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Recommended Citation

Knight, John; Patrickson, Margaret; and Gurd, Bruce, "Understanding South Australian GP Attitudes Towards Health Informatics Systems" (2007). *ACIS 2007 Proceedings*. 77.

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Understanding South Australian GP Attitudes Towards Health Informatics Systems

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Abstract

This paper reports on the attitudes of 20 practitioners in South Australian General Practice towards adopting Health Informatics (HI) systems. HI systems are aimed at improving the overall quality and management of healthcare, but adoption of the technology may require a change in the General Practitioner's (GP) approach to the way they perform their healthcare delivery role. This qualitative study found HI adoption was primarily influenced by the perceived potential for change in the professional's value and role. While GPs were generally reluctant to consider technological innovation that was not perceived to demonstrate potential for improvement in patient health outcomes, increased exposure to HI systems positively influenced perceptions of both the importance and the certainty of potential implementation outcomes. It was concluded that GP attitudes could be characterised by four different perspectives of HI systems use in general practice medicine delivery.

Keywords

Health Informatics, GPs, Resistance, Adoption, Professionalism

Research Background and Context

This paper explores General Medical Practitioner (GP) reaction to Health Informatics (HI) systems in South Australia. HI is an emergent interdisciplinary label for the '...application of computers to assist the gathering, storage, processing and use of information to improve the procedures or outcomes of health care...' (Sullivan 2001, p. 251). Aimed at improving the efficiency and effectiveness of healthcare management, HI systems also include decision support and expert applications to potentially assist the medical practitioner in their tasks (Jones & Craig 2000). Findings indicate that whereas HI systems that can reproduce accepted models of clinical reasoning and can be viewed as providing immediate patient benefit have generally been adopted, systems aimed at improving the overall efficiency and effectiveness of healthcare appear to have been resisted (Arroll et al. 2002; Bolton et al. 1998; Walsh 2004).

Understanding why people accept (or not) innovation, particularly in information systems research, remains one of the most challenging and complex issues (Davis, Bagozzi & Warshaw 1989; Frambach & Schillerwaett 2002). Medical practitioners have often been cited as classic examples of 'professional' populations, where understanding decisions of what innovations are adopted and when has been especially problematic (Greenhalgh et al. 2004; Mintzberg 1979). Yet rapid development of technological systems coupled with the push for adoption by governments underscores the need to identify factors affecting their decision making (Chau & Hu 2002). Implementing HI systems is seen to have the potential to reduce the cost of chronic care and significantly raise the overall level of public health (Kelly 2000; Warren et al. 2001). Bhalsale et al. (1999) have estimated for example, that 76 percent of unintended events that could or did 'harm a patient' in Australian General Practice were preventable with such technology. Total government expenditure on healthcare delivery (9.8 percent of the Australian Gross Domestic Product in 2004-05) is further projected to become unsustainable and unfundable over the next four decades unless there is a change in approach toward health and aged care (Commonwealth of Australia 2002, 2006).

Yet HI systems require adoption of electronic patient records and potentially the need to reengineer traditional workflows and disrupt existing business and clinical processes (Ford, Menachemi & Phillips 2006). HealthConnect is an example of a national HI network initiative to routinely collect, store, exchange and download patient information at the point of care (Commonwealth of Australia 2001). Established with the support of all levels of government in 2005, the National e-Health Transition Authority (NeHTA) was tasked with setting national standards for the sharing of health information (Henderson, Britt & Miller, 2006). Yet the results of the HealthConnect initiative remain a complex and multi-tiered collection of isolated programs and piecemeal projects (Commonwealth of Australia 2004, 2005). Estimated to see 85 percent of healthcare consumers annually, GPs are seen as gatekeepers to the wider health system and integral to delivering any

comprehensive, coordinated and continuing healthcare strategy (Weller & Dunbar 2005). Dependent on a proposed electronic patient record populated by sources across the continuum of healthcare, the majority of HealthConnect data for example was to come from General Practice (Commonwealth of Australia 2005). To facilitate such technology use, the Federal Government has targeted GPs with funding initiatives such as Practice Incentive Payments to increase the use of electronic prescribing (AMWAC Report 2005). Hence almost all practices nowadays have at least one computer, and some are seen to have increased the use of technologically supported systems and to have consciously redesigned their processes in order to increase practice income (Powell-Davies & Fry 2005; Rudd & Watts 2005). Yet a study Australian GPs between 2003 and 2005 by Henderson, Britt & Miller (2006) found some GPs who had access to computers and clinical software chose not to use them, and only 32.8 percent kept all patient data in an electronic format. The purpose of this study is to gather more detailed and in-depth information on why GPs tend to resist (or not) HI systems.

