



SO-grams: a personal visualisation toolkit for intranet users

Elisabeth Davenport, Kathy Buckner

Department of Business Information Management,
Napier Business School, Napier University, Sighthill Campus, Sighthill Court,
Edinburgh EH11 4BN
e.davenport@napier.ac.uk

Department of Communication and Information Studies,
Queen Margaret College, Clerwood Terrace,
Edinburgh EH12 8TS
k.buckner@mail.gmced.ac.uk

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Abstract

The problem: visibility in the virtual workplace

We are interested in the problem of how to share human expertise in large distributed organisations whose work is carried out remotely by means of intranets. or comparable media platforms. In such environments, expertise cannot be transferred in the face to face exchanges or direct observations that physical proximity affords. Knowledge management in the virtual workplace must thus include an added dimension: the knowledge of each other's skills, experience and expertise, which is taken for granted (or tacitly acknowledged) in interactions in physical space. In the text which follows, we present a generic interface for social browsing (the 'SO-gram') which may improve 'visibility' (or employee's awareness of each other) in the virtual workplace. We describe the origins of the browser in fieldwork in a real-world community, and discuss its viability as a tool for social navigation in the context of three different organisations: local government, an independent medium size enterprise in the food and beverage sector, and a global computer manufacturer.

Background

In identifying the problem of community myopia, and in developing a 'social browsing' tool which might address the problem, we have drawn on different literature sets. The first is social network analysis, and is concerned primarily with the charting and analysis of social cohesion and the graphical display of cognate groups that are key components of the study of group dynamics (Grosser 1991). Haythornthwaite's work (Haythornthwaite 1996) on social networks as a tool for the study of information exchange. and recent conference presentations by Huotari (Huotari 1998) and Sonnenwald (Sonnenwald 1998) have proved to be particularly useful in our study, as has work on family support (Tracey and Whittaker 1990), where reliable representations of social space result in therapeutic interventions. Though such work demonstrates the explanatory power of social networks in terms of data analysis and data visualisation, they do not, as far as we are aware, address the issue of how social network data might trigger interaction, or, in the terms of our study, improve social visibility.

Another important source was the literature on navigation tools. The 'trigger' effect is covered in the literature on navigation, most pertinently in discussion of 'push technologies' like Firefly (Lyons 1998), which puts readers/users in touch with like-minded users or like-material on the basis of experiential profiles. Although Firefly engines have been adopted in some sectors of e-commerce (Amazon.com) we have not found references to this type of technology as a social trigger within organisations. As work by Vishik (Vishik 1997) and Wexelblat and Maes (Wexelblat and Maes 1998) indicates, the focus in the literature on organisational intranets is on navigating texts or documentation. With the notable exception of Dieberger (Dieberger 1997, Dieberger 1998) who discusses 'social navigation', those researching the virtual workplace do not appear to treat human expertise as a navigable resource. Dieberger's work provides an introduction to the webspaces and interactive genres that engage humans in virtual environments, but offers little guidance on how interaction or synergy might be engineered.

We are also aware of studies of the management and legitimisation of intranets by Rosenbaum (Rosenbaum 1997), and Sheepers and Damsgaard (Sheepers and Damsgaard 1997), and of workflow architectures for the virtual workplace (Ames of al 1997). Though these may well describe developments when partners are familiar to each other, they do not address the problem of initial contact. As we indicate above, our proposed networked version of the SO-gram, may both enhance observation of interactions, and overcome organisational myopia to promote interactions In developing the concept. and designing prototypes, we have drawn heavily on the work of Spence (Spence 1998) and his colleagues on browsing. Browsing, in Spence's terms, is a general scoping activity which allows members of a community to find points of interest, and pursue them within the constraints of the effort required. Criteria for an acceptable social browser in a given context must take account of a group's hedonic calculus. We discuss these issues, albeit at a simple level. in the text which follows.

