Approaching issues of inequality by addressing disadvantage represents a conceptualization of the problem as one in which those who are worst off "should be (the) absolute priority" (Wolff & De-Shalit, 2013, p.3).
Exclusion	Exclusion, as an issue of inequality, represents the deprivation of capabilities to participate in society with an opportunity to change social status (Zheng & Walsham, 2008).

Discrimination	Discrimination represents a specific issue within inequality in which discriminatory actions, as rights-depriving actions, target particular groups based on social conceptualizations (Feagin & Eckberg, 1980).
Marginalization	Marginalization occurs when groups maintain distinct culture that is not valued by and do not have significant interaction with society at large (Phinney, Horenezyk, Liebkind, & Vedder, 2001).

In summary, inequality has been assessed against a variety of indicators and defined in a number of ways, as illustrated in table 1. Yet, studies of inequalities, including economic and social, have alluded to and emphasized weakly understood mechanisms in interrelationships (e.g. James, 2011). For example, inequalities are often conflated when there is mutual impact, such as with socio-economic inequalities (Neckerman & Torche, 2007) because of the considerable evidence that social capital and economic distributions impact each other (Ali, Naseem, & Farooq, 2013; Josten, 2013). This chapter will first consider information inequality and theories for analysis of information inequality, before deconstructing inequalities that interact with information inequalities and the sociotechnical nature of information inequality. Research included within this sample conceptualizes inequality along many of the ways discussed, however for purposes of theorization on a large scale, it should be understood as issues of variance and difference.

2.1 Concepts of Interest

2.1.1 Information Inequality

Inequalities impact a variety of distributions, however the focus of this paper is on inequalities in information. In order to address this specific type of inequality, it is first necessary to define information, as a concept. For the purposes of this discussion, a general definition will serve as

the basis for understanding information conceptually; information is well-formed and meaningful data that is understood as semantic content (Floridi, 2010). Floridi emphasizes that information is meaningful, not only based on semantics, but also based on context. This assertion is most significant when coupling this definition with the theory of the life cycle of information, which Floridi describes as follows:

> The life cycle of information typically includes the following phases: *occurrence* (discovering, designing, authoring, etc.), *transmission* (networking, distributing, accessing, retrieving, transmitting, etc.), *processing* and *management* (collecting, validating, modifying, organizing, indexing, classifying, filtering, updating, sorting, storing, etc.), and *usage* (monitoring, modeling, analyzing, explaining, planning, forecasting, decision-making, instructing, educating, learning, etc.). (2010, p.4)

In this sense, information need not be used, so long as it has been articulated in a meaningful way. Yet, from a social perspective, it is often the use of information that is a concern. It is important to generate an understanding of what may promote or inhibit use and when use of information is desirable. This ultimately is the point of integration between information inequality and information use.

Information inequality has been divided into non-mutually exclusive issues of: the digital divide, knowledge gaps, information poverty, information literacy, access, and awareness. The most inclusive theory of information inequality, outlined in the introduction, states that inequality is context dependent based on socioeconomic factors (Meyer & Kraft, 2000), yet it has primarily been employed to explain individual micro level cases (Yu, 2006; Zheng & Walsham, 2008). Information inequality concerns difference and variation in distributions of availability, access, ability, and infrastructure to support the use and consumption of information and ICTs,

extending beyond the scope of the digital divide (Yu, 2006). Information inequality is also distinct from information inequity, though scholarship often fails to differentiate between the two; information inequity refers to unjust distributions, assuming that information inequality is inevitable and necessary (Lievrouw & Farb, 2003).

Meyer and Kraft's (2000) theory, originally outlined in an earlier working paper by Meyer (2000), provides the only general theory of information inequality, despite much theorization about information poverty (e.g. Burnett, Besant, & Chatman, 2001; Chatman, 1996) and the digital divide (e.g. James, 2011), as components of information inequality. Meyer and Kraft's (2000) theory of information inequality emphasizes three primary points:

1. Individual actors are both information rich and information poor, depending on context;
2. Environmentally dynamic context shapes and interacts with social constraints; and
3. Inequality is only measurable in context.

In this sense, consideration of both absolute and relative inequality in information distributions is important, and environmental features, particularly social barriers, but also policies and ICTs that shape interaction, define the nature of this inequality. Information inequality, thus, includes differences in access, which is often narrowly conceptualized as availability, as well as in autonomy of use, skill, and social support (Di Maggio, Hargittai, Celeste, & Shafer, 2004).

Information inequality subsumes digital inequality issues, specifically including the digital divide. Digital divide assessment has considered differences across a variety of dividing lines: region and place of residence, employment status, income, educational attainment, race and ethnicity, age, gender, and family structure within countries (Di Maggio, Hargittai, Celeste,

& Shafer, 2004), as well as comparative assessment between countries (e.g. Epstein, Nisbet, & Gillespie, 2011; James, 2011). Popular discourse on the digital divide most often considers differences in location and income (e.g. James, 2011), only occasionally dealing with race (e.g. Kvasny, 2006) or culture (Gebremichael & Jackson, 2006), yet rarely with other concerns.

James (2011) provides an example of theorization about another component of information inequality is his pilot study into relationships between GDP and Internet accessibility. He suggests a theory to define the multiple patterns that exist in overcoming the digital divide, having found two primary patterns, one of convergence consistent with regression and another of prolonged inequality within countries, preventing nations from converging to global patterns. James did not begin to examine why these patterns of convergence and divergence occur, yet did posit possible explanations of causality between economic and information variables in concluding the study.

James (2011) tested competing hypotheses that changes in the digital divide, measured by Internet access, were either positively or negatively connected to income levels over a six-year period. The study concluded that there were unequal outcomes by context, with some nations following a pattern of convergence and others facing increasing inequality within their own countries (James, 2011); while the digital divide thus appears to be a paradox, the results in fact support theories of information inequality, such as Meyer's theory on the context dependent nature of information inequality (Meyer, 2000; Meyer & Kraft, 2000). While James succeeding in mapping relationships between information and economic inequalities using two indicators, there is more to analyze because it is not yet clear how other indicators correlate or why. In this sense, asking what leads to divergent patterns, beginning with political variables, is a logical mechanism to expand inquiry in way that has not yet been done.

Others have extensively considered only those at the bottom of information distributions when examining information inequality, employing a disadvantage or marginalization conception of inequality. The theory of information poverty developed originally by Chatman (1991; 1996), provides the most robust theorization about how lack of access and ability to use information is most highly correlated with low achievement in other socioeconomic categories. Building on her work on the information life worlds of outsiders, Chatman (1996) provided six distinct propositions (p.197-198):

> Proposition 1: People who are defined as information poor perceive themselves to be devoid of any sources that might help them.
>
> Proposition 2: Information poverty is partially associated with class distinction. That is, the condition of information poverty is influenced by outsiders who withhold privileged access to information.
>
> Proposition 3: Information poverty is determined by self-protective behaviors which are used in response to social norms.
>
> Proposition 4: Both secrecy and deception are self-protecting mechanisms due to a sense of mistrust regarding the interest or ability of others to provide useful information.
>
> Proposition 5: A decision to risk exposure about our true problems is often not taken due to a perception that negative consequences outweigh benefits.
>
> Proposition 6: New knowledge will be selectively introduced into the information world of poor people. A condition that influences this process is the relevance of that information in response to everyday problems and concerns.

This theory has resulted in detailed analyses of information seeking and use behaviors of those who are information impoverished, such as janitors, single mothers, and the elderly (Chatman,

1996) and others in small worlds (Burnett, Besant, & Chatman, 2001). It is significant in that "the idea of meaning, or how people use information to reshape, redefine, or reclaim their social reality, played against the background of insider/outsider" (Chatman, 1996, p.195) allows a scholar to consider information inequality as perceived and as experienced at the individual level, without the need for comparative analysis.

The conception of poverty life-world shaping information experiences is fundamentally dependent on social construction of reality as there is interaction between an individual's perceived and experienced reality and the reality of those around them (Chatman, 1996). In this sense, sociological conceptions of information inequality, developed in parallel to information science theories, rather than in concert (Di Maggio, Hargittai, Celeste, & Shafer, 2004), could be integrated in a manner that would benefit improved understanding of experienced information inequality.

Specifically describing the sociological tradition of information inequality research, Di Maggio, Hargittai, Celeste, and Shafer (2004) write:

> One generalization that emerges from this work is what we call the differentiation principle. At first, scarce information services are often relatively undifferentiated. As they become more available, they also become more differentiated in character, as the relatively privileged seek advantage by accumulating kinds that are more richly rewarded in marital or labor markets… In the sphere of information technology, hand-held communication devices have been differentiated, as the old stationary telephone has evolved into cellular telephones, personal digital assistants, wireless Internet devices, and varied combinations thereof. We anticipate that high rates of Internet penetration will increase the salience of new kinds of inequality among Internet users that affect the

extent to which they reap benefits from going online. (p.375)

In this sense, sociologists have already identified key areas of interest from information science, yet these connections have not been well developed. An interdisciplinary approach, integrating aspects of multiple traditions would likely provide clearer insights about variable relationships, as well, because information inequality is not just a social, technical, or political problem, but a problem with multivariate causes and consequences

Information inequality is thus a multifaceted concept, which has been examined in diverse ways, addressing distinct components of interest, such as information poverty (e.g. Chatman, 1996) or the digital divide (e.g. Bertot, 2003; James, 2011), from distinct theoretical perspectives. However, information inequality has not been systematically conceptualized, despite distinct theories of its provenance and impact. It is thus necessary to examine what is known about information inequality and how those conclusions were reached, in order to offer a conceptualization of information inequality that integrates existing understanding.

2.1.2 Access to Information

Just as there is disagreement about how to conceptualize differences in access to and use of information, so to is there variation in conceptualizations of access to information technologies and digitally mediated information access. While some are primarily concerned with availability, others embed the ability to use ICTs within the concept of access. Di Maggio, Hargittai, Celeste, and Shafer (2004) represent an example of the latter approach; they specifically define access at different levels of disadvantage through relative comparison of: “using the Internet anywhere; using the Internet at one’s place of residence; and using the Internet at home through a high-

speed connection" (p.362).

Access is important when assessing inequality. Previous reviews on equity, as opposed to equality, identify horizontal and vertical distinctions, as distinctions between information and users, respectively, in unequal access (Lievrouw & Farb, 2003). Lievrouw and Farb (2003) make this distinctions between horizontal differences, which are based on information type, do not have as significant of social or political implications as do vertical differences, which lead to differences in access between groups and communities. These distinctions can be used to structure analysis of information inequality to provide a more complete picture, as represented in table 2.

Table 2. Horizontal and Vertical Differentiation in Access

	Aspects	References
Horizontal Levels of Access: differences based on nature of information (Lievrouw & Farb, 2003)	Public sector information	Blakemore & Craglia, 2007
	What information cannot be accessed, must be accessible	Jaeger, 2007
	Dissemination, distribution, access, availability	Robertson & Vatrapu, 2010
	Information access, collection, dissemination	Strickland & Hunt, 2005
Vertical Levels of Access: differences by demographic, stakeholder groups (Lievrouw & Farb, 2003)	What information social groups, organizations can access	Jaeger, 2007
	Levels of access	Juergensmeyer & Bishop, 1985
	Knowledge, communication, control	Świgoń, 2011

What the literature reveals is that not all information inequalities are equally as problematic or unjust; information equity becomes a more precise concept for examining differences in access, to some extent, because horizontal differences in access are in many cases

necessary and to be expected, while vertical differences in access discriminate and exacerbate social, political, and economic differences (Lievrouw & Farb, 2003). Horizontal differences in access result from legitimate social interests in, for example, national security as a reason to withhold information from the general public or intellectual property and trade secrets as a reason for businesses not to share information and ICT fundamental to their practices with everyone else. Vertical differences, on the other hand, are in some cases the results of differences in distributions, such as economic inequalities leading to different access based on cost barriers or location of infrastructure.

Issues of access are important to inclusion in the information society and must be understood to decrease information inequity. The access divide, extending beyond the digital divide, includes issues of availability, differences in access that are mental, material, skills, and usage based (Chadwick, 2006). There are significant consequences to gaps in access, including economic opportunity and democratic divides, that not only reinforce the inequalities that contribute to information inequality in a feedback loop, but are problematic in their own rights. (Chadwick, 2006)

In this sense, there are distinct challenges to decreasing inequities in information distributions because of the complexities of access. Human aspects in particular create barriers to information access, as trust, emotion, and socially constructed understandings of information lead to differences in representation and disclosure as groups are created and some are excluded (Sonnenwald, 2006). Furthermore, policies are employed to control information, not only in the justifiable horizontal sense, but also in discriminatory vertical configurations based on the social constructions enforced and experienced in society (Jaeger, 2007). ICTs also constrain information, as access, in all dimensions, to information technologies that constrain information

is often required (Orlikowski & Robey, 1991). Each of these factors will be discussed, in terms of how they facilitate and inhibit access to information.

2.1.2.1 Socio-cultural Aspects

Social aspects shape access, to a significant extent. Analyses of the digital divide and multicultural collaboration supported by ICTs illustrate the extent to which gaps in use exist between social and cultural groups, as studies of educational gaps illustrate social and cultural discrepancies in literacy and information literacy. This section specifically examines literature that illustrates the socio-cultural aspects of access and inequality in access, as one significant component of information inequality.

While ICTs have the potential to facilitate an inclusive multicultural public sphere (Papaioannou, 2011), unequal access to ICTs further fragments diverse societies by reinforcing boundaries along cultural, socioeconomic, and demographic lines; reciprocally, cultural differences lead to differences in ICT ownership, access, and use, thereby limiting the potential of ICTs to overcome inequalities without complimentary policy or social shifts (Falkheimer & Heide, 2009). From a theoretical perspective, inequalities in ownership have been conceptualized along 10 lines: land, labor, institutions, animals, coercion, machines, capital, information, media, and scientific innovation (Oyedemi, 2009). Particularly important to contextualize cultural and social concerns in relationship to ICTs are: institutions, information, and scientific knowledge. Institutions form grounds for inequalities in that they make social, economic, and administrative commitments along cultural boundaries and under the assumption of ICT access and knowledge. Information facilitates informed decision-making and establishes grounds for action, much as

scientific knowledge shapes social interventions, such as responses and initiatives within society, both for beneficial and harmful purposes; asymmetrical information and knowledge distributions have significant social impacts both as an externality of interaction between cultural differentiation and ICT distribution, and as an intended outcome from informed decision-making and action-taking.

Social factors enable and constrain access to information in part by determining who interacts and what groups exchange information or share members. Sonnenwald (1995) identifies observed communication roles that span group boundaries: agents as those who facilitate interaction and mediate conflict; external stars who extend beyond the group to interact with external people; intergroup stars who interact with other participants and represent their groups; gatekeepers who filter information between groups and sources; and boundary translators who present group information to outsiders. At the individual level, people impact the information that can be accessed by others.

Furthermore, as social factors are aggregated in the distributions that yield social inequality, and there is inequality in access based on vertical differentiation, social factors mediate other aspects of access. Burnett, Jaeger, and Thompson (2008), for example, employ a conceptualization of information access that consists of physical, intellectual, and social aspects that contribute to the institutional context of information access, drawing on Chatman's small worlds theory of information inequality. Through case study analysis, they illustrate that "social norms, worldview, and social types influence what information is seen as permissible for members of a small world to access and what kinds of information from the outside world is acceptable within a specific small world" as well as that social and cultural norms regarding "information behaviors define the appropriate mechanisms and activities involved in information

access" (Burnett, Jaeger, & Thompson, 2008, p.59). As a result of social and cultural norms, information may not be accessible beyond specific communities or by specific communities due to socio-cultural logic of appropriateness.

Social differences in information access impact the ability of individuals to participate in other economic, social, and political activities, due to inadequate information at the low end of information distributions and inordinate advantages due to highly asymmetric information favoring the top end of information distributions. In this sense, those social and cultural groups with more information are empowered to exert greater influence over political aspects and policy constraints on information and access than is proportionate.

2.1.2.2 Political and Policy Aspects

Information access is thus importantly constrained by politics and policy. This section will discuss both of these aspects of access, in order to convey understanding about the political importance of information to development concerns and how various social and political concerns are translated into policy constraints on access.

Focusing specifically on political aspects of access, there are distinct political interests in different vertical and horizontal constrains on access. As in the example provided introducing section 2.1.2, national security preferences favor vertical differentiation in access; furthermore, the Social Construction of Target Groups theory, discussed in the introduction, explains why social constructions of particular groups may lead to political preferences favoring horizontal differentiation between groups in information access. English-only laws represent a fruition of

distinct preferences in constraining information access horizontally, as socially constructed frames have been employed to establish non-English speakers as undeserving.

There are also important political preferences in increasing information access generally. The United Nations and the Internet Governance Forum, through the Internet Society (ISOC), have encouraged specific policies within nations to spur development through information technology access on the basis that access is determined by cooperative regulation, provision of infrastructure, creation of standards, and decision-making between Governments, the private section, and civil society (Souter, 2012). Between nations, promotion of globally standard information policies includes arguments that uniformity: promotes information exchange, provides continuity in a global society, routinizes and automates information decision making, insulates decision makers from emotional and "ill-considered requests for a policy change", and better coordinate global society, encouraging communication without borders (Riggs, 1996, p.2). Furthermore, Riggs argues this would encourage innovation in information technology and increase reliability, access, and quality of ICT and Internet access.

There is also explicit evidence that differences in politics and polices yield different distributions of information and Internet access, within different economic contexts and with different economic implications. For example, Fan (2005) empirically examined linkages between regulation, markets, and Internet access, comparing China and Australia, as exemplar of distinct digital opportunity strategies. Fan suggests that the level of Internet access is dependent on regulation of the telecommunications industry, particularly Internet service providers, to promote and guarantee fair competition (Fan 2005). While information is non-rival and non-excludable (Torrens, 2013), information access, in this case by means of Internet access, is

excludable thereby providing onus for policy makers to seek to affect the distributions of access because of the important role of information in an informed citizenry and labor force.

Henderson, Gentle, and Ball (2005) importantly considered how the international regulatory environment with respect to telecommunications impacts social and economic outcomes in developing nations, focusing specifically on WTO principles. They found that the divergent patterns between developed and developing nations, with respect to telecommunication and information policy led to choices that favored the developed at the expense of the developing (Henderson, Gentle, & Ball, 2005). International regulation of information and ICT can have negative social and economic impacts in developing nations by pricing the public out of access and thereby socially fragmenting regions and even neighborhoods based on accessibility (Henderson, Gentle, & Ball, 2005).

In this sense, there is evidence that the missing argument to James' model is a political and policy oriented component, yet this can easily be integrated. Acemoglu (2008) and Acemoglu & Akcigit (2012) provide support for a development economics approach to interpretation of the statistical results and development of the model being tested through analysis of the information and economic indicators. Intellectual property rights polices and competition policies, regarding development in technology firms, have significant implications for: 1) the profitability of new technology, which in turn impacts consumption of new technology based on economies of scale, and 2) technology gaps between firms, which has significant social implications in terms of accessibility of technology by cost and availability (Acemoglu & Akcigit, 2012). Acemoglu and Akcigit (2012) illustrate that robust intellectual property rights protection for industry leaders incentivizes development of new technology, which increases consumption, whereas protection of small and peripheral firms or weak

intellectual property rights policies only encourages an often statistically insignificant increase in consumption at the onset of product offering. In this sense, choices about intellectual property rights impact availability of technology, including ICT, which has social implications. Furthermore, these decisions have implications for employment and economic development, as robust protection encouraging further development and technological progress increases participation in the technology sector.

Based on these previous findings, it can be assumed that policies that impact the incentive structures and the payoff calculus of information technology companies, as well as telecommunications companies who provide Internet access, has dramatic impact upon the distribution of Internet access. Furthermore, policies can have dramatic impact on economic development, independent of information and Internet access (Acemoglu, 2008). In this sense, James comparison of changes in the absolute digital divide with ratios of growth in developed versus developing countries omitted a fundamental variable that likely explains a pattern of divergence and a pattern of convergence: policies.

Focusing specifically on the relationship between information access and policy, within the relevant context of social policy, the primary aspect to consider is how policy constrains access to information. Conceptually, there many competing frameworks that both treat issues of information and social characteristics differently and hold different implications for modeling the relationships between information inequality, social distributions, and policy. In order to evaluate the identified research questions empirically, it is first necessary to comparatively explore the suggestions of frameworks with respect to contrasting theories and in synthesis with previous empirical results. The frameworks considered are: the Social Construction of Target Groups, Punctuated Equilibrium Theory, and Historical Path Dependence. This set was selected from the

larger body of policy theory because all consider social issues in depth and include informational factors as integral to the policy process, which are necessary conditions to model potential relationships between these variables and provide any consistency with Meyer and Kraft's theory of information inequality (2000), which is assumed to define the problem space.

The Social Construction of Target Groups, as a framework, asserts that social understanding and perception of groups is constructed in a way that advantages and disadvantages groups, thereby impacting their participation in the democratic process and how policies are constructed to preferentially meet social needs (Schneider & Ingram, 1993). Specifically, social construction is a process through which shared characteristics of a particular social group, a target group, are identified and correlated with social values within popular and political discourse (Schneider & Ingram, 1993). Constructions are not necessarily persistent, and in fact there is contention with regard to particular constructions, making certain constructions relevant in particular contexts (Ingram, Schneider, & Deleon, 2007).

In this sense, the social construction framework directly addresses issues of social inequality, arguing that perception of and subsequent active Social Construction of Target Groups drives different distributions of policy outcomes based on the political calculus of a particular group's perceived positive or negative connotations and relative social power, as indicative of their deservedness for benefits or rights in a particular context (Ingram, Schneider, & Deleon, 2007). This framework is also significant in that it "… helps explain why public policy … fails in its nominal purposes, fails to solve important public problems, perpetuates injustice, fails to support democratic institutions, and produces an unequal citizenship" (Ingram, Schneider, & Deleon, 2007, p.93). Inequalities specifically replicate as social inequalities are projected onto the distribution of rights and services by policies that distribute based on social

constructions. Within this framework, questions consider what leads to particular constructions, as well as what impact particular constructions have on policy outcomes.

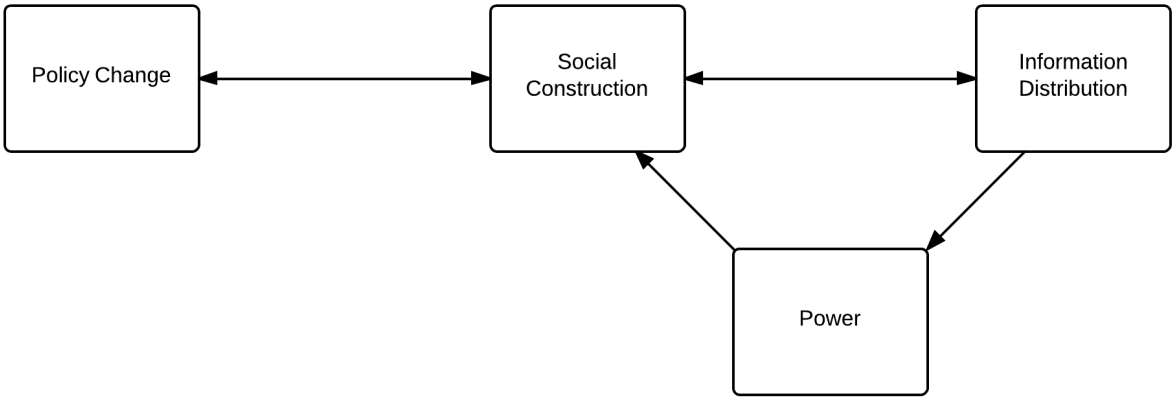
Social construction importantly affects information distributions; policies developed in response to particular constructions lead to messaging toward the target population that "indicate(s) whether the problems of the target population are legitimate ones for government attention, what kind of game politics is (public-spirited or the pursuit of private interests), and who usually wins" (Schneider & Ingram, 1993, p.340). This is significant in coupling social legitimacy with information that is internalized by the group about their political position and social power, yet this is only a surface level implication of the framework about how social construction affects information distributions. If assumptions are reflected in practice, in addition to affecting information distributions by social positions, only groups constructed to be deserving within political discourse will have information needs met by the government, leaving the disadvantaged, or in the language of the framework the "deviants" and in some cases the "dependents" and "contenders," further disadvantaged whereas the advantaged benefit and are further empowered over the rest of the citizenry. As Ingram, Schneider, and Deleon (2007) wrote, this framework explains why injustice is perpetuated, and further, it explains the empirical reality of social and informational disadvantage overlapping (e.g. Kim, Lee, & Menon, 2009; Yu, 2011).

