

Public Domain Information Systems

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Abstract

Organisations are increasingly using home pages on the Internet to provide the general public with information systems which supply organisational information to, and extract information from, customers and potential customers. These Public Domain Information Systems (PDISs) may have significant effects on information management within organisations. Approaches to information systems development may be influenced by PDISs : users becomes audiences, development becomes production and implementation becomes publication. PDISs will highlight the role of information systems in relationship management. A customer relationship goes through stages of awareness, exploration, expansion, commitment and dissolution, each of which require IT intervention. This intervention will involve a strengthened relationship between IT and marketing focusing on relationship marketing. A role for a Public Domain Information Manager is suggested and the issues that would concern such a role are discussed.

Keywords: Internet applications, relationship marketing.

Introduction

Public Domain Information Systems (PDIS) are information systems whose users are outside the organisation; whose function is the provision of information about the organisation, the gathering of information about the users and the support of communications, transactions and product distribution; and whose goal is the cementing of a long-term relationship between the user and the organisation. A PDIS acts as a marketing interface to the organisation and an interface between the external systems and environment and the internal systems and culture. The users are members of the general public who have some interest in the organisation. Access to a PDIS will inevitably be via the Internet from the individual's home or workplace. The PDIS functions in two directions, providing organisational information to the user and information about the user as a customer or potential customer to the organisation.

While some PDIS exist as stand-alone systems accessed in public places, the growth of PDIS has been stimulated by the Internet. Most PDIS run over the Internet, located in the organisation's publicly-accessible home pages. PDIS provide access to organisational information, allow anyone to enter into a transaction with the organisation - to buy TVs, take out insurance, create a direct debit, check energy efficiency in the home etc. Many of the systems currently used by organisations

involve sending messages via a Netscape-based application or e-mail. See, for example, the home sites of Centrica and Sterling Gas. Currently these systems provide little more than formatted e-mails which are sent to the customer services department and dealt with by employees. Future systems will provide direct access to company databases. Integration of internal systems will be extended to integration of external systems.

The development of PDIS represents a potentially significant change in information management practice. Information management was previously bounded by the technology - servers in the organisation and PCs on people's desks - and a limited set of users - trained employees of the organisation. These boundaries are challenged by the evolution of PDISs. An organisation's information systems may be accessed across the Internet at any time, using any computer, including mobile computers. PDIS will not be bounded by organisational culture or location. Neither will these organisational IS be bounded by a limited user population: anyone with the technology can access a PDIS. The information manager's role has been clearly defined by the organisational boundaries. Information Technology's customers are primarily the internal users. PDISs promise a customer base of hundreds of thousands of users across the world.

The advent of PDIS creates new challenges for practitioners, researchers and teachers. In essence, assumed boundaries may be removed. The role of IS changes. New disciplines, for example marketing, will be involved. The nature of the user will change and user expectations may be more diverse. These changes are explored further in this paper. The purpose of this paper is to highlight the significance of these changes and identify some consequences for IS practitioners and academics.

Cultural Revolution

In the past year, access to Internet services has effectively become free for anyone who wants access and can afford the cost of a PC. Retailers such as Dixons, WHSmith and Tesco offer free Internet access. A variety of other companies, for example, Boden, a clothing mail order company, offer free Internet services in order to attract customers to their Internet sites.

The Internet as accepted as a communication medium, on a par with the telephone. Many companies display their web addresses on advertisements, in magazines, on buses and on their lorries. There has been a spread of advertisements on television and paper media advertising Internet service or retailing outlets that are only available on the Internet. Business use of the Internet has become almost mandatory for forward-looking organisations.

The Internet is now seen as a publicly acceptable source of information. Many school students and university students complete projects using the Internet as their primary source. Newspapers such as The Times regularly list Internet sources of information at the end of articles.

In many organisations, the use of e-mail is now as culturally acceptable as the telephone. In some cases e-mail becomes the preferred means of communication or even the only means. In the recent Turkish earthquake, some people maintained

contact with relatives via the Internet using mobile communications, when all other communication channels were unavailable.

The cultural revolution in communications has far reaching effects on information systems. The boundaries of IS within organisations have been broken down or at the least blurred. It is no longer a case of building IS for use within the organisation by employees who carry out business functions; or providing information resources just for executives with the organisation. Through the Internet, IS may be used by the public as customers of the organisation who may carry out their own business processes. Shareholders, customers, and third parties may take an interest in company information and make purchasing, investment and regulatory decisions based on it.