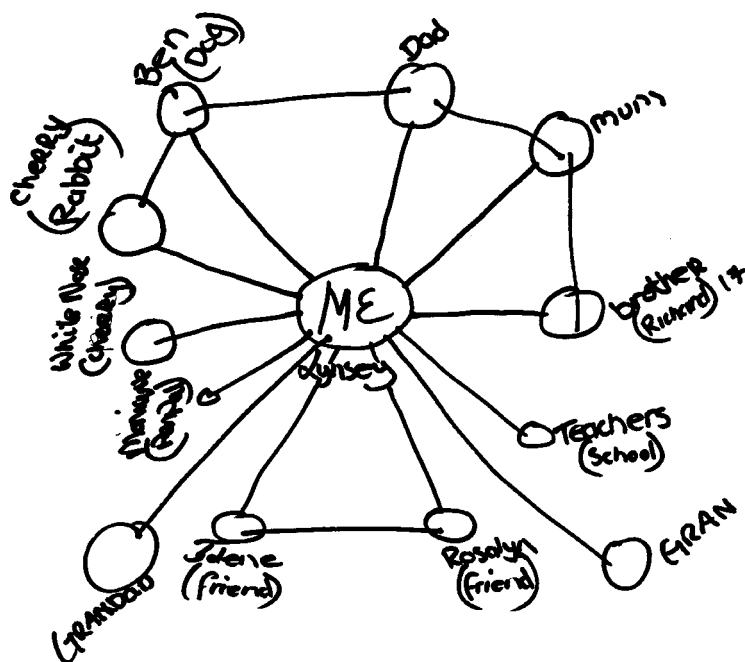
The origins of the social browser concept

For the past year, we have collaborated on a project which seeks to investigate the application of information technology to the enhancement of social cohesion within a small geographic community in the West End of Edinburgh. Our dialogues in the locality, with individual residents and members of community groups, have focused on group interaction. Under this rubric, we have tried to elicit who is significant in our respondents' lives, and how that significance is manifest and articulated in exchanges between respondents and their significant others. We have attempted to discover how respondents rank their relationships, and whether patterns of behaviour reflect rankings in a way that allows zones of comparative significance to be identified and described in terms of attributes. In addition, we have explored the viability of a tool for extending relationships beyond the immediate circle of friends and friends of friends. As a result of our fieldwork we have identified a generic problem 'community myopia' (Davenport et al 1998a) which may be overcome with tools that enhance 'community visibility'.

Level One: 'draw and describe'

To track the relationships of participants in the community project, we developed a simple conversational prop, the 'SO-gram', or 'significant other' gram (Davenport et al 1998b). Each participant was asked to draw a simple node and arc diagram of important others (people and animals) in her or his life, and to place himself or herself at the centre of the 'map' (Fig. 1). The nodes were drawn in different sizes to reflect the intensity of the relationship - a large node is more 'significant' than a small node. Participants were then asked to talk about what 'significance' implied (fondness, trust, frequency of contact, long-termism and so on), and to describe the relationship (represented by the arc) between the 'me' node and its neighbours. Though useful as a conversational prop (participants found the diagram easy to draw, and to talk through), the paper SO-gram has two obvious limitations as a social browsing tool: firstly, it represents only one-to-many relationships and is thus unlikely to take an individual outside an existing circle; and it is navigated in a simple chaining process, which is both time consuming, and unwieldy where 'multiple' paper SO-grams are stacked.