Information inequalities also lead to differences in social construction of groups; messaging about and perception of social attributes around which groups are constructed are dependent on information flows. Constructions are fed both by "stereotypes" and objective reality (Schneider & Ingram, 1993, p.335) and often there are competing constructions within discourse as "contradictions" are passed along (Schneider & Ingram, 1993, p.338). This

conceptualization precisely describes the process surrounding digital divide initiatives, which sought social empowerment through ICT based on messaging campaigns, such as One Laptop per Child, which reduced the problems of global inequality and injustice to lack of access to information technology in the developing world (Hudson, 2012). In this sense, the information manipulation and asymmetry fed social policies which failed to account for the larger problems and also ignored many of those who are disadvantaged by lack of access to ICT, such as low-socioeconomic status individuals within affluent and developed countries (James, 2011), thereby constructing the disadvantaged who are far away as deserving and constructing the disadvantaged nearby as undeserving.

Based on a synthesis of research employing the Social Construction of Target Groups framework, a model can be hypothesized for these relationships, as represented in figure 1. This model illustrates that the relationship between policy and information distributions is mediated by social constructions and that information distributions impact both power, as the relative social and political influence of constructed groups, and social constructions. The complexity of the model is particularly interesting, as the relationship between social and informational inequalities is neither directional nor limited to a particular path; not only do social and informational inequalities impact one another, but information access impacts relative power, which can feedback through social construction to impact information. This seemingly addresses the limitations of earlier explanations of informational and social inequalities (e.g. Hudson, 2012; Kim, Lee, & Menon, 2009). However, this representation does not completed explain information inequalities and it is necessary to examine other approaches.

Figure 1. Hypothesized Relationships between Social Construction of Target Groups and Information Inequality



Punctuated-equilibrium conceptualizes policy and political processes by treating policy changes as periodic departures from stable policy conditions, thereby reestablishing the equilibrium, in response to information flows (True, Jones, & Baumgartner, 2007). Furthermore, "how the policymaking system allocates attention to the problem is a critical component of problem recognition and subsequent action" (True, Jones, & Baumgartner, 2007, p.177). This implies that information availability and quality determine recognition and decision making in instances of punctuated changes, as policy recommendations are fundamentally dependent on policy makers acquiring and processing information to inform their characterization and understanding of a particular policy or policy area.

Based on the punctuated-equilibrium approach to policy change as grounded in information processing, the framework serves as the basis for the Information Processing Theory of Policy Dynamics (Workman, Jones, & Jochim, 2009). Within this theory, public policymakers exhibit bounded rationality in which attention is not consistent or unlimited within a dynamic information environment with an oversupply confusing and contradictory information produced by actors with particular interests (Workman, Jones, & Jochim, 2009). As a result of these

conditions, policymakers must prioritize information processing (Workman, Jones, & Jochim, 2009).

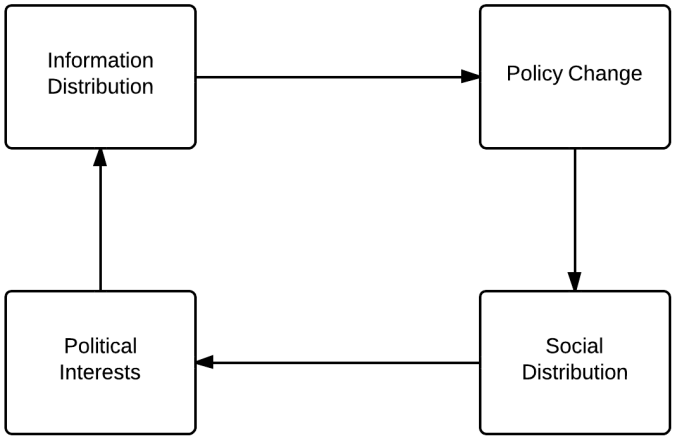
In addressing how unequal information distributions and flows impact policy punctuations of social equilibriums, Workman, Jones, and Jochim identify the "need to study both the sender of the information and the structures that increase or decrease information supply, and the receiver of the information and the structures that will use that information to prioritize both problems and solutions" (2009, p.88). Furthermore, Jones and Baumgartner (2012) explicitly derive a theory of government information processing from the overarching punctuated equilibrium framework in which the rates of information processing, allocation of attention, and availability of information both lead to maintenance of the equilibrium and significant shifts. Punctuated equilibrium is thus highly compatible with theories of information processing and behavior, which conceptualize information processing as fundamental to decision making generally and is determined at social, technical, cognitive, and emotional levels (Davenport & Prusak, 1997), as is described for government information processing (Jones and Baumgartner, 2012). In this sense, there is awareness that information inequality impacts the policymaking process by limiting and defining policy changes as punctuations of policy equilibriums, as well as impacting policy effectiveness (Nwagwu & Iheanetu, 2011).

Yet, with respect to how policy changes punctuate information distribution equilibriums, there is little direct consideration of how policy may impact information inequality; a suggestion is that interests arguably shape information distributions (Workman, Jones, & Jochim, 2009), making the social outcomes of policy a driver of the feedback into the punctuated change model. An explanation as indirect as this, in which information distributions impact social distributions only as mediated by policy change does not reflect the general empirical reality that information

serves as capital in society (Adair, 2010; Nilsen, 2010) and can empower those who are otherwise disadvantaged as well as be leveraged by those in positions of power to further reinforce their advantage (Lievrouw & Farb, 2003). However, the cyclical nature may be true in the specific context of policy and politics; those who are socially advantaged control information flows to support their position (Zheng & Walsham, 2008), specifically exhibiting gatekeeping behaviors to prevent information flows they do not wish to impact the policy environment (Soroka, 2012).

Drawing on this approach to conceptualizing the policy process, an alternate set of relationships between policy, information, and social differences can be modeled, as represented in figure 2. The model represents a cycle that is realistic within the context of direct impacts on policy changes, yet the indirect influences, in which information may impact social distributions, which thereby feed back into the loop, drawing on other scholarship (Kim, Lee, & Menon, 2009), are not well accounted for. The primary advantage of this model is in its suggestion of a direct impact from information on policy, which is to be expected based on information processing theory (e.g. Davenport & Prusak, 1997; Wilson, 1999) and the cognitive load of policy makers (Jones and Baumgartner, 2012). However, this model is again insufficient for understanding information inequality in general; not only does the model ignore the concept of power which was importantly included in the social constructivist perspective, but it fails to account for the historical development of political aspects of information inequality.

Figure 2. Hypothesized Relationship between Punctuated Equilibrium Theory and Information Inequality



Path dependent approaches offer historical institutionalism as the cause of the relatively constant, slow-to-change policy environment in particular domains (Peters, Pierre, & King, 2005), rather than considering information processing as the impediment of change. This conceptualization often draws on punctuated equilibrium models to explain changes (Peters, Pierre, & King, 2005).

Within this approach, it would be possible to conceptualize social and informational environments as consistent and entrenched institutionalisms which because of their co-occurrence at path origins and at points of impact on policy, jointly impact policy at points of change, but do not in fact interact with one another in relationship to policy. This would consistently illustrate why change is slow, as the framework suggests that changes require perceptions of gaps between norms and performance, as well as a serious policy replacement and even this does not guarantee a new equilibrium (Peters, Pierre, & King, 2005). For example, historical path dependence explains unequal outcomes from Poland's drastic market changes during the 1990s on the basis that social capital was unequally distributed historically and this distribution could not be overcome, despite economic policy change (Zukowski, 2004). The parallel economic and social paths fundamentally impact outcomes in this case, and the same

may be true of social and informational environments. This conceptualization of entrenchment of the status quo based on social and information institutions is possible when compared to empirical knowledge, though is much less intuitive.

With respect to this framework, what is necessary to understand is how policy changes impact information distributions and whether informational distributions impact entrenched social institutions by producing policy change, as well as why these changes might not occur.

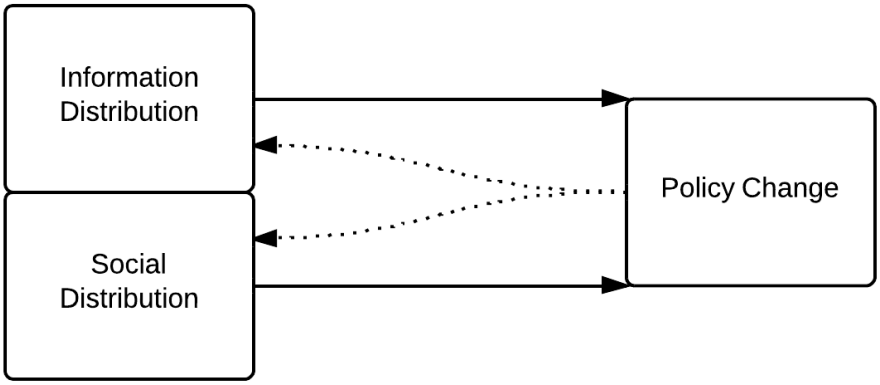
Path dependent approaches are often criticized for their failure to consider what leads to rare changes, in part answering the second question (Peters, Pierre, & King, 2005), yet this failure does in itself reflect on policy failure with respect to disadvantaged populations (Jacobs & Soss, 2010). However, historically unequal social and information distributions do seemingly impact policy under this model, albeit slowly (Pierson, 2003). This is consistent with descriptions from other related bodies of literature describing instances in which policies are developed when socially powerful and information rich actors call for change (e.g. Soss & Schram, 2007), whereas socially and information disadvantaged actors rarely achieve the policy changes they desire if they participate at all (Soss & Jacobs, 2009). This is fundamentally what path dependent literature describes when discussing "the dynamics of self-reinforcing or positive feedback processes" as the modest and slow moving changes as the status quo is reinforced (Pierson, 2003, p.195).

A historical path dependent approach also illustrates why policies intended to impact information distributions often fail (Bertot, 2003): other disadvantages are so tightly coupled to informational disadvantage (Yu, 2011) that availability alone does not guarantee an improvement in position, as literacy, awareness, and time limit information processing (Yu, 2011). Information policies, which reflect seven values ranging from access to privacy, fundamentally redistribute or

attribute ownership rights over information and have historically suffered from "policy impossibility" in which perspectives and preferences are so varied that the status quo is often maintained (Overman & Cahill, 1990, p.813).

Considering path dependency, a model can be proposed which coordinates information and social distributions with policy change, as represented in figure 3. In this model, there is no direct influencing relationship between information and social distributions, which can lead to policy changes, though policy change does not necessarily change information and social distributions. Historical path dependence, thus accounts for the entrenched nature of information inequality, but still fails to account for concepts of power.

Figure 3. Hypothesized Relationship between Historical Path Dependence and Information Inequality



When comparing the models suggested by these frameworks with relation to social policy spheres and relevant literature on information inequalities, it appears that each model has its own advantages, which is significant in asking and answering other related questions. For the purposes of understanding political and policy aspects of information inequality, the Social Construction of Target Groups framework provides a reasonably sound conceptualization with

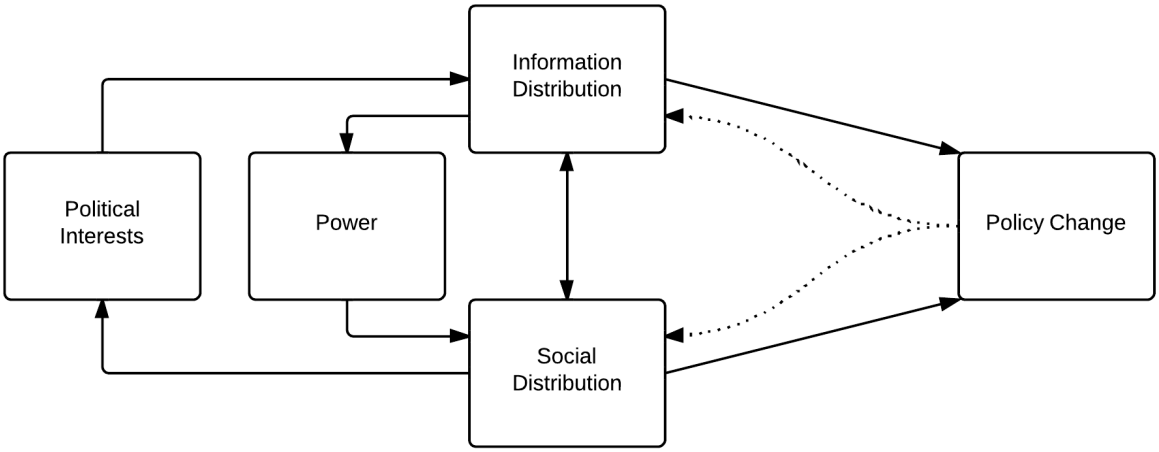
respect to both primary political aspects of information inequality and is therefore best suited to exploring the relationship between policy and social and informational inequalities. Punctuated equilibrium, on the other hand, provides a more explicitly detailed and accurate model for the impact of information inequality, and distributions generally, on the policy process, and would provide better insight when narrowing the focus to that specific question. Historical path dependence provides the best explanation of social and informational inequalities as distinct variables, or rather constants, in a policy environment, yet it is limited in conceptualizing variable interactions. In order to explore the more fundamental relationship between policy, information inequality, and social inequality, a combination of approaches would best reflect the complex tensions between historically entrenched inequalities.

This comparative analysis presents suggestions for both future scholarship and a hypothetical model that may better capture the complexity of reality. First, short term and long term research agendas can be proposed. In asking how the policy literature conceptualizes the impact of information inequality on policy and the impact of policy on information inequality, with consideration of social aspects, the Social Construction of Target Groups best encompasses both parts of the inquiry, which ought not to be severed in empirical assessment seeking to understand information inequality, rather than policy alone. The model presented in figure 1 should be applied and tested.

In exploring the more fundamental relationship between inequalities and policy, the combinatorial approach, illustrated in figure 4, provides a higher-level view of the environment in which all of these variables, along with various mediating variables, interact. In the long term, research should both aggregate and synthesize the various micro-level studies within this system and conduct long term data collection regarding both perceived and experienced inequalities, so

as to examine interactions over time. This is significant both theoretically to improve our understanding of inequalities and practically to inform policy makers that are in the unique position to introduce the changes necessary to begin to equilibrate historical inequalities.

Figure 4. Political and Policy Aspects of Information Distributions



The second major implication of this analysis is an integrated model, depicted in figure 4, which both points to the complexity of these relationships and illustrates possible pathways to flexibly explain a variety of cases in which social and informational inequalities interact with respect to policy. This provides a more complete representation to account for scenarios in which socially unequal groups with different information available to them manipulate their social status and power based on the information they possess and thereby reinforce or adjust their social positions. It is important to note that social distributions mediate the relationship between power and political interests within the suggested model because groups with relatively similar levels of power may be constructed as either deserving or undeserving, which will yield different interests. As a result, those who are socially advantaged have particular political interests that lead them to impact the information available to policy makers, thereby constructing both the facts and the social distributions in such a way as to lead to advantageous policies, which may or

may not be effective. While complicated, this describes policy changes that are intended in impact inequalities, such as welfare reform (Soss & Schram, 2007). This is important because lack of access to government by those who are disadvantaged seemingly reinforces their position (Soss & Jacobs, 2009), just as does lack of access to public services like education and professional training (Stanton-Salazar & Dornbusch, 1995).

2.1.2.3 Technological Aspects

Technology controls access to information in a variety of ways, through (1) innate features of ICTs, (2) implicit embedded values within information technologies, or (3) explicit decisions to employ ICT to meet particular goals of control. All three mechanisms for technological barriers to access will be discussed.

First, ICTs innately increase "information networking, sharing, and access, which require increased precision in carefully defining information parameters and management" (Sanfilippo, 2014, p.). Technology decreases the costs of information sharing by replicating and connecting people to information, yet access to information technology, which is unequal, limits social benefits without intentional intervention in technology development, implementation, and control (Navas-Sabater, Dymond, & Juntunen, 2002).

Second, ICTs are created with specific values in mind, leading to technologies that reflect social norms with implications for access (Fichman & Sanfilippo, 2013). Through the identification and analysis of social expectations, ICTs are designed to suit specific contexts and sometimes reflect majority or dominant cultural values over inclusivity, whether that is intentional or not (Bird & Osland, 2005/2006). ICTs are cultural products. When different value

sets come into contact, technologies with specific sets of embedded values can either exacerbate or mitigate social conflict and differentiation (Fleischmann, 2007; 2014). Specifically, ICTs that are products of particular cultures may enhance the position of that culture within multicultural interactions at the expense of their collaborators, while ICTs that represent multicultural values are more likely to reduce conflict.

Third, policy and ICT interact to affect access to information. As discussed in Sanfilippo (2014, p.46-47):

> Policy has driven some of the largest technological innovations, for example ARPANET as the Internet's precursor, and technology has driven significant policy changes. Bidirectional interactions between these spheres and constructs are of extensive scholarly and public debate. The consideration of legal policy implications is critical to the design of compliant and usable information technologies, particularly in support of information access. Privacy, security, intellectual property, and federal standards must be balanced with technical possibilities and financial constraints for accuracy and accessibility. Policy constraints on technology have an impact on government information because detailed, and sometimes conflicting, policies from multiple levels of authority govern information management. Furthermore, technology increases information networking, sharing, and access, which require increased precision in carefully defining information parameters and management. The dynamics of the policy and technological context of government information have been evaluated to identify a variety of interactions…

Specifically, policies stipulate how technological infrastructure for information resources should be structured, with the impact of defining who can access what resources and the specific ways

that access is possible (Doty & Bishop, 1994; Gostojić, Sladić, Milosavljević, and Konjović, 2012).

In this sense, whether information is encrypted, password protected, or restricted in more complex ways makes a difference with respect to access. Certainly choices are made about ICT, but the technology itself is an important factor. ICTs that require specific skills to use or at least knowledge of the structural context of information, such as in organization in databases, can impede access, making education one of the important factors in increasing access.

Furthermore, access is sometimes broken down into issues of mental, material, skills, and usage access (Chadwick, 2006), as was discussed in the introduction to section 2.1.2, technological aspects of access have implications for all of these issues. Emotional and cognitive perceptions of technology, cost and availability of technology, requisite skills to use technology, and actual use of technology all limit the extent to which ICTs provide access to information. Technological aspects of access significantly impact information inequalities, particularly as information is increasingly preserved, shared, and made available through ICTs; findings related to technological shaping of information inequality will be explored in much greater detail in section 2.2.2.

2.2 Findings

A review of the literature on information inequalities spans information behavior and policy research, as policies create limitations and barriers to access, which inhibit information seeking and cause unequal social distributions (Adair, 2010). The sample reviewed, as described in the introduction, includes key scholars and notable papers from relevant journals. Scholarship

incorporates a variety of theories and concepts, many of which characterize information inequality as an issue of a complex, sociotechnical nature.

Previous research has produced a variety of significant insights associated with understanding information inequalities and access issues in information seeking and use. Major findings are summarized in table 3.

Table 3. Current Understanding of Information Inequality

References	Findings
Adair, 2010	Information control: political, social, cultural, legal, economic Information inequality increases social inequality
Barzilai-Nahon, 2009	Gatekeeping rationale: access, editorial, protection, cultural preservation, change agent
Bozeman & Cole, 1982	Integrated information supports gatekeeping dissemination and sharing
Fedorowicz, Gogan, & Culnan, 2010	Transparency/fairness/equal treatment reduces costs/barriers
James, 2011	Attention is given to privileged interests in technological diffusion and development
Jimenez-Martinez, 2006	Iteration increases probability of sharing Information sharing is a collective action problem
Juergensmeyer & Bishop, 1985	Minimum right to access: published information access for everyone at public library
Kumpulainen & Järvelin, 2012	Intervening variables and mediating technologies as bridges to information, barriers to access Increased complexity increases barriers
Kvasny, 2006	ICTs unintentionally retrench inequality Non-class based attributes contribute to inequality as significantly as demographics
Lievrouw, 2000	Empirical evaluation of information environment by influences and interactions Availability is not equivalent to access

Lievrouw & Farb, 2003	Elements of information inequality Informal, interpersonal information sharing increases dissemination
Lu, 2007	Interpersonal networks satisfy information needs Gatekeepers are nominated, socially positioned strategic proximity and centrality, culturally certified
Martinez, 1994	Knowledge was lowest among those without access Relationship between social inequality and technical access inequality
Robertson & Vatrapu, 2010	Accessibility challenges e-government Power distributions and inequalities conserved when technologically mediated
Soroka, 2012	Quantified gatekeeping (probability distributions) and bias
Stanton-Salazar & Dornbusch, 1995	Mobility, attainment need institutional support, suppression of social barriers Equates social networks with informational networks
Świgoń, 2011	Access is affected by limits with social consequences
Urquhart, 2011	Power perspective on information behavior, seeking is contextual, political, social
Walby & Larsen, 2012	Collective action problems in research

Information inequality results from distinct constraints on access (Adair, 2010). The concept of information access, as one conceptualization employed to study information inequality (Hudson, 2012; Yu, 2006; 2011), can be further subdivided into dimensions of availability (Blakemore & Craglia, 2007; Dervin, 1994; Fisher & Julien, 2009; Juergensmeyer & Bishop, 1985; Soroka, 2012; Świgoń, 2011), awareness (Britz, 2004; Haider & Bawden, 2007), and ability to use information (Epstein, Nisbet, & Gillespie, 2011; James, 2011; Kvasny, 2006; Lantz, 1984). Each dimension has social (Sonnenwald, 2006), institutional (Jaeger, 2007), and

technical (Orlikowski & Robey, 1991) facets. Specifically, information availability refers to channels of access, including the medium (Fisher & Julien, 2009), policies and rules that constrain access (Blakemore & Craglia, 2007; Dervin, 1994), and social norms that differentiate among groups deserving of access (Falkheimer & Heide, 2009). Information awareness can be decomposed into social recognition of availability, understanding of channels, and understanding of rules governing use (Britz, 2004; Haider & Bawden, 2007). Ability to use information is a skills-based dimension of access (Hudson, 2012), which includes ability to use channels, ability to process information, both as technical skills (Gebremichael & Jackson, 2006; Hudson, 2012), and ability to interact within the social and institutional context (Gebremichael & Jackson, 2006; Kvasny, 2006; Sonnenwald, 2006).

Adair (2010) has established that each of these dimensions of information access is shaped by a variety of dynamic variables, including political, social, cultural, legal, and economic distributions. These distributions constrain information access in a variety of intentional (e.g. Braman, 2009) and unintentional ways (e.g. Kvasny, 2006). Gatekeepers actively employ policies to limit access, differentiating between information types as well as between individuals in determining who can access what (Barzilai-Nahon, 2009; Bozeman & Cole, 1982; Lu, 2007; Soroka, 2012). On the other hand, information differences sometimes result from unintentional boundaries between individuals, thereby limiting availability and awareness as those who are less advantaged occupy different social networks (Stanton-Salazar & Dornbusch, 1995). Ability to use information is rarely intentionally leveraged as a means to exclude or differentiate and is generally acknowledged as a critical skill to be universally developed through education (Webber & Johnston, 2000).

Intentional efforts to control information access in a vertical way are often designed to favor those who are advantaged or privileged, rather than to reduce inequality. In encouraging development and technological diffusion, the interests of the privileged are often prioritized, leading efforts that could introduce equitable change to simply perpetuate difference or actually exacerbate it (James, 2011). Information behaviors, shaped by individuals' social, cultural, and political dimensions (Urquhart, 2011), lead those who occupy positions of power to make decisions that favor the status quo (Braman, 2009; Robertson & Vatrapu, 2010). When information policies are made to increase access, they are often only superficial efforts to increase availability, but which does nothing to guarantee use; information availability does not constitute access on its own (Lievrouw, 2000). This will be emphasized in greater detail in section 2.2.3.

Differences in information availability, information awareness, and ability to use information, jointly as differences in access, yield differences among individuals with serious social implications (Świgoń, 2011). For example, those with reduced access have less knowledge about potential social and economic opportunities (Martinez, 1994). The relationship between information inequality and socioeconomic levels is strong (Martinez, 1994), as is that between information inequality and demographic groups (Kvasny, 2006). Information access is complexly intertwined with other inequalities (Lievrouw & Farb, 2003) and these relationships are often exacerbated because ICTS are so often employed to provide access (Kumpulainen & Järvelin, 2012), yet it is expensive and requires knowledge and experience to use (Joseph, 2012).

The nuances of information inequality and information access are complex and have been explored in a variety of scholarly domains. Furthermore, adjacent areas of literature, such as information behavior and social informatics literature illustrate findings with important

implications for information access and inequality, which importantly provides insights that allow for the development of expectations where there are gaps in the literature. The remainder of this section is organized as follows: section 2.2.1 discusses what the literature published up to this point reveals about the relationships between information inequalities and other inequalities; section 2.2.2 presents social informatics findings related to information inequality, as well as illustrates how issues of information inequality fit into the larger social informatics domain; and section 2.2.3, which summarizes research findings on efforts to increase information access, so as to identify key points for successful efforts and gaps in the literature.

