MISQ Research Curation on Information Systems Development

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Information systems development (ISD) has been a fundamental topic in *MISQ* from its first volume (Juergens 1977, Kling 1977).

1 Focus of the Research Curation

An early challenge for us in preparing this curation was that ISD was not defined precisely in any of the *MISQ* articles we reviewed, despite early recommendations to do so (Moore 1979, p. 31). The best definitions we could find tended to be mere descriptions of activities in the systems development life-cycle (Juergens 1977, Swanson 1989, Slaughter et al. 2006). To address this problem, we developed the following definition of ISD to focus the curation.

> *ISD is the entire suite of development activities (e.g., planning, analysis, design, building, testing, and maintenance) undertaken by agents (humans [individuals/ collectives] or software) to create a working information system. ISD is embedded in a social, organizational, and technical context with stakeholders who influence and are influenced by the ISD activities.*

For papers to be included in the curation, we did not require them to address every element of the definition. Nevertheless, we required them to match at least several elements of it. The definition focused our search and, in turn, our analysis of the papers helped us to refine the definition.

With this definition in mind, we examined the titles and abstracts of all *MISQ* articles. We identified 107 potentially relevant articles. We then removed six articles deemed only marginally relevant. Our final set comprised 101 articles that had a core focus on ISD.

Of the 107 articles, 67 articles were published from 1977-1999 and 34 from 2000 and 2021. We do not believe that the reducing publication rate reflects a reduction in ISD's significance. Rather, we believe it reflects the burgeoning of ISD-*related* topics covered in other *MISQ* curations, such as IT project management, IS control & governance, and IS sourcing). To minimize duplication among curations, we only include articles from those other curations in this curation if they make a core ISD contribution (e.g., Rai et al. 2009, Gregory et al. 2013, and Benaroch et al. 2016).

2 Progression of Research in *MISQ*

1977 to 1979|: Focus on ISD practices and techniques

The earliest papers focused on general ISD concepts, frameworks, and techniques. For example, researchers discussed the efficacy of concepts such as decoupling (Juergens 1977), heuristics (Berrisford and Wetherbe 1978), and team structures (Locander et al. 1979). Others focused on measuring ISD quality (Halloran et al. 1978) and learning how organizational strategy/process supports ISD (Moore 1979). Researchers also recognized users as critical actors in ISD (e.g., Kling 1977, Alter 1978, Schmitt and Kozar 1978, Senn 1978a,b; McLean 1979). Authors rarely used an explicit theoretical lens in early articles. Instead, they generally adopted a practitioner-informed lens.

1980s: Focus on organizational and managerial issues

ISD research in the 1980s centered on questions related to organizational problems and the opportunities provided by IS. During this time, ISD *methods* were generally seen as a 'must-have.'

We identified two areas of focus in the articles, both centered on methods. First, some articles examined existing methods, especially prototyping methods (Janson and Smith 1985, Kraushaar et al. 1985, Mahmood 1987). Other articles developed new methods and artifacts (Weber 2003) in what would later be referred to as the design science tradition (Hevner et al. 2004).

In essence, the method articles in this period unpacked the characteristics of the ISD life cycle (Necco et al. 1987), created an approach for managing large ISD efforts (Zmud 1980), and compared alternative models (Shomenta et al. 1983, Mantha 1987, King 1992) while also elaborating on significant factors that influence ISD, mainly that of the development environment and actors (Ahituv et al. 1984). This era closed with an article by Mantei and Teorey (1989) that elaborated on techniques for gathering human-oriented information to improve a system's human-computer interface.

Continuing from the prior era, articles in this era emphasized users as critical ISD actors. Some articles proposed and applied user-centered ISD approaches (Kozar and Mahlum 1987) and contingency models (Mann and Watson 1984; Tait and Vessey 1988) to theorize users' inputs. Others focused on communication patterns between users and analysts (Salaway 1987) and the distinctions between user participation and user involvement (Barki and Hartwick 1989).

Overall, ISD research in this period contributed to establishing an identity for the IS field (Benbasat and Zmud, 2003).

1990s: Focus on stakeholders and methods

The articles in this timeframe showed significant interest in users as stakeholders in ISD, e.g., Hunton and Beeler (1997), McKeen et al. (1994), Barki and Hartwick (1994), Newman and Robey (1992). Researchers also studied other stakeholders, such as top management (Newman and Sabherwal 1996), IS executives (Watson and Frolick 1993), and IS managers (Watson et al. 1991).

The growing interest in activities by ISD stakeholders resulted in articles examining specific aspects of ISD methods from the stakeholder perspective. Articles examined the use of metaphors for ISD activities (Kendall and Kendall 1993), how to tailor methods to meet organizational demands (Hirschheim and Klein 1994), and the need for completely new methods (Swanson et al 1991).

2000 - present: Focus on agility, complexity, and innovation in ISD

Compared to earlier periods, ISD articles in this period were more strongly informed by theory, more integrated with different, but related topics, and more diverse in empirical methods. Benefiting from the foundational work of previous years, these articles became more granular in their focus on specific aspects of ISD. The articles clearly specified a theoretical lens to develop and test hypotheses.

We identified four major evolutionary paths in the articles published after 2000.

First, we noted an evolution in the study of the ISD method itself. In prior eras, articles focused on presenting and developing ISD methods, motivated by the shortcomings of traditional methods and the lack of generally-accepted methods. Since 2000, the articles shifted their focus to the use of ISD methods in context. The studies examined the effective use and tailoring of ISD methods. For example, Iivari and Huisman (2007) examined method deployment as a function of organizational culture and Kudaravalli et al. (2017) outlined how ISD method choices regarding design decentralization and technical expertise impacted coordination outcomes.

