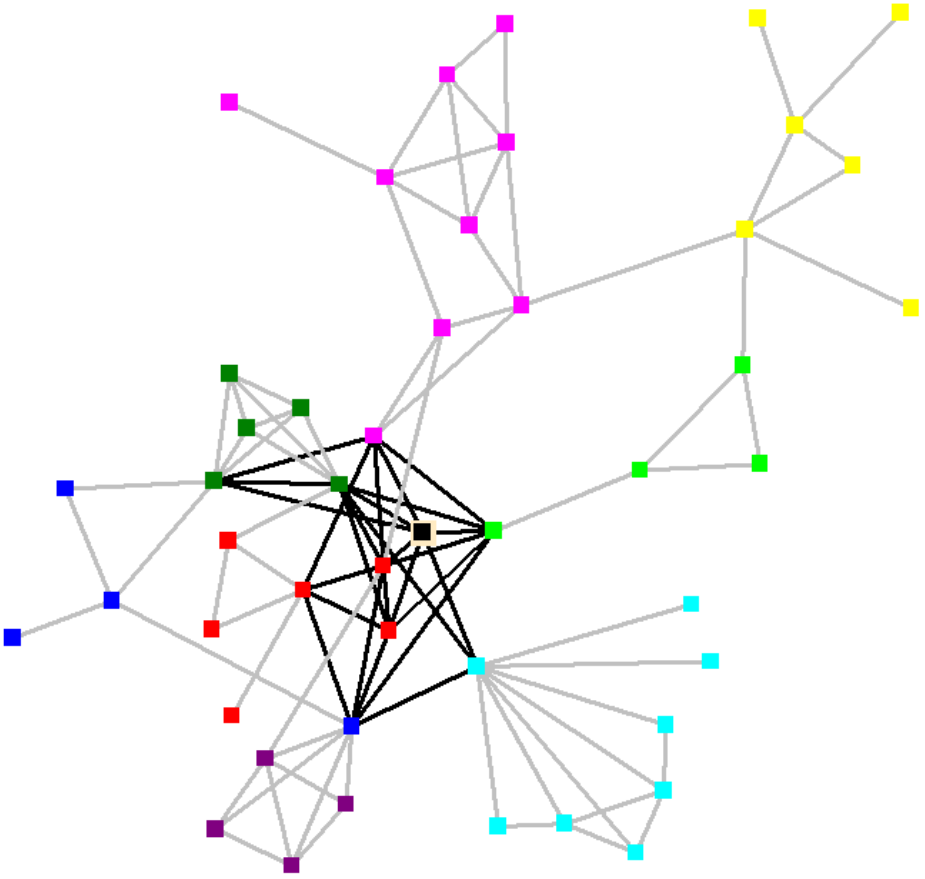
The Use of Social Network Analysis Tools in the Evaluation of Social Change Communications



An input into the Background Conceptual Paper: An Expanded M&E Framework for Social Change Communication

By Dr Rick Davies, April 2009

Contents

Background

This paper has been commissioned by the Communication for Social Change Consortium. In their Terms of Reference they emphasised that…

> "We wish to highlight what an "alternative M&E paradigm" can offer, given the need to address the complex and often unpredictable character of social change and development processes. I.e. a perspective that encompasses a more comprehensive and innovative approach and one that includes less known and less practiced M&E methodologies and practice. One that emphasizes learning for programme improvement, institutional development and change, and wider accountability. An approach that is flexible, open to unfolding developments and the unforeseen, one that captures the richness, diversity and complexity of SCC initiatives and that can be adapted to local contexts and circumstances."

And the Terms of Reference also point out that

"This process is being initiated in the context of the need for better evaluation of HIV and AIDS programmes, but will have far wider application and relevance"

What is Social Network Analysis? A brief introduction

Social Network Analysis (SNA) is a body of methods developed for analyzing social networks. It has its origins in sociology and mathematics (graph theory) but it is now being used across a wide range of other disciplines (Freeman, 2004). The spread of personal computer (PC) use from the late 1980s has encouraged much wider use of SNA methods because it has meant increased ability to manage large data sets and to visualize social network data in a wide variety of ways. The global rise of the internet from the mid-1990s has made networks an ever present and powerful metaphor, especially with the more recent proliferation of social networking sites[1]. Associated with these developments there have been a number of popular science books on the subject of networks (Watts, 2003; Barabasi, 2002).