2.2.1 Interacting Inequalities

There is specific evidence that information inequality is impacted by, and impacts, social, political, and economic inequalities. Mutual shaping, or feedback loops, thus exists between various forms of inequality. As with the digital divide (van Dijk, 2005), disparities in wealth and education, political clout and community development contribute to differences in access and awareness, and are later exacerbated by differences in participation in the information society (Yu, 2006; 2011). In this section, findings on the interrelationships between economic, social, and political inequalities with information inequalities will be discussed in detail, though relationships between other forms of inequality will only be mentioned as is relevant to information inequality.

2.2.1.1 Economic Inequality and Development Issues

Economic differences are often identified as the root causes of information inequality (Yu, 2011). It is hypothesized that differences in incomes and financial circumstances between countries lead to differences in access to ICTs and different infrastructural support for information and information technology resources (Kvasny, 2006). Furthermore, there is expectation that increases in access to and infrastructure for information and ICTs will have positive economic results (Epstein, Nisbet, & Gillespie, 2011; Jensen, Danziger, & Venkatesh, 2007).

James (2011) has examined these hypotheses on a global scale to illustrate with strong empirical support that there is a definite pattern by which digital convergence and high access are associated with high incomes, as well as high incomes with a decrease in the divide. What is also evident is that the stagnation of the digital divide, and in some areas regression as the divide widens, are associated with economic strife; in this sense, inequalities reinforce one another (James, 2011). Stanton-Salazar and Dornbusch (1995) examined these hypotheses at the level of individual students, finding that parental socioeconomic status determined students' awareness and uses of information resources regarding post-secondary education and employment, which shaped their perceived opportunities and reproduced socioeconomic gaps among peers. In this sense, information and economic inequality reinforce one another.

Conceptually, the problem is more complex than that, however, as information has an economic impact that is more diverse. To understand the nature of these interrelationships more fully, it is important to understand economic inequality in greater conceptual detail. As a concept, economic inequality includes: wage inequality, inequality of wealth, and inequality of opportunity (Neckerman & Torche, 2007). Among other hypothesized implications, these inequalities have been empirically demonstrated to yield consequences in: health, education,

crime and incarceration, social relations, and politics (Neckerman & Torche, 2007). Causes identified for economic inequality include: policies, institutions, markets, and other structural inequalities (Neckerman & Torche, 2007), as well as the historical distributions of these factors (van Leeuwen & Maas, 2010).

If economic inequality is accepted to be something broader than differences in per capita GDP or the net worth of individual, the relationship between information and the economy expands to have implications for development. The knowledge economy and the improved decision-making afforded by increased access to information create opportunities for development. Evidence points to the fact that information drives the contemporary economy, with respect to the intellectual goods produced and information shaping globalization and international exchange and cooperation, as ICTs have changed interactions based on human values (Castells, 2010; 2011).

There is empirical evidence illustrating that: unequal literacy levels lead to unequal income levels (Acemoglu, 2008; Bhargava, 2010), distributions of technology impact productivity levels (Acemoglu, 2008; James, 2011), and intellectual property inequalities yield unequal growth rates (Acemoglu & Akcigit 2012; Chu, Leung, & Tang, 2012). Development initiatives often fail to account for the differences in starting points, leading to differences in development outcomes. Inequalities are important to development outcomes (Acemoglu, 2008), yet these relationships have been understudied with respect to direct variable treatment.

Economic development is sometimes dysfunctional or even conflictual as a result of ICT-supported multicultural interactions because exclusion occurs (Kaye & Little, 2000; Leidner & Kayworth, 2006). Patterns of dysfunction and economic inequality are both often outcomes of social or cultural inequalities, discussed in section 2.2.1.2, and of the relationship between

culture and ICTs; there are winners and losers during technological change and these changes often benefit the status quo.

Economic factors also have been identified as mediating the interaction between culture and technology (Zheng & Walsham, 2008). In developing multicultural societies, such as South Africa, economic boundaries often separate cultures, which leads to unequal access to ICTs (Gebremichael & Jackson, 2006). Economic factors mediate intercultural interactions through ICTs at the global level, with the global North and South experiencing and favoring different technologies and their relative economies leading to technologies that favor the preferences of high-wage countries, which exacerbates difference and conflict (Kaye & Little, 2000). Additional mediating variables in the multicultural digital divide include: digital literacy, or the knowledge and skills necessary to use ICTs, information access between and across social boundaries, and telecommunications infrastructure that supports the use of ICTs, and differs where different cultures live (Gebremichael & Jackson, 2006). Culture and technology are two macro-level concepts. At the micro-level, variables, such as self-constructs and individual values, mediate the interaction of culture and ICTs in the lives of individuals (Gudykunst, Matsumoto, Ting-Toomey, Nishida, Kim, & Heyman, 1996).

As information is so intrinsically linked to economic outcomes, information and economic inequalities impact each other in ways that reinforce one another. It is important to continue to study these factors, particularly from an interdisciplinary perspective, because much current research comes from scholars more interested in one side of that equation, which thus treats the other variable as one-dimensional and simpler than it really is. Ekbia (Under Revision) provides a notable example of an attempt to being to integrate these approaches, in the forthcoming article on exploitation of labor in social information production.

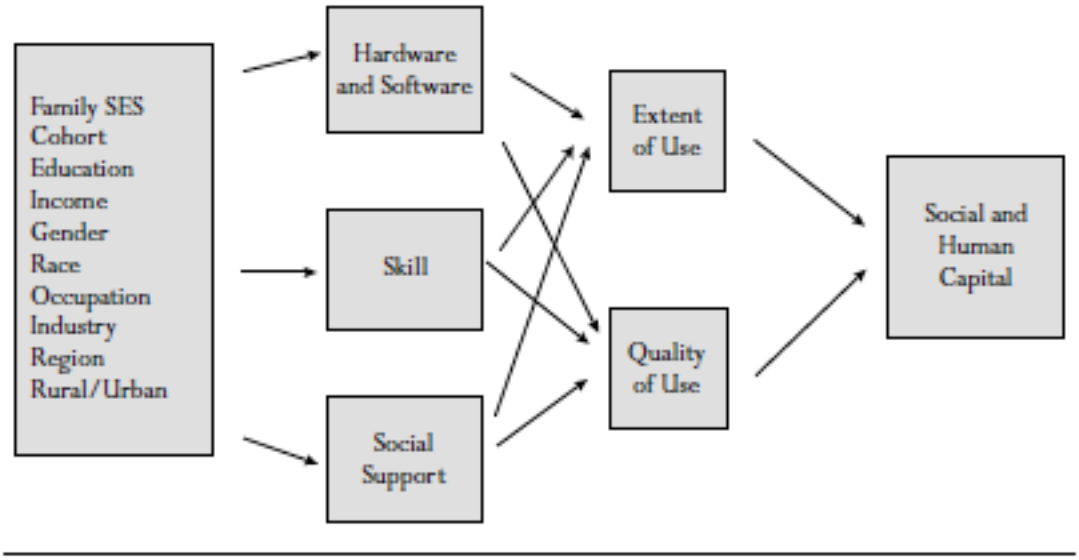
2.2.1.2 Sociocultural Inequality

There is also evidence that social and cultural inequalities contribute to information inequalities, in some cases in concert with economic or political variables. For example, in the study by Stanton-Salazar and Dornbusch (1995), mentioned in section 2.2.1.2, lower socio-economic status was associated with fewer and more disjointed social connections, leading to lower information flow. Sociocultural inequalities are importantly both the vertical distinctions described by Lievrouw and Farb (2003) as leading to information inequity, and consequences of information inequality, as social and cultural groups are afforded different opportunities based on their access to and use of information. In this sense, sociocultural inequality and information inequality are importantly related.

However, interactions between information and social inequality are complex. For example, Di Maggio, Hargittai, Celeste, and Shafer (2004) identify four socially unequal distributions that interact with inequality with respect to technology: "competence destruction increases inequality" (p.357), "new technologies reduce inequality by generating demand for more skilled workers" (p.358), "new technology influence inequality indirectly by altering the structure of political interests and the capacity of groups to mobilize" (p.358), and "new technologies enhance social equality by democratizing consumption" (p.358). Competence destruction, as a concept, is particularly interesting as it refers to the extent that new technologies depart from previous patterns of use and skills to use; as new technologies require more learning, previous competencies are rendered useless. In other words, as learning requirements increase to use technology, inequality is increased. The authors extend their work by developing a model of

the relationship between the digital divide and social outcomes, entitled: The Impact of Internet Access on Life Chances.

Figure 5. The Impact of Internet Access on Life Chances (Di Maggio, Hargittai, Celeste, & Shafer, 2004)



This model provides one example of how social and demographic characteristics impact distinct aspects of information behavior, with subsequent impacts on later social outcomes. If the constructs in the first and last boxes in this sequence are taken as representing dimensions of demographic inequality, and the variables mediating the process of change or reinforcement are taken as representing inequality in information access and use, the becomes one illustrating the mediating impact of information inequality on socioeconomic inequality, as reinforcing inequality, temporally. In this sense, social inequalities interact with information inequalities in a feedback loop over time, much as economic variables interacted reciprocally with information inequality.

Social inequality incorporates differences and inequities based on a number of differentiating factors, including education, gender, race, ethnicity, culture, occupation, and

location among them (Di Maggio, Hargittai, Celeste, & Shafer, 2004). An understanding of the ways in which demographic concepts interact can facilitate sound decision-making and better planning for the future (Cozzens, 2012). Scholars have sought to understand both how culture impacts ICT and how ICT impacts culture based not only on the reasonable presumption that there is a relationship between these variables (Boast, Bravo, & Srinivasan, 2007; Fichman & Sanfilippo, 2013; Gibson & Gibbs, 2006), but also on the observation that cultural, social, and technological inequalities overlap in populations over which they are distributed (Sassi, 2005).

Culture and ICT interact bi-directionally[*], with ICTs facilitating globalization and multicultural interactions, while cultural diversity affects ICT development, implementation, and applications (Barrett, Jarvenpaa, Silva, & Walsham, 2003). These strong ties begin to explain why social inequalities overlap with cultural boundaries and different levels of ICT access (Sassi, 2005). Power inequalities map onto cultural interaction with ICT (e.g. Cozzens, 2012; Srinivasan, 2013), implying that inequalities cannot be resolved through purely social or purely technological solutions, but rather require a sociotechnical approach.

The interplay between culture and ICT also has serious implications for global society with respect to cultural conflicts, terrorism, and violence, because these problems have origins in both culture and technology (Hamada, 2004). Analysis of interactions between the Western world and Islamic cultures, for example, illustrates the complex iterative causation between cultural diversity, cultural openness, and ICTs (Hamada, 2004). This interaction is dynamic and is a subset of a complex system in which culture, politics, interests, distance, organizations, individuals, technologies, and information all interact (e.g. Dawes, Gharawi, & Burke, 2012; Lievrouw, 1998; Nurmi, Bosch-Sijtsema, Sivunen, & Fruchter, 2009). Such complexity is evident, as sociodemographic attributes predict different ICT, media use, and configurations.

[*] This section includes revised excerpts from Fichman and Sanfilippo, 2013.

These configurations and uses predict social membership and achievement; thus, these sociodemographic attributes and ICT use become inseparable and non-linear as each feeds back into the other (d'Haenens, 2003). Similar to the bidirectional impacts of ICT and culture on global society, the reflexivity between culture, multiculturalism, and ICTs is notably evident at the group level, as both technological mediation shapes multicultural interaction and multicultural teams shape their products, embedding in ICT shared values and compromises (Easterby-Smith & Malina, 1999).

As researchers have sought to understand the interplay between culture and technology, the tendency to argue for unidirectional causation between culture and technology has failed to overcome socioeconomic problems by using too simplistic a predictive model; both technology and culture must be well understood to achieve change. On one hand, technological determinism has not provided a means to bridge the digital divide and provide economic salvation to the developing world, and on the other, cultural determinism has not been able to overcome social and economic boundaries (Gebremichael & Jackson, 2006) in ICT design, policy, implementation, and use.

In order to better understand and explain the complexity of issues involving multiculturalism and ICT, a variety of theoretical lenses have been employed for analytical structure: Giddens' social theory of structuration, power theory regarding class interactions and international relations, cultural theory regarding networks and institutions (Barrett, Jarvenpaa, Silva, & Walsham, 2003; Halford & Savage, 2010), as well as Sen's capability approach (Zheng & Walsham, 2008). This interaction between multiculturalism and ICT was also the driving force for the development of some other theoretical models (e.g., Gebremichael & Jackson, 2006; Kaye & Little, 2000; Shachaf & Hara, 2007). Leidner and Kayworth's (2006) theory of

conflict between information technology and culture is a significant example, which has been described as a tripartite model of interaction, and Gebremichael & Jackson's (2006) aforementioned theory of information poverty, conceptualizing socioeconomic inequality, is another example. These inequalities have also been conceptualized as social exclusion in the information society; this is significant because it explicitly addresses both social and technological roots of disparities (Zheng & Walsham, 2008). Another type of conceptual development was the result of overlaying cultural and communication theories onto ICTs to better understand multicultural interactions among individuals, in particular within heterogeneous groups (Gudykunst, Matsumoto, Ting-Toomey, Nishida, Kim, & Heyman, 1996; Kaye & Little, 2000; Massey, Hung, Montoya-Weiss, & Ramesh, 2001; Shachaf, 2005).

It is reasonable to move from evidence that ICT and culture impact each other in both directions to a model of feedback and mutual interaction (Diamant, Fussell, & Lo, 2009). Information systems and ICTs support and constrain local cultures and global cultural diversity, changing cultural identity when technologies rigidly impose outside cultural conventions and preserving identity when open-source conventions enable culturally sensitive structuration of ICT (Boast, Bravo, & Srinivasan, 2007).

Because ICTs serve as cultural bridges, in multicultural settings they are valued by many as mechanisms for engagement, identity preservation, and connection to other cultures with desirable resources or power in their societies (Falkheimer & Heide, 2009). For example, a study of cultural minorities in the Netherlands illustrated that children of immigrants in religious families were more likely to have access to information technology and that this access to ICT, whether or not the user was religious, led to greater cultural identification with their ancestral

culture, with teenagers consuming more media and communicating with more peers in their ancestral home country than in the minority community abroad (d'Haenens, 2003).

Another illustration of mutual shaping occurs as cultural values shape ICT infrastructure, impacting society in such a way as to reinforce distributions that favor cultural norms, rather than to reform or reassess them (Oyedemi, 2009). In this sense, cultural conflict is in part the result of technologies shaped by cultures in conflict (Kaye & Little, 2000). An example of cultural conflict in South Africa concerns access initiatives for the poor and rural minority groups. Failure of the South African project increased resentment among those who sought to benefit but did not, and increased distance between the affluent and middle classes because the access gap increased (Oyedemi, 2009). Furthermore, social inequality can result from leverage of ICTs through heterotopic communication and cultural values concerning power and control. Accordingly, ICTs can be used to gain socioeconomic advantage, stratify and separate society, perpetuate conflict, and manipulate competition, because they are embedded with social values from a cultural context in which they already occur (Lievrouw, 1998). ICT diffusion initiatives can mask underlying exclusion and deprivations in instances where information technology is available but not accessible due to knowledge, resources, or cultural constraints (Zheng & Walsham, 2008). Yet, social justice can be achieved through ICT diffusion (Papaioannou, 2011); for example, in Finland equal access to information, resources, and ICTs within its present economy results in relatively egalitarian socio-cultural structures (Sassi, 2005). Finland, while a small nation, manages to maintain low within country information inequality, incorporating migrant populations in a way that other Scandinavian countries do not match.

Cultural distance and technological distance have bidirectional impacts, as ICTs are cultural products for cultural endeavors and cultures are bounded, bridged, preserved, and

connected through ICTs and other technologies (Dawes, Gharawi, & Burke, 2012). Social differentiation is diminished or exacerbated as a result of the mutual interaction of cultural and technological distinctions and inequalities (Halford & Savage, 2010). In some cases social exclusion occurs under conditions of diminished agency or well-being because of differing levels of access to information channels and ICTs central to the economy, which results from the cultural differences between those in power and other segments of the population (Zheng & Walsham, 2008).

In contrast to cultural distance and differences, cultural openness shapes inclusive ICTs and ICT platforms by encouraging intercultural interactions and learning, leading to multicultural communities and intercultural understanding (Palaiologou, 2009). However, this openness allows for feedback that presents both negative and positive externalities: on one hand, ICTs enable coordination and transmission of cultural knowledge, which is important for garnering support for leaderless movements, as in the Arab Spring, yet ICTs also enable misrepresentation, which creates chaos and cultural misunderstandings (Srinivasan, 2013).

Culture and ICTs form a dynamic cycle in which forces wax and wane, thereby varying reciprocal impact over time and driving constant change and interaction (Dawes, Gharawi, & Burke, 2012). Global and local cultures take part in this cycle in which they each affect ICT and are impacted by it.

Further, there is evidence that cultural and technological cycles are primary factors in rising global inequality despite increasing integration and interdependence in global supply chains (Cozzens, 2012; Halford & Savage, 2010). As technologies enable globalization, the cultural and social elite favor technological innovation and policy which favors them, thereby exacerbating tensions, while global civil society and cultural forces of the masses better favor

cohesion and equitable access to ICTs and knowledge, which would diminish inequality at the expense of the powerful (Cozzens, 2012). In addition to the economic sphere, global society experiences inequality between cultural consumers, producers, and those excluded from the global ICT network as a result of social differentiation through and of information technology (Halford & Savage, 2010).

It is also important to consider that within these complex cycles, cultural changes can take various forms; multiculturalism, intercultural interaction, cultural convergence, and cultural divergence are all phenomenon associated with cultural diversity and ICTs (Hamada, 2004). For example within global society, ICT's networking of cultures is perceived, from an Islamic perspective, as strongly shaped by Western cultures that push for convergence, which, for them, is much less desirable than multiculturalism. In this sense there is a feedback loop between cultural hegemony, ICT configuration and potential, and cultural conflict, as cultures that disagree with the prevailing trends oppose potential ICT-driven changes (Hamada, 2004).

In another effort to show the cyclical interaction between ICT and culture, Papaioannou (2011) synthesized global justice theory and technological diffusion theory to illustrate a feedback loop in which ICTs diffuse further and have greater impact while social empowerment results from technological adoption, which results from empowered groups controlling ICT and incentivizing accessibility. In this sense, ICTs are viewed optimistically, but their cultural origins are recognized, as technology and culture feed into one another to achieve justice (Papaioannou, 2011). This argument is somewhat limited by its own optimism, which precludes acknowledgement of the abuse of technology for further social control.

Under a guise of openness, cultural bridging, and collaboration, cultural aspects of technological feedback can promote cultural inequality and conflict and the further control of

ICTs by the powerful in order to enable the self-perpetuation of their interests (Lievrouw, 1998). Yet, even in instances where choices are made in an attempt to bridge gaps and integrate marginalized populations, incomplete analysis and lack of understanding of all the variables involved can lead to exacerbation of problems (Oyedemi, 2009). For example, universal access legislation in South Africa failed, because the program design did not recognize that those most in need were in areas labeled "not economical", the program had an unrealistically small budget, and the cultural valuation of privatization decreased the oversight of funds, allowing their use to be even less efficient (Oyedemi, 2009).

Examination of interactions between information inequality and sociocultural inequality has primarily focused on issues of ICT with respect to social and cultural factors, rather than information generally. Yet there are many conclusions made with respect to ICTs that could be generalized as suggested hypotheses to be tested in future research, such as that information creates social conflict over issues of control and the values that are embedded in information production or information inequality impact social attainment and social integration.

2.2.1.3 Political Inequality

Political implications of information inequality are in some cases clear from the discussion of social inequalities, which logically integrate with political concepts of power, conflict, and control. Political inequality has largely been conceptualized in relationship to social and economic inequalities, in that "Dominant groups can use their social and economic power resources more or less directly in the political sphere" (Rueschemeyer, 2004, p.76). Yet information is also strongly tied to this form of inequality within the information society because

"Where material inequality massively differentiates people's access to goods and services, and those goods and services are themselves a necessary resource for citizenship, then political rights are the victim of the vicissitudes of the marketplace and its inegalitarian structure" (Murdock & Golding, 1989).

In this sense, information inequality creates unequal political opportunities by altering the political environment. This pattern was alluded to within section 2.1.2.2, when discussing implications of the Social Construction of Target Groups framework for information inequality. This section provides greater depth into issues of political inequality as they relate to information inequality, with key findings summarized in Table 4.

Table 4. Relationships between information and the political environment

References	Findings
Blakemore & Craglia, 2007	Tensions between rights and obligations Economic perspectives drive policy lifecycle
Dervin, 1994	Order/chaos tradeoffs best describe political treatment of information in democratic society
Epstein, Nisbet, & Gillespie, 2011	Information manipulation leads to informational inequalities Information non-objective
Jensen, Danziger, & Venkatesh, 2007	Political role of information and information technologies
Lievrouw, 1994	Access to involving information resources enable engaged discursive democracy
McClure & Jaeger, 2008	Information policy constrains information environment/society
Nilsen, 2010	Excludable information not economically efficient Market failures for public sector information justify government information redistribution
Wilson, 1999	Information representation is a function of individual, political interests
Zheng & Walsham, 2008	Freedom of agency and freedom of well-being effect social exclusion

	Socioeconomic inequality creates information exclusion

Power, as an intangible social force, interacts with culture in a relationship mediated by ICT (Cozzens, 2012; Lievrouw, 1998; Nurmi, Bosch-Sijtsema, Sivunen, & Fruchter, 2009; Srinivasan, 2013). Power depends on and is perpetuated by ICT, which marshals resources for the control of culture, society, and information. Yet ICTs can also empower (Cozzens, 2012). Political power specifically interacts with ICTs and culture to the extent that it is wielded to integrate, segregate, or stratify the public by ICT inclusiveness or boundary establishment (Falkheimer & Heide, 2009). Politicians also leverage their power to restrict ICT access, thereby limiting multicultural interaction as well as socioeconomic integration (Hamada, 2004). The mediating impact of power extends beyond human actors in the network, allowing ideas to gain power through mediation of this interaction (Srinivasan, 2013).

Speaking of the impacts of information, more broadly than ICTs, individuals protect information, avoiding disclosure, as well as misrepresent information to further their political and ideological interests (Wilson, 1999). This also happens with respect to the digital divide, as politicians and advocacy groups frame issues of information inequality in terms that best suit their needs and preferences (Epstein, Nisbet, & Gillespie, 2011). Political inequality shapes information inequality through direct and indirect political interventions, yet information and information technology also shape political inequality.

Di Maggio, Hargittai, Celeste, and Shafer (2004), for example, specifically posed the question “Does technology enhance political influence and community engagement?” (p.385). In their review of the literature, they found significant empirical evidence to support this claim and concluded that: “Internet use does not lead to passivity or privatism” (p.385), “Internet use does

not cause people to become socially or politically involved" but "makes it easier for people who are already engaged in community activities and political affairs to become even more so" (p.386), and "Internet use simultaneously increases local and long-distance communication, serving as a complementary channel to (rather than a substitute for) face-to-face interaction" (p.386). In this sense, there is evidence to support the expectation that information and ICTs shape political involvement, without creating it. In this sense information exacerbates inequality in political participation because those already involved become more so, increasing the divide between themselves and those who do not or cannot participate.

The concept of political participation, which is often unequally distributed across a population, is highly correlated with democracy, effective local governance, and community integration (McLeod, Scheufele, & Moy, 1999). Furthermore, research has considered the importance of interpersonal communication, as an everyday life information behavior (Fisher & Julien, 2009), to political participation and found that it is critical to two dimensions of political participation: institutional and public forum participation (McLeod, Scheufele, & Moy, 1999). Along with the dimensions of institutional and public forum participation, resource-based (Brady, Verba, & Schlozman, 1995) and consciousness (Miller, Gurin, Gurin, & Malanchuk, 1981) participations dimensions constitute political participation. Institutional participation includes electoral and non-electoral facets, such as voting, petitioning, contacting public officials, and volunteering for candidates (McLeod, Scheufele, & Moy, 1999). Public forum participation includes local committee service and speaking at public meetings (McLeod, Scheufele, & Moy, 1999). Resource based participation includes monetary donations to political campaigns and interest groups, as well as donations of time to political causes (Brady, Verba, & Schlozman, 1995). Consciousness, as a form of participation, includes the active consideration of

political issues and political candidates and the ideological alignment with particular positions (Miller, Gurin, Gurin, & Malanchuk, 1981).

Thus the relationship between information and political inequality, which has been recognized for upwards of 25 years (e.g. Murdock & Golding, 1989), represents a complex mutual shaping. While this relationship has been theoretically developed, there are still areas that require further attention. For example, it is still a relatively open question whether "Internet use exacerbates inequality in political engagement and social participation" (Di Maggio, Hargittai, Celeste, & Shafer, 2004, 386).

2.2.2 Socio-Technical Assessment of Information Inequality

Based on the evidence that there are mutually shaping interactions between various inequalities, political institutions, and ICTs within social contexts, a sociotechnical perspective provides the most holistic view of the variables in question, yet this approach to assessment has received somewhat scant attention. This section will thus be divided into two subsections: (1) a review of findings from the SI perspective on information inequality, and (2) a review of SI findings with implications for information inequality.