The Internet will bring information systems out of the IT department, out of the company boundaries and firmly into the public domain. A shift of IS into the public domain has important consequences for managers of information within organisations, researchers of information systems and teachers of information systems courses. As if information systems was not struggling enough to find its feet as a bounded discipline, it faces further erosion of boundaries, inclusion of new disciplines, and increasing uncertainty as a result of the social acceptance of the Internet.

The Rules are Different

The use of the Internet is challenging business and IS models of how IS operates within the organisation. Information managers face an entirely new set of customers whose needs and ways of thinking may be foreign to their organisation. Researchers are grappling with a widening discipline. The disciplines of marketing, media studies, mass communication and social psychology are now allies of information systems. New theories, ways of thinking and collaborating are required. Teachers of IS analysis and development can no longer consider the task to be one of interviewing users in the organisation, identifying their business processing needs and developing a system. The user base is larger and more diverse, and users needs will be more difficult to pin down. Analysts will consider users outside the organisation, both suppliers and customers, as equals with internal users.

The rules are different: users become audiences, development becomes production and implementation becomes publication. IS development requires a wider variety of skills in, for example, graphic design, communications, writing, and presentation. The development of information systems in the 21st century may have more in common with film production than building construction. Old skills of programming, analysis and database design are still needed, but the wider integration of skills requires improved and more communicative project management. A new discipline of public domain information management may be required with a wider remit and an extra-organisational focus.

This paper develops the idea that public domain information systems are relationship managing systems. Implications for researchers, practitioners and teachers are outlined. In particular, the role of Public Domain Information Manager is identified.

From Users to Audiences

The first information systems were operated remotely from business users. Data sheets and requests for information were sent to a data processing centre, entered into a computer by clerks and the processed results returned to users. Computers were very large machines kept behind closed doors. IT staff acted as gatekeepers, restricting access and communicating with a privileged set of users within the organisation. They updated the files and controlled both data and applications.

The advent of on-line computing and subsequently PCs enabled business users to directly input data into databases, and to control and own information. The role of IT professionals was eroded. They designed and built the applications but did not necessarily understand the data that the applications held. The increased availability of PCs and easy-to-program databases and development languages resulted in the rise of end-user computing and further eroded the power of IT. Although IT departments fought back, attempting to wrest control back from end-users through monopolistic management procedures, computing still spread throughout the organisation. Central control was reduced, data ownership decentralised and applications proliferated throughout the organisation. However the boundary of the IS remained within the organisation. Customers were unlikely to directly access organisational systems. Users entered data on customer's behalf and mediated the relationship. The target of the IS was still a small group of employees whose requirements were known and whose skills, culture and understanding were homogenous since they were organisational employees, all doing a similar job.

The use of the Internet now allows customers to directly interact with organisational systems. This has significant implications. Customers can carry out their own self-service transactions without an organisational employee mediating. Customers may then have increased autonomy and responsibility for their relationship with an organisation. However, a uniform and predictable user population whose requirements may be determined becomes a diverse population of customers whose requirements may only be guessed at through market surveys. The organisational information systems are now being used by a wide audience rather than a narrow group of users.

From Development to Production

The provision of organisational information systems aimed at customers using organisational information via the Internet has resulted in a different kind of development. The PDIS of the future may be developed by a process more akin to TV production. There is a much greater variety of technology being integrated. Java, Javascript, HTML authoring packages, and multi-media development packages are used in concert to produce an Internet customer system. These new software technologies still need integrating with database technology and linking to existing organisational systems. Issues of integration with existing systems needs to be considered. There is a greater emphasis on the provision, presentation and display of information for a diverse audience. Artwork and program logic intermingle. Software development management is more like directing the production of an entertainment package than building a business system. Contractors and specialists are used for

some aspects of the production. Specialist Internet application development companies are emerging analogous to small film production companies.

From Implementation to Publication

IT and information systems on the Internet are seen more as media on a par with newspaper, film and television rather than technical artefacts. Implementation of a technical business system for a limited, exclusive group of users becomes publication of a media presentation for a international audience. This has its own implications. While any computer system, including an Internet-based customer system, will never be perfect and will evolve as new information and functions become available, the act of publishing an Internet application carries greater risk than the implementation of an internal system. Mistakes in the published Internet system may affect hundreds of thousands of people. Errors in transactions may be very costly for the organisation in terms of lost business and refunds or lost profit. For example, Argos sold TVs for £2.99 instead of £299 because of a wrongly placed decimal point. A bug ridden Internet application can severely damage a company's reputation. Publication of company information and access to company database may involve greater legal implications than the implementation of an internal system.