Previous Research and Theoretical Underpinning

Studies of clinician behaviour suggest innovation is not necessarily always better, resistance always bad, nor adoption more worthy of study than resistance (Greenhalgh et al. 2004). However understanding technology acceptance behaviour has largely drawn on application of research models such as Rogers' (1995) Innovation Diffusion Theory or behavioural intention constructs (see for example Venkatesh et al. 2003). Innovation Diffusion Theory views innovation adoption as a process of reducing uncertainty about outcomes rather than as a single event, and studies of the introduction and penetration of innovations in healthcare generally validate Rogers' (1995) S shaped curve of adoption over time (see for example Gosling, Westbrook & Braithwaite 2003). Behavioural intention models posit determinants of both intention to use technology and technology usage behaviour. This allows for perceptions of a behaviour to influence the level of effort and persistence exerted in pursuit of performing that behaviour, and behavioural scientists have agreed a commonality of factors that facilitate (or inhibit) intention translating into behaviour (Bandura 1986; Fishbein, Middlestadt & Hitchcock 1991). Thus the perception of an innovation's relative technological advantage will not by itself guarantee widespread adoption (Fitzgerald et al. 2002).

Gallivan (2001), however, has argued traditional frameworks do not necessarily reflect the reality of innovation adoption and diffusion, and Gatignon & Robertson (1989) have argued that rejection is not simply the mirror image of adoption. Furthermore, earlier studies have tended to take place within large and complex organisations, whereas General Practice in South Australia mostly operates as solo practices, partnerships or incorporated bodies averaging 2.5 GPs each (AMWAC Report, 2000). Chau & Hu (2002) have also criticised behavioural intention studies in healthcare environments as lacking consistency with studies using non-professionals. Larsen (2003) similarly identifies there is little diffusion research that examines the impact of organisational context. Limited relevant information systems research literature does attribute new technology resistance to technological, individual, organisational and external factors (see for example Enns, Huff & Golden 2001). Debreceny et al. (2002) for example, found key inhibitors to be uncertainty about future business models and perceptions of inadequate technical, legal and policy infrastructure.

It seems reasonable that technology adoption within General Practice may be influenced by structural and cultural complexities different even from other healthcare settings, and technology adoption models have arguably been generalised to a commonality of factors that lacks regard for contexts and settings (Aarts, Doorewaard & Berg 2004; Kaplan 2001). Also previous technology acceptance research has only made limited usage of the literature from professional groups, even though early evidence suggests change perceived as an assault on a professional's autonomy (such as making their skills programmable) triggers resistance, as this not only impinges on their autonomy but also drives a change in the organisational form (Mintzberg 1979; Swan & Newell 1996). These findings indicate technological innovations are likely to be resisted if the change process, change agent, risks or outcomes are perceived to be incompatible with the professional's values, goals, skills or ways of working (Bayless 1996; Edwards, Kornacki & Silversin, 2002). Thus even if the efficacy of the technological innovation is accepted, perceptions of anticipated implementation outcomes could still lead to resistance, rejection or non-adoption. This research explores the question: -

What do practitioners in General Practice medicine perceive as barriers to implementing Health Informatics systems that can potentially routinely collect, analyse and redistribute information?

Drawing from the paradigms and the empirical studies cited above, the author has developed a research model (see figure 1 below) to illustrate the process by which theory suggests a GP develops a perception of the relative advantage of adopting a particular HI system. This can be seen as the emergent outcome of individual and environmental characteristics and a perceived potential for change if the innovation is adopted. The model posits that the perceived relative advantage, behavioural intention and subsequent behaviour of a GP contemplating adoption of a particular HI system within a particular context is influenced by individual perceptions of environmental antecedents and the professional value and role of GPs.