A second evolution was the transition of ISD from being performed within organizations to being undertaken outside organizations through outsourcing and Open Source Software (OSS) development. The outsourcing articles highlighted new phenomena that arise in outsourced contexts, such as relational factors that influence the success of outsourced ISD projects (Rai et al. 2009), obligations of stakeholders in outsourcing relationships (Ågerfalk and Fitzgerald 2008), the need for control

balancing in offshored ISD projects (Gregory et al. 2013), and optimal allocation of intellectual property rights (Chen et al. 2019). The OSS articles sought to understand the radically new way of developing software by engaging a broader community of developers (Fitzgerald 2006). Stewart and Gosain (2006) examined the effectiveness of OSS development, Daniel et al. (2018) examined ideological differences in the OSS community, Maruping et al. (2019) examined the personal values of OSS developers, and Tang et al. (2020) studied how OSS projects absorb external knowledge.

A third evolution saw a strong interest in the link between ISD work and ISD stakeholders in the organizational processes. These articles integrated research areas that were previously examined in isolation. Through this integration, a stronger cumulative record of ISD research in organizations emerged. For instance, Ravichandran and Rai (2000) studied how organizational stakeholders improve system quality through the design of the ISD process. In addition, articles examined the ISD team as an important stakeholder. They investigated team characteristics in terms of autonomy (Lee and Xia 2010, Ramasubbu and Bardhan, 2021), knowledge/expertise (Amstrong and Hardgrave 2007, Hahn and Lee, 2021, Kudaravalli et al. 2017), programming method (Balijepally et al. 2009), ideology (Stewart and Gosain 2006), and work attitude/behavior (Ang and Slaughter 2001).

A fourth evolution was the transformative nature of ISD methods from the traditional waterfall model to agile methods. The publication of the Agile Manifesto in 2001 was a watershed moment, and agile methods quickly became a reference point for IS researchers studying ISD in context. Researchers focused on how the ISD process had evolved from being standardized and pre-planned to being flexible and adaptive. In particular, Lee and Xia (2010) investigated the effect of team characteristics (autonomy and diversity) on ISD agility, Balijepally et al. (2009) compared the agile practice of pair programming in terms of its efficacy for individual programmers, and Maruping and Matook (2020) theorized different roles of customer representatives in agile ISD projects to explain the tension of assisting with ISD inputs while assessing ISD outputs.

The theories adopted in these articles were drawn from different disciplines, including economics (e.g., property rights, transaction cost economics), psychology/sociology (e.g., role theory, social networks, interpersonal conflict theory), and management (e.g., institutional theory, innovation).

3 Thematic Advances in Knowledge

Our analysis of the *MISQ* articles identified three tightly integrated research themes:

- ISD stakeholders – human actors directly and indirectly involved in ISD activities
- ISD processes – planned and ad hoc activities undertaken to create ISD outputs
- ISD outputs – tangible and intangible outcomes of the ISD process

Table 1 presents detailed information about the articles published since 2000. Table 2 summarizes the historically important insights offered by the articles published from 1977 to 1999.

ISD stakeholders

The first major thematic advance focused on ISD stakeholders, including managers, users, teams, and communities. *Managers*, such as top management, IS executives, and IS managers, were of interest because their decision-making authority, knowledge, and attitude can support or impair ISD (Newman and Sabherwal 1996**)**. They function as gatekeepers or champions for ISD.

Users are important stakeholders as they have vested interest in ISD outputs. Thus, articles examined user-related problems, including user participation (Barki and Hartwick 1994), communication challenges between analysts and users (Newman and Robey 1992; Salaway 1987), and the tension between serving as users and customer representatives in agile ISD (Maruping and Matook 2020).

The *ISD team* is another essential stakeholder. Of particular interest were the interactions of the team with other stakeholders and their responses to uncertainties and change. Articles examined cross-

domain knowledge (Hahn and Lee 2021), responses to requirement changes (Lee and Xia 2010), and differences between contract developers and permanent developers (Ang and Slaughter 2001).

The *OSS community* is an increasingly significant stakeholder (Tang et al. 2020; Vlaar et al. 2008). Originally conceptualized as a voluntary contribution of gifted hackers, OSS came to be seen as a mainstream commercial ISD approach (Fitzgerald 2006). Researchers especially focused on OSS developers, including their motivations (Von Krogh et al. 2012), commitments and contributions (Daniel et al. 2018), and value system (Maruping et al. 2019).

ISD processes

The second major thematic advance focused on ISD processes, and especially ISD methods. In particular, researchers compared methods, such as evolutionary vs. revolutionary methods (Sircar et al. 2001), and investigated method practices, such as prototyping (Baskerville and Stage 1996), ISD metaphors (Kendall and Kendall 1993), and pair programming (Balijepally et al. 2009). Researchers also developed new method elements (Swanson et al. 1991), and examined the tailoring of existing methods (Hirschheim and Klein 1994).

Other articles enhanced our understanding of ISD method-in-use by studying how ISD methods are applied in real-world projects. For example, Malinova and Mendling (2021) examined how diagrammatic models (an applied aspect of an ISD method) aided analysis and design. Others studied the interplay of ISD methods with internal organizational aspects such as culture (Iivari and Huisman 2007) and method learning in offshoring and outsourcing (Ramasubbu et al. 2008).

A smaller set of articles focused on organizational aspects of ISD processes. In particular, researchers examined how ISD stakeholders' mutual understanding changes over time (Jenkin et al. 2019), how ISD expertise is coordinated (Kudaravalli et al. 2017), how organizational quality systems can support ISD (Ravichandran and Rai 2000), and how ISD processes can span organizational boundaries, whether creating obligations, as they do in outsourcing relationships (Ågerfalk and Fitzgerald 2008), or motivating the need for the bridging of those boundaries (Holmström Olsson et al. 2008).