2.2.2.1 Social Informatics Findings on Information Inequality

From a social informatics perspective, as socio-cultural and organizational contexts are perceived to be fundamental forces that shape the design, implementation, and use of ICTs, the interaction between culture and ICTs is a logical progression from the general idea of interaction

between social and technological factors. To take Sub-Saharan Africa as an example, cultural differences between the creators of ICTs and users in separate places impact implementation and use because preferences and interpretations differ between the two (Mutula, 2005). Simultaneously, ICTs impact users in terms of their limited knowledge of technology and subsequent struggle to interpret intended use consistently with those from other cultures, which whom they may want to collaborate (Mutula, 2005). Concurrent impact of culture on ICT design, implementation, and use with the impact of ICT affordances, including usability and reliability, and mediums on multiculturalism feed into one another and are largely determined by context (Mutula, 2005).

ICTs provide particular affordances that make them better suited to bridging cultures, for example connecting immigrant populations to national cultures, than traditional broadcast or print media, because these migrant cultural minorities are more likely to have access to ICTs and social media to connect to their home countries. This is evident in research focusing on Sweden, and is particularly important for providing equal social services in times of crises (Falkheimer & Heide, 2009). Given ICTs important role in this regard, cultural, economic, and social inequality result from cultural competition and unequal access to ICTs (Halford & Savage, 2010; Mutula, 2005); globalization in this sense integrates unequal groups without providing social cohesion, because tensions are exacerbated by ICTs which favor particular cultures over others (Cozzens, 2012).

Furthermore, reconceptualization of the digital divide as digital social inequality allows for more holistic discussion of the shared impact of economics, culture, and ICT on social outcomes and distributions (Halford & Savage, 2010). Digital social inequality shifts focus from the disadvantages symptomatic of the digital divide to the change and stasis in social

arrangements that accompany differentiation, exclusion, and bridging of cultures through ICT (Halford & Savage, 2010). This revised theoretical construct modifies information poverty theory (Gebremichael & Jackson, 2006), which holds that lack of information or ability to use it is tied to lower economic development. This theory modification illustrates the negative social impact of: 1) significant cultural and educational barriers, 2) a lack of access to emerging technology and information infrastructure, and 3) a lack of skills to process or use the information (Halford & Savage, 2010). Specifically, Halford and Savage (2010) found that lack of access created by these barriers led to socioeconomic stagnation and isolation. These conclusions expanded information poverty theory by incorporating: 1) actor network theory, as barriers to information access are both created by and limit an agent's social network; 2) feminist theory, as information marginalization is coupled with social marginalization; and 3) Bourdieu's sociological field analysis.

This approach presents the most nuanced conceptualization of information inequality in relation to other dynamic trends and distributions, yet has not been well developed or widely applied. It is thus the purpose of the next section to contextualize this approach toward inequality within the larger set of findings supported by social informatics, so as to later develop a conceptual framework for these inquiries by integrating a detailed understanding of access to information with fundamental social informatics concepts, so as to produce a conceptual model of key points of contact between the domains of research, to be applied in future empirical works.

2.2.2.2 Social Informatics Findings with Implications for the Study of Inequality

Development of a social informatics approach applied to information inequality must first begin with a clear understanding as to "what is social informatics," a question most prominently asked and answered by Rob Kling (1999). Social informatics[†], as "the interdisciplinary study of the design, uses and consequences of information technology that takes into account their interaction with institutional and cultural contexts" (Kling, 1998), provides flexible mechanisms to explore complex and dynamic socio-technical interactions. As a domain of study related largely by common vocabulary, causes, and conclusions, rather than shared methods or theory, social informatics (SI) seeks to critically examine common conceptions of and expectations for ICT, by providing empirical evidence in particular contexts.

First, social informatics has importantly come to certain conclusions about unequal distributions of outcomes from, decision-making power about, and consequences of technological use and change within stratified societies. These findings provide the most support for adopting this perspective in addressing information inequality, given that all human interaction with information within society is governed by these trends and that human-information interaction is increasingly mediated by ICT. Among these highly relevant assertions are:

1. ICTs favor the status quo,
2. Outcome distributions are unequal,
3. Technology impacts identity,
4. Politics and strategic interests impact outcomes, and
5. ICTs have unintended consequences.

[†] Sections on social informatics are based on previously published analysis of the development of social informatics; portions have been published in Sanfilippo and Fichman, 2014, and Fichman, Sanfilippo, and Rosenbaum, forthcoming.

Each of these findings will be discussed in detail, and in relationship to one another.

The idea that ICTs favor the status quo is supported in various contexts. Not only does majoritarianism impact ICT design, that is ICTs are designed for the majority and for elites in control, but also impacts ICT use and implementation. This was clear from the earliest work within the US social informatics tradition. Case studies of information systems adoption revealed that key actors leveraged authority and influence to gain legitimacy and encourage computerization because it was in their own self-interest (Kling & Iacono, 1984b), thereby making changes in social structure and power unlikely. Furthermore, this finding is tightly coupled with the others within this list. Emphasis on social dynamics, including political interests and personal preferences (Davenport & Horton, 2006; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006; Shachaf & Hara, 2007), has importantly continued to describe unequal distributions of social change (Sawyer & Tapia, 2006; Sawyer & Tyworth, 2006; Tapia & Maitland, 2009) and to explain why in many instances ICTs benefit the status quo (Robbin, Lamb, King, & Berleur, 2006), as those in power advocate what will benefit them.

As a result of the complexity of interactions between people and ICTs in context, other findings recur, such as the paradoxical impacts of ICTs (e.g. Lamb & Sawyer, 2005; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000), unintended consequences to ICT use and change (e.g. Courtright, 2004; Davenport, 2005), and unequal distribution of changes (e.g. Kling, 2000a; 2000b; Lamb & Sawyer, 2005; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000). Agre, for example, found that business and political governance narratives painted idealized views of the positive impact of information technology on those spheres, yet analysis provided detailed evidence of countervailing factors,

consequences, and inequality, rather than standardization (2000b; 2002). Expectations founded in inaccurate assumptions lead to unexpected situations in which investments made exceed productivity gains or exacerbate and worsen inequalities (Kling & Hara, 2004; Meyer & Kling, 2002). Furthermore, there is evidence that when information professionals don't understand the complexity of their organization, information technologies are used in unplanned for ways (Kling, 2003; Kling & Hara, 2004).

The idea that technology impacts identity is significant to the study of inequality because it illustrates how ICTs impact both perceived self-worth and social perception of individuals, which has implications for allocation of access, from a policy perspective. This specific finding has primarily been explored with respect to professional identity. The interaction between the social and technological natures of ICTs affects professional identity of users in organizational contexts (Hara & Kling, 2002; Lamb & Davidson, 2005). Hara and Kling (2002), in studying professional communities of practice, found that less experienced attorneys relied more on information technologies because they were less integrated into the community which was bound in part by collective knowledge building and shared identity; the implication is thus that, in this context, information technology integration is negatively correlated with strong communities of practice (Hara & Kling, 2002). Their paper is further contextualized by the more expansive study of legal communities of practice, as presented in Hara's dissertation (2000). In contrast, Lamb and Davidson (2005) found that ICTs enhanced scientific identities by allowing scientists with specializations or expertise to have greater, more meaningful contributions. While the impacts differed by context, ICTs did alter existing identities within professional communities.

Strategic and political interests were evident as impactful on computing outcomes in an ongoing capacity from pre- to post-implementation (Kling & Iacono, 1984b; 1988; 1989).

Politics, preferences, and a permeable environment are important in influencing outcomes because ICT users are social actors who interact with other contexts and with each other (Davenport, 2001; Kling, 2000b; Kling, McKim, & King, 2003; Kling, Rosenbaum, & Sawyer, 2005; Lamb, King, & Kling, 2003; Lamb & Kling, 2003; Wood-Harper & Wood, 2005). ICTs are not value neutral, despite the fact that they are frequently conceptualized as sterile, standardized tools; values are embedded within ICTs, the use of ICTs by users and designers, and supportive infrastructure (Kling & Courtright, 2003; Kling, Rosenbaum, & Sawyer, 2005; Lamb & Sawyer, 2005; Meyer & Kling, 2002; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000). The recurring patterns within social informatics findings support a nuanced and sound perspective from which to challenge arguments based on non-empirical premises; continued empirical support for these findings strengthened social informatics.

It is important to recognize that unequal outcomes result in part from unequal social beginnings, with advantaged and disadvantaged actors, making the potential for social justice through technological change or innovation alone extremely unlikely (Kling & Star, 1997). Assumptions that advanced ICT will provide improvement fail to recognize the access issues and thus unintended outcomes and consequences are experienced because the situation was not as simple and equitable as asserted (Kling, 1998). Unintended consequences, negative externalities, and unsustainability lead to technological failure because socio-economic embeddedness limits the extent to which ICT and online environments can created their envisioned utopias (Kling & Lamb, 1996). Inequality and consequences of ICTs imply that there are winners and losers, making information technologies moral and ethical subjects (Kling, 1996).

Research has iterated particular findings, emphasizing specific aspects of the complex context that lead to surprising outcomes; planning often accounts for the technical requirements,

but too often ignores significant cultural or institutional aspects. There is strong evidence that politics and strategic interests impact outcomes (Agre, 2002; Allen, 2005; Ekbia & Kling, 2003; 2005; Kling & Callahan, 2003; Kling, McKim, & King, 2003; Kling, Rosenbaum, & Sawyer, 2005; Lamb, King, & Kling, 2003; Mansell, 2005; Wood-Harper & Wood, 2005), as well as that external factors affect interactions between users, ICTs, and context (Courtright, 2005; Ekbia & Kling, 2005; Kling, 2001; Kling & Courtright, 2003; Kling, McKim, & King, 2003; Lamb, King, & Kling, 2003).

Second, social informatics findings provide rich descriptions of the larger context of human-information interaction, which allows us to better situate inquiries of inequality and to anticipate how the context may lead to unanticipated consequences, as already discussed as a major claim of social informatics. However, it is often difficult to anticipate consequences or outcomes.

While there are sometimes predictable patterns about who will benefit from the adoption of new technologies, there are certainly paradoxical impacts of ICTs (Oltmann, Rosenbaum, & Hara, 2006; Sawyer & Tyworth, 2006), in part because: ICTs are not value neutral (Davenport & Horton, 2006; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006), there are moral and ethical aspects of ICTs (Davenport & Horton, 2006; Robbin, Lamb, King, & Berleur, 2006; Sawyer & Tyworth, 2006), contexts are complex (Contractor, Monge, & Leonardi, 2011; Davenport & Horton, 2006; 2007; Hara & Rosenbaum, 2008; Oltmann, Rosenbaum, & Hara, 2006; Robbin, Lamb, King, & Berleur, 2006; Rosenbaum & Shachaf, 2010; Sawyer & Tapia, 2006; Shachaf & Hara, 2007; Tapia & Maitland, 2009), and contexts impact implementation and use (Davenport & Horton, 2006; 2007; King, Iacono, & Grudin, 2007; Maldonado, Maitland, &

Tapia, 2010; Oltmann, Rosenbaum, & Hara, 2006; Robbin, Lamb, King, & Berleur, 2006; Sawyer & Tyworth, 2006).

Contexts are complex. The complexity of control in institutional computerized work contexts revealed that expectations of social change resultant from new technologies were unrealistic (Kling & Iacono, 1984a). These diverse factors, along with the particular histories of organizations and individuals, and the structures within which they operate create highly complex contexts (e.g. Kling, 2000b; Kling, Rosenbaum, & Sawyer, 2005; Lamb & Sawyer, 2005; Sawyer, 2005). Research continued to indicate that simplistic analysis in planning for technological change led to consequences and externalities because reality was more complex (Courtright, 2004), as well as that multiple incentives and practices compete and interact in context (Ekbia & Kling, 2005; Kling, McKim, & King, 2003; Lamb, King, & Kling, 2003). Findings also revealed that subtle differences in context impact outcomes in complex ways (Mansell, 2005), such as normative differences between and within scholarly domains (Kling, 2003; Kling & Callahan, 2003; Meyer & Kling, 2002). Wood-Harper and Wood presented an approach for information system planning as considering multiple perspectives, in order to better account for complexity in context (2005). Within these complex contexts, change is constant (Sawyer & Rosenbaum, 2000).

This social context and subsequent social shaping of ICT are important because the meaning and value of technologies are socially constructed by the groups and organizations who use them (Iacono, 1996); these groups have been shaped themselves by sociopolitical and historical factors, creating ideologies, and defining their habits and practices, which include ICT (Iacono, 1996). In this sense, all groups are not equal and social discrepancies and disparities greatly impact computerization and public access (Kling, 1998; 1999) This social embeddedness

of ICT determines outcomes, negative externalities, changes, and consequences (Kling &Star, 1997). Social factors are important because users of technologies are social actors who create social dynamics, institutions, norms, and practices (Iacono, 1996).

These findings indicate there are many more facets to socio-technical interactions than were previously evaluated, as well as the importance of beginning to explain more precisely and under different conditions what the role of information technologies is in social and organizational change. Later research further verified surrounding the social context, in that: there is social shaping and context of ICT (e.g. Kling, 2000a; 2000b; Kling, Rosenbaum, & Sawyer, 2005), context impacts implementation and use (e.g. Kling, 2001; 2003), and ICT use is situated and context dependent (e.g. Kling, McKim, & King, 2003; Kling, Rosenbaum, & Sawyer, 2005; Sawyer & Rosenbaum, 2000). These findings mutually reinforce social informatics principles and support conclusions about the significance of analyzing social and contextual variables as they situate and interact with ICTs.

Analysis of social aspects and social change associated with ICTs did continue to be a major focus. Data continued to indicate and further elucidate the socially shaped nature and context of ICT (King, Iacono, & Grudin, 2007; Maldonado, Maitland, & Tapia, 2010). King, Iacono, and Grudin (2007) specifically emphasize the limitations of rational, critical approaches in predicting social outcomes surrounding computing, particularly with respect to social computing in comparison to professional or scholarly computing, because social forces and viral trends can overwhelm critical perspectives. Furthermore, separation and barriers between users, as social context, are often conserved in technological collaboration allowing social factors to shape technological potential (Maldonado, Maitland, & Tapia, 2010).

While earlier research had emphasized that use of technology does not happen in a vacuum and the situated nature of ICTs is important, it had not explored how context specifically affected ICTs in implementation and use stages (Kling, 1996). Context was found to strongly impact implementation and use because the preferences of individuals in decision making positions (Kling & Lamb, 1999) and the practices and habits of users determine implementation and use in organizations, as social systems (Kling, 1996). This impact, as empirically assessed, better explained why outcomes varied by context because the complexity of work environments and processes is specific and does not fit perfectly into general systems and technologies (Kling, 1998). Contractor and Seibold (1993) identified the impact of user experience and communication between users in context as determinant of outcomes and Lamb (1996) further explored other social interactions and relationships as impacting outcomes. Social context (Contractor & Seibold, 1993; Lamb, 1996) and cultural models determine change, implementation and use of information technologies (Kling & Tilquist, 1998).

Evidence reveals that context impacts not only attitudes toward ICT, but also their implementation, adoption and use (Davenport, 2005; Kling, 2001; 2003; Kling & Hara, 2004). Kling and Hara explain how context shapes implementation of technology in education and how consequences arise from this context (2004). Davenport argues that this evidence provides a fundamental precept of social informatics (2005). When ICTs are implemented, their uses cannot be separated from their contexts (Kling & Iacono, 2001; Lamb & Davidson, 2005; Lamb, King, & Kling, 2003; Lamb & Kling, 2003; Lamb & Sawyer, 2005; Meyer & Kling, 2002; Sawyer, 2005). In order to understand changes resultant from and unanticipated results experienced through use, the situation, environment, and social aspects of users must be considered

(Davenport, 2005; Kling, 2003; Kling & McKim, 2000; Mansell, 2005; Sawyer & Eschenfelder, 2002; Wood-Harper & Wood, 2005).

Because use is situated and contexts vary, particular socio-technical interactions lead to different, and sometimes contradictory, impacts in context, such as simultaneous specialization and routinization in institutionalized settings with shared control and competing interests (Kling & Iacono, 1989). That the context of technology is social and that this context impacts technologies is evident in Agre's (2000a) analysis of higher education and challenge to arguments that technological infrastructure will fundamentally change universities as institutions. Empirical evidence simply does not support the claim that introducing new ICTs will force institutions to completely standardize and reform their practice (Agre, 2000a; Hara & Kling, 2002; Sawyer & Tapia, 2005), because the complexity of context matters (Courtright, 2004; Kling, 2001; Kling, Rosenbaum, & Sawyer, 2005). Kling and McKim (2000) explained how even the social norms and forces of different scholarly domains provided different stabilizing and destabilizing factors with respect to technological media.

The interests impacting positions in computerization movements are representative of values placed on the power of computing, social change, and idealism (Kling & Iacono, 1988); these values, which often lead to activism for computerization, are falsely grounded in the belief that people are the problem when computerization fails to meet expectations, rather than ICT not fitting context (Kling & Iacono, 1988). The reality is that ICTs are socio-technical and therefore must coordinate with social structure and meet technological needs of a group or organization (Kling & Iacono, 1988; 1989).

In addition to complex contexts, change is constant in reality. Kling discusses the dynamics of computerization in terms of human changes, control and privacy changes, risks of

accidents or failures, and constant evolution of questions through work that change the context of ICTs as time passes (1996). Change also results from other changes; when new technologies are introduced, they affect work and implicit processes are often challenged or overlooked in this process (Kling, 1999; Kling & Lamb, 1999).

When social, technical, and institutional complexities interact in context, these factors are mutually shaping (Davenport & Horton, 2006; Robbin, Lamb, King, & Berleur, 2006). Furthermore, while it may be tempting to analyze factors within a bounded context, the reality is that external factors affect interaction (Maldonado, Maitland, & Tapia, 2010).

Yet it is not only the unnoticed within organizations that affects outcomes, external factors play a role including interaction with regulatory agencies, clients' or partners' needs, and industry-wide changes Kling & Lamb, 1999). In adopting ICTs, organizations largely hope to increase productivity, but sometimes find that automation investments and actual gains are paradoxical (Kling & Star, 1997). Increases in productivity do not keep pace with the cost of technologies (Kling, 1998); therefore incentives really do matter in encouraging users to learn the technology to the optimal level (Kling & Lamb, 1999).

Repeated findings indicated that the mutually shaping relationships between ICTs and context result from iterated interactions (e.g. Kling, 2001; Kling, Rosenbaum, & Sawyer, 2005; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000). Agre (2000a, 2000b) and Hara and Kling (2002) explain how as social forces change the context, uses of ICTs change, and as new technologies are introduced, social shifts occur. Lamb and Sawyer (2005) present a version of the socio-technical perspective that considers interdependencies and networked links over time as shaping both the social and technical interactions. In this sense, ICTs are sociotechnical network systems (e.g. Kling, 2000a; 2000b; Kling & Iacono, 2001).

Scholarly communication forums and scholarly norms, for example, create a structure through and including technological mediation that serves as a professional network for discussion and collaboration (Kling, McKim, & King, 2003). Lamb and Kling (2003) conceptualize the social interactions between people and technologies as a network dependent on users as social actors with affiliations, environments, interactions, and identities.

It is thus possible to anticipate that a social informatics could address a number of questions about information inequality, as will be discussed in section 2.2.2.3. Table 5 provides a summary of key social informatics findings, including those discussed, as they appear in seminal social informatics works.

Table 5. Social informatics findings

Finding	First Published	References
Context is complex	1984	Courtright, 2004; Contractor, Monge, & Leonardi, 2011; Davenport & Horton, 2006; 2007; Hara & Rosenbaum, 2008; Kling, 1998; 2001; 2000b; 2003; Kling & Hara, 2004; Kling and Iacono, 1984a; Kling & Star 1997; Kling & Tilquist, 1998; Kling, Rosenbaum, & Sawyer, 2005; Lamb & Sawyer, 2005; Oltmann, Rosenbaum, & Hara, 2006; Robbin, Lamb, King, & Berleur, 2006; Rosenbaum & Shachaf, 2010; Sawyer, 2005; Sawyer & Tapia, 2006; Shachaf & Hara, 2007; Tapia & Maitland, 2009; Wood-Harper & Wood, 2005
ICTs favor the status quo	1984	Kling and Iacono, 1984a; 1984b; Contractor & Seibold, 1993; Kling, 1999; Kling & Tilquist, 1998; Agre, 2000a; Hara & Kling, 2002; Sawyer & Tapia, 2005; Agre, 2002; Davenport, 2000; Ekbia & Kling, 2003; Meyer & Kling, 2002; Sawyer & Rosenbaum, 2000; Robbin, Lamb,

		King, & Berleur, 2006
Politics and strategic interests impact outcomes	1984	Kling and Iacono, 1984b; 1988; 1989; Kling & Lamb, 1996; Agre, 2002; Allen, 2005; Ekbia & Kling, 2003; 2005; Kling & Callahan, 2003; Kling, McKim, & King, 2003; Kling, Rosenbaum, & Sawyer, 2005; Lamb, King, & Kling, 2003; Mansell, 2005; Wood-Harper & Wood, 2005; Davenport & Horton, 2006; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006; Shachaf & Hara, 2007
ICTs are not value neutral	1988	Kling and Iacono, 1988; Kling, 1996; Kling & Courtright, 2003; Kling, Rosenbaum, & Sawyer, 2005; Lamb & Sawyer, 2005; Meyer & Kling, 2002; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000; Davenport & Horton, 2006; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006
ICT use is situated and context dependent	1988	Kling and Iacono, 1988; 1989; Iacono, 1996; Kling, McKim, & King, 2003; Kling, Rosenbaum, & Sawyer, 2005; Sawyer & Rosenbaum, 2000; Davenport, 2005; Kling, 2001; 2003; Kling & Hara, 2004; Kling & Iacono, 2001; Lamb & Davidson, 2005; Lamb, King, & Kling, 2003; Lamb & Kling, 2003; Lamb & Sawyer, 2005; Meyer & Kling, 2002; Sawyer, 2005
ICTs have multiple and paradoxical impacts	1989	Kling and Iacono, 1989; Lamb & Sawyer, 2005; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000; Agre, 2000b; 2002; Oltmann, Rosenbaum, & Hara, 2006; Sawyer & Tyworth, 2006
Impact of context on implementation and use	1993	Contractor & Seibold, 1993; Kling, 1996; 1998; Kling & Lamb, 1999; Kling & Tilquist, 1998; Lamb, 1996; Kling, 2001; 2003; Davenport, 2005;

		Kling, 2001; 2003; Kling & Hara, 2004; Davenport & Horton, 2006; 2007; King, Iacono, & Grudin, 2007; Maldonado, Maitland, & Tapia, 2010; Oltmann, Rosenbaum, & Hara, 2006; Robbin, Lamb, King, & Berleur, 2006; Sawyer & Tyworth, 2006
Social shaping and context of technology	1996	Iacono, 1996; Kling, 1998; 1999; Kling & Star, 1997; Kling, 2000a; 2000b; Kling, Rosenbaum, & Sawyer, 2005; Agre, 2000a; King, Iacono, & Grudin, 2007; Maldonado, Maitland, & Tapia, 2010; Davenport & Horton, 2006; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006; Shachaf & Hara, 2007
ICT users are social actors	1996	Iacono, 1996; Davenport, 2001; Kling, 2000b; Kling, McKim, & King, 2003; Kling, Rosenbaum, & Sawyer, 2005; Lamb, King, & Kling, 2003; Lamb & Kling, 2003; Wood-Harper & Wood, 2005; Blincoe, Valetto, & Goggins, 2012; Contractor, 2009; Goggins, Laffey, & Gallagher, 2011; Rosenbaum & Shachaf, 2010; Shachaf & Hara, 2007
There are moral and ethical aspects of ICTs	1996	Kling, 1996; Davenport & Horton, 2006; Robbin, Lamb, King, & Berleur, 2006; Sawyer & Tyworth, 2006
Change is constant	1996	Kling, 1996; Sawyer & Rosenbaum, 2000
There are unintended consequences	1996	Kling & Lamb, 1996; Davenport, 2005; Kling, 2001; 2003; Kling & Hara, 2004; Davenport, 2005; Kling, 2003; Kling & McKim, 2000; Mansell, 2005; Sawyer & Eschenfelder, 2002; Wood-Harper & Wood, 2005; Courtright, 2004; Davenport, 2005; Kling & Hara, 2004; Meyer & Kling, 2002
External factors affect interaction	1996	Kling & Lamb, 1996; Kling &

		McKim, 2000; Davenport, 2005; Kling, 2003; Kling & McKim, 2000; Mansell, 2005; Sawyer & Eschenfelder, 2002; Wood-Harper & Wood, 2005; Courtright, 2005; Ekbia & Kling, 2005; Kling, 2001; Kling & Courtright, 2003; Kling, McKim, & King, 2003; Lamb, King, & Kling, 2003; Maldonado, Maitland, & Tapia, 2010
There is a productivity paradox	1997	Kling, 1998; Kling & Star 1997
Outcome distributions are unequal	1997	Kling, 1999; Kling & Star 1997; Mansell, 2005; Kling, 2003; Kling & Callahan, 2003; Meyer & Kling, 2002; Kling, 2000a; 2000b; Lamb & Sawyer, 2005; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000; Sawyer & Tapia, 2006; Sawyer & Tyworth, 2006; Tapia & Maitland, 2009
Articulation is important	1999	Kling, 1999; Kling & Lamb, 1999; Kling, 2003; Kling & Hara, 2004; Contractor, Monge, & Leonardi, 2011; Sawyer & Tapia, 2006
Incentives matter	1999	Kling & Lamb, 1999; Ekbia & Kling, 2005; Kling, McKim, & King, 2003; Lamb, King, & Kling, 2003
ICTs and their context are mutually shaping	2000	Agre, 2000a; 2000b; Hara & Kling, 2002; Kling, 2001; Kling, Rosenbaum, & Sawyer, 2005; Lamb & Sawyer, 2005; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Rosenbaum, 2000; Davenport & Horton, 2006; Robbin, Lamb, King, & Berleur, 2006
ICTs are sociotechnical network systems	2000	Kling, 2000a; 2000b; Kling & Iacono, 2001; Kling, McKim, & King, 2003; Lamb & Kling, 2003; Lamb & Sawyer, 2005; Blincoe, Valetto, & Goggins, 2012; Contractor, 2009; Contractor, Monge, & Leonardi, 2011; Goggins, Laffey, & Gallagher, 2011; Orlikowski & Iacono, 2008

Technology affects professional identity	2002	Hara & Kling, 2002; Lamb & Davidson, 2005
ICTs are configurable	2003	Kling, McKim, & King, 2003; Kling, Rosenbaum, & Sawyer, 2005; Robbin, Lamb, King, & Berleur, 2006
ICTs have social, technical, and institutional natures	2005	Kling, Rosenbaum, & Sawyer, 2005; Lamb & Sawyer, 2005; Sawyer, 2005; Sawyer & Tyworth, 2006
Five conceptualizations of information technology as a tool, ensemble, proxy, computational, and nominal	2008	Orlikowski & Iacono, 2008

2.2.3 Increasing Access

Despite all of the potential barriers to access, there are also ways to leverage factors that constrain in favor of increased access to information. Various intentional efforts have been made toward socially positive ends. These are clear technological and socio-cultural products, such as global public-private partnerships for global information justice (Papaioannou, 2011) in which valuation of equality and ICT innovation and diffusion yield social equality and the inclusion of marginalized populations in the global multicultural society (Papaioannou, 2011). To take an example from the education sector, collaboration throughout the European Union for open and distance learning has been enabled by cultural and technological factors, and has in turn impacted them (Siakas, 2008). Study of the attempt to integrate ICT-mediated classrooms highlights the ability to capitalize on Internet and multimedia potential for the sake of high-quality ICT education resources and the development of European intercultural awareness because they value cooperation and exchange (Siakas, 2008). In this sense, cultural openness and ICT attributes and communication modes can be leveraged for access.