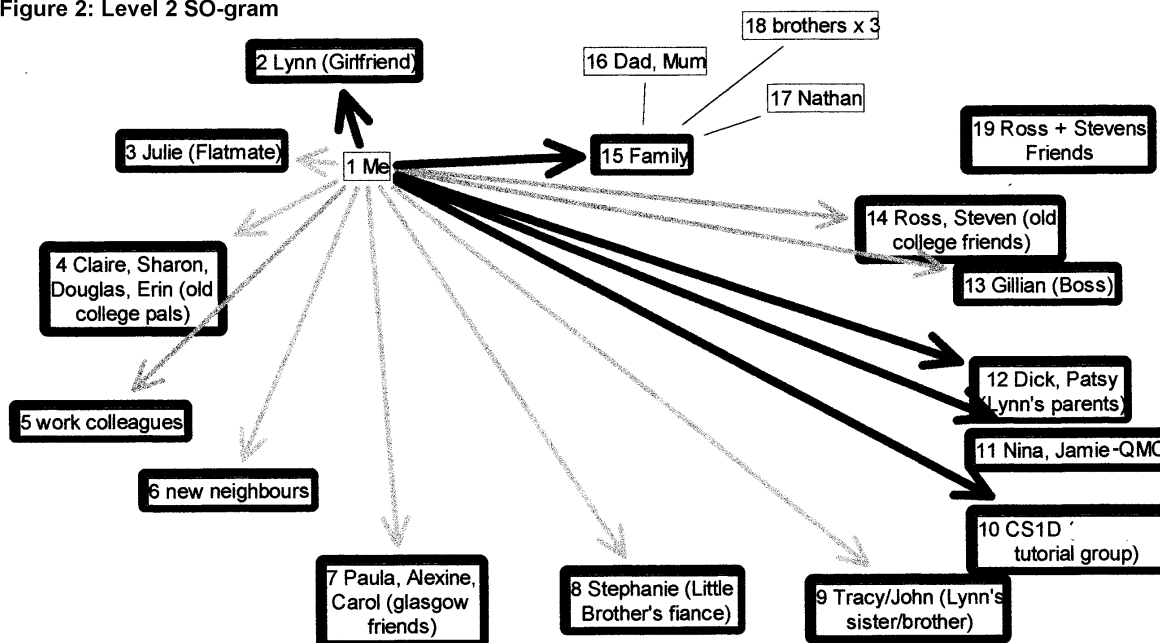
Figure 1. Level 1 SO-gram



Level Two: 'draw and describe' and 'point and click'

In Level Two, we used simple computer tools to model interactions, using SO-gram data based on a version of the basic diagram which was modified by asking participants to follow standardised procedures for annotation of the node and arc diagram, and to use prescribed criteria to 'zone' their interactions. Not only did these constraints allow the SO-gram data to be transferred into two off-the-shelf application packages, but they were also appreciated by participants, who appeared to take less time to offer a more consolidated view of their social interactions. The two packages, Decision Explorer (Decision Explorer 1998) and Inspiration (Inspiration 1998), have been designed to help in the representation of qualitative information in complex environments, by allowing links between different concepts to be established and manipulated, and facilitating the analysis of concept maps (Fig. 2).

Figure 2: Level 2 SO-gram



There are several advantages in using a computer tool. Both tools allow nodes to be moved around in the SO-gram, so that individuals from the same groups can be positioned near to each other. Inspiration allows free form circles to be drawn around the group to allow visualisation of zones. Both tools allow users to zoom into the SO-grams of neighbours by entering a given node, and both packages allow users to store data for future analysis on the types of exchanges which are taking place. Using import/export functions it is possible for data from qualitative data analysis packages to be linked to concept mapping tools. Instead of concepts, we used people as node labels.

Though the simple computer based tool clearly increases the analytic scope of the SO-gram as a social browser, we identified several drawbacks. In terms of navigation, Decision Explorer and inspiration tie the user to a 'chaining' process which may be inadequate in the context of a complex organisation, and we suspect that their optimal capacity may be limited. In addition, the resource implications may be high where the tool is implemented and maintained by small groups on low budgets, and some users may find the computer tool too demanding unless a facilitator is present. Computer-based SO-grams may be modified in ways which make them easier to construct, and improve their efficacy as carriers of focused information. We are currently 'tidying' the protocol for constructing SO-grams to derive a series of versions which can accommodate different participant levels of comfort.