ISD outputs

The third major thematic advance focused on ISD outputs, especially systems characteristics and ISD performance. First, some articles studied the characteristics of the IS, in terms of reusability of software components (e.g., Apte et al. 1990; Jiang et al. 2019), systems reliability (Halloran et al. 1978), systems maintainability (e.g., Dekleva 1992; Swanson and Beath 1989), and systems complexity (Hahn and Lee 2021).

Second, several articles investigated various factors affecting ISD performance in terms of process performance (on-time and on-budget completion) and product performance (systems quality and user satisfaction). The factors studied include technical and process skills (White and Leifer 1986), ISD teams' autonomy and diversity (Lee and Xia 2010), interpersonal conflict (Barki and Hartwick 2001), and attributes of cognitive systems (Mangalaraj et al. 2014).

4 Conclusion

MISQ has published many of the most influential ISD papers. Going forward, ISD researchers must keep up with, and ideally help shape, emerging ISD trends. These include the increasing use of microservices and platforms, the rise of artificial intelligence (AI), the emergence of DevOps, and the increasing complexity of ISD interdependencies (e.g., human-hybrid models). We believe the requirements for responsible ISD and ethical IS will be particularly important. Overall, the focus needs to shift from studying ISD per se, to studying ISD with a larger impact in mind, such as delivering on long-term sustainable development goals.

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Table 1. MISQ Articles on Information Systems Development (2000-2021)

No	Paper	Contribution to our understanding of ISD (insights)	How ISD was studied, or what is the focus	Theoretical Stance	Research approach	Theme
34	Ramasubbu, N. and Bardhan, I. (2021)	An organizational policy that provides higher levels of autonomy for software teams engenders performance-enhancing adaptations through agile reconfigurations of project operations.	Focus on team autonomy and agile reconfigurations of project operations	Configurational perspective	Field experiment (project-level data spanning a four-year observation)	Stakeholder (ISD team) Method -- Agile methods in ISD
33	Hahn, J. and Lee, G. (2021)	ISD performance is higher when cross-domain knowledge is unevenly distributed across business and IS units and when its distribution pattern matches the pattern of the design interdependencies.	Focus on the effect of cross-domain knowledge on ISD performance under varying levels and patterns of design element interdependencies	Domain knowledge, ISD complexity	Simulation-based theory building	Stakeholder (ISD team) IT artifact focus - design interdependency
32	Malinova, M. and Mendling, J. (2021)	Develops a theoretical cognitive framework for task performance with diagrams; organizes criteria for effective cognitive processing of diagrams; investigates how diagrams support the SAD processes.	Focus on a diagrammatic model for systems analysis and design	Cognitive theories	Theory and literature review	Method - application of ISD methods
31	Maruping, L. M., and Matook, S. (2020).	ISD customers' assisting and assessing are simultaneously conflicting and complementary, and theorize six customer roles (trigger, behavior, response) that master the tension.	Focus on the ISD customer involvement and participation in the ISD tasks by balancing assisting and assessing responsibilities of customers in ISD	Role theory	Qualitative study of multiple teams in two Australian companies. Data analysis based on theorizing for inductive cases study design.	User Related participation / involvement / satisfaction Method – Agile methods in ISD
30	Tang, T. Y., Fang, E. E., and Qualls, W. J. (2020).	External knowledge absorption in Open-Source Software (OSS) development projects works in two ways: OSS projects with broad internal knowledge (breadth) absorb effortlessly from close contacts (network depth-closeness centrality); OSS projects with specialized internal knowledge (depth) absorb easily from many contacts (network breadth-degree centrality).	Focus on the success of Open-Source Software (OSS) development projects by linking network characteristics (network depth and breadth) to a project's ability to absorb external knowledge	Social network theory enriched with an absorptive capacity perspective	Quantitative study collecting longitudinal data from SourceForge. Analysis used social network analysis (closeness centrality) and other measures (Herfindahl index, regression, slop analysis). Further, a simulation analysis was done.	Stakeholder (IS managers, top management)
29	Jenkin, T. A., Chan, Y. E., and Sabherwal, R. (2019).	Mutual understanding (represented by sense-making and sense-giving) is impacted by project management mechanisms that are more effective with stakeholder engagement and cross-project learning.	Focus on how mutual understanding among ISD stakeholders changes over time within projects and across projects	Theoretical framework based on cognitive theory (sense-making and sense-giving) enriched with control theoretical concepts	Quantitative and qualitative study of multiple teams in two North American companies. Data analysis based on theorizing for inductive cases study design.	Stakeholder (IS managers, top management) Organizational process/ approach/ strategy
28	Maruping, L.M., Daniel, S.L., and Cataldo, M. (2019).	Congruence and incongruence in values between OSS developers and the OSS community, as well as the structural position of developers in the OSS network, impact the developers' commitment to the OSS and their code contributions.	Focus on personal value and network position of developers in OSS	Uncertainty reduction theory and Person-Environment (P-E) fit perspective	Survey study and archival data from 410 developers in the GNOME OSS community. Data analysis with polynomial regression analysis.	OSS and outsourcing/offshoring Organizational process/ approach/ strategy
27		A misfit of developer ideology with their company and their community impacts on the developers'	Focus on ideology of developers in OSS	Self-Determination Theory and Person-	Survey study and archival data from 186 developers in the GNOME OSS	OSS and outsourcing/offshoring