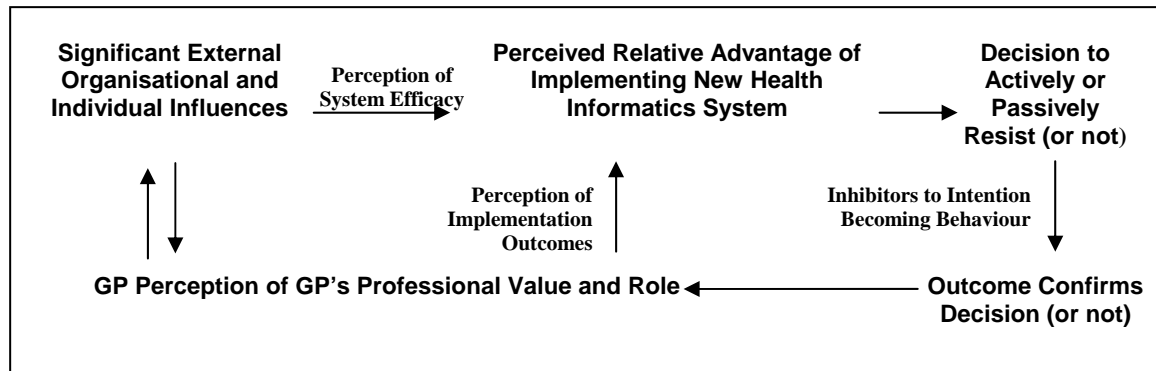


Figure 1: Research Model of Influences on GP Attitude towards a new Health Informatics System

Research Methodology

Interviews were conducted between January and June 2007 with GPs in member practices of South Australian Divisions of General Practice. Practices varied in size (from solo to 22 full time equivalent GPs), structure (2 solo, 2 only partners, 14 partners and associates, and 2 incorporated) and designation (13 Metropolitan and 7 Rural). All of the member practices of three Divisions were offered the opportunity to participate in the study through initial communication with Practice Managers. Subsequently practices from other Divisions were involved and this paper reports on interviews with 20 GPs (10 full time). The GP's (16 Male) experience ranged from residency to '25 plus' years, and qualifications ranged from an overseas trained Doctor awaiting Australian recognition to post graduate qualifications in such areas as Public Health, Obstetrics, Anaesthesiology and Doctorate of Philosophy.

In depth interviews lasting between 30 and 90 minutes were used to increase the likelihood of identifying the seemingly diverse yet interrelated communication, care, context and control causes for potential barriers to HI system adoption (see for example Greenhalgh et al. 2004 Conceptual Model). Questions began with their reaction to the topic and subsequent questions were specifically designed to probe deeply held attitudinal information and associated underlying tacit or informal knowledge (Sternberg & Horvath 1999). Their answers determined how further questions were asked in order to determine individual, organisational and external sources of influence on the interviewee's attitude, using a funnel sequence of questions to uncover information not as yet available from prior research (Cavana, Delahaye & Sekaran 2001). Specific demographic data were not collected to ensure participant confidentiality. To ensure that the full range of potential beliefs was canvassed, seven practitioners were purposively added to the initial sample as they were perceived by other interviewees to belong to practices of substantially above or below average technology use. Each interview was later transcribed, delivering transcripts of almost 23 hours of talk which served as the unit of analysis. The transcriptions were analysed by manual content coding followed by NVivo (computerised text-based analysis) to arrive at the key concerns/themes expressed (Bazeley & Richards 2000). The data was approached from a logic of discovery with no advance hypotheses or a priori categories (Strauss & Corbin 1998).

Results

All practices used technology to some degree. Only one practice had no clinical software (and no computer on the GP's desk), no broadband connection and no electronic pathology result capability. All 19 with access used clinical software to some extent such as for generating scripts or recording quantitative patient data, however 4 did not record clinical notes electronically. The 5 interviewees who did not regard themselves as organisational innovation decision makers tended to support existing technology strategies and expressed overall satisfaction with their current usage. Nonetheless, all interviewees were readily able to identify opportunities and weaknesses with aspects of organisational technology in use.