Level three: mobilising SO-gram data

The tool has potential as a probe to explore the underlying communication structure in larger groups, where it might provide a mechanism for collecting parsimonious data for personal profiling. If, for example, SO-grams were to inform the design of an agent-based message system for a given population, they would need to deliver information on:

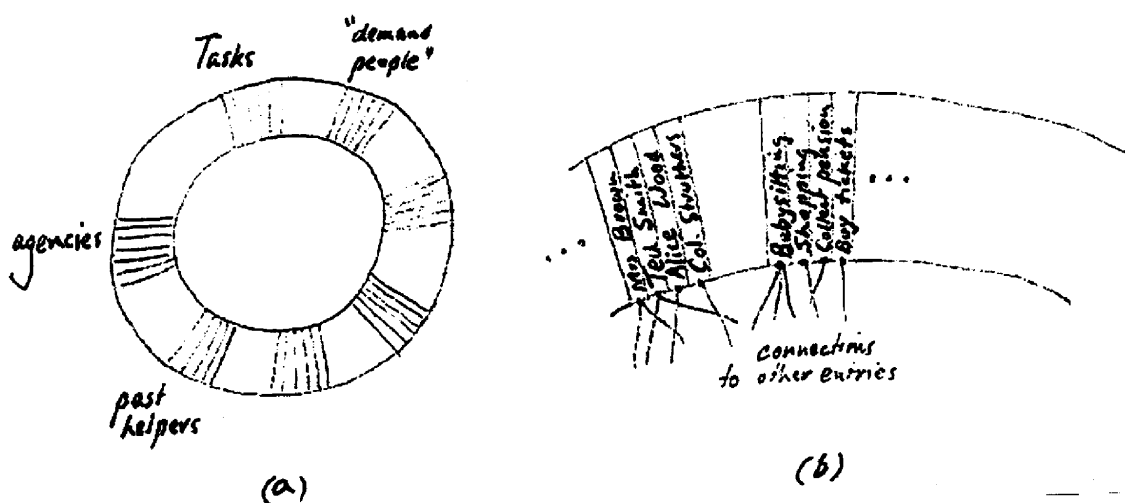
- motivation for communication;
- type of exchange;
- initiation-response patterns;
- sites for interaction.

Between June and September 1998, we worked with a commercial network mapping tool, Netmap (r) (Netmap 1998) to test the usefulness of SO-gram data embedded in a complex computer application (Connolly 1998). We derived certain 'mobilisation' criteria for the application to function as a 'rich' social browser which would overcome the drawbacks identified in our application of the simple computer-based version:

- the tool must be capable of representing each entry in the SO-gram as a different node, and must allow these to be labelled accordingly - it must support differentiation;
- the tool must be capable of representing the links between nodes and differentiating between links of different types, displaying only links of a certain type if required - it must support extraction;
- the tool must be capable of simplifying the connection networks when the number of connections is so high as to detract from the clarity of the information presented - it must support filtering;
- the tool must be capable of accessing information inside nodes - it must support data mining.

Netmap® was originally developed on the UNIX platform and its graphical user interface is based on the X-windows system, It is now available for the Windows NT platform; however, the GUI still requires X-windows to be installed on NT machines. The software is licensed and a key code can be obtained from the developers. The installation process is relatively straightforward but the assistance of a systems administrator may be required when installing into a networked environment. The package accommodates complicated manipulations of the sort which we wish to represent, and is thus pertinent to our search for a social browser that overcomes community myopia in a range of contexts.

The features of a basic Netmap® are presented in Fig. 3. Nodes are presented as small sectors around a circle, each with its own label. These sectors are collected into groups which can be differentiated by colour, as can the links between members of different groups within the main circle. Beside each link is a smaller 'satellite' circle made up of all the nodes of that group, within which a user can find all the links within that group. The software can select links of a designated type and also users to extract information using threshold values as a filter.



(Fig. 3)

An analyst who wishes to improve his or her ability to observe social interactions in a community can choose a 'discrete network' grouping strategy that allows small isolated groups to be identified and displayed. In addition, an emergent grouping strategy allows an analyst to see the weaker connections between groups without combining them into a single supergroup on the basis of one or two transgroup interconnections. This feature would be useful for managers who wished to evaluate the effects of strategies for social cohesion. Netmap® triggers social interaction by allowing users to search on individual nodes (a task or a location, for example), to find out who has previously linked to whom on these, and to mine for further details on the flipcharts that lie behind each node. These features would support a member of an organisation wishing to identify an experienced (and trustworthy) partner for a project.