Collaboration succeeds when ICT access can be matched and cultures seek to integrate to accomplish a particular end; collaboration is not viable in all situations, yet is critical to equitably integrating the global community and bridging gaps that leave certain cultures and developing nations to struggle with problems that are dealt with better in other places, such as collaboration for AIDS telemedicine (Gebremichael & Jackson, 2006).

Multicultural collaboration is important because it increases global tolerance through increasing awareness and allowing cultures to interact and coexist, thereby crossing boundaries, rather than converging on a global culture or diverging and becoming isolationist (Hamada, 2004). Furthermore, collaboration and inclusion within diverse countries leads to more equitable outcomes across cultures and through ICTs, yet instances of exclusion and marginalization relate to more fundamental causes in addition to culture and information technology (Sassi, 2005). Collaboration and intercultural discourse are complicated; culturally, interaction is believed to be socially positive, helping to diminish differences, yet competitive self-interests shape communication and interaction, as well as commodification of knowledge, which perpetuates social challenges (Lievrouw, 1998).

Furthermore, information diffusion can be enhanced for increased access by increasing awareness of resources, to lessen barriers based simply on unknowns. For example, Chatman (1986) explains the diffusion process "as consisting of four essential elements: (1) the innovation, (2) its communication from one individual to another, (3) in a social structure (defined here as social environment), and (4) over a period of time" (p.378). In this sense, social interaction increases information access in a low resistance, passive way.

Active strategies to improved access can also be taken. Dervin (2005) articulated 25 propositions, based on existing literature for how the information needs of underserved

communities can be better supported, within the context of health information. Yet these principles can be translated to a general context, as presented in table 6.

Table 6. Implications of Dervin's (2005) Propositions for Information Access

Dervin's Propositions	General Implications for Access
"Reaching target audiences or users with health information is tough; bridging the gap between information and behavior is even tougher." (Dervin, 2005, p.S75)	Increasing access will be difficult Increasing subsequent use will be difficult; resistance to change in information habits
"One-way information transmission works best with people who are similar to the information providers." (Dervin, 2005, p.S76)	People will be more receptive to information from peers than from individuals from different groups
"Too often, top-down information transmission rests on a host of faulty assumptions about target audiences." (Dervin, 2005, p.S76)	Authority figures seek to disseminate information without understanding target audience
"Too often, top-down information transmission has ignored the experiential realities of lay persons' lives; too often, it blames the victims and is received as irrelevant at best and as prejudicial and oppressive at worst." (Dervin, 2005, p.S76)	Access initiatives directed from positions of authority fail because they are shaped by the values and misunderstandings of those authorities
"The information environment is increasingly marked by decreasing trust in expert and institutional sources" (Dervin, 2005, p.S76)	Official access initiatives will be viewed skeptically
"Lay people are increasingly wise about how information is tied to vested interests" (Dervin, 2005, p.S76)	People understand what values have shaped information, biasing it based on interests
"The growing complexity of the information environment is making information dissemination more difficult" (Dervin, 2005, p.S76)	Complexity complicates access and dissemination
"The volatility of the information environment makes the professionals' jobs harder" (Dervin, 2005, p.S77)	Dynamic information environments make control of information and access provision more complicated
"When it comes to expertise, all nonexperts are vulnerable" (Dervin, 2005, p.S77)	Expert information is least accessible to individuals
"One-way information transmission can backfire" (Dervin, 2005, p.S77)	Access without feedback often does not improve information use or equity
"Information is rarely enough" (Dervin, 2005, p.S77)	Access is insufficient without skills to use information
"Information is not sufficient, but it is necessary" (Dervin, 2005, p.S77)	Access is highly necessary
"Tinkering with information presentation strategies can make a big difference, but there	Representation impacts accessibility

is a big caveat: the difference depends on where the recipient is coming from" (Dervin, 2005, p.S77)	
"The biggest increases in campaign effectiveness have come from conceptualizing campaign design away from information transmission to multistage communication intervention" (Dervin, 2005, p.S77)	Access is more effective than transmission in many circumstances
"Communication interventions must be communicative; it they revert to transmission they will fail" (Dervin, 2005, p.S77)	Access should be interactive
"Communication-based interventions necessarily involve community context; the most common route have been cultural, in the hope of addressing lived experiences and societal circumstances" (S78)	Access initiatives should be context specific
"The culture of community route to communicating is not a quick fix" (Dervin, 2005, p.S78)	Context specific access will not necessarily fix all associated inequities
"While target group memberships may define policy aims, they are not the best way of defining information dissemination purposes" (Dervin, 2005, p.S78)	Socially constructed contexts by group are not the most effective means of improving access because frames of groups may not coincide with those in need
"Recipient readiness is, in fact, the best predictor of information receptivity" (Dervin, 2005, p.S78)	Demand for access indicates where access will lead to improvements
"Recipient readiness is predicted best phenomenologically and situationally, not in terms of a priori-demographic or expert system categories" (Dervin, 2005, p.S78)	Demand for access is context specific
"Alternative research approaches have shown that what was formerly seen as chaotic behavior is in fact patterned information seeking and use" (Dervin, 2005, p.S78)	Information needs and uses follow complex patterns.
"Focusing on information seeking and use situationally and contextually decreases the variability that information disseminators must cope with" (Dervin, 2005, p.S79)	Context specific approaches to access will reduce unequal outcomes
"Focusing on the verbs of information seeking and use provides even greater capacity to predict and explain" (Dervin, 2005, p.S79)	Access that is tailored to users improves outcomes
"Treating people as human works best" (Dervin, 2005, p.S79)	Conceptualizing users as people, rather than target groups, is important
"Communication's most basic fundamental is the quid pro quo" (Dervin, 2005, p.S79)	Increased access can yield reciprocal exchange.

The implications of Dervin's (2005) work include suggestions as to why access initiatives often fail and insights that can produce successful access initiatives in the future. Context specific focus on users provides the best strategy to counteract the inequalities in information distributions produced by policies designed based on social constructions, as discussed in section 2.1.2.2. In this sense, questioning the assumptions made within the political shaping of information inequality is an important step in understanding how to improve information access. The context specific focus also may support some of the methodological decisions made within this literature, as will be discussed in section 2.4.

Many of Dervin's (2005) findings also tie into other findings within this literature sample. For example, the emphasis on values embedded in access initiatives coordinate with the values shaping information policies and embedded in ICTs. Users' skepticism in access initiatives (Dervin, 2005), is well founded given the historical behavioral patterns of decision makers in favoring the status quo and only superficially addressing access by increasing availability without acknowledging other dimensions of access (Braman, 2009; James, 2011; Lievrouw, 2000; Robertson & Vatrapu, 2010). Furthermore, the issue of complexity that permeates these propositions signifies that approaching the study of access initiatives from a social informatics perspective would be especially effective in future research.

Improving information access is one important strategy toward decreasing information inequality. Dervin (2005) importantly offers a set of propositions that draw on previous scholarship, yet there are existing gaps in understanding how access initiatives can succeed and the extent to which improving access in particular contexts actually impacts information inequality. It is important to further determine how success in one context can be generalizable to other contexts, as well as what aspects of initiatives actually make a difference in reducing

inequity. Understanding how contextual inequality relates to information inequality at large may help elucidate these mechanisms.

2.3 Theoretical Approaches

While the introduction to section 2.1 provided details on specific theories of information inequality, various other theories have been employed to understand information inequality issues in ways that are consistent with broader scholarly domains. Section 2.3 is thus divided into sections that detail notable theories applied in information inequality research (section 2.3.1) and social informatics research (2.3.2), as well as key variables considered within these theories (section 2.3.3).

2.3.1 Theories Applied

Research on information inequalities has employed theories from a variety of disciplines, as well as from interdisciplinary perspectives. Table 7 provides an overview of theories that have explained inequality in access and use; the remained of this section discussed these applications in detail.

Table 7. Theoretical constructs underlying information inequality insights

Theory	Major Constructs	References
Activity theory	Active, social determination of behavior	Urquhart, 2011
	Social information sharing and social barriers to information exchange	Wilson, 2013

	Sen's capability approach	Zheng & Walsham, 2008
Bourdieu's Theory on the Cultural Origins of Social Order	Assumptions and intentions shape outcomes	Kvasny, 2006
Critical Theory	Conflict, externalities, competition affect social distributions for information, economics, education, social capital	Adair, 2010
Democratic Theory	Participation depends on informed citizens; government responsibility to provide access Consequences of exclusion from public information Informed citizenry interacts in system to produce equitable outcomes	Jaeger, 2007 Jaeger & Thompson, 2005 Lievrouw, 1994; Martinez, 1994
Game Theory	Strategic Information Sharing Interim information sharing game	Bozeman & Cole, 1982 Jimenez-Martinez, 2006
Knowledge Gap Theory	Disparities are increased over time as positions of privilege facilitate early information adoption, creating a persistent gap	Di Maggio, Hargittai, Celeste, & Shafer, 2004 van Dijk, 2005
Myrdal's Theory of Cumulative Causation	Dynamic system: divergences, constant changes	James, 2011
Neoclassical Economic Theory	Inefficiency produces market failures (competition, externalities, imperfect information, public goods)	Nilsen, 2010
Network Gatekeeping Theory	Information control, gatekeepers and gated, interactions, dynamic status, position	Barzilai-Nahon, 2009
Social Reproduction Theory	Social distributions of possibilities	Stanton-Salazar & Dornbusch, 1995
Small Worlds Theory	Information poverty impacts social and informational environment horizons	Burnett, Besant, & Chatman, 2001 Chatman, 1991
Stakeholder Theory	Normative and instrumental roles of primary and	Fedorowicz, Gogan, & Culnan, 2010

	secondary stakeholders	

The knowledge gap hypothesis is one significant theory explaining the persistence and growth of information inequality; Di Maggio, Hargittai, Celeste, and Shafer (2004) succinctly summarize this tradition:

> Research on inequality in the use of earlier communication technologies establishes a precedent. According to the "knowledge gap" hypothesis (Tichenor, Donohue, and Olien 1970), people of high socioeconomic status are always advantaged in exploiting new sources of information. Because of their privileged social locations, they find out about them first, and because of their high incomes, they can afford to access them while they are new. Moreover, schooling provides an initial cognitive advantage that enables the well-educated to process new information more effectively, so that their returns to investments in knowledge are higher. As a consequence, not only do the socioeconomically advantaged learn more than others, but the gap is destined to grow ever larger owing to their advantage in access to new sources of information. (p.375-376)

In this sense, the knowledge gap describes the mechanism of path dependence in information attainment, as well as indicating how information gaps translate to social and economic consequences. Knowledge gaps have long been used to conceptualize ranges between information possessed and used by opposite ends of social distributions, in studying information inequality (van Dijk, 2005).

Theory regarding small worlds extends this apparent connection by incorporating constructs on normative behavior, with respect to information, that shape information environments of individuals. Specifically, Burnett, Besant, and Chatman (2001) outline how social norms, worldviews, social types, and information behavior shape the experiences and

decisions of individuals. They define the interactions and implications of these constructs as follows:

> (1) Social norms are standards to which members of a social world comply to exhibit desirable expressions of public behavior.
>
> (2) Members chose compliance because it allows for ways in which to affirm what is normative for a specific context at a specific time.
>
> (3) Worldview is shaped by the normative values that influence how members think about the ways of the world. It is a collective, taken-for-granted attitude that sensitizes members to be responsive to certain events and to ignore others.
>
> (4) Everyday reality contains a belief that members of a social world do retain attention or interest sufficient enough to influence behavior. The process of placing persons in ideal categories of lesser or greater quality can be thought of as social typification.
>
> (5) Information behavior is a construct through which to approach everyday reality and its effect on actions to gain or avoid the possession of information. The choice of an appropriate course of action is driven by members' beliefs concerning what is necessary to support a normative way of life. (p.538)

Individuals have long been limited by the information of which they are aware and capable of obtaining (Chatman, 1991), yielding social causes of and consequences to information access and use.

Myrdal's theory of cumulative causation, as has been applied by James (2011), explains why inequalities are not balanced over time. Divides grow further apart because social and economic systems move constantly so that those at the higher end of the distribution become more advantaged and those at the bottom more disadvantaged (Myrdal, 1968). As James

explained with respect to the digital divide, "Richer developing countries can afford the new technology, which causes a rise in productivity and income, whereas the less wealthy developing countries are essentially left out of the process and fall further behind" (2011, p.123). To extrapolate this beyond ICTs and the Internet, there is an information divide, which grows cumulatively over time; the divide is exacerbated through constant change and no equilibrium or stability is reached, though the divergence described by Myrdal can be mitigated through exogenous intervention, often in the form of policy. The information divide encompasses not only the availability and use of information technology, but also the ability to use the information available through ICT and other means.

The theory of networked gatekeeping, described by Barzilai-Nahon (2009) and mentioned within section 1, applies the network construct of gatekeeping, which is often associated with the work of Burt (Castells, 2011), to explain constraints on information flows. Specifically, individuals who are strategically located in social networks are able to control information to gated individuals, as gatekeepers can decide what to filter, in order to use information to establish themselves as more powerful within a context. In this sense, control of information creates dynamic status in absolute terms for any individual, but relatively divergent trends overall. Those with access to information, who can control who else obtains access, improve their positions and obtain more power and control, while those without are increasingly dependent on and increasingly further in terms of social distance from their gatekeepers.

Activity theory, which Wilson (2013) argues would better be called transformative action theory, has also been applied to examine information access and inequality issues. Activity theory specifically relates individuals to instruments and objects, subject to constraints in the form of institutions, community contexts, and divisions of labor. Individuals employ instruments

to transform objects, both physical and implicit. Wilson (2013) specifically operationalizes this to illustrate how motives determine goals, which are affected by conditions, to produce activities including various actions comprised of multiple operations. This model drives applications of activity theory for information behavior research. Specifically, it can explain how information use can help individuals.

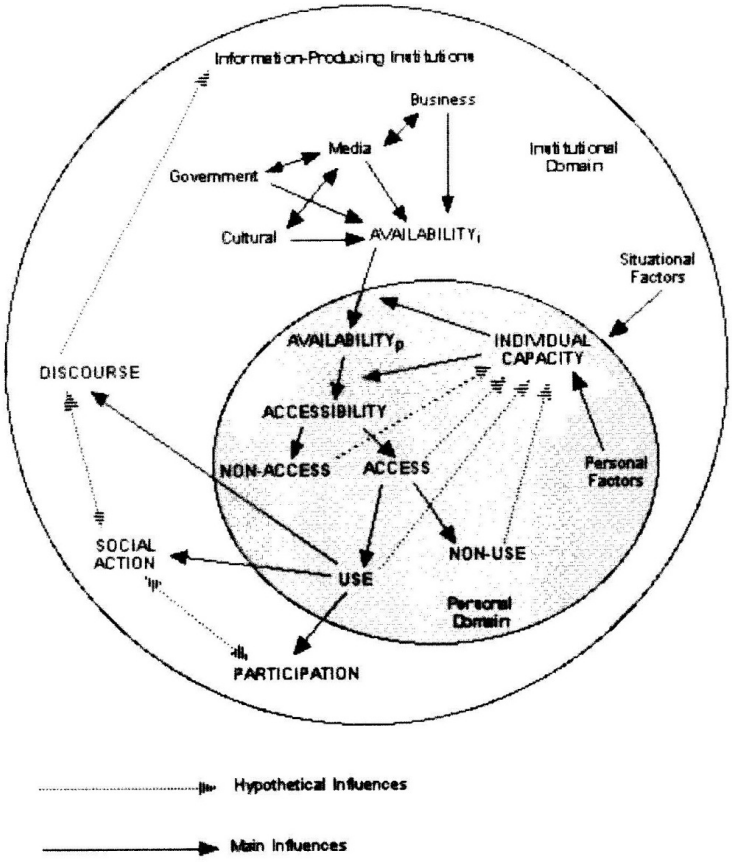
Urquhart (2011), in a review of information behavior research, identifies the use of activity theory in information behavior research through a participatory perspective. Through engagement with information, individuals can reduce their level of relative inequality. Sen's capability approach, which contends that individuals can attain what they want through transformative activity, has been employed by Zheng and Walsham (2008) to explain how exclusion from the means of participation in the information society amounts to capability deprivation. Within their work, the emphasis was on exclusion from ICT use and Internet access, yet the idea could easily be expanded to explore the deprivation experienced from other barriers to information access, such as insufficient information literacy training in public education or lack of transparency about social services.

There are also a number of theories that have guided conceptualization of access. Fisher and Julien (2009), for example, integrated network theory with theories of information environments (e.g. Lievrouw, 2000) and Wilson's (1999) theories of information behavior within their review of information seeking and use research. This has been widely cited and has guided research that examined access in various case studies.

Lievrouw's (1994; 2000) work on information environments has been particularly influential. Not only has Lievrouw teased out democratic expectations surrounding the environment, with respect to accountability, dialogue regarding governance, and the impact of

political interests at the expense of some democratic participants (1994), but has employed meta-analysis to develop a representation of influence within the information environment, as relations to access and social consequences of information (2000). This representation is depicted in figure 6. It is important to note, from this perspective, how individuals are situated in and impacted by an institutional context.

Figure 6. Lievrouw's (2000) Information Environment



Wilson's models of information behavior, which are most often associated with the information seeking and use domain of research, are also very relevant to the study of information inequality. Specifically, Wilson (1999) details how barriers at the individual, social, and environmental levels impact the behavior of individuals. This is depicted in Figure 7. This theory unifies many of the shaping aspects of access generally in the environment with local

impacts; not only are the cognitive and skills based gaps possessed by an individual important to their ability to access and subsequently use information, but so too are the social constructions into which they fit and the environment.

Figure 7. Wilson's (1999) model of information-seeking behavior

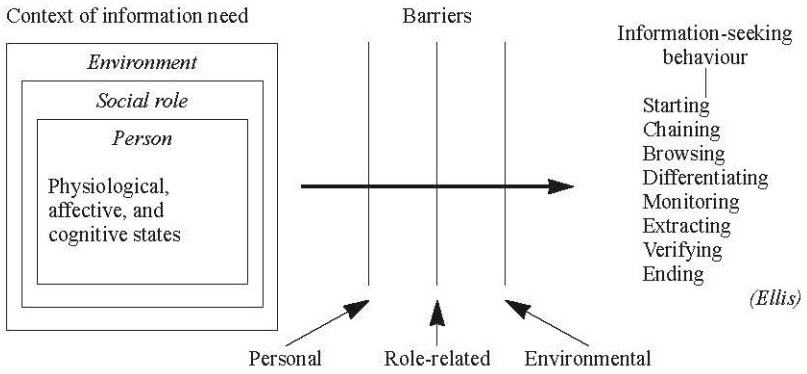


Figure 2. *Wilson's model of information-seeking behaviour*

These theories not only support inquiry on information inequality, but also provide points of connection to interdisciplinary research that are important to develop hypotheses about open questions regarding information inequality. Inclusive perspectives and theories are most relevant to understanding information inequality because of the diverse social, political, and technological aspects that shape it.

2.3.2 Relevant Theories Applied in Social Informatics

Social informatics (SI) provides an interdisciplinary perspective that is appropriate for this problem space, though it has not been employed to study information inequality to a great extent to this point. SI has never explicitly guided scholars toward particular theories or methods, but rather has depended on deeply interdisciplinary approaches. Theories have been drawn from

political science, sociology, psychology and cognitive science, economics, and business and organizational sciences, among other scholarly disciplines. Problem centered research designs have primarily driven this diversity in theoretical borrowing, as well as the development of interdisciplinary theoretical constructs. Domains from which significant work has been drawn will organize this section.

2.3.2.1 Political and Economic Theory

Elements of political and economic theory have been employed to understand various consequences of ICT use and design, as well as the decision making, policy making, and institutional development that surrounds the role of information and ICTs in society. Drawing on these theories has contributed greatly to researchers establishing consensus around various findings over time, including the unexpected consequences, externalities, and unequal distributions that result from ICT use.

In the earliest SI research, Kling and Iacono (1984b) employed elements of political theory—including: coalition formation, ideologies and preferences, mobilization of support, and legitimacy—to explain how computing infrastructure can be controlled by dominant parties or shared distribution. They argued, a decade before discussion of the digital divide co-opted the attention of those interested in information inequality, that ICTs would have exacerbating effects on social, political, and economic differences, though they were primarily interested in these changes within organizations, rather than society at large.

These theoretical constructs continued to shape scholarly analysis of sociotechnical interactions (e.g. Agre, 2000b; Ekbia & Kling, 2005; Mansell, 2005). Furthermore, emphasis on

institutions, through institutional theory (Lamb & Davidson, 2005) and the institutional social shaping approaches (Agre, 2000a) frequently structured conceptualizations of the environment of ICT use. SI recognized that institutions were an important facet of context, yet this analysis primarily drew on theories of social institutionalisms, while neglecting to draw on important political theories that would have implications for SI inquiry, such as Ostrom's (1986, 2009) theorization of institutions as the rules which structure interactions. This connection should be explored in future research, with emphasis on integrating theories of sociotechnical institutions with this relevant approach to institutionalism.

This is particularly important because emphasis on economic and political issues compliments social informatics' traditional emphasis on design and policy implications of empirically sound arguments (Kling, 2000a; 2000b), as one major research trend. SI has always pushed for practical and pragmatic conclusions from the critical perspectives presented on computerization and use of ICT. Economic theory (Agre, 2000b; Ekbia & Kling, 2005; Mansell, 2005)—specifically as theory of economies of scale (Agre, 2000b), theory of networked society with respect to production relationships (Ekbia & Kling, 2005), and rationality through theories of political economy (Mansell, 2005)—provided explanations for institutional and individual behaviors and financial interests regarding investment in technology and the benefits of innovation and adoption. By explaining informational, global, and networked attributes of ICTs, economic theory can explain complexity and provide predictive modeling for strategic planning surrounding ICTs (Ekbia & Kling, 2005). Political analysis compliments these approaches by explaining resistance to and enforcement of institutional and organizational norms, including strategic practices (Mansell, 2005).