Public domain information management involves the management of a new population of users of the organisation's IS; the development of new strategies for the presentation and gathering of information; the management of a development process which may not fit easily into the traditional systems development lifecycle and may be more suited to rapid application development methods; closer co-operation between different organisational functions which may not have previously had much contact (for example, IT may need to co-operate closely with marketing and legal departments); the use of different techniques to determine audience requirements and to select information; and a focus on external customers and the commercial-public interface.

Public Domain Information Management raises new areas of concern as well as accentuating existing concerns. The management of relationships with customers through the medium of information systems is of key importance in PDIS. This will be discussed further.

Information selection is a key factor in successful public domain information management: How do we get customers to select information from our organisation and to use our web-based applications? How do we select the right information to present to our customers? How complex should that information be? A successful PDIS promotes a relationship of trust and loyalty between the customer and organisations. This must be based on absolute accuracy of the information provided. One mistake can destroy the entire trust placed in an organisation by the public. The public revisits a PDIS because of its usefulness and accuracy. The branding of the PDIS may be important here. Furthermore it may be suggested that both too complex PDIS designs and too simple PDIS design will be rejected. The web site must be simple enough that the information can easily be found and complex enough that the information when found is of value to the customer.

It should also be noted that, public domain information management involves increased autonomy for the customer and reduced control by the organisation. Issues surrounding end-user computing which have increased in importance now affect customers. There is no reason why customers should only select their own information from an organisation's site. They may go as far as developing their own personalised information environments which involve the use of an organisation's information in an unpredictable way. The end-user population of a PDIS consists of hundreds of thousands of customers and members of the public. Public extraction, rearranging and manipulation of organisational information is likely. The outcome of this is not controllable. An organisation's end-user computing problem may spread into a world-wide problem through the use of PDIS.

Information Systems as Relationship Managing Systems

Information systems may be considered as relationship managing systems. Usage of the information systems is a result of a relationship between the public and the organisation. Furthermore the purpose of the IS may be to store information about a relationship and its maintenance. Relationships are maintained by the IS whether due to information presence or information usage.

In public domain information management, the IS supports a link between the organisation and members of the general public who are customers or have some interest in the organisation and the information it can provide. The greater the strength of the relationship, the more the IS will be used. Additionally the public domain IS can be used to strengthen the relationship. Incentives to use an IS, for example, discounts on purchases, the availability of extra advice, and specialist information, may attract new customers and establish customer loyalty.

Public domain IS running over the Internet will have a significant effect on the progression of a relationship. Relationships will be established on the basis of mutual needs, shared interests and shared problems. The relationship between supplier and customer involves the meeting of needs - profit for the supplier and satisfying of a need for the customer. A self-help group will exist on the Internet to develop relationships based on shared problems. These IS mediated relationships are influenced by location but not dependent on location. Public domain IS users may be located globally but behave like a local community.

Relationships between customers and an organisation will progress through stages of awareness, exploration, expansion, commitment and dissolution (Buttle, 1996, p4), each involving changing use of public domain IS. Table 1 identifies so key factors in each of these stages and suggests possible IT involvement.

The development of public domain IS will require an understanding of the organisational relationship with the public domain user and how that relationship progresses through its lifecycle. A relationship focus may be a key factor in public domain IS. Systems should concentrate on attracting, developing and retaining customers rather than maximising short-term one off transactions. The organisational value of PDIS will be obtained from long-term loyal customer relationships.

Table 1. Relationship stages.

Stage	Definition	Key Factors	IT Involvement
Awareness	A customer finds out that the organisation exists.	Surfing. Advertising. Brand identity. Partnerships.	Search Engines Networks.
Exploration	Customer explores home site and gains understanding of organisation.	Site layout Quality and ease of use Value of information	Home site search facility. Site design and maintenance
Expansion	The customer begins to use the PDIS for transactions and accessing services	Subscription Customer relationship tracking. Integration with business processes	Provision of customer databases to support PDIS. Integration support.
Commitment	The customer becomes a loyal user of services, identifying with organisational values.	Information value and quality. Understanding of customer. Customer involvement	Security: Different IS access for loyal PDIS users. Relationship tracking through

			customer databases. Customisation functions
Dissolution	The customer abandons the organisation due to dissatisfaction, better offers from a competitor, or changed in needs and life stage.	Relationship tracking. Continuous intelligence concerning competitor's PDIS.	Internal access to competitor PDIS.

Treating PDIS as relationship-maintaining systems gives rise to a number of issues. A key element of any PDIS should be relationship tracking. It should be possible to monitor the progression of a customer from awareness through exploration to commitment. Relationship tracking within the PDIS should also give warnings of rising customer dissatisfaction which may lead to dissolution if not addressed. Current company home pages offer little more than an indication of the number of hits. Functions are needed to identify customers and encourage registration. Subsequent hits can then be mapped to the progression of the relationship. Relationship tracking should be linked to customisation in which increasing commitment brings with it opportunities to customise interaction with company web sites and through a hierarchy of security, to gain access to more company information and more systems. PDIS may provide different interfaces and information depending on the maturity of the relationship with the PD user.