Field conversations

As we indicate above, we see scope for 'social browsers' in the virtual workplace, or intranet-driven organisational work. Where the browser allows individuals, and groups, to observe 'visualised' interaction, or where it triggers interaction outside the scope of observable activity, it may contribute to organisational synergy and social learning.

From May to August 1998, we held a series of interviews with representatives from three organisations in an attempt to scope the viability of the browser, and identify contexts where more sustained research might be carried out. Organisation A is an information and library service in a local government authority which has recently been re-structured as an independent body. Organisation B is an independent medium sized enterprise in the food and beverage sector which has experienced a series of major transformations in the past three years: management buy-out, flotation, and, automation of the sales force. Organisation C is the Scottish arm of a major global computer manufacturer. The interviews focused on two dimensions of the social browser: its potential as an observatory, and, its potential as a trigger for social interactions that might otherwise not have happened.

Social browsing in local government

DM is the director of one of the smaller departments in Organisation A, which, as we indicate above, has recently undergone major restructuring and has been split off from a larger authority, to be run as an autonomous unit. Overall, DM is responsible for 55 people, scattered across 11 branch offices, and two mobile service units. In addition to daily running responsibilities, DM is increasingly involved in the preparation of bids for funding, as the local authority budget is tight. These bids cover all aspects of his work - from capital funds for building through the Private Finance Initiative, funds for the re-skilling of personnel to fit them for the internet age, to EC funds which will allow DM's department to acquire much needed equipment. DM summarises the three main areas where SO-grams might be useful as:

- to assist him, and others, in their understanding of the newly configured (and constantly fluctuating) organisational structure and in their ability to contact appropriate colleagues for given tasks:
- to assist him in his search for funds, both in terms of locating funders and partners where funders require collaboration as a condition of grant etc;
- to act as a personal organiser, and a framework within which to evaluate career trajectories.

DM can see that levels one, two and three might all be useful in different ways, depending on the status of the individual who uses them. Level one is most appropriate for the 'personal organising' function, and level two for the 'dynamic organigram'. As overall manager of the unit, however, DM would find level three SO-grams useful in identifying areas where better connections might be made among his staff, or identifying cases where staff are not engaging with a particular task or a particular site. He would also welcome a system that could put him in touch with potential partners, on the basis of others' personal experience; much time can be wasted meeting with partners who are not suitable.

Though he can see many benefits rising from the application of SO-grams, DM is sceptical that the local authority in its present state of IT development might adopt them as an organisational standard, as the benefits from levels two and three depend on mutual connectivity, and the local authority is reluctant to provide this for reasons of security. He would be happy to implement 'level - one' prototypes within his own unit if the cost was controlled. One way to implement mutually networked SO-grams might be to develop 'social browsers' as a sectoral standard for collaborative interfaces within library and information services. He would be happy to be included in any grant proposals to further this.

Social browsing in the food and beverage sector

MS is a senior administrator in a medium sized enterprise (around 500 employees) in the food and beverage sector, which, as we indicate above, has undergone major re-structuring since 1993. A management buy-out was followed by flotation on the stock market in 1996. A 'level one' SO-gram drawn by MS clarified six main areas of responsibility. Personal Assistant to the Managing Director, induction and training, coordinator of the Salesforce, stationery and office supplies, office documentation. (MS indicated that drawing the SO-gram in itself had proved

useful). Two further emerging roles are assistant to the IT manager, and assistant coordinator of financial services.

In most of these roles, MS acts as a gatekeeper. putting people in touch with those they need to work with. She sees her work with office documentation as part of this: she was solely responsible for designing and introducing standard forms and protocols for all office procedures throughout the enterprise, which she sees as a way of making sure that people have access to the same Information and can share it effectively with the minimum of effort. This groundwork has prepared the way for computerisation of the company, which is rapidly adopting an enterprise wide computing strategy in response to the demands of distributors and suppliers, and to pressure within the sector. MS could see scope for 'level two' SO-grams in five main areas.