	Daniel, S.L., Maruping, L.M., Cataldo, M., and Herbsleb, J. (2018).	commitment to the OSS community and their code contributions.		Environment (P-E) fit perspective	community. Data analysis with polynomial regression analysis.	Organizational process/ approach/ strategy
26	Chen, Y., Bharadwaj, A., and Goh, K. Y. (2017)	Sharing of intellectual property rights can be considered as a bundle of ownership and usage rights and depends on the vendor's bargaining power, asset-specificity, and the degree of uncertainty. Study shows that most often, clients (49-61%) hold sole ownership, joint ownership is least common (11%-15%), and vendors sometimes hold sole ownership (28-37%). Usage rights may include rights to sell software.	Focus on the allocation of intellectual property rights between vendors and clients in software development outsourcing projects	Property rights theory	Quantitative study collecting longitudinal data from U.S. Securities and Exchange Commission enriched with data from ICC full-text annual reports for international company profile.	Stakeholder (IS managers, top management) OSS and outsourcing/offshoring
25	Kudaravalli, S., Faraj, S., and Johnson, S. L. (2017).	The impacts of centralization of design and technical collaboration on team coordination success depend on the type of expertise. Particularly, (1) centralized design expertise increases team conflict, centralized technical expertise decreases team conflict when tacit knowledge is in demand, and (2) coordination success has a negative relationship with design collaboration centralization and a positive one with technical collaboration centralization.	Focus on how to coordinate expertise in ISD	Coordination literature with a focus on expertise	Quantitative cross–sectional survey. Analysis with hierarchical regression.	Organizational process/ approach/ strategy Stakeholder (ISD team)
24	Benaroch, M., Lichtenstein, Y., and Fink, L. (2016).	Transaction cost balance can be achieved through optimizing the combination of different individual contract functions capturing contract extensiveness in ‘time and material’ (TandM) contracts (type). Contract complexity, contract uncertainty, and vendor familiarity are related to the extensiveness of a (TandM) contract, while knowledge specificity is not.	Focus on balancing ‘ex ante’ and ‘ex post’ transactions costs in software development outsourcing contracts through choices on how to design the contracts	Transaction cost economics enriched with ideas from agency theory, knowledge-based view, relational exchange theory	Quantitative using an archival dataset. Analysis was done with different forms of regression (OLS, SUR).	Organizational process/ approach/ strategy OSS and outsourcing/offshoring
23	Ramasubbu, N. Anandhi Bharadwaj and Giri Kumar Tayi (2015)	Software process diversity is a three-dimensional concept of separation (which ISD method practices are used), variety (how extensively ISD method practices are used), and disparity (extent of resources allocated to the ISD method practices) to conceptualize differences in ISD methods.	Focus on defining the concept of software process diversity to detail in practice use of plan-driven or agile methods	Organizational diversity literature from management	Multi-method design using focus groups, interviews, and archival data. Analysis used multiple techniques, including standard deviation-based measurement, Blau’s index, variation coefficients, SUR regression.	Organizational process/ approach/ strategy Method – Agile methods in ISD
22	Mangalaraj, G., Nerur, S., Mahapatra, R. and Price, K.H. (March 2014	Design patterns enable correct designs faster (better software quality, shorter completion times). When comparing design outputs of ‘pairs’ versus ‘second best,’ it shows that using design patterns raises the performance of the ‘second best’.	Focus on using design patterns in pairs of developers to improve ISD processes	Distributed cognition theory	Quantitative using a factorial experimental design. Data analyzed with multivariate analysis techniques (MANCOVA, ANCOVA).	IT artifact focus – maintenance and reusability (quality of a design solution, time taken to complete a design task)
21		Control balancing can be achieved through control configurations using authoritative, coordinated, and	Focus on offshoring ISD projects and their need for control balancing	Control theory literature	Qualitative using a longitudinal, single case across two countries (a German	Method – Application of ISD method

	Gregory, R. W., Beck, R., and Keil, M. (2013).	trust-based control. The configurations mix mechanisms of control type, degree, and style.	to deepen client-vendor shared understanding		bank offshoring to India). Data analysis based on grounded theory.	OSS and outsourcing/offshoring
20	Von Krogh, G., Haefliger, S., Spaeth, S., and Wallin, M. W. (2012).	The proposed motivation–practice framework depicts how the social practice and its supporting institutions mediate individual motivation and outcome in OSS development. The framework contains three theoretical conjectures and six propositions that seek to explain how collectively-elaborated standards of excellence prompt developers to produce high-quality software, change institutions, and sustain OSS development.	Review of prior research on the motivations of developers to open-source software development in terms of the values of the social practice	MacIntyre's theory on social practice, motivation, and institution	Literature review of 40 articles	Stakeholder (community) OSS and outsourcing/offshoring
19	Lee, G., and Xia, W. (2010).	Team autonomy has a positive effect on response efficiency and a negative effect on response extensiveness, and team diversity has a positive effect on response extensiveness. There is a tradeoff between response extensiveness and response efficiency. Response efficiency positively affects all of on-time completion, on-budget completion, and software functionality, whereas response extensiveness positively affects only software functionality.	Team characteristics affecting software development agility	Theories on agility, autonomy, and diversity	Multi-methods including a cross-sectional survey with 399 managers and 10 mini case studies	Method – Agile methods in ISD Output focused (productivity, software quality) in organizations
18	Balijepally, V., Mahapatra, R., Nerur, S., and Price, K. H. (2009).	Programming pairs performed at the level above the second-best performers and the level of the best performers in each nominal pair. Programming pairs reported higher satisfaction levels than those of the best and second-best performing members in nominal pairs.	Efficacy of pair programming used in Extreme Programming compared to individual programmers	no specific theory	Lab experiment with 122 student subjects	Method – Agile methods in ISD Stakeholder (ISD team)
17	Rai, A., Maruping, L.M., and Venkatesh, V. (2009)	Project cost overruns are reduced, and client satisfaction increases with higher levels of information exchange, joint problem solving, and trust. Success is also dependent on customer representation in the project.	Focus on the role of social embeddedness and cultural characteristics on the success in offshoring ISD projects	Agency theory, social embeddedness, and relational theory	Field study of 155 offshoring projects with 22 project leaders, data analyzed with hierarchical linear modeling (HLM)	OSS and outsourcing/offshoring Organizational process/ approach/ strategy
16	Ramasubbu, N., Mithas, S., Krishnan, M. S., and Kemerer, C. F. (2008).	Investments in structured processes mitigate the negative effects of work dispersion in offshore software development. The effect of software process improvement initiatives is mediated through investments in process-based learning activities.	Effect of software process investments and process-based learning on productivity and quality in offshore software development	Organizational learning, contextualization, and institutionalization of organizational processes	Audit database of 42 offshore software development projects	Method – Application of ISD method OSS and outsourcing/offshoring
15	Ågerfalk, P. J., and Fitzgerald, B. (2008)	Both customers and the community have clearly defined obligations, albeit largely different ones. For example, customers must take project ownership, whereas the community must show a responsible and innovative attitude, while both need to create a sustainable ecosystem.	Focus on obligations of customers and communities in successful open sourcing relationships	Psychological contract theory	Revelatory case study of three project sites (Celtix), enriched with interview data from the DVTk and Morfeo project. Analysis done by open and axial coding. Analytical memos to identify patterns and themes	OSS and outsourcing/offshoring Organizational process/ approach/ strategy