Many attributed slow HI system take up rate to be in part the result of little available time for GPs to spend addressing 'non-medical' issues. Recent graduates had been introduced to clinical software '...as part of our GP training by GPs associated with the RACGP [Royal Australian College of General Practitioners] or an RTO [Registered Training Organisation] who had used the software...', but not as part of their university medical training. Continuing GP education however, was generally focused on '...saving lives rather than learning about computer programmes...' The perceived need for electronic interaction with external entities varied with context, but all interviewees identified electronic interaction with specialists as an important driver. HI systems were generally recognised as an integral part of contemporary healthcare provision, however the lack of a public health management perspective was suggested by an attitude of '...no conceivable need for access to de-identified amalgamated data...' Yet a desire to improve the holistic and longitudinal outcomes of patient

healthcare was always expressed. There was little to no interest in potential usage of de-identified (not linked to a unique individual) and delinked (not linked to other data such as demographic) amalgamated medical data as this was perceived to offer ‘...nothing more than medicare data could...’ However all interviewees, regardless of context, recognised potential benefits from being able to access consolidated longitudinal patient records, and to a lesser extent linked statistical data. But a diverse range of barriers was also perceived, including conflicting perceptions of the need to standardise processes (5 interviewees raised this issue) and share clinical notes (16), the potential for competitive disadvantage (5), the resolution of ethical moral and legal issues (12), the availability of technology (6), and the motivations for political and policy decision making (17). A ‘closed book’ (where new patients are not automatically seen) practice was not unusual (7 interviewees operated like this in some form), and attracting numbers of patients was not generally perceived as a competitive issue. Concern was expressed for the loss of GPs (2 interviewees raised this) to other practices because the practice could ‘...only maintain revenue if the remaining GPs worked even longer and harder...’ The only GP interviewed who had changed practices recently cited the nature of work as the main reason. A consistent theme was the nature of the work had greater appeal to the GP than effective organisational use of technology. This was maintainable because the organisation was structured in order to underpin the GP performing their role.

The results for this study may be limited because Practice Managers generally negotiated an interview with the GP and their choice was generally ascribed to the technology champion status of the GP within that practice. Also the results reflect the views of GPs from just 22 of 700 practices in South Australia. The sample was initially voluntary (13) and subsequently more purposive (7) and does not necessarily reflect the profile of General Practitioners in Australia (Britt et al. 2007; Sims & Bolton 2005). For example, GPs in solo practice (10% in the sample compared to 5.2% nationally), female (20% c.f. 34.0%), full time (50% c.f. 63.3%) and Rural (35% c.f. 17.1%).

Discussion

The data were further analysed through NVivo in order to elude common themes or concerns. Four discrete GP attitudes towards new HI systems were able to be identified. They are not mutually exclusive and are more appropriately seen as a series of developmental and co-existing perspectives influenced by the GPs’ perception of their role and value, the GP’s need for self-validation of existing processes, and the GP’s exposure to utilising HI systems as part of their workflow. These attitudes are summarised in Table 1 and further discussed below.

Passive or Active Resistance

While billing was computerised, a sole GP with a ‘loyal’ patient base and an ‘...almost spiritual...’ patient care philosophy for example, could identify no adequate incentive nor potential for improved patient outcomes from adopting clinical software. On the other hand, the change in clinical note taking and a reliance on technical support were seen as unacceptable impositions on the GP’s ability to perform the GP’s role. Nevertheless voice recognition software was being considered because it ‘...can potentially record my thoughts faster than I can write them...’ Such software was not intended to be utilised in front of the patient and had been trialled in the past but found to be inadequate. This GP attitude was identified from a diverse range of technologically aware practices and GPs. A practice which perceived itself to be ‘paperless’ for example, did not utilise the electronic appointments because it was considered to be wanting in comparison to the traditional appointment book for each GP. Where clinical software was present this attitude manifested as clinical histories being recorded by hand and the electronic patient database being maintained only for specific reasons such as chronic disease management or script writing. GP attitude to the clinical history notes (c.f. summaries) was possessive with little or no desire to share these outside of the practice. This was seen to reflect perceptions of the potential nature of the amalgamated data. Resistance was expressed in terms of the inherent value and control of the data outside the organisational boundary, and trust in potential data collecting entities. This contributed to uncertainty about the potential to maintain patient-GP trust, and of ownership and responsibility for the subsequent amalgamated data. Despite general recognition and even advocacy for technology utilisation associated with this attitude, the utilisation of particular technologies was seen to be a process too far removed from the GP’s ‘style’ of ‘thinking’, ‘reflecting’, ‘observing’ or ‘recording.’ The primary inhibitor to adoption was seen to be unwanted change in the GP’s ways of working. In this instance it is argued the GP will adopt the technology only if there is perceived to be a clear and certain advantage to the GP performing their role. Hence improved patient outcomes (health and attitude) must be clearly perceived to outweigh the need for the GP to adapt to new ways of working.