- as personal visualisation tools for daily planning and career development;
- as a general interface for presenting the company organigram and job descriptions with contact points;
- as interfaces which would enhance the induction process (whenever an employee is put in the position of having to 'start over' in relation to a new project, for example) by offering point and click access to colleagues at the level of the organisation, the project and so on;
- in relation to the expanding global sales initiatives, as a means of making the work of regional reps. visible to the rest of the company,

and,

- as a key component of the 'retrack' system. The field sales force have recently been equipped with laptops and mobile datalinks, which will allow them to retrieve and input information on the fly. A SO-gram would provide rapid access to their contact networks, and would allow new clients to be added. 'Significance' in this case might be measured in terms of the 'temperature' of the contact - cold, warm hot etc.

MS did not feel able to comment on 'level three' SO-grams, as she felt that that kind of analysis would be done by upper management; in this context it might be of use in the annual planning sessions, when next year's targets are set in response to market trends, and five year plans are drawn up.

MS was very positive about level one and level two SO-grams, and would like to see them built in to the emerging computing platform in Company B. The main problem might be time consuming data input, but many of the problems associated with that have been dealt with in the office document standardisation project. At present, interface design and the social aspects of computing are secondary issues in the company, as accounting has dominated IT initiatives up till now. MS does not doubt that pressures from the trade will, however, make the 'human connection' factor increasingly important. Two areas where she would like to make a start with SO-grams in Company B are:

- personal evaluation and induction,

- the laptop initiative with the salesforce. where they could be combined with the communications facility.

Social browsing in a global computer manufacturer

IR is a senior development engineer in a global computer manufacturing firm. His immediate workgroup (located at the same site) consists of 10 - 15 colleagues depending on the project to hand. In addition, he has contacts with the Marketing and Manufacturing departments, with colleagues on other projects, and with colleagues on the sister site in the US. His social networks are to some extent dictated by the projects that he works on, most of which have a time frame of eighteen months to two years. Strong bonds develop between member of the project teams, who rapidly become 'significant' to each other.

The group currently uses an intranet for communication and sources, and has web access; one of the group members acts as a gatekeeper, particularly for online information. As existing systems already provide good networking facilities, IR thinks that level three SO-grams would be of most interest to his group because of the added value that they provide in terms of triggering social/collaborative links that might not otherwise have been made. For example, a newcomer to the firm, added to a team with a specialist function, might need to locate others in the company with expertise in that function who had worked successfully with other team members - a level three SO-gram might facilitate the connection.

IR is aware that in other computer companies, with a less hierarchical structure than his own, teams work to shorter time frames, and place more responsibility on new-comers to organise and configure their own groups. In this case, the need to find 'unknown' talent may be greater, as team members cannot rely on the channels that exist in established company divisions. In companies like this, an individual's work load may be more heterogeneous than in IR's firm, and a 'tracking' interface would obviously be of use.

In terms of implementation, any SO-gram browser must be unobtrusive, and require no greater effort than existing systems. A level three system would require an administrator; this might be added to the existing gatekeeper's portfolio. In addition, if the browser proved to be successful, it would be likely that the company would wish to develop it themselves as an in-house or commercial product.

Conclusion

We have outlined a problem, 'community myopia', that can affect group members who may wish to accomplish tasks together, but are unaware of each other, and have described a possible prosthesis - a 'social browser' to improve corporate visibility. We suggest that both the problem, and the proposed solution, may be relevant in the virtual workplace, where members of organisations cannot enjoy the easy contact afforded by physical proximity. Field 'conversations' (discussions of concept scenarios in three different organisations) revealed that:

- social browsers are best presented to organisations as systems that operate at different levels,,

- the appropriateness of the level used will be determined by the state of development of technology (infrastructure and workforce experience) in the organisation;
- the amount of effort that an organisation is prepared to invest in a social browser will be related to the perceived added value offered by the tool.

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