Furthermore, political analysis is key to understanding control of information systems and information technologies. The issues of power and control conceptually developed through cumulative SI analyses have long lacked robustness. Without integrating them with theories of governance, as suggested by Kling (2000) it has been difficult to fully analyze variables that operationalized these concepts. Recent work has developed this connection (e.g. Cumbie & Sankar, 2012), building on the theory formalized by Maldonado, Maitland, and Tapia (2010), which presented an SI approach to technology governance, which had been deterministically considered (e.g. Van Grembergen, 2004).

Governance issues, addressed by IS/IT governance theory, have become increasingly focused upon because of their control and power implications surrounding access and changes to information technologies (Maldonado, Maitland, & Tapia, 2010). IS/IT governance theory was derived in part from multi-level governance theory, as a subarea of political theory (Maldonado, Maitland, & Tapia, 2010).

Throughout SI scholarship, political theory and political economics, as for example rational actor theory (Robbin & Day, 2006), are employed in a variety of ways to explain the interests of stakeholders and the distributions of computerization outcomes (Maldonado, Maitland, & Tapia, 2010; Robbin, 2007). Commonalities between political and economic issues and SI and information concerns should be further explored.

2.3.2.2 Social Theory

Social theory, including sociological approaches, as well as organizational approaches, have served as a key feature of SI analysis since the beginning, despite opposition to socially

constructivist perspectives. This can be explained because understanding social factors has always been recognized as fundamental to understanding the context in which humans interact with information and information technology, as well as with each other through ICTs. In many cases, social theory was not directly borrowed, but rather adapted to conform to the SI paradigm.

An institutional social shaping approach was manifested through both institutional and organizational theory (Kling & Iacono, 1984a; 1989). Institutional theory underlies social control models, which explain how management and control structures impact computerization by accounting for information flows, actors, controls, and rule systems (Kling & Iacono, 1984a). Organizational theory was the foundation for social organization of computing models; ICTs are situated in social structures and boundaries are shaped by social, rather than technical parameters (Kling & Iacono, 1989). The institutional social shaping approach continued to be employed (Iacono, 1996; Contractor & Seibold, 1993; Kling & Star, 1997).

In keeping with these ideas, situatedness and structure were increasingly considered in SI research. The introduction of structuration into social informatics work was specifically significant because it supported the understandings of the social shaping of technology (Contractor and Seibold, 1993). Social shaping of technology (SST), which some argued was a socially deterministic approach, grew out of this work and began to form a more concrete theoretical approach which would continue to grow in popularity (Kling & McKim, 2000; Sawyer & Tapia, 2005).

Social informatics has long emphasized social theory and social science oriented theorization about information technology and computerization (Sawyer & Eschenfelder, 2002), and this has been manifested in a variety of ways including: amplification model (Agre, 2002), grounded theory (Allen, 2005), activity theory (Davenport, 2005), and regimes of truth (Ekbia &

Kling, 2003). In tandem with many of these specific theories, analysis of social informatics research has described critical (Iacono, King, & Kraemer, 2003; Kling, 2003; Lamb & Sawyer, 2005; Sawyer & Rosenbaum, 2000), normative (Lamb & Sawyer, 2005; Sawyer & Rosenbaum, 2000), and analytical orientations (Lamb & Sawyer, 2005; Sawyer & Rosenbaum, 2000). Earlier work had primarily been analytical or critical, but the third orientation—normative—provided more practical and tangible translations of social informatics as implications for design, policy, or use alternatives (Lamb & Sawyer, 2005). The normative approach presents a direction from which changes in favor of increased access and equality can conceivably be promoted.

A variety of other studies have employed these social theories to support their interdisciplinary inquiries of social informatics (Robbin, 2007), including Sawyer and Tapia's application of theories of articulation work (2006) and subsequent applications of social institutional theory (2007), Tapia and Maitland's use of various organizational theories (2009), and Rosenbaum and Shachaf's consideration of structuration in online communities (2010). Within the domain of SI, specifically constructed social theories include behavioral complexity theory of media selection (Shachaf & Hara, 2007), as well as social theories of learning in the context of ICTs (Goggins, Laffey, & Gallagher, 2007). This theory of social learning sets parameters for group formation and development around information, based on Wenger's social theory of learning (Goggins, Laffey, & Gallagher, 2007).

It is logical to theorize about the sociotechnical construction of technologies using social theories. The aforementioned theoretical approaches have revealed aspects of ICT use and implications in a way that demonstrate the value of social consideration of technology, rather than simply limiting analysis of ICT to developers, technicians, and computer scientists. ICTs have a social role and this must be further analyzed, both because technology continues to

change and because humans employ ICTs in changing ways to work, communicate, and control information.

2.3.2.3 Interdisciplinary Sociotechnical Theory

In many ways, social and political approaches have been synthesized and new SI specific theories have been posed which integrate technological perspectives with other disciplinary traditions. Sociotechnical theories have provided structure for important findings by constructing models of integrated concepts, and in some cases providing methodological directives.

Kling and Iacono, for example, came to their findings through a combination of institutional social shaping approaches, political analysis, and the introduction of both a computerization movement framework and sociotechnical studies (1984a; 1984b; 1988; 1989). Computerization movements were developed as a theoretical construct and empirically evaluated in order to characterize general beliefs and practices, as well as to differentiate between specific attributes of various mobilizations for support of computerization (Kling & Iacono, 1988). The construct holds that computerization movements are: fragmentary in nature, have shared core beliefs, and consider particular computer based technologies to be inherently different from other, past innovations; value laden arguments made by computerization movement advocates allow for deconstruction of mismatches between context and technologies in cases of unmet expectations (Kling & Iacono, 1988).

Collaboration between Kling and Iacono produced a definite socio-technical principle (1989) to explain the complex interrelationship between social and technological variables (1988). Social theorization about information systems, grounded in case study analysis, described the sociotechnical nature of computer-based information systems embedded in social,

organizational contexts as highly integrated based on social and technological choices which lead to development, implementation, and adoption of the technology. The socio-technical nature of computerization served as the guiding principle for the developing interdisciplinary domain of social informatics.

Sociotechnical studies, as derived from work by Kling and Iacono (1989), are empirically grounded social theories about computerization, which explain unanticipated outcomes, both as change and stasis. Sociotechnical studies consider information systems, and technologies, in socio-technical contexts (Kling & Iacono, 1989). Socio-technical theory, in recognition of mutually shaping tendencies, provided a more balanced perspective on social and technological interactions than social shaping theory (Lamb & Kling, 2003; Sawyer & Tapia, 2005), and formalized the sociotechnical studies (Lamb & Sawyer, 2005) of earlier work.

Sociotechnical theory is also developing into a multi-theoretical and integrated framework for sociotechnical studies (Davenport, 2008) of interactions based on sociotechnical principles (Sawyer & Tyworth, 2006; Tapia & Maitland, 2009). The socio-technical systems (STS) construct is, in particular, developing into a popular mechanism for the conceptualization of information systems because it enables and mutually impacts social processes (Tapia & Maitland, 2009). The Mylyn framework has also been applied to calculate sociotechnical congruence (Blincoe, Valetto, & Goggins, 2012).

Lamb developed one of the earliest specifically SI theories: informational context (1996). Informational imperatives, common in discourse, emphasized accelerated rationality, empowered democracy, digitization, and streamlined bureaucracy, yet this did not explain real behaviors or changes, leading Lamb to conceptually reframe information technology's social potential as: technological mediation, effective interpersonal interaction, and access to power (1996).

The interdisciplinary theories and intra-social informatics theorization increasingly bolstered the objectives of social informatics: to improve design and understand the actual uses and consequences of ICTs, rather than explain design prescriptions or outcomes from a particular set of disciplinary theories.

There was also growing emphasis on networks in theory (Lamb & Davidson, 2005), specifically emphasizing actor-network theory (e.g. Hara & Kling, 2002; Sawyer & Tapia, 2005), in analysis (Courtright, 2005), and as sociotechnical networks (e.g. Kling, 2000a; Kling, McKim, & King, 2003; Lamb, 2003). The focus on networks in some ways correlated with the economic theory of networked society (Ekbia & Kling, 2005), as well as being based in the understanding that ICT users are social actors (Lamb & Davidson, 2005; Lamb & Kling, 2003). Network theory, emphasizing the importance of relationships and interactions between actors, institutions, and information resources, deconstructed the use of ICTs for collaboration and coordination to a conceptual level (Lamb & Davidson, 2005). Actor-network theory, as one manifestation, facilitated analysis at the egocentric level to understand important nodes and specific interactions, as opposed to exhaustively explaining all nodes and interactions (Hara & Kling, 2002; Kling, McKim, & King, 2003; Lamb & Kling, 2003; Sawyer & Tapia, 2005). Network analysis not only emphasized relationships between nodes, but also provided a modeling mechanism to characterize types of relationships and the central importance of specific nodes within communities, as in Courtright's study of social health-information seeking of Latino immigrants through face-to-face interaction and technologically mediated interaction (2005).

Networks, as a theoretical construct, enable social informaticists to look at the relationships between individuals, institutions, and information technology in order to identify

patterns and understand the context of sociotechnical interaction (Contractor, 2009; Sawyer & Tyworth, 2006). Analysis of networks (Goggins, Laffey, & Gallagher, 2011) is guided by a variety of approaches, including: the socio-technical network model (Blincoe, Valetto, & Goggins, 2012), social network theory (Contractor, 2009), actor-network theory (Contractor, 2009; Contractor, Monge, & Leonardi, 2011; Davenport, 2008), and sociotechnical interaction networks (Sawyer & Tyworth, 2006).

Socio-technical interaction networks explicitly applied network theory to sociotechnical contexts by including technologies as nodes, in addition to mechanisms that facilitate interactions or relationships between actors, groups, and resources (Kling, 2000a; Kling, McKim, & King, 2003; Lamb, 2003; Meyer & Kling, 2002). This contextual application for social informatics established socio-technical network models, including the social actor model, to more accurately account for the mutually shaping interactions between social and technological factors (Kling & Callahan, 2003; Lamb & Davidson, 2005; Lamb & Kling, 2003; Meyer & Kling, 2002). Other social informatics-specific approaches developed during this period: technical action frames (Kling & Iacono, 2001), information environments (Lamb, King, & Kling, 2003), and the multiview approach (Wood-Harper & Wood, 2005). These theoretical developments recognized: the importance of grounding discourse in empirical realities for successful practical outcomes (Kling & Iacono, 2001), the institutional and technological dimensions of workplaces as ICT interaction contexts (Lamb, King, & Kling, 2003), and that the complexity of sociotechnical innovation, introduction, and change can only be explained through multivariate theoretical combinations, not through reductive, simplifying constructs (Wood-Harper & Wood, 2005).

Recent scholarship has focused critical orientations on cases, trends, and social informatics itself (Day, 2007; King, Iacono, & Grudin, 2007; Oltmann, Rosenbaum, & Hara, 2006; Robbin & Day, 2006). The theoretical approaches employed to further social informatics in recent years are reflective of the desire to revise, fortify, and institutionalize social informatics as a significant and advantageous approach to analysis of social aspects of computing (Sawyer & Tapia, 2007). There is also a movement, driven by Orlikowski & Iacono (2008), to redirect attention away from context and use, toward information technology itself, to understand its meaning, potential, functions, and embedded properties, rather than simply the consequences of IT; IT theory, as a standalone technical theory, is beginning to emerge.

Diverse theoretical approaches during this period resulted in part from increased visibility of social informatics and its central scholars for other disciplines, drawing in communication and media scholars, who are relatively closely aligned in some respects, as well as scholars of the political economy who generally deal with very specific concepts, distinct from social informatics, despite overlap in attention to particular problems. The increased structure of social informatics, in identifying a third orientation, was also a significant step toward institutionalization and important in validating and including different types of scholarship in shared discussion.

Theoretical designs developed and employed by Kling and Iacono (1984a; 1984b; 1988; 1989) represent the value of social informatics approaches to business, political, and social problems being addressed by more traditional domains of scholarship. Social informatics, from the beginning, was not bound by theory, which allowed researchers to address the appropriate concepts for a particular situation, rather than the concepts traditionally prescribed through

theories within a field. Kling and Iacono were early to draw on developed theory from other disciplines, in order to socially theorize about ICTs in context.

2.3.3 Variables Considered

While the theories that have guided information inequality research have varied, certain concepts have proved relevant across inquiries. Examination of these variables is critical support future analysis of the overarching concepts of information inequality and inequality in information access in a more systematic way. This section thus discusses variables in information inequality research, as well as more broadly from social informatics, so as to identify common variables of interest and put important concepts into a larger social informatics context.

The primary conceptual development within information inequality research can be organized through the concepts underlying Meyer's theory of information inequality: actors, environment, context, constraints, and inequality (Meyer & Kraft, 2000). These variables and concepts are evident throughout the literature, and serve to organize previous research based on operationalization. Table 8 presents previous treatment of these constructs, specifically with respect to information inequality.

Table 8. Variables in information inequality

Concept	Variables	References
Actors/Stakeholders	Gatekeepers	Adair, 2010; Barzilai-Nahon, 2009; Bozeman & Cole, 1982; Lu, 2007
	Accountability	Epstein, Nisbet, & Gillespie, 2011; Walby & Larsen, 2012
	Data controllers/subjects/providers Secondary stakeholders	Fedorowicz, Gogan, & Culnan, 2010

	Public/Private regarding	Jensen, Danziger, & Venkatesh, 2007; Stanton-Salazar & Dornbusch, 1995
	Agents as senders and receivers	Jimenez-Martinez, 2006
	Stakeholder impact	McClure & Jaeger, 2008
	Personal characteristics	Świgoń, 2011
Environmental Context	Public sector	Blakemore & Craglia, 2007; Lievrouw & Farb, 2003
	Channels	Bozeman & Cole, 1982; Świgoń, 2011
	Competitive information environment	Jimenez-Martinez, 2006
	Fragmentation, complexity, integration	Kumpulainen & Järvelin, 2012
	Technological barriers	Kumpulainen & Järvelin, 2012; Strickland & Hunt, 2005; Świgoń, 2011
	Economic/Resource barriers	Lantz, 1984; Lu, 2007; Martinez, 1994; Świgoń, 2011
	Government dimensions	Robertson & Vatrapu, 2010; Strickland & Hunt, 2005
Inequality	Gatekeeping	Adair, 2010; Barzilai-Nahon, 2009; Fisher & Julien, 2009; Lu, 2007; Soroka, 2012
	Access versus possession/attainment/availability	Blakemore & Craglia, 2007; Dervin, 1994; Fisher & Julien, 2009; Juergensmeyer & Bishop, 1985; Soroka, 2012; Świgoń, 2011
	Access versus Skills; Digital divide	Epstein, Nisbet, & Gillespie, 2011; James, 2011; Kvasny, 2006; Lantz, 1984
	Equity versus equality	Lievrouw & Farb, 2003

	Bias	Martinez, 1994; Soroka, 2012
Social Constraints	Intellectual Property	Adair, 2010
	Affect	Fisher & Julien, 2009; Świgoń, 2011
	Organizational, Cultural Barriers	Kumpulainen & Järvelin, 2012; Lantz, 1984; Stanton-Salazar & Dornbusch, 1995; Świgoń, 2011
	Needs versus perceptions	Kvasny, 2006; Lantz, 1984
	Policy	Lantz, 1984; Soroka, 2012; Strickland & Hunt, 2005
	Social capital	Lievrouw & Farb, 2003; Martinez, 1994; Stanton-Salazar & Dornbusch, 1995; Świgoń, 2011

These variables and many others relevant to improving our understanding of information inequality have been specifically defined within the social informatics literature. Concepts are critical to the social informatics perspective, which is united by vocabulary, as opposed to being a tradition unified by specific theories. Many of these concepts have been explored in ways that lead to key findings shared across SI scholarship, which will be discussed in the next section. Strong conceptual development allows for common dialogue among social informaticists, despite a lack on consensus on particular theories to be employed, as well as for the application of interdisciplinary theories to SI inquiry. Table 9, included at the end of this chapter, presents an overview of the concepts fundamental to SI.

Context is important in evaluating technological outcomes under social conditions (Kling & Iacono, 1984a). Institutional contexts are of particular importance because of their scale and early-mover role in adopting new technologies (Kling & Iacono, 1984a; 1989). In context, outcomes are different because no combinations of workers, ICTs, environments, and points in

time are the same (Kling & Star, 1997). The real problem with business process re-engineering during the 1980s and 1990s, was its failure to account for different contexts (Kling & Tilquist, 1998). In not acknowledging context, imperatives about change through information technology prescribe unrealistic expectations on which public policy is produced, leading to public failures on a large scale (Lamb, 1996). What social informatics successfully provides is an analytical lens grounded in real complexity, rather than over-simplified non-empirical prescriptions (Kling, 1996; 1998; 1999).

From disparities stem conflict within organizational and institutional contexts (Kling & Iacono, 1984b); a common resolution of conflict is an ICT change or stasis that favors the status quo because those in power seek to serve their own benefit in advocating for and controlling changes (Kling & Iacono, 1984a; 1984b; 1988). Distributions of power (Davenport & Horton, 2006; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006) and organizational politics (Maldonado, Maitland, & Tapia, 2010) are determinant of interests and control within organizations and groups, thereby affecting changes, which are a primary subject of social informatics concern.

The social and organizational preferences and interests shape political dynamics surrounding resistance or amenability toward change, as well (Kling & Lamb, 1999). The imbalances between the strength of preferences and the interests of stakeholders represent gradients of values, which can be very hard to overcome, even when they are extremely inequitable (Kling, 1999). Understanding management and control mechanisms allows researchers to identify whether directed changes can be coordinated with existing patterns of authority and information and influence flows (Kling & Tilquist, 1998). Mismatches between top

down-controls and bottom-up cultures during implementation lead to failure (Kling & Tilquist, 1998), largely because of inefficiency, resistance, and sustainability (Kling & Lamb, 1996).

Context—with specific emphasis on social (Courtright, 2004; Kling, 2000a; Kling & McKim, 2000; Kling, Rosenbaum, & Sawyer, 2005; Mansell, 2005; Sawyer & Eschenfelder, 2002) context, as opposed to sociotechnical, institutional, and organizational variations—continued to be examined (Iacono, King, & Kraemer, 2003; Sawyer, 2005), based on the premise that ICTs and their users do not exist or interact in isolation. Institutions provide a conceptual construct to bound formal social arrangements, including norms and practices (Agre, 2002; Kling, 2003; Lamb & Davidson, 2005; Lamb, King, & Kling, 2003; Lamb & Kling, 2003). The organizational environment provides another contextual environment in which to examine interactions (Agre, 2000b; Allen, 2005; Ekbia & Kling, 2005; Lamb, King, & Kling, 2003).

Emphasis on context (Blincoe, Valetto, & Goggins, 2012; Oltmann, Rosenbaum, & Hara, 2006; Tapia & Maitland, 2009), specifically on social context (Contractor, 2009; Contractor, Monge, & Leonardi, 2011; Davenport & Horton, 2006; 2007; Hara & Rosenbaum, 2008; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006), has led researchers to consider and evaluate relationships and interactions that are supported by information technologies for: coordination (Blincoe, Valetto, & Goggins, 2012; Goggins, Laffey, & Gallagher, 2011), collaboration (Contractor, 2009; Goggins, Laffey, & Gallagher, 2011; Maldonado, Maitland, & Tapia, 2010), and cooperation (Goggins, Laffey & Gallagher, 2011).

Within these contexts, interactions are examined as coordination (Lamb & Davidson, 2005), cooperation (Ekbia & Kling, 2005), collaboration (Agre, 2000a; Kling & McKim, 2000; Kling, McKim, & King, 2003; Lamb & Davidson, 2005), and communication (Hara & Kling, 2002; Kling, 2000a; Kling & McKim, 2000; Kling, McKim, & King, 2003; Lamb, 2003;

Mansell, 2005; Meyer & Kling, 2002; Wood-Harper & Wood, 2005). By examining these interactions, researchers were able to theorize about power relationships (Agre, 2000a; 2002; Ekbia & Kling, 2003), organizational politics (Sawyer & Tapia, 2005), identity (Lamb & Davidson, 2005; Lamb & Kling, 2003), management (Davenport, 2001; Ekbia & Kling, 2003; Hara & Kling, 2002; Kling, 2000a; 2003; Kling & Hara, 2004; Sawyer & Tapia, 2005), control (Ekbia & Kling, 2003), complexity (Courtright, 2004; Iacono, King & Kraemer, 2003; Kling & Hara, 2004; Kling, McKim, & King, 2003; Lamb, King, & Kling, 2003), and dynamics (Courtright, 2004).

Researchers also began to examine collaboration (Kling & Lamb, 1999), communication (Kling, 1997; 1999; Kling & Star, 1997; Kling, Rosenbaum & Hert, 1998), and community (Kling, 1996; Kling & Lamb, 1996), both from the perspective that they are supported by ICTs, and also that they include interactions with ICTs. Kling and Lamb examined online sales and services as including and being supported by technology (1999), as well as envisioned cyber utopias (1996), arguing that technological mediation of communities or collaborators does not mitigate socio-economic limitations. Communication online or through ICT is shaped by social practice, not wholly technical standards (Kling, 1997; 1999; Kling & Star, 1997; Kling, Rosenbaum & Hert, 1998), implying that technologies to support communication and collaboration ought to be human centered (Kling & Star, 1997).

Over time, analysis has included many of the same constructs, as well as a new emphasis on coordination (Lamb & Davidson, 2005), cooperation (Ekbia & Kling, 2005), uncertainty (Courtright, 2004), and governance (Agre, 2000a), each of which is fundamentally linked to the respective theoretical trends of: network theory; economic theory; political theory, economic theory, information environments; and political theory.

Organizations and institutions (Contractor, 2009; Sawyer & Tapia, 2007) are formally bounded and structured social arrangements that have been analyzed for their economic and governance implications for society, at local and global scales (Davenport & Horton, 2006; 2007; Maldonado, Maitland, & Tapia, 2010). Communities have been studied similarly, though their varied make-ups and levels of formalization have different social implications (Davenport & Horton, 2007; Goggins, Laffey, & Gallagher, 2011; Rosenbaum & Shachaf, 2010). Analysis of organizational, institutional, and community contexts of ICTs also serves as the foundation for study of more complex processes and dynamics, including institutionalization (Elliot & Kraemer, 2007; Sawyer & Tapia, 2007), values (Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006), identity (Robbin & Day, 2006; Rosenbaum & Shachaf, 2010), and efficiency (Robbin & Day, 2006).

Yet the organizational environment (Robbin, Lamb, King, & Berleur, 2006) is not simply composed of interactions between equally powerful actors; many organizational environments are formally structured with actors in management positions (Blincoe, Valetto, & Goggins, 2012; Contractor, 2009; Contractor, Monge, & Leonardi, 2011; Davenport & Horton, 2007; Maldonado, Maitland, & Tapia, 2010) who control (Davenport & Horton, 2007; King, Iacono, & Grudin, 2007; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006) priorities, decisions, and access to information and ICT. Constraints (Maldonado, Maitland, & Tapia, 2010; Oltmann, Rosenbaum, & Hara, 2006) and limits to access are often intentional, yet there are also unanticipated consequences (Robbin, 2007; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006) under conditions of change (Sawyer & Tyworth, 2006).

Information technology is immense in scale, and therefore requires complex and costly infrastructure (Kling & Star, 1997; Lamb, 1996). The expense of infrastructure to support the

Internet and e-business was also considered by Kling and Lamb (1999), as they sought to understand why narratives about cost cutting through online business models failed (Kling & Lamb, 1996; 1999). Kling, Rosenbaum, and Hert (1998) went on to discuss the role of infrastructure in connecting micro-level ICT issues in use to macro-level ICT issues, including economic and social contexts.

Social informatics research, by definition, addresses the role of ICTs in social and organizational change (Kling, Rosenbaum, & Hert, 1998). Change is analyzed in terms of the impact of technologies on social structures, surrounding the impact of decision support technologies on organizations (Contractor and Seibold, 1993), and in terms of the impact of social change on the use of ICT, as in how social dynamics shape the information age (Iacono, 1996). Kling analyzed computerization movements in order to understand change in both direction, in terms of the social choices that yield technological change and the impact of new computer technologies (Kling, 1994; 1996). Kling emphasized that expectations of positive change, and change in general, are often unmet (1996); collaborating with Tilquist, he went on to illustrate why technology-driven organizational change often failed: the precepts of business process re-engineering emphasized down-down directives to stakeholders, non-contextual solutions, and imposed constraints on the legitimacy of non-technical solutions (Kling & Tilquist, 1998).