The focus of the PDIS should be on the customer or supporter. The development of that relationship involves an increasing intimacy and revealing of information, increasing customer autonomy and control, and increasing involvement in the organisation.

It should be noted that the relationships maintained by the PDIS need not be only between public users and the organisation, but also amongst the public users themselves. If the PDIS supports interaction amongst the public through bulletin boards, chat rooms, virtual conferences, etc., tribes of organisational supporters may be developed (Kozinets, 1999).

Implications

Implications for researcher

The development of Internet-based PDIS extends the research problem faced by researchers. Essentially, the boundaries are extended beyond the organisation and the subject of research is more diverse and the discipline is widened. Research into PDIS may require greater use of social psychology techniques as well as approaches to media studies.

The definition of IS may widen to include mathematical and statistical approaches such as small-world mathematics and sociological techniques aimed at analysing large populations. The problem of defining IS is made harder by the inclusion of ideas from disciplines such as marketing.

The usage of PDIS by a wide and varying population within an immense network may give rise to unexpected and emerging phenomenon which may affect the value provided by the PDIS. Emerging phenomenon may require the use of different theoretical frameworks such as chaos theory in order to make sense of what is happening.

Implications for managers

The effect of the Internet is to expand the brief of the IS manager beyond the organisational boundaries. Interorganisational system supporting business to business e-commerce and EDI are now part of the IS managers concerns. PDIS supporting business to customer ecommerce, information provisions, help services and relationship marketing join an already bursting portfolio. These roles cannot, in any larger organisation, rest on one person's shoulders. There may be a need for new roles in managing interorganisational systems and PDIS.

A role of Public Domain Information Manager may be proposed. This role will focus on the management of the IS interface between the organisation and the general public. The key aim would be generating long term relationships with the public and turning visitors into customers and customers into partners. PDIS would be produced and published which attract the public and guide individual from awareness, through exploration and enhancement to commitment. Table 2 outlines the principle responsibilities of the Public Domain Information Manager.

Table 2: The Role of Public Domain Information Manager

- The production of PDIS which is built on Internet pages joined to organisational information systems and databases, involving liaison with web designers, internal systems, contractors, marketing, finance, and legal departments.
- The quality monitoring of PDIS structure and content to ensure accuracy, legality and timeliness, involving an understanding of the business strategy and liaising with marketing, sales, new products and those responsible for pricing.

- The management of integration of PDIS with internal systems, customer-oriented systems and internal information sources. Integration will be a key concern of the Public Domain Information Manager.
- The provision and management of help desks to support users of the PDIS, and to deal with problems arising from action taken by customers arising from interaction with PDISs.
- The monitoring of user response to the PDIS through questionnaires and email feedback facilities on the web sites and external marketing surveys.
- The monitoring of benefits and value in terms of sales, the strengthening of customer relationships and the administrative savings provided by the PDIS. Benefits monitoring should consider long term value such as increased customer loyalty as well as short-term administrative savings. Relationship tracking functions will need to be developed.
- The monitoring of competitor PDIS to ensure competitive advantage.
- The identification of public domain software which might meet the organisation's strategic objective, and for which sufficient internal knowledge or external support is possible to justify their incorporation into the organisations IT infrastructure. For example, the use of Linux as a base operating system may be considered.

The design of security policy which reflects organisational needs and differentiates between various levels of public commitment. The security policy should involve different levels of physical access through passwords, different levels of data access and different levels of customisation.

- Liaison with Marketing to design strategies for relationship marketing and PDIS to support relationship marketing.

The role of Public Domain Information Manager will also involve tackling the new problems which arise from public access to organisational system and the exponential widening of the organisation's IS user base. The need to tackle requirements gathering, testing, publication and the continuous appraisal of PDIS will be paramount. Table 3 identifies a series of concerns facing the public domain information manager. Some arise from the nature of PDISs, some from the nature of the audience. What is clear is that a number of these issues have not previously impacted on IT: the changing role of IS within the organisation, the spread of influence beyond organisational boundaries and the seamlessness of public and private IS will all stretch the IT function. IS managers must now be concerned with a diverse audience - from the executive in head office working out future strategy to the teenager at home working on a school project. Both will be accessing organisational systems designed, produced and supported by the organisation's IT department.