A Tool to Support Individual Processes

A practice justified implementation of clinical software for example, on the basis this would improve revenue and reduce the costs of maintaining patient records. While all GPs subsequently utilised electronic prescribing for example, some GPs (both decision making and non-decision making) actively and passively resisted full

adoption of the application. A consistent outcome of this attitude was the need for a practice structure able to support both electronic and manual processes for the same task. In one practice this attitude manifested in patient files being physically transported between sites. The progressive implementation of different vendor systems also increased the likelihood of new software being perceived as less intuitive, and incompatibility between different operating systems leading to overall system instability. In this instance it is argued the GP perceives benefits of technology adoption as a clear and certain potential for organisational advantage. However fundamental to this attitude is costs are perceived primarily in terms of the cost of changing organisational processes and not as changes to individual GP workflows or autonomy.

Table 1: Attitudes Adopted towards HI Systems by the Medical Professional in a General Practice Context

Attitude	Resist unless Certain and Demonstrable Individual Advantage	Use to Support Existing Individual and Organisational Processes	Use to Integrate Existing Individual and Organisational Processes	Use to Transform Healthcare System
Manifests as: -	Lack of technology or available technology not used	Available technology not used: Electronic and manual processes duplicated	Strategic acquisition of hardware and more integrative software	Practice active in activities external to the practice
Benefits perceived primarily in terms of: -	Individual Patient Outcomes	Organisational Advantage	Organisational Capability	Organisational capability as part of a healthcare delivery system
Costs perceived primarily in terms of: -	Changes in individual workflows	Financial Terms	Financial Terms	Financial Terms
Other Concerns in considering Relative Advantage	'unreimbursed' time commitment; patient expectations; patient trust;	Costs are perceived primarily in terms of the cost of changing organisational processes and not as changes to individual GP workflows or autonomy	Change in organisational ways of working by autonomous members; Migrating existing systems; System reliability and capability	Trust in other entities; paucity of sanctioned software; indifference of software vendors; onus to use in-house resources; unresolved, changing or ambiguous policy issues; 'top down' yet 'piecemeal' approach of government
Adoption if: -	Improved patient outcomes (health and attitude) clearly perceived to outweigh the need for the GP to adapt to new ways of working	Clear and certain potential for organisational advantage	Improved individual workflow or organisational process (and hence for patient outcomes) clearly perceived to outweigh financial costs	Facilitates the transforming of external entities and improves own organisational interoperability

A Tool to Integrate Current Processes

This attitude manifested to some degree in most practices as the strategic acquisition of hardware and systematic upgrading of clinical software and more integrative billing software. Also planned was integrating electronic readings (such as ECG) directly into patient files, and patient access to appointments through the internet. The adoption of more complex, less understood, less available and potentially more integrative systems was aligned with concerns about the need for change in the organisational ways of working by autonomous members, migrating existing systems, and system reliability and capability. Those who had recently changed existing clinical software were generally looking to integrate billing and clinical software for 'greater system stability'.

However this was also seen to create tension with GPs reluctant to consider changing vendors or existing ways of software use. Adopting this attitude was generally associated with GPs that had access to experience (both inside and outside the practice) of technology use in their environment and saw potential change in processes as acceptable outcomes of adoption. In this instance it is argued the GP primarily perceives benefits of technology adoption in terms of the potential for improvement in individual workflow or organisational process and hence for patient outcomes, and costs in financial terms.