14	Holmström Olsson, H., Conchuir, E. O., Ågerfalk, P. J., and Fitzgerald, B. (2008)	Two-stage offshoring is dependent on the gestalt of team integration, organizational level implementation, and site hierarchy.	Focus on understanding the dual role of companies in offshoring relationships as clients and vendors	Relational exchange theory	Revelatory case study of two large global companies, headquartered in the US with a focus on their Irish sites, Data: 22 interviews, 4 workshops, 2 formal meetings, e-mails. Analysis used comparative analysis with open, axial coding.	OSS and outsourcing/offshoring Organizational process/ approach/ strategy
13	Vlaar, P. W. L., Fenema, P. C. V., and Tiwari, V. (2008).	Knowledge and experience asymmetries, and requirements and task characteristics (such as complexity, instability, ambiguity, and novelty) are postulated to prompt onsite and offshore team members to engage in acts of sense-giving, sense-demanding, and sense-breaking. This allows them to make sense of their tasks and their environment, and it increases the likelihood of the emergence of congruent and actionable understandings and the co-creation of novel understandings.	Distributed ISD workers' sense-giving, sense-making, sense-demanding, sense-breaking, shared understanding, and value co-creation.	The literature on distributed work, offshore ISD, understanding, and communication	Case study of a geographically distributed ISD project	Method – Application of ISD method OSS and outsourcing/offshoring Stakeholder (community)
12	Kappos, A., and Rivard, S. (2008).	Culture influences the ISD process and moderates the relationship between the ISD process and the characteristics of the IS.	Interplay between culture and ISD process	Three perspectives on culture: integration, differentiation, and fragmentation	Literature review of 56 articles	Method – Application of ISD method
11	Armstrong, D. J., and Hardgrave, B. C. (2007).	Software developers have higher knowledge scores on the OO concepts they perceive as novel or carryover compared to those they perceive as changed. Thus, developers experience detrimental interference from their existing traditional software development knowledge structure when learning OO software development.	Mind shifts for software developers transitioning from traditional to object-oriented (OO) software development	Mindshift learning theory	Cross-sectional survey with 81 software developers	Method – Application of ISD method Stakeholder (ISD team)
10	Iivari, J., and Huisman, M. (2007).	The deployment of methodologies by IS developers is primarily associated with a hierarchical culture oriented toward security, order, and routinization.	Relationship between organizational culture and the deployment of ISD methodologies.	Competing Values Model of organizational culture	Cross-sectional survey with 234 IS developers	Method – Application of ISD method
9	Slaughter, S.A., Levine, L. Ramesh, B. Pries-Heje, J., Baskerville R. (2006)	IS strategy research is focused on a macro level. For software development, more micro/operational level analysis is needed. Software process alignment depends on how a firm competes. The variety of product requirements (product characteristics, customer volume, and business unit strategies) are crucial in determining the type of software processes to be deployed.	Alignment of software development processes with firm's business unit strategies in the context of Internet application development	Porter's competitive forces strategic model	Case studies in nine firms (from 20 - 100k employees). Semi-structured interviews with 45 employees	Organizational process/ approach/ strategy Method – Application of ISD method
8	Stewart, K. J., and Gosain, S. (2006).	Ideological tenets are important to the effectiveness of OSS development teams by supporting trust and communication quality in the teams. Interesting that adherence to some ideological components was beneficial to team effectiveness in attracting and retaining input but detrimental to team output.	Importance of ideology in OSS development teams, given the absence of formal controls.	Ideology, Trust (affective and cognitive)	Surveys (x2) on Sourceforge. Survey 1 18 respondents helped develop Survey 2 with 67 respondents	Method – ISD method focus OSS and outsourcing/offshoring Stakeholder (community)