In the early 2000s, the analytical focus of social informatics began to be defined in terms of social and technological change, making the concept of change critical to many analyses (Sawyer & Tapia, 2005). Focus on institutional changes allowed researchers to describe how the introduction of information technologies affected social, normative, and cultural structures (Agre, 2000a; Courtright, 2005; Kling & Iacono, 2001), while organizational change dealt with

the formal and informal relationships governed by business rules (Hara & Kling, 2002; Kling, 200a). Examination of sociotechnical change deconstructed the mutually shaping interactions between social and technological factors (Allen, 2005; Iacono, King, & Kraemer, 2003; Kling & Iacono, 2001), whereas emphasis on social change sought to explain the directional impact of ICT (Kling, 2000a; Lamb & Sawyer, 2005). Closely related to change was an impetus toward better understanding information technologies as ICTS (Agre, 2000a; 2000b; 2002; Courtright, 2004; Ekbia & Kling, 2003; 2005; Hara & Kling, 2002; Iacono, King, & Kraemer, 2003; Kling, 2000a; 2000b; Kling & Hara, 2004; Kling, Rosenbaum, & Sawyer, 2005; Lamb, 2003; 2005; Lamb & Kling, 2003; Mansell, 2005; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Wood-Harper & Wood, 2005).

Researchers have examined organizational (Tapia & Maitland, 2009), institutional (Davenport & Horton, 2006; 2007), sociotechnical (Goggins, Laffey, & Gallagher, 2011; King, Iacono, & Grudin, 2007), and technical (Orlikowski & Iacono, 2008) changes in organizations and communities, in order to understand the complexity (Contractor, Monge, & Leonardi, 2011; Davenport & Horton, 2006; 2007; King, Iacono, & Grudin, 2007; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006; Rosenbaum & Shachaf, 2010; Tapia & Maitland, 2009) and dynamics (Contractor, Monge, & Leonardi, 2011; Robbin, Lamb, King, & Berleur, 2006; Rosenbaum & Shachaf, 2010) of sociotechnical interactions and systems (Tapia & Maitland, 2009) in context.

Building on complexity and changes over time, the concept of dynamics (Kling, 1997; Kling & Star, 1997) is introduced. Dynamics result from multiple sets of norms and practices interacting within a context (Kling, 1997). Externalities, time, unintended consequences, and

intentional pressures yield multiple, constant changes in society and organizations (Kling & Star, 1997).

Anticipated changes fail to materialize and unanticipated changes occur precisely because organizations, institutions, and ICT are much more complex than simplistic arguments acknowledge (Kling & Tilquist, 1998). Part of the complexity can be explained as mismatches in embedded social variables between the technologies, embodying social facets from their context of development, and the social context in which they are used (Kling, 1996). Furthermore, complexity develops from multiple levels of implicit and explicit work practices, norms, supports, and constraints (Kling, 1999), as well as variable scopes, large scales, and externalities manifesting change over time (Kling & Star, 1997).

It was significant to analyze consequences and constraints in their own rights, rather than to treat them as acknowledged but unexplored variables, just as it was important to begin to understand the embedded social values and norms within ICTs, rather than simply looking at their impact (Kling & Star, 1997; Kling & Tilquist, 1998). Consequences result from implicit, unarticulated aspects of work that go unaccounted for in planning for change (Kling & Star, 1997), as well as from intentional social changes that are non-sustainable and dependent on other dynamic contexts or variables (Kling & Lamb, 1996). Furthermore, the identification of policy, politics, control, and culture in constraining outcomes also facilitates better planning (Kling & Tilquist, 1998).

Imbalances between preferences and interests lead to access problems in society at large without equal infrastructure to support Internet access (Kling, 1999) and between organizations and the public as new and important technologies are often expensive and the businesses that introduce them control access to them, in many cases (Kling, 1998).

Variables that have been examined within social informatics literature are summarized in table 9.

Table 9. Variables within social informatics literature

Concept	First Published	References
Context	1984	Blincoe, Valetto, & Goggins, 2012; Contractor, 2009; Contractor, Monge, & Leonardi, 2011; Courtright, 2004; Davenport & Horton, 2006; 2007; Eschenfelder, 2002; Hara & Rosenbaum, 2008; Iacono, King, & Kraemer, 2003; Kling, 1996; 1998; 1999; Kling & Iacono, 1984a; Kling & Star, 1997; Kling & Tilquist, 1998; Lamb, 1996; Kling, 2000a; Kling & McKim, 2000; Kling, Rosenbaum, & Mansell, 2005; Oltmann, Rosenbaum, & Hara, 2006; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006); Sawyer, 2005; Sawyer & Sawyer, 2005; Tapia & Maitland, 2009
Control	1984	Davenport & Horton, 2007; Ekbia & Kling, 2003; King, Iacono, & Grudin, 2007; Kling & Iacono, 1984a; 1984b; 1989; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006
Institutions	1984	Agre, 2002; Contractor, 2009; Elliot & Kraemer, 2007; Kling, 2003; Kling & Iacono, 1984a; 1989; Lamb & Davidson, 2005; Lamb, King, & Kling, 2003; Lamb & Kling, 2003; Sawyer & Tapia, 2007
Management	1984	Blincoe, Valetto, & Goggins, 2012; Contractor, 2009; Contractor, Monge, & Leonardi, 2011; Davenport, 2001; Davenport & Horton, 2007; Ekbia & Kling, 2003; Hara & Kling, 2002; Kling, 2000a; 2003; Kling & Hara, 2004; Kling & Iacono, 1984a; 1989; Kling &

		Tilquist, 1998; Maldonado, Maitland, & Tapia, 2010; Sawyer & Tapia, 2005
Organizational Politics	1984	Kling & Iacono, 1984b; 1989; Kling & Lamb, 1999; Maldonado, Maitland, & Tapia, 2010; Sawyer & Tapia, 2005
Power Relationships	1984	Agre, 2000a; 2002; Davenport & Horton, 2006; Ekbia & Kling, 2003; Kling & Iacono, 1984b; 1989; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006
Change	1988	Agre, 2000a; Allen, 2005; Contractor & Seibold, 1993; Courtright, 2005; Davenport & Horton, 2006; 2007; Goggins, Laffey, & Gallagher, 2011; Hara & Kling, 2002; Iacono, 1996; Iacono, King, & Kraemer, 2003; King, Iacono, & Grudin, 2007; Kling, 1994; 1996; 2000a; Kling & Iacono, 1988; 2001; Kling, Rosenbaum & Hert, 1998; Kling & Star, 1997; Kling & Tilquist, 1998; Lamb & Sawyer, 2005; Orlikowski & Iacono, 2008; Sawyer & Tyworth, 2006; Tapia & Maitland, 2009
Computerization Movements	1988	Hara & Rosenbaum, 2008; Kling, 1994; 1996; Kling & Iacono, 1988
Values	1988	Allen, 2005; Kling, 1999; 2003; Kling & Iacono, 1988; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006; Sawyer, 2005
Complexity	1989	Contractor, Monge, & Leonardi, 2011; Courtright, 2004; Davenport & Horton, 2006; 2007; Iacono, King & Kraemer, 2003; Kling, 1996; 1999; Kling & Hara, 2004; Kling & Iacono, 1989; King, Iacono, & Grudin, 2007; Kling, McKim, & King, 2003; Kling & Star, 1997; Kling & Tilquist, 1998; Lamb, King, & Kling, 2003; Maldonado, Maitland, & Tapia, 2010; Robbin & Day, 2006; Rosenbaum & Shachaf, 2010; Tapia & Maitland, 2009

Efficiency	1989	Agre, 2000b; Kling & Iacono, 1989; Kling & Lamb, 1996; Robbin & Day, 2006
Organizational Environments	1993	Agre, 2000b; Allen, 2005; Contractor & Seibold, 1993; Ekbia & Kling, 2005; Lamb, King, & Kling, 2003; Robbin, Lamb, King, & Berleur, 2006
ICTs and Information Technology	1994	Agre, 2000a; 2000b; 2002; Contractor, Monge, & Leonardi, 2011; Courtright, 2004; Davenport & Horton, 2006; Day, 2007; Ekbia & Kling, 2003; 2005; Elliot & Kraemer, 2007; Goggins, Laffey, & Gallagher, 2011; Hara & Kling, 2002; Hara & Rosenbaum, 2008; Iacono, King, & Kraemer, 2003; Kling, 1994; 1996; 2000a; 2000b; Kling & Hara, 2004; Kling, Rosenbaum & Hert, 1998; Kling, Rosenbaum, & Sawyer, 2005; Kling & Star, 1997; Kling & Tilquist, 1998; Lamb, 1996; Lamb, 2003; 2005; Lamb & Kling, 2003; Mansell, 2005; Orlikowski & Iacono, 2008; Robbin, 2007; Sawyer, 2005; Sawyer & Eschenfelder, 2002; Sawyer & Tapia, 2006; Wood-Harper & Wood, 2005
Community	1996	Davenport & Horton, 2007; Goggins, Laffey, & Gallagher, 2011; Kling, 1996; Kling & Courtright, 2003; Kling & Lamb, 1996; Rosenbaum & Shachaf, 2010
Consequences, intended and unintended	1996	Kling & Hara, 2004; Kling & Lamb, 1996; Kling & Star, 1997; Robbin, 2007; Robbin & Day, 2006; Robbin, Lamb, King, & Berleur, 2006
Infrastructure	1996	Courtright, 2005; Davenport, 2001; Kling, 1999; 2000a; Kling & Lamb, 1999; Kling & Star, 1997; Lamb, 1996
Internet	1996	Agre, 2002; Contractor, 2009; Kling, 1999; 2001; Kling & Callahan, 2003; Kling & Courtright, 2003; Kling & Lamb, 1996; Kling &

		McKim, 2000; Kling, Rosenbaum & Hert, 1998; Lamb, King, & Kling, 2003
Networks	1996	Agre, 2000a; 2000b; Contractor, 2009; Contractor, Monge, & Leonardi, 2011; Courtright, 2005; Ekbia & Kling, 2005; Goggins, Laffey, & Gallagher, 2011; Hara & Kling, 2005; Kling, 1997; 2000a; 2000b; 2001; 2003; Kling & Lamb, 1999; Kling, McKim, & King, 2003; Lamb, 1996; 2003; Lamb & Davidson, 2005; Lamb & Kling, 2003; Mansell, 2005; Meyer & Kling, 2002; Sawyer & Tyworth, 2006
Communication	1997	Hara & Kling, 2002; Kling, 1997; 1999; 2000a; Kling & McKim, 2000; Kling, McKim, & King, 2003; Kling & Star, 1997; Kling, Rosenbaum & Hert, 1998; Lamb, 2003; Mansell, 2005; Meyer & Kling, 2002; Wood-Harper & Wood, 2005
Dynamics	1997	Courtright, 2004; Contractor, Monge, & Leonardi, 2011; Kling, 1997; Kling & Star, 1997; Robbin, Lamb, King, & Berleur, 2006; Rosenbaum & Shachaf, 2010
Human Centered	1997	Kling & Star, 1997
Social practice	1997	Kling, 1997; 1999; Kling, Rosenbaum & Hert, 1998; Kling & Star, 1997
Sociotechnical Systems	1997	Kling, 1997; 2000a; Kling & Lamb, 1999; Sawyer & Rosenbaum, 2000; Tapia & Maitland, 2009
Access	1998	Hara & Kling, 2002; Kling, 1998; 1999; 2000a; 2000b; Kling & Callahan, 2003; Maldonado, Maitland, & Tapia, 2010; Oltmann, Rosenbaum, & Hara, 2006
Constraints	1998	Kling & Tilquist, 1998; Maldonado, Maitland, & Tapia, 2010; Oltmann, Rosenbaum, & Hara, 2006
Collaboration	1999	Agre, 2000a; Contractor, 2009; Goggins, Laffey, & Gallagher, 2011;

		Kling & Lamb, 1999; Kling & McKim, 2000; Kling, McKim, & King, 2003; Lamb & Davidson, 2005; Maldonado, Maitland, & Tapia, 2010
Governance	2000	Agre, 2000a; Davenport & Horton, 2006; 2007; Maldonado, Maitland, & Tapia, 2010
Identity	2003	Lamb & Davidson, 2005; Lamb & Kling, 2003; Robbin & Day, 2006; Rosenbaum & Shachaf, 2010
Uncertainty	2004	Courtright, 2004
Cooperation	2005	Ekbia & Kling, 2005; Goggins, Laffey & Gallagher, 2011
Coordination	2005	Blincoe, Valetto, & Goggins, 2012; Goggins, Laffey, & Gallagher, 2011; Lamb & Davidson, 2005

2.4 Methodological Approaches

Various methods have produced findings on information inequality, some in conjunction with particular methods. Qualitative data gathering and analysis dominate these methods, which is also consistent with social informatics research. Methods specifically employed in past analysis of information inequality and in social informatics works generally, are reviewed within this section, discussing the strengths and weaknesses, as well as the relationships between particular methods and theories.

Before considering the methods employed to generate and analyze data, there are other important components of research design relevant to the study of information inequality. Inequality measures have five fundamental requirements: the Pigou-Dalton transfer principle, income scale independence, principle of population, anonymity, and decomposability (Litchfield, 1999). This means inequalities happen both within and between populations, are not measured between specific people, and can be separated into quartiles, with changes in inequalities

dependent on transfers. Transfers from the average population to the long privileged tail would increase inequality, while the reverse would decrease inequality. In the case of information inequality, accessibility distributions and opportunity indices comply with these axioms.

2.4.1 Information Inequality Research

Information inequality research itself spans many disciplines, theories, and methods, however the vast majority of information inequality research either considers differences at the micro level or theorizes about the macro level without empirical support. James (2011) provides a notable exception to this trend. Another important trend is that researchers encourage mixed and multi method approaches for validity; triangulation is emphasized as important (Fisher & Julien, 2009; McClure & Jaeger, 2008; Strickland & Hunt, 2005; Walby & Larsen, 2012).

McClure and Jaeger (2008) provide a detailed explanation of what information policy analysis is, why it should always be combined with stakeholder analysis, and triangulated with another method to support understanding of information access and dissemination from the government. Information policy analysis seeks to identify: impacts and outcomes; conflicts and tradeoffs between stakeholders, assumptions, values, policies; and actionable recommendations (McClure & Jaeger, 2008).

Other methods employed within this body of research more generally fit into research designs appropriate for qualitative inquiry. It is important to note that literature sample considered within this paper included considerably more theoretical papers than empirical works, which is in part the nature of this sub-domain of scholarship and in part a result of emphasis on information inequality as a superordinate concept, rather than each of the individual

subcomponents, such as the digital divide and information literacy, which each have more empirical works. Exemplar empirical works from these subdomains are considered. An overview of methods is presented in table 10.

Table 10. Methods employed in information inequality research

Method	Applications	References
Case Study	Case study of databases	Fedorowicz, Gogan, & Culnan, 2010
	Context of information flow, needs within information management	Lantz, 1984
	Interests, outcomes, resources associated with UCITA	Meyer & Kraft, 2000
	Digital government initiative success/failure in context	Robertson & Vatrapu, 2010
	Contextual analysis of information behavior	Wilson, 1999
	Micro-level context of information inequality	Zheng & Walsham, 2008
Comparative Analysis	Ontological, epistemological contrasts between information policy assumptions	Dervin, 1994
	Comparisons between text of information policies before and after changes	Jaeger, 2007 James, 2011
	Quantitative convergence/divergence entity modeling of the digital divide	Kvasny, 2006
	Comparisons of administrator's understanding of needs, reality	Soroka, 2012
	Comparative textual analysis of media, government representations	Zheng & Walsham, 2008
	Compare/contrast case studies	
Competitive Strategy Assessment	Information constraints on strategy in iterative information sharing	Jimenez-Martinez, 2006

Cost/Benefit Analysis	Economic tradeoffs between control and access on public sector information Tradeoffs associated with public sector information	Blakemore & Craglia, 2007 Nilsen, 2010
Economic Market Analysis	Market failures associated with information	Nilsen, 2010
Ethnographic Observation	Small worlds contextual analysis Observation of information behaviors in context Shadowing of researchers to identify information seeking behaviors in tasks Observation of interactions, use in community technology center Participatory action oriented research on barriers	Burnett, Besant, & Chatman, 2001; Chatman, 1996 Fisher & Julien, 2009 Kumpulainen & Järvelin, 2012 Kvasny, 2006 Lantz, 1984
Experimental Variable Manipulation	Framing to assess perception of assumptions/arguments in digital divide discourse Exposure versus acquisition of information	Epstein, Nisbet, & Gillespie, 2011 Yang & Grabe, 2014
Freedom of Information Act /Access to Information Law Request	Initial request, terms of request fulfillment, follow up requests	Walby & Larsen, 2012
Interest Evaluation	Interest identification, analysis in public information management Tradeoffs and competing interests in information sharing	Bozeman & Cole, 1982 Fedorowicz, Gogan, & Culnan, 2010
Meta-Research	Meta-analysis of multiple contextual assessments of information behavior situations Meta-analysis/ethnography/review of information behavior for policy development	Fisher & Julien, 2009 Urquhart, 2011
Network Analysis	Gatekeeping in information flow, as control points, filters	Barzilai-Nahon, 2009

	Interactions, associations surrounding government, politics, civics	Jensen, Danziger, & Venkatesh, 2007
	Resource exchange through interpersonal relations	Lu, 2007
	Power, accessibility networks surrounding e-government	Robertson & Vatrapu, 2010
	Sociological networks as information networks	Stanton-Salazar & Dornbusch, 1995
Policy Analysis	Information access policy prescription and access realities; comparative textual analysis for policies; formal impact assessment over six years	Jaeger, 2007
	Content analysis of policy on information dissemination, representation	Soroka, 2012
	Assessment of policy in historical context	Strickland & Hunt, 2005
Stakeholder Analysis	Interests, assumptions of stakeholders surrounding access to public sector information	Blakemore & Craglia, 2007
	Interests and channel preferences of gatekeepers in public management	Bozeman & Cole, 1982
	Public perception of decision-makers' arguments in information policy	Epstein, Nisbet, & Gillespie, 2011
	Qualitative typologies for stakeholders and their interests	Fedorowicz, Gogan, & Culnan, 2010
	Needs with respect to technology based on demographics, experiences of stakeholders	Kvasny, 2006
	Stakeholder needs, interests, resources	Meyer & Kraft, 2000
	Stakeholder advantage, inequality surrounding e-government	Robertson & Vatrapu, 2010
Statistical Analysis	Regression of economic status against access at the level of nations	James, 2011

	ANCOVA analysis of knowledge acquisition and information exposure	Yang & Grabe, 2014
Survey/Questionnaire /Interview	Survey of public perception on different information policy proposals	Epstein, Nisbet, & Gillespie, 2011
	Semi-structured interviews of stakeholders	Fedorowicz, Gogan, & Culnan, 2010
	Interviews, surveys about information behaviors	Fisher & Julien, 2009
	Survey of community about governmental, political, civic participation, association online	Jensen, Danziger, & Venkatesh, 2007
	Survey of children on access to, use of IT	Martinez, 1994
	Survey of students on information sharing relationships	Stanton-Salazar & Dornbusch, 1995
	Survey on privacy, technology	Strickland & Hunt, 2005
Work-Flow Modeling	Information seeking and access in the context of work tasks	Kumpulainen & Järvelin, 2012

This sample of the literature includes research that focuses on individual cases and comparisons between cases, as well as on broader communities and policies at the societal level. These methods will be aggregated to examine the strengths and weaknesses of each type of approach.

Case studies focus on bounded contexts in order to examine change, events, or dynamics at the micro level. This approach is extremely common within information inequality research and if often employed to understand the success or failures of particular initiatives intended to change inequalities (e.g. Meyer & Kraft, 2000; Robertson & Vatrapu, 2010; Zheng & Walsham, 2008). The advantage of this approach is a deep and detailed understanding within a particular

context, yet it does not explain why outcomes may differ by context and somewhat limited in terms of generalizability, though some attempts have been made to argue for generalization from case studies through methods that extrapolate based on aspects of cases that reflect the population as a whole (e.g. Becker, 1990). However, generalizations related to information inequality remain problematic, as very little research has examined the issues at the macro level.

Ethnographic observations are often employed to gather data for case study analyses. This method provides rich, qualitative data in context (Fisher & Julien, 2009). Kvasny (2006) provides what is perhaps the most meaningful ethnographic study of information inequality in her study of interactions and use in a community technology center established to address the digital divide. Through her observations and her participatory interactions with users, she develops a detailed understanding of why the initiative fails to address the complete needs of the community. It becomes clear that the program is insufficient to truly develop digital literacy and provides inadequate availability, given that many of those who would most benefit cannot use the center during its limited hours (Kvasny, 2006). This method was advantageous because the author was able to differentiate between what the policies prescribed for the initiative and what it looked like in practice. Evaluation was possible in context with a complete understanding of users and interactions.

This is the primary method through which the Chatman tradition of information poverty research, considering small worlds and other dimensions of information inequality, have been examined (e.g. Burnett, Besant, & Chatman, 2001, Chatman, 1996). Ethnography is important to these theories in that they assume each context is unique and thus detailed, qualitative analysis of individuals' needs and behaviors is best supported when the research fully understands the experience.

Evaluation of interests, as in studies by Bozeman and Cole (1982) and Fedorowicz, Gogan, and Culnan (2010), is important to understanding information inequality because competing interests and the interests of decision makers often shapes information distributions. This method, which is qualitative, identifies interests based on a strategic perspective and employs data that is gathered through observation, document analysis, and interviews.

Workflow modeling has allowed scholars to examine information seeking and access within contexts of information needs. This method compliments other analysis of cases. Kumpulainen and Järvelin (2012) employed workflow modeling to examine differences in access and behaviors within the context of work. This method could appropriately be applied to other information-based tasks in a way that may usefully illustrate how barriers to access are encountered and responded to within contexts that matter to social, economic, and political outcomes.

Surveys, questionnaires, and interviews are a very popular method for data gathering within this domain. These methods allow both for the construction of large behavioral data sets to illustrate general patterns and detailed data sets within particular contexts. For example, while Fedorowicz, Gogan, and Culnan (2010) employed interviews to understand stakeholders and interests and Stanton-Salazar and Dornbusch (1995) surveyed students about their information sharing networks to provide details in context, Martinez (1994) surveyed a large number of students to understand differences in access to information technology. These are flexible methods and can also be manipulated to gather data on the intersection of multiple factors, such as Jensen, Danziger, and Venkatesh (2007) who examine differences in online participation in a number of domains: governmental, political, and civic.

Experimentation has been employed to understand how framing impacts perceptions of the digital divide, as well as how knowledge acquisition and the digital divide intersect. Epstein, Nisbet, and Gillespie (2011) manipulated representations of digital divide causes to test where people place the blame for unequal access, in an effort to determine who is responsible, in the public's eye, for overcoming unequal distributions. Yang and Grabe (2014) used experimental methods to test exposure to information in different lengths and through different mediums as producing differences in comprehension, in order to examine how the digital divide and knowledge gaps intersect. This research is particularly interesting in associating availability with information literacy in a way that supports the larger construct of information access. In this sense, experimental methods importantly elucidate causality in a controlled context, which is helpful in developing a model for future analysis.

Comparative research designs with respect to information access distributions include both a variety of approaches. From a qualitative perspective, various scholars have sough to compare and contrast policies, assumptions, outcomes, and perceptions in an effort to understand different outcomes with respect to information access in different contexts. Dervin (1994), for example, contrasts assumptions about particular policies in order to understand the distinct thought patterns and interests that support particular policy constraints on information and access in society. Jaeger (2007) employed a similar approach to substantively understand policy changes, whereas Kvasny (2006) sought to understand how needs differed from actual information status and Soroka (2012) contrasted media and government representations of information and access. This approach is richly descriptive and provides explanations as to why information constraints are configured in particular ways, yet the actual causes and consequences are not provided.

Cost benefit analysis has been employed to evaluate tradeoffs between access and control, security advantages and disadvantages in understanding political claims within access for the public. Blakemore and Craglia (2007) specifically sought to understand arguments and resistance against providing access to public information, and so undertook a comparative evaluation of economic costs and benefits to different levels of access. The method was useful because it added a dimension not often considered when arguing for the public benefits associated with increased access, delineating clear financial costs of access. Nilsen (2010) similarly examines the tradeoffs in terms of rights with access to and control of public sector information, including privacy and transparency. In contrasting values associated with different levels of access, cost benefit analysis importantly elucidates what assumptions must be met in order to make the decisions that produced particular policy or political conditions to shape access. As a result, this method importantly points toward possible causes.

Jimenez-Martinez (2006) built on these approaches to model paths to information constraints on iterated information sharing through the use of competitive strategy assessment. This, to an extent, better incorporates causes and consequences of constraints, yet the strength of claims is limited by the qualitative nature of the inquiry and scope of population studied. The instances in which quantitative analysis comes into comparative designs provide more strength, though there are few within the domain of information inequality.