Table 3: Questions for the Public Domain Information Manager: A Service Quality Perspective

Tangibles

- Is the PDIS of high quality and easy to use?
- Does it reward the user sufficiently to promote repeat visits?
- Is it visually appealing and complete?
- Should production and support be outsourced?
- To what extent can we develop the PDIS using public domain software?

Reliability

- How do we differentiate between signal and noise?
- How do we evaluate PDIS?
- How do we ensure the security of the PDIS?

Responsiveness

- How do we assure a rapid response time and reply to PDIS user communications in an order that reflects their priority.
- How do we deal with the large information / communication volume?

Assurance

- How do we control customer expectations concerning, for example, speed and veracity?

Empathy

- How is the use of the PDIS to be controlled?
 - Developing relationships: how do we identify the stage of each customer relationship and respond appropriately?
 - How do we assure trust and commitment?
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The Public Domain Information Manager must be aware that he is delivering a service rather than just a system. Issues such as service design, delivery and quality should be examined.

Implications for teaching

The proliferation of PDIS, the blurring of boundaries between internal and external IS and the move towards the use of Internet technology in the form of Intranets as the basic IT infrastructure within which organisational IS are embedded has significant implications for teaching, a number of which are outlined below.

Classic approaches to analysis, design and programming, supported by the teaching of the System Development Life Cycle may no longer apply. Rapid application development approaches will predominate. Teamwork across disciplines including graphic design, marketing and information science will be necessary. Programming will no longer dominate projects: information gathering and multi-media design will need to be taught.

New subject areas will encroach on the traditional analysis and design modules. Marketing will become an adjunct to IS. Requirements analysis will involve marketing surveys, focus groups and brand development. Models of customer involvement, such as that outlined above will need to be considered in the design of PDIS. An understanding of relationship marketing will be required for the design of PDIS. Social concepts of community and group dynamics on the web will become relevant to analysis.

In addition to the widening subjects and concepts required for the production of PDIS, new curricula may be required within IS to support information management and the process of maintenance and development of PDISs. Service operations management, including topics such as service design, service quality, availability management, human resource management and help desk management will become core subjects in understanding PDISs. Aspects of system development such as programming and database design, while still of importance, become only tools rather than major strands of curriculum.

Information systems evaluation may increase importance. Public domain information managers will need to evaluate IS offerings to support their function. Design and programming may take second place to the evaluation of PDIS and the study of problems of integration.

Theoretical foundations will need to be developed concerning how PDIS users find, transform, use and remember information. An understanding of information selection and the context within which information becomes valuable will be required. An understanding of the nature of transactions may be important. Theoretical aspects of information theory and agency theory may influence understanding of information selection and PDIS transactions respectively.

A renewed focus on end-user computing, who does it, how it is managed may be required. On the technical side, the selection of components and the management of their evolution into PDISs will be necessary. If PDIS users are taking information,

transforming its and using it in new ways, some understanding that this is occurring is required as a minimum. The volume of end-user development, inside and outside organisations, may outstrip the volume of development by professionals in IT departments or software houses.

The teaching of IS may widen to include aspects of marketing, media studies, management and psychology on the one hand and components and formal methods for their construction on the other. It is likely that the sea-change in organisational approaches to the technology, the audience and the production of information systems will influence teaching content and process. The debate on what should and shouldn't be incorporated into IS curricula will continue. It is important that IS curriculum development does not fall behind technological, and equally importantly, organisational change.

Conclusions

Information systems practice and teaching is still in a state of flux. The emergence of public domain information systems may result in a widening of the issues faced by practitioners and the disciplines incorporated into information system teaching.

For practitioners, PDIS represent a widening focus of IT responsibility externally. Much larger amounts of information will flow in and out of the organisation. Organisation information barriers will become at the least semi-permeable if not transparent. The increasing IT responsibility may include 'guaranteeing' information and systems which are open to the public eye. The different audience, heterogeneous and not necessarily organisation-friendly, and the increased risk of litigation require increased vigilance.

As well as an increased outward flow of information, the IT department will face an increased inward flow. Large amounts of customer relationship information may result in increased IT needs for managing this and deriving intelligence which will support relationship marketing and customer retention strategies. The need for data mining tools and analysis tools, if only to separate signal and noise, may grow.

Integration of internal information systems with other organisations' information systems and PDISs will become a key issue if cost savings and added value is to be derived from Internet-based systems including PDISs.

Security becomes a prime issue, not merely excluding unwanted users but encouraging committed customer involvement through the provision of graduated levels of security privileges.

Research is need to focus on the information interface between the organisation and the outside world. There is a need to understand how the changing 'permeability' of this barrier affects organisational culture and relationship between the organisation and its customers.

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