7	Fitzgerald, B. (2006)	Open-source development has metamorphosed as a purposive ISD life cycle model for complex products and visible ISD applications, supporting value-added and market-creating services, with paid licensing.	Focus on the conceptualization of open-source software	Technological transformation theory (Tushman and Andersen, 1986)	--	OSS and outsourcing/offshoring Method – Application of ISD method
6	Lyytinen, K., and Rose, G. M. (2003).	In the Internet computing context, strong evidence for Conjecture A (system development trajectories significantly departed from past practices Software delivery times expected to be shortened by a factor of four or more) and Conjecture B (companies experienced a profound change in the services being demanded and built).	Innovations in systems development due to Internet computing	Industry innovation (Christensen 1992; Teece 1986), IS innovation (Swanson (1994) and radical innovation (Zaltman et al. 1977)	Analysis of textbooks and professional literature between 1998 and 2002 for internet computing development practices. Multisite case study in 8 organizations	Method – Application of ISD method Output focused (productivity, software quality) in organizations
5	Ang, S., and Slaughter, S. A. (2001).	Contractors are perceived as less loyal and trustworthy than permanent staff. Contractor jobs are low in task variety, identity, significance, autonomy, and feedback relative to permanent staff. Due to how organizations design contractor work. They tend to under-employ contractors and unwittingly broaden the job scope and responsibilities of permanent staff.	Work attitude, behavior, and performance of contractors vs. permanent IS developers	Social exchange/social comparison	Survey plus interviews	Stakeholder (ISD team) Organizational process/ approach/ strategy
4	Sircar, S., Nerur, S. P., and Mahapatra, R. (2001).	The conceptual shift from a structured to an OO systems development approach during analysis and design is considered architectural, whereas for programming, it is deemed merely incremental. Architectural change is more relevant and succinct for OO development than the notion of revolutionary or evolutionary change.	OO v Structured SDMs as evolution or revolution. Architectural change v incremental change	Henderson (1996) framework for technical change	Author co-citation analysis used. Factor analysis and cluster analysis to identify five factors (topics)	Method – ISD method focus
3	Barki, H., and Hartwick, J. (2001).	Interpersonal conflict reflects disagreement, interference, and negative emotion. It negatively affects ISD outcomes, despite conflict management and resolution.	Relationship between interpersonal conflict, management of the conflict, and ISD outcomes for developers and users	Interpersonal conflict (Thomas 1992)	Survey of 265 IS staff and 272 users working on 162 ISD projects. SEM analysis	Method – Application of ISD method Output focused (productivity, software quality) in organizations
2	Ravichandran, T., and Rai, A. (2000).	Adoption of individual quality management practices is not effective. Holistic organizational system of quality needed with stakeholders influencing the design of the development processes.	Quality improvement in systems development	Quality management literature to define a model of organizational system for quality improvement.	Survey of Fortune 1000 companies and large government agencies. 123 usable responses. PLS analysis	Stakeholder (IS managers, top management) Organizational process/ approach/ strategy
1	Cooper, R. B. (2000).	Comparison between IT development “theory” and creativity theory. Creativity is not natural to organizations but can be fostered by manipulating various group and individual characteristics.	Creativity during IT requirements and logical design phase in the development of imaging system	Creativity theory from interactional psychology (Woodman et al. 1993)	Case study - interview with 15 employees	Organizational process/ approach/ strategy Method – ISD method focus

Table 2. MISQ Articles on Information Systems Development (1977-1999) [papers with author names in bold have 300+ Google citations on 4 July 2021]

No	Paper	Historically important insight	Coding theme
67	Wastell 1999	ISD failure may happen because people resort to defense-avoidance behaviors and disengagement.	Output focused (productivity, software quality) in organizations
66	Nidumolu and Knotts 1998	Software firms preserve competitive performance (process flexibility and predictability) through increased customizability of the software solution, but not component reusability.	Output focused (productivity, software quality) in organizations
65	**Hunton and Beeler 1997**	User participation in ISD is effective when users perceive some level of control over ISD decisions.	User Related participation / involvement / satisfaction
64	**Newman and Sabherwal 1996**	Top management commitment impacts the success of an ISD project, with project factors being important for initial commitment while psychological, social, and structural factors impact commitment in later project stages.	Stakeholder (IS managers, top management)
63	Baskerville and Stage 1996	A risk management approach increases use scenarios for prototyping in organizations.	ISD process (prototyping focus)
62	McKeen et al. 1994	User satisfaction is a function of user participation, influence, and communication gaps to developers. However, it is moderated by the complexities of the task and the system.	User Related participation / involvement / satisfaction
61	Finlay and Mitchell 1994	ISD methods are CASE tools that lead to improvements of ISD outputs regarding quality and earlier software delivery.	Method – CASE tools
60	**Hirschheim and Klein 1994**	Tailoring approach for ISD methods to incorporate emancipatory principles based on the understanding of ISD being a social process	Method – ISD method focus
59	**Orlikowski 1993**	CASE tool use can lead to different ISD experiences because of varied change processes, organizational contexts, and involved key players.	Method – CASE tools
58	Barki and Hartwick 1994	Development of a measure of user participation with three subscales of responsibility, user-IS relationship, and hands-on activities	User Related participation / involvement / satisfaction
57	Lawrence and Low 1993	User satisfaction with a newly developed system is achieved via user groups that feel involved, understand the system's objectives, receive training, and are provided with system documentation.	User Related participation / involvement / satisfaction
56	Watson and Frolick 1993	Methods for determining executive IS requirements are unsuccessful due to time constraints of executives, inaccessibility, and misunderstandings of informants, and inability to articulate information needs.	Stakeholder (IS managers, top management)
55	Kendall and Kendall 1993	Seven metaphors (journey, game, society, machine, family, zoo, and jungle) are found in systems development methodologies. These metaphors help analysts see the systems development process in a different way.	Method – ISD method focus
54	Dekleva 1992	Modern ISD methodology decreases maintenance time spent on emergency error correction and the number of system failures.	IT artifact focus – maintenance and reusability
53	Newman and Robey 1992	Established relationships between analysts and users will persist unless critical encounters change the trajectory of the ISD project.	User Related participation / involvement / satisfaction
52	Swanson et al. 1991	Describes the relationships between technology, management, methods, and design approaches that comprise an ISD approach named the Application Software Factory	Method – ISD method focus
51	**Watson et al. 1991**	IS managers often initiate the development of an EIS (Executive Information System) and serve as its operational sponsor.	Stakeholder (IS managers, top management)