A Tool to Transform Processes

This attitude tended to manifest in practices with GPs active in medical activities outside of the practice, including professional organisations. Of those interviewees associated with scoping external projects, GPs identified the existing need for multiple activities to be duplicated in order to satisfy the requirements of all stakeholders involved in healthcare delivery. Concern was consistently expressed about trust in other entities, the paucity of sanctioned software and apparent indifference of software vendors, and a perceived onus to use in-house resources to provide ‘...different solutions to the same problem...’ Major inhibitors to adoption were perceptions of unresolved, changing or ambiguous policy issues (e.g. legal, ethical and data control) and in particular the ‘top down’ yet ‘piecemeal’ approach of governments to technological solutions. Examples cited were the government provider of electronic pathology results using a communication protocol different from that OACIS (Open Architecture Clinical Information System) uses to link public hospitals, and the non-standardised applications for communication with external entities (e.g. specialists, pathologists and Medicare). This attitude was generally associated with GPs that had access to detailed experience of technology use in similar environments and who perceived themselves or their organisation to be technologically capable. The potential to improve individual patient health outcomes through improved use of healthcare delivery system resources was the dominant driver. While change in individual workflow and/or organisational process was seen to be acceptable outcomes, change was primarily perceived in terms of the need to transform external entities. In this instance it is argued the GP is not only pursuing individual or organisational relative advantage, but is also adopting a less isolationist perspective of the quality and management of individual healthcare. However healthcare entity interoperability was also seen to be complex and difficult and to generate the least immediate concern for GPs in general.

Conclusion

All GPs interviewed represented their role to some degree as dispensers of complex health knowledge that was irreplaceable by technology or other disciplines in medicine. Inherent in this perception was a tension between efficiently and effectively (in terms of GP time and patient outcomes), and holistically managing a patient’s longitudinal health. The data from this sample suggest GP attitudes towards implementing HI innovations to this end were influenced by concerns relating to the potential for changes in the GP role and value and perceptions of organisational and external antecedents. While GP decision makers commonly perceived the relative advantage of implementing future technological innovations in terms of financial and time cost, task performance, patient outcomes and organisational revenue, this was influenced by perspectives of the GPs’ role and value, need for self-validation of existing processes and exposure to utilising HI systems as part of their workflow. Despite consensus on the inevitable increase in technology use to deliver healthcare in a General Practice context, the exigency to implement technology was seen to be influenced by whether the GP adopted an individual, organisational or healthcare system perspective of potential implementation outcomes, and was positively influenced by exposure to utilising HI systems as part of their workflow. Yet this research did not seek to focus on adoption per se, but rather on what GPs perceive as barriers to HI system innovation. An individual, organisational or healthcare system perspective of a potential for undesirable change in the GP value and role was seen to be the primary trigger for active or passive resistance to adoption. Resistance was seen to be exacerbated by a low exposure to utilising HI systems as part of the GP’s workflow. This suggests resistance to HI systems could be positively influenced by introducing the potential of such technology to improve the quality and management of population health as part of Medical School curriculums as well as part of continuing GP education.

At the least this research provides a theoretical grounding for and empirical evidence of directions for future investigations of GP acceptance of technological innovations, and hence the development of counteracting strategies to overcome resistance and improve adoption in a particular context. The research may be of value to change practitioners by helping them to predict potential adopter barriers and professional concerns regarding new technology. This research also contributes to existing understanding of why and how the medical professional forms an opinion about and the decision to implement (or not), innovations in a healthcare organisation context. The research also has relevance to improving diffusion of other new technologies among other professional groups and contributes to the mainstream change management literature, in particular the diffusion of innovations literature with regard to why and how the professional forms an opinion about and the decision to implement (or not) innovations in different contexts and settings, by providing an alternative

perspective to adoption. This research potentially benefits researchers and assists in explaining technology rejection in a variety of contexts and addresses the calls for research in this regard from authors such as Frambach & Schillerwaett (2002). The research may also benefit professionals themselves by allowing them to understand the barriers to technology adoption at different levels and settings of their organisation, and to understand that these barriers are not necessarily attributable to the technology. Finally, the findings highlight the desirability of ensuring the importance and certainty of potential HI system implementation outcomes are associated with benefits to the practice rather than burdens for the practitioner.

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Acknowledgements

The authors would like to acknowledge the generosity of the General Practitioners and their organisations who took part in this research, and the Australian Research Council and the South Australian Divisions of General Practice for their support. In particular, the authors would like to thank Brenton Chappell, Chris Seiboth and Peter Del Fante.

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