A number of papers compare case studies, such as Zheng and Walsham (2008) and Gebremichael and Jackson (2006), which to an extent overcomes the limited generalizability concerns of many individual case studies, yet also allow for the differentiation between distinct patterns within cases which facilitates the development of hypotheses to be tested at the macro level. James (2011), for example, built upon comparisons between cases to test hypotheses that

there are two patterns within the global digital divide: one of convergence between and one of divergence within countries. The methods employed to scale the comparative approach will be discussed relative to statistical analysis.

Economic analysis, drawing on classical economic theory, could easily provide a mechanism to evaluate models of information dissemination, as outlined by Nilsen (2010), yet have rarely been used within this context. Specifically, in the way that examination of market failures has yielded insight into the adoption of new technologies (Schilling, 2002) or access to the Internet in Spain (Dabbah & Lasok, 2006) and consideration of labor markets has facilitated nuanced examination of exploitation in commercial profit from community content production on the social web (Ekbia, under revision), economic analysis can quantify what levels of public sector information access impact "general economic efficiency, commercial re-use, value adding, and revenue generation" (Nilsen, 2010, p.419).This is an approach that ought to be developed in future research.

Statistical analysis also provides distinct advantages in providing a macro level perspective on information inequality. Various scholars cite figures on access in describing and theorizing about the digital divide (e.g. Di Maggio, Hargittai, Celeste, & Shafer, 2004; Donner, 2008), without testing for causality or regressing outcomes against associated factors. James (2011) provides one of earliest examples in which relationships between vectors representing information inequality and another inequality were examined in relation to one another. Yang and Grabe (2014) provide a more recent and more sophisticated example in their experimental manipulation of information exposure and retention. They employed ANCOVA, as one-way analyses of covariance, with covariates for recall, comprehension, and recognition of exposure,

against exposure and exposure amounts, in an effort to illustrate the impact of the digital divide on the knowledge gap and vice versa.

Network analysis has also provided significant contributions to understandings of information inequality, beyond the theoretical contributions of conceptualizations of ICT interactions as sociotechnical interaction networks. Network studies have primarily been applied in one of two ways within this context: examining information flows (Barzilai-Nahon, 2009; Lu, 2007; Stanton-Salazar & Dornbusch, 1995) and examining how policies and politics shape information networks (Jensen, Danzinger, & Venkatesh, 2007; Robertson & Vatrapu, 2010). The advantages of this method include illustrating how information is distributed and why, as well as how intentional constraints, often in the form of policies, may fail to shape information distributions as intended. For example, policies often are intended to encourage open participation on the social web or with e-government initiatives, yet people often continue to interact with those more like them than with the community at large.

Policy analysis often compliments a variety of other approaches, as it facilitates detailed understanding of the rules and institutions that shapes decisions regarding and distributions for access. Jaeger (2007) for example not only examines policy prescriptions through detailed textual analysis, but also conducts a formal impact assessment. Content analysis (Soroka, 2012) and context analysis (Strickland & Hunt, 2005) present useful approaches for understanding policy, however it would likely be useful to conduct formal policy analysis based on designs employed within policy research (e.g. Scott & Garrison, 2011), rather than simply applying more general methods to achieve an understanding of information policy. Walby and Larsen (2012) do take a political science approach in addressing information policy issues; they present a detailed

description of the use of freedom of information act/access to information law requests as a method to obtain information about the implementation process.

There are a variety of advantages and disadvantages to each of these methods, within the context of information inequality analysis. Methods used in previous studies are appropriate for examining the local context, however few approaches have managed to match questions about information inequality in society at large. This is a distinct gap in approaches to this point.

2.4.2 Social Informatics Research

Social informatics, like information inequality, has largely depended on small, qualitative studies, throughout the history of the tradition, with the exception of network analysis. Past reviews of social informatics—notably including those by Sawyer and Eschenfelder (2002) and Robbin and Day (2006), as well as Fichman, Sanfilippo, and Rosenbaum (forthcoming)—have provided greater depth of analysis of methods within social informatics, as well as discussing the trends and limitations within this area of scholarship. For example, it is clear that there are no unifying methods within this work. Instead of reiterating past broad reviews, this brief section serves to highly specific approaches that are relevant and comparable to information inequality research. Major approaches that will be discussed within this section include: grounded theory designs, interviews, and network approaches.

Grounded theory approaches to research design have importantly led to the development of key SI theories, such as Allen's (2005) schema for enterprise resource planning (ERP) based on value conflicts and Goggins, Laffey, and Gallagher's (2011) theory of groups as socio-technical systems. Allen (2005) specifically employed ethnography, interviews, and documental

analysis in order to understand conflicts in design in a medium computing input hardware firm; through a participant observer approach, a rich understanding of the context was developed. Goggins, Laffey, and Gallagher (2011) used interviews and social network analysis within the cases they examined to understand how groups form and how members interact. These approaches leverage a variety of data gathering tools in order to support a design in which theorization comes from the context.

The use of interviews has also been pervasive in this domain. Goggins, Laffey, and Gallagher (2011) employed interviews to gather data for their grounded theory study. Courtright (2005) employed semi-structured interviews to examine the information needs of undocumented immigrants, with respect to public services and health care. From this data, networks were constructed to examine how information flowed within the bounded communities in which participants were embedded.

Network-centered methodologies have also grown in popularity, consistent with their employment in other domains of research. These works can be subdivided in a number of ways: general network analysis, actor network analysis, socio-technical interaction network (STIN) modeling, and information diffusion networks, as exemplified by those constructed by Courtright (2005). Blincoe, Valetto, and Goggins (2012) exemplify general adaptation of quantitative network analysis and visualization to explore proximity as an antecedent to coordination within organizational contexts. Contractor's work particular represents this tradition (e.g. Contractor, 2009; Contractor, Monge, & Leonardi, 2011).

Actor Network Theory, popular in social studies of science and socio-technical studies, has also been popular in social informatics. Davenport (2008) provides an example in which this theory guides network analysis in tandem with the novel ETHICS methodology for analysis.

ETHICS, as the effective technological and human implementation of computer systems is a sociotechnical framework to guide systematic analysis of interactions between people and ICT in the implementation process, which is a common focus within social informatics scholarship. Network analysis importantly supports this method in that it conceptualizes interactions in a way that can be systematically interpreted.

Socio-technical interaction network, or STIN, analysis provides a social informatics specific mechanism to explore networks of people and ICTs. Kling, McKim, and King (2003) employ STIN modeling to examine online professional communications as computer mediated scholarly communication. They argue that STIN provides a mechanism that more richly illustrates lifecycle and uses of online communities by explicitly illustrating how gatekeeping and integration issues define interactions and flow. Shachaf and Rosenbaum (2009) have applied STIN methods, in analyzing social reference, as has Meyer (e.g. Meyer & Kling, 2003; Gómez Cruz & Meyer, 2012), who has also contributed importantly to further developing the approach (Meyer, 2006).

It is important, also, to note with respect to design orientation, that distinct orientations exist: critical (Kling, 1994; 1996), normative (Lamb & Sawyer, 2005; Sawyer & Rosenbaum, 2000), and analytical orientations (Kling, 1996). The introduction of specific orientations in social informatics was significant because it structured social informatics work and legitimated different kinds of approaches and motivations in social informatics research. The critical orientation developed from the earliest social informatics impulses to challenge thin arguments about technology and computerization through robust empirically supported arguments (i.e. Kling, 1994; 1996). The analytical orientation sought to understand specific instances of sociotechnical interaction, in order to understand changes in progress (Kling, 1996).

Methodological approaches in social informatics have largely supported inquiry on the small scale, examining specific interactions between people and ICTs, however future analyses that employ critical orientations and examine patterns on a larger scale would benefit social informatics by allowing for more generalizable theorization.

2.5 Implications of the Review

This review sought to answer distinct questions about information inequality, yet the answers were bounded by the limited nature of research into information inequality generally, as opposed to information poverty or the digital divide, specifically, which have been explored to greater extent. Information barriers and inequalities require further attention. This final section of chapter 2 not only serves to summarize the review, but also to identify gaps and areas that are underdeveloped, connecting these points to tangential areas of research, in order to support future research.

Information inequality is the unequal distribution of information access—as availability, awareness, and ability—and infrastructure to support use and consumption of information and information technology. Information inequality is shaped by context and is universal; it is intricately linked with other forms of inequality, as economic, social, cultural, and political distributions impact both the context, as the information environment, and individuals in society. As a result of the complex information environment, policy constrains access to information in that policy makers allocate information according to preferences shaped in context. Information also impacts policy, in that preferences are informed by information flows. Furthermore, ICTs enable and constrain access to information by gatekeeping many forms of information, yet

information inequality also impacts technology, as ICT are designed and implemented based on unequal information flows. In this sense, social, political, and technological constraints on information access have significant impacts on distributions and use; efforts to provide information, as in public sector transparency or digital divide initiatives, cannot be expected to succeed without an encompassing effort to address all associated factors.

Future research to fill in gaps will provide more meaningful knowledge on which to base policy and organizational changes with respect to equality of information access and dissemination. Other scholars have called for attention to specific topics, including: e-government (McClure & Jaeger, 2008; Robertson & Vatrapu, 2010); political aspects of and interests associated with information (Jimenez-Martinez, 2006; Lievrouw & Farb, 2003); gatekeeping development (Barzilai-Nahon, 2009; Fisher & Julien, 2009); dynamics of policy and technological interaction impacting access (Jaeger, 2007); and network analysis of information behavior (Jensen, Danziger, & Venkatesh, 2007; Lu, 2007). However the gaps identified within this review span more broadly. Additional attention ought to be given to: creating coherent consensus on use of definitions, understanding information inequality as it relates to context through empirical analysis, theorization, and expansion of inquiry through the use of rigorous quantitative analysis.

Theoretically, Lievrouw and Farb (2003)'s horizontal and vertical inquiry, the unifying theory of information inequality by Meyer and Kraft (2000), and additional socio-political aspects of information ought to be applied to a greater extent. A variety of papers have suggested similar conceptions of information inequality, yet the absence of integrated perspectives or applications evaluating these theories limits the extent to which action can be taken to overcome disadvantage based on information inequality. While a variety of divisions have been identified

and there is strong evidence to suggest that certain political and institutional factors impact access, it is necessary to more specifically examine what impacts these factors have on equality of distributions in practice.

From a methodological perspective, there is a dearth of macro level inquiry in information inequality research, as well as in social informatics research in general. This is problematic in that assumptions about information inequalities have not been examined in general. Furthermore, while many causal claims have been made, the methodologies that have been employed do not support such strong claims and causal analysis is necessary to better elucidate the causes and consequences of information inequality.

While this research is sporadic and often more theoretical than empirical, there are important patterns that can be ascertained. Information inequality research specifically develops the work on unequal outcomes, winners and losers, and identity shaping impacts. Furthermore, through the integration of information inequality research and SI perspectives, scholarship can begin to posit how unequal beginning points shape embedded values in ICTs and information regimes. Both of these precepts have long been asserted by empirical social informatics research (Sanfilippo & Fichman, 2014); social informatics emphasizes that despite the optimistic and simple predictions of technological determinists, there are negative consequences at the expense of certain individuals and social groups, who are different from and less powerful than decision makers (Kling, 1999). Deterministic discourse often expects decisions regarding ICTs, and in this case access initiatives, to yield successful outcomes, when in fact many increase inequality; decision makers often fail to understand the needs of users who are not like them.

The reality of unequal outcomes when ICTs are introduced into particular contexts is one of the primary tenets of the social informatics perspective; technologies produce inequalities.

Placing this in a social context, within which there are existing social and political distributions, all stakeholders are not equally likely to be either winners or losers. The question thus becomes: how do ICTs impact socially and politically unequal information distributions and how do social and political institutions shape technological distributions? Furthermore, issues of identity should be considered in relationship to social construction of users in context, in order to fully understand how information, and ICT, inequality is experienced.

It can be anticipated that there is a relationship between this inequality and identity as users internalize and self-perceive based on access and context, including policy frames that place individuals in constructed target groups. Drawing on works, such as Hara's dissertation (2000) as previously discussed, which examined social construction of knowledge in concert with the identity shaping processes associated with ICT use in a professional community of practice, there is a logical expectation that similar processes occur in other types of communities. However, insufficient attention has been paid to identity issues associated with information.

Social reinforcing of inequality has been examined from many scholarly perspectives, including sociology and cultural anthropology (e.g. Morrison, 1993; Spradley, 1997). If it is accepted that "culture is acquired knowledge that people use to generate behavior and interpret experience" (Spradley, 1997, p.22), and knowledge acquisition is strongly shaped by life worlds (Chatman, 1991; 1996) and the information environment (Lievrouw, 2000), then unequal social contexts reproduce and reinforce inequality. This explains why inequality is entrenched (Sen, 1992) and disadvantage is difficult to escape (Bradbrook, et al., 2008).

Inequality is socially reinforced as unequal starting positions shape outcomes and separation increases with time when actions are not taken to counteract this trend through redistribution. Organizational socialization, "as the process whereby newcomers learn the

behaviors and attitudes necessary for assuming roles in an organization (Morrison, 1993, p.557), illustrates a participation gap that can be overcome through "technical, referent, normative, performance feedback, and social feedback information in order to master their jobs and become integrated into their organizations" (Morrison, 1993, p.559). In this sense, people perform in way that is consistent with organizational expectations and their interpretations of them. However, considering socialization more broadly, it could be expected that what has been observed in organizations also happens the same way in communities and society. In this sense, a lack of feedback between social groups, particularly between those advantaged and those disadvantaged, leads to highly distinct performances and stratified socialization.

Political reinforcing of inequality also occurs (e.g. Pieterse, 2002; Stunkel & Sarsar, 1994). Policies focus on poverty alleviation, as opposed to reducing inequality, and neoliberal ideologies drive domestic and international efforts in a way that benefits the status quo and hegemonic powers over actual improvement (Pieterse, 2002). Inequality between countries, in terms of standards of living and other economic indicators, as well as within countries, in terms of GDP and other economic indicators, grows in many contexts largely because those with the power to promote increased equity instead reframe issues in neoliberal and capitalist terms, thereby reinforcing their own privileges (Pieterse, 2002). In this sense, political rhetoric drives policy change and both impact inequality, with rhetoric reinforcing the perceived undeserving nature of the marginalized and policies reinforcing their positions (Ingram, Schneider, & Deleon, 2007; Schneider & Ingram, 1993).

Stunkel and Sarsar (1994)—in their expansive review of interactions between ideology, values, and technology that impact the political sphere—identify points of connection between

political and technical reinforcing of inequalities, particularly along lines of social stratification. They specifically argue:

> … poverty usually tends to be more powerless and confining than white poverty because of an intimate link between access to education and skills needed for technologically sophisticated jobs. Access … to forms of technology as consumers … is no substitute for mastering technology through marketable skills and productive labor. As technology develops and educational opportunity and facilities lag behind, closing the gap becomes more difficult. (Stunkel & Sarsar, 1994, p.22)

In this sense, technology is fundamentally tied to the economy and economic status strongly shapes political power, both at group and individual levels. Furthermore technical ability, as a dimension of information behavior, is impacted by political decisions and allocation of education, thereby tightly coupling these dynamic forces shaping inequalities.

Technological reinforcing of inequality is multifaceted, as it is a dynamic shaped both by the ICTs themselves and the use of ICTs (Johnson & Nissenbaum, 1995). Unequal uses of ICT exacerbate inequality and leave those disadvantaged even more so, however ICT offers rare opportunities to counter inequality (Bradbrook, et al., 2008). Inequality is technically reinforced as many initiatives simply provide technology or infrastructure, though not necessarily together, without coupling them with resources for use or education to develop the ability to use information technology or even recognize its availability (Bradbrook, et al., 2008).

Couple these dynamic forces in shaping inequalities with the existing distributions, discussed in chapter 2, and relationships between inequalities are suggested. These forces are local and global, perceived and relative; the marginalized often legitimize social status within subgroups delineated by other disadvantages, yet also experience marginalization within a large

context as changes occur at various levels (Haglund, 2005). Inequalities, in this sense, are macro-level and micro-level phenomena. Distributions are rarely uniform, but rather are unequal with normal variation in ranges and skew. Constant changes affect these distributions, yet many are entrenched, and cross sectional consideration of a variety of interacting distributions illustrates what Meyer and Kraft (2000) asserted with respect to information: inequality is experienced by everyone, context shapes experiences of inequality.

Issues of identity also importantly speak to the questions examined within this review. Because technologies impact social identities and constructions of groups, they shape unequal distribution of information based on existing social and information inequalities, thereby having reinforcing or wedging effects.

There is evidence that information technology affects professional identity, yet it would also be interesting to explore how access or technological barriers impact perceived self-worth or political identities of marginalized communities. In this sense, we improve understanding of how control empowers and shapes identities by examining the reverse; that is: if access to and control of ICTs positively impacts identity, does lack of access or control negatively impact it? In generalizing the scope, from information technology to information and in synthesizing this work with political construction of identity, through the Social Construction of Target Groups, a robust model of sociotechnical identity formation could be developed in which the inequalities that result from sociotechnical construction have implications on identity, as inequalities are internalized.

Identity formation "can only be understood as part of a larger cultural context" (Holeton, 1998, p.6). In this sense historical institutionalisms impact the construction process as significantly as personal experiences, which in contemporary society include computer-mediated

interactions. Holeton (1998) connects identity, including social and political facets, to how individuals interact with the people and world around them, and subsequently with how communities thus engage with information; everyone's identity formation is ongoing, yet identity informs how people aggregate and form communities and membership shapes knowledge seeking within the information society.

In this sense, identities are unequal (Erjavic, 2003; Goff & Dunn, 2004), as they are unique and shaped by both experience and context. Identities impact social and political participation (Mehan, 1993; Levinson, 1998; Stunkel & Sarsar, 1994), as general identities form political identities (Johnson, 1998; Mackenzie, 1978; Stunkel & Sarsar, 1994; Trucios-Haynes, 1997), which have bearing on participation. Who participates in political and civic affairs matters, as the interests of participants importantly shape access (Holeton, 1998; Phinney, Horenezyk, Liebkind, & Vedder, 2001).

Therefore, an understanding of information inequality must incorporate interdisciplinary theory on context, as well as on society. People are both products and shapers of their environments and, thus, people impact information distributions, directly and indirectly, within contexts. In aggregate, the literature suggests that policy, information technology, and complex aspects of context, including social, political, and cultural dimensions, impact information inequality. Furthermore, information inequality reciprocally shapes these factors.

As access is shaped in context, it becomes a sociotechnical construct. Those with social, economic, or political advantages, tend to have higher access to information, whereas those who are systematically disadvantaged are also disadvantaged in information distributions. This is particularly true within the context of public sector information and government information. Limited transparency and complex bureaucracy are difficult to navigate without resources to

leverage in obtaining information. Those who are disadvantaged often are unaware of information and are more often unable to use information, even if they could obtain it. Access is a function of awareness, ability to use, and availability, as well as being shaped by infrastructure. Use is also distinct from access, as even when possible, certain disadvantaged communities resist use due to perceived legitimacy differences, as explained in small worlds, or life worlds of outsiders (e.g. Chatman, 1996), and information poverty theory. This importantly compliments Social Construction of Target Groups Theory.

As individuals, as products of their environment, process information about other social groups, messages are clear spread, through the media and popular culture, classifying social groups in particular ways. Classifications often draw on particular demographic details, economic or educational status, and social and political dynamics. These groups thus judge themselves by these social constructions, which importantly shapes their individual identities. In this sense, their social and political participation is a product of self-identification based on the social context.

It is expected that information policy changes regarding access components or infrastructure would impact information inequality. Specifically, places with different policy constraints on information infrastructure or availability, will likely have different levels of information inequality. Access to information at the individual and societal levels may also be unequal due to transparency and disclosure differences, which would impact awareness, as differences in information literacy initiatives would impact abilities to use information. Instances where similar policy constraints may yield differences in information inequality may be attributable to other factors.

Differences in ICT use, access, and configuration, are also expected to impact information inequality. In this sense, as the digital divide is subsumed within information inequality, it is possible to explore how one type of information inequality may produce another. For example, in countries that offer e-government services, the digital divide may have a more significant impact on differences in public sector information access than in nations that rely on more traditional or analogue modes of information dissemination. This represents instances of within place information inequality that may differ relative to other contexts with similar digital equality. Furthermore, between places, differences in information inequality may result from differences in ICT use habits, such as reliance on mobile Internet access as opposed to use of traditional Internet browsers on computers.

Finally, as much of the digital divide literature asserts, economic and social inequalities are also expected to yield information inequality, along with political inequalities. Because these distributions differ across communities, states, and countries, it is likely possible to ascertain at a large scale across many contexts, how these variables cause changes in information inequality, rather than focusing on the digital divide specifically or interpreting the correlations between these factors as causation. It is important to better understand these relationships because many inequalities are entrenched and in order to overcome information inequality, or improve information equity, it is necessary to fully understand its causes, not simply its characteristics.

It would also be very interesting to attempt to explore, in detail, why places with relatively similar ICT, policy, and inequality distributions might have different levels of information inequality. In this sense, not only are the suggested relationships true, but so too are their converses and compliments. Determining any other causes of information inequality would be very valuable.

This review has aggregated models and conceptualizations of information inequalities to support an interdisciplinary perspective for future analysis, focusing on: interaction networks of stakeholders, interests, and types of transfers. It is also clear that information inequality has causes and consequences related to other unequal distributions.

3. Conclusions

On reviewing the literature about information inequalities in this context, it is clear that interest in some questions is well saturated with empirical and conceptual explanations. Barriers forming the structure of inequalities have been examined, identifying a variety of constraints and limiting informational factors; well-examined barriers include: access to ICT with respect to the digital divide, economic and financial causes of information inequality, and institutional constraints to access, including information policies. Information inequality research in recent decades has primarily been directed at the digital divide, yet there are more broad issues of critical importance.

Information inequality, as a concept, represents unequal distributions in information access and infrastructure, as they impact use and the potential to use socially and politically important information. Constraints on access and infrastructure produce unequal distributions of information. Information inequality is relative and context dependent, in that distributions vary by context, as do implications. In this sense, information inequality is a product of complex and highly unequal social, economic, and political contexts, and information inequality contributes to these distributions as information has social, economic, and political connotations.

Policies constrain and support access to information by formalizing terms of use, conditions of availability, and other factors that are intrinsic to the potential to use information, such as awareness and ability, through education and setting conditions which may require skills or knowledge. Information policies prescribe who can access and use information, how and when information can be used, and what information can be accessed or used. Because policies differentiate between users in ways that are context dependent, similar policies may in fact yield

differences in access, as do different policy constraints on information. Thus there is sociopolitical shaping of information inequality, as well as sociopolitical consequences.

ICTs also constrain access to information. This is in some ways a product of policy, in that policies often establish information access through particular information technologies, which themselves may not be equally accessible. More significantly, the complex implications of ICTs that support information access produce unequal outcomes explicitly because of embedded values within their design and implementation. ICTs often support the status quo and in highly unequal society this systematically increases disadvantage by preventing those who likely most need public sector or socially important information from getting the resources that they need, or in other words by decreasing opportunity. Sociotechnical shaping and consequences of information inequality are significant.

Information inequality is complex and constructed by a number of factors. The implications of information inequality for society are significant. It is also clear that there are a number of gaps to be further examined, such as: the sociotechnical nature of information inequality, interrelationships between social inequality and information inequality, and interrelationships between political inequality and information inequality. It is important to put information inequality in a larger societal context because while many qualitative studies of the digital divide have assumed there are various consequences relating to political, educational, social, and economic outcomes, there is insufficient empirical support for these assumptions. Information inequality is likely related to other inequalities in a complex, mutually reinforcing way, rather than through simple, linear causation.

As argued throughout, information plays a significant role in a functioning democracy, not least because it enables the traditional institution of elected government, but also because it

allows individuals to exercise their fundamental rights, ensure their interests are being represented within government, and to know that within their society the rights of all are protected.

Inquiries addressing this question, as well as more broadly investigating information inequality, are significant to Library and Information Science disciplines of Information Behavior, Information Policy, and Social Informatics, as well as interdisciplinary scholarship. These issues are also important to society in that we need to better understand the political impact of information inequality (Dervin, 1994). Information inequality research is practically relevant in that everyone is information poor by relative standards (Dervin, 1994; Meyer & Kraft, 2000) and when the causes and consequences of this form of inequality are better understood, decision-making can account for these factors so as to improve equity in information distributions.

Understanding information inequality is important because it is a concept with significant social, policy, and research implications. Information inequality is somewhat entrenched and is often assumed to be irrevocable, and therefore not worth attention, or non-problematic, as inequality is naturally occurring. However, these are limited interpretations of the problem. Information asymmetries are too often accepted because they are innate to interactions and decision-making at both the individual and the organizational levels, yet asymmetries in some types of information are actually problematic, such as public sector information. To participate fully in society, it is necessary that a certain level of information access be provided, as civic, political, and economic participation require information.

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