50	Banker and Kauffman 1991	ICASE (Integrated Computer-Aided Software Engineering) increases software development productivity by increasing software reusability.	Method – CASE tool
49	Apte et al. 1990	Applying the reusability concept to all stages of the ISD life cycle results in both strategic and operational benefits.	IT artifact focus – maintenance and reusability
48	Karimi 1990	An asset-based ISD approach facilitates software reusability by developing information assets designed to be reused.	Method – ISD method focus
47	Swanson and Beath 1989	System maintenance should be given proper emphasis and strategic recognition in an IS organization.	IT artifact focus – maintenance and reusability
46	Mantei and Teorey 1989	The ISD life cycle should incorporate various techniques that facilitate the gathering of human-oriented information to improve the human-computer interface of the system.	Method – ISD method focus
45	Barki and Hartwick 1989	User participation (behavioral) and user involvement (psychological) state are differentiated.	User Related participation / involvement / satisfaction
44	Tait and Vessey 1988	Applies contingency theory to study the effect of user involvement on system success. High complexity and constraints on resources negatively affect system success	User Related participation / involvement / satisfaction
43	Necco et al. 1987	Analyzes the use of current ISD approaches (SDLC, structured, prototyping, info center) in practice and suggests key factors for improvement	Method – ISD method focus
42	Mantha 1987	Compares data flow and data structure modeling and finds that data structure modeling produces a greater number of entity views and attributes	Method – ISD method focus
41	O'Keefe and Wade 1987	Case study of the use of an application generator approach to developing a system	Method – ISD method focus
40	Mahmood 1987	Compares SDLC and prototyping and concludes that each suited to different development contexts	Method – ISD method focus
39	Salaway 1987	User-analyst communication is problematic in the traditional approach. A new approach based on organizational learning interaction methodology by Argyris and Schon	User Related participation / involvement / satisfaction
38	Kozar and Mahlum 1987	User-generated IS development approach, based on chief developer approach supported by users	User Related participation / involvement / satisfaction
37	Houdeshel and Watson 1987	Management information and decision support (MIDS) system success factors: senior executive sponsor, carefully defined systems, and information requirements	Output focused (productivity, software quality) in organizations
36	White and Leifer 1986	ISD success factors as perceived by team members include communication and technical and process skills, but not user involvement	User Related participation / involvement / satisfaction
			Output focused (productivity, software quality) in organizations
35	Janson and Smith 1985	Identification of prototype types for a variety of purposes to be integrated into different stages of the systems development life cycle	Method – ISD method focus
34	Kraushaar and Shirland 1985	Creation of a prototyping development method that integrates user and designer experience to provide on-time and within-budget IS	Method – ISD method focus
33	**Doll 1985**	Guidelines on how to effectively manage the involvement of top management in ISD (e.g., mutually agreed priorities, use of steering committee)	Stakeholder (IS managers, top management)

32	Meador et al 1984	Creation of a development life cycle model for decision support systems based on a 13-stage tactical development plan	Method – ISD method focus
31	Meador and Metzger 1984	Evaluation framework for selecting a set of decision support systems improve the organizational effectiveness and productivity.	Method – ISD method focus
30	Ahituv et al. 1984	Suggest that the IS development life cycle is project-dependent and influenced by factors from the project environment and development effort	Method – ISD method focus
29	Mann and Watson1984	Creation of a user involvement contingency model for the development of decision support systems	User Related participation / involvement / satisfaction
28	Rivard and Huff 1984	User-developed applications (UDA) are expected to reduce both development backlog and maintenance workload. Not reported empirically. Rather user satisfaction with systems was the greatest concern.	User Related participation / involvement / satisfaction
27	Zmud 1983	Enabling innovation in ISD teams through information channels that have resource commitments (internal training) and reference sources	Stakeholder (ISD Team)
26	McKeen 1983	Performing detailed systems analysis improves the ISD process (less coding time) and outcomes (user satisfaction, budgets, and deadlines)	Output focused (productivity, software quality) in organizations
25	Shomenta et al. 1983	An evaluation tool for matching a proposed application with the most appropriate development method	Method – ISD method focus
24	Naumann and Jenkins 1982	A four-step process model and resource requirements for prototyping for ISD	Method – ISD method focus
23	Naumann and Palvia 1982	A selection model consisting of quantitative and qualitative evaluations for ISD methodologies and techniques	Method – ISD method focus
22	Olson and Ives1982	No evidence supporting the view that the type of charging scheme affects the degree to which users become involved in system development.	User Related participation / involvement / satisfaction
21	Kaiser and King 1982	The user-analyst liaison function is generally performed informally by systems representatives.	User Related participation / involvement / satisfaction
20	King 1982	Comparison of alternative systems design approaches in terms of specificity, practicality, life cycle stage, cost, and role of users	Method – ISD method focus
19	Shenolikar 1981	The management issues, technology issues, and development strategy for the implementation of a novel MIS development	Organizational process/approach/strategy
18	Ewers and Vessey 1981	The use of automated programmer productivity tools to address the issue of increasing software maintenance costs	Output focused (productivity, software quality) in organizations
			IT artifact focus – maintenance and reusability
17	Gremillion 1980	The organizational change process for implementing a standardized system	Organizational process/approach/strategy
16	Kneitel 1980	Operational philosophy that permits rapid system development at a low cost, and techniques used for interacting with users	Organizational process/approach/strategy
15	**Zmud 1980**	An approach based on modern software practices for managing large software development efforts	Method – ISD method focus
14	Semprevivo 1980	Innovative organizational and technological approaches, including a Dictionary/Directory Facility, contribute to the success of a university's IS.	Organizational process/approach/strategy
13	**Sprague 1980**	Conceptualization of DSS, MIS and EDP as related entities identifies a typology of DSS in terms of technology and different development approaches needed for DSS.	IT artifact focus – conceptualization and framework (ontology)
12	McLean 1979	Growing demand for CBIS requires end-users to become developers. Need tools/techniques and a move from "adversary development" to "cooperative development"	User Related participation / involvement / satisfaction
11	Locander et al. 1979	Traditional ISD approaches are not suited to DSS development. Team approach based on egoless programming with functional specialists as well as information analysts is needed.	Method – ISD method focus

10	Moore 1979	Software developmental attributes for MIS/MSS differ from those of other computer support systems (e.g., OS, DBMS, compilers, interpreters). MIS and CSS differentiated on 11 characteristics. At least 90% of unsuccessful MSS developments were attributed to managerial issues of a non-technical nature.	Organizational process/approach/strategy
9	Berrisford and Wetherbe 1979	Waterfall SDLC fails as the design phase cannot be completed due to managerial lack of knowledge of actual requirements (a la Ackoff 1967). Heuristic Development method suggested which incorporates elements of data-driven development and emphasizes the contribution of relational DBMS.	Method – ISD method focus
8	Rittenberg and Purdy 1978	Identifies four audit roles (control adequacy, design process, application user, design participant) that internal auditors can play to assist MIS managers.	Stakeholder (IS managers, top management)
7	Alter 1978	Identifies 4 implementation patterns for DSS (low v. high user initiation and participation). User-initiated projects associated with higher success but low impact. Project portfolio approach recommended.	User Related participation / involvement / satisfaction
6	Halloran et al. 1978	Identifies a comprehensive set of factors (and associated measurements) to assess the quality of systems development.	Output focused (productivity, software quality) in organizations
5	Senn 1978a	Identifies the antagonistic relationship between users and IS developers, identifies reasons, and suggests potential solutions (e.g., better tools such as DBMS)	User Related participation / involvement / satisfaction
4	Senn 1978b	Differentiates MIS from clerical DP and suggests development principles in two categories: technical (e.g., data management) and organizational (e.g., user involvement, resistance)	User Related participation / involvement / satisfaction
3	Schmitt and Kozar 1978	Case study of IS failure identifying a network of errors (e.g., no clear goals, no active user involvement). Framework provided to foster user-centered design	User Related participation / involvement / satisfaction
2	Kling 1977	Good technical design is not sufficient, needs to satisfy human and organizational needs.	Method – ISD method focus
1	Juergens 1977	Identifies importance of recursion, iteration, and parallelism despite the sequential nature of the SDLC and the need for a system to be able to accommodate change	Method – ISD method focus

MIS QUARTERLY RESEARCH CURATION INFORMATION SYSTEMS DEVELOPMENT

Information Systems Development (ISD) is the entire suite of development activities (e.g., planning, analysis, design, building, testing, and maintenance) undertaken by agents (humans (individuals/collectives) or software) to create a working information system.

ISD is a fundamental IS research topic embedded in a social, organizational, and technical context with stakeholders who influence and are influenced by the ISD activities, as evidenced by the 101 publications on the topic.

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PROGRESS IN RESEARCH

EARLY WORK

- EFFICACY OF DIFFERENT ISD PRACTICES
- ISD & ORGANIZATIONAL CHANGE
- ROLE OF USERS, MANAGEMENT, & IS MANAGERS
- CSF FOR ISD
- DEVELOPING NEW METHODS (DESIGN SCIENCE)

RECENT WORK

- USE OF ISD METHODS IN CONTEXT
- AGILE METHODS
- ISD OUTSOURCING
- OPEN SOURCE SOFTWARE DEVELOPMENT
- LINK AMONG ISD PROCESSES, STAKEHOLDERS & ORGANIZATIONAL PROCESSES

METHODS

- ☑ CONCEPTUAL DEVELOPMENT
- ☑ FIELD EXPERIMENT
- ☑ CROSS-SECTIONAL SURVEY
- ☑ ANALYSIS OF PUBLICLY AVAILABLE DATA
- ☑ LITERATURE REVIEW
- ☑ CASE STUDY
- ☑ SIMULATION
- ☑ LAB EXPERIMENT

THEMATIC ADVANCES IN KNOWLEDGE

STAKEHOLDERS

- MANAGERS & IS EXECUTIVES ARE GATE KEEPERS OR CHAMPIONS
- USERS & USER REPRESENTATIVES WORKING WITH ISD TEAMS TO DEVELOP RELEVANT SYSTEMS
- COMMUNITIES & DISTRIBUTED TEAMS ON THEIR ISD ACTIVITIES
- DYNAMICS & COMPLEX ACTIVITIES IN ISD TEAMS

PROCESSES

- ISD METHODS ARE CREATED TO SUPPORT ISD ACTIVITIES
- ISD METHODS ARE USED AND ADAPTED FOR CONTEXT (METHOD-IN-USE)
- ISD METHOD APPROACHES ARE EXAMINED (TRADITIONAL–AGILE)
- ISD ACTIVITIES IN RELATION TO ORGANIZATIONAL STRUCTURES & PROCESSES

OUTPUTS

- IS CHARACTERISTICS REGARDING ITS REUSABILITY, COMPLEXITY & RELIABILITY
- USER OUTCOMES TO DETERMINE SATISFACTION WITH ISD ACTIVITIES
- ORGANIZATIONAL OUTCOMES TO MEASURE PERFORMANCE OF ISD ACTIVITIES

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MIS Quarterly