SNA is not tied to a specific theory of how society or individuals function. This is an important point to note when considering its use for evaluation purposes, since each program or project will normally have its own (implicit or explicit) "theory-of-change". SNA might be best described as a "representational technology". There are three aspects to this technology: network diagrams, network matrices, and mathematical measures describing the structure of networks, and the place of actors (individuals, groups, etc) within them. Because of the complexity of many networks there has been the associated development of various software packages to analyse and visualise networks. These are useful, but not essential to many of the uses of SNA proposed later in this paper. The network diagram on the front page of this report shows a network of individuals within an organisation, and the different kinds of relationships that connect the individuals concerned.[2]

The definition of a network is very simple, but yet still very useful. A social network is a number of actors connected by some kind of relationship. Actors can be individuals, groups, or organisations. Relationships can be of any kind, from formal to informal, financial, sexual, friendship, professional, etc. Networks can also include actors' relationships with other kinds of entities, such as events that multiple people may attend, or interests that multiple people may share[3]. Distinctions are also made between egocentric networks, where data is gathered from one actor (ego) about their relationships with others, and whole networks, where data is gathered from all those in the network of concern.

[1] It should be noted that SNA is not on and the same as social networking sites on the internet, such as MySpace, Facebook, LinkedIn and countless others. However, SNA tools have been used to analyse interactions within these sites, both by external researchers and by managers of these sites.

[2] As seen on Valdis Kreb's website http://www.orgnet.com/emergent.html

[3] These are usually described as two-mode networks, and require different methods of analysis

The most important point of difference between SNA and other forms of analysis of social phenomena is that attention is paid to the *structure of relationships* between actors. This is in contrast to the analysis of the *attributes of actors* (and different categories of actors). Focusing on attributes, we could describe a group of intravenous drug users in terms of their average age, education status, ethnicity, employment status, etc, and then to compare them with non-drug users. Focusing on relationships we could describe the structure and kinds of relationships between the drug-users and compare these to those found amongst comparable non-drug users. This difference in approach is one of emphasis, they do not need to be mutually exclusive. In practice good social network analysis will pay attention to actors' attributes as well as the structure of their relationships.

The emphasis on the structure of relationships is especially relevant in the field of HIV/AIDS. This point was clearly made by Heckathorn et al (1999) in the 1990s:

> "The rationale for employing social network analysis to understand the AIDS epidemic is strong. Whereas many infectious diseases are spread through casual contact and contagion, HIV transmission results from risk behaviors that involve close and often intimate contact. Hence, the transmission of HIV is structured by the social relationships within which these contacts are embedded (Neaigus 1998; Klovdahl et al. 1994; Morris and Kretzschmar 1995; Laumann et al. 1993). An implication is that efforts to prevent the spread of HIV must take social networks into account. Social networks can play a dual role in the HIV epidemic. They serve as both the route of transmission for the virus, and, potentially, the route of transmission for HIV- prevention information and services."

The use of SNA in the study of HIV/AIDS

There is now a significant body of literature on the use of Social Network Analysis tools in relation to HIV. Applications of SNA have been in use since the mid-1980's, with Klovdahl's (1985) social network analysis of the spread of HIV/AIDS being one of the first.

Three types of uses can be identified. The first is for epidemiological purposes, understanding how HIV spreads. Experience in this field has recently been the focus of Martina Morris's (2004) **"***Network Epidemiology: A Handbook for Survey Design and Data Collection*". The second is to understand how information and ideas about disease and health promotion spread within communities. For example, the Kenyan Diffusion and Ideational Change Project (KDICP) and the Malawi Diffusion and Ideational Change Project (MDICP), described by Behrman, Kohler and Watkins' (2009) *Lessons From Empirical Network Analyses.* This works overlaps with more cross-disciplinary attempt to understand the process of the spread of ideas, as captured in the mid-1990s by Valente's (1995) "*Network Models of the Diffusion of Innovations*" and his work since then.

The third type of use of SNA has been for program planning purposes. Some prevention programs are now explicitly designed on the basis of knowledge about the structure of social networks. In his 1999 paper Heckathorn reported "the results of a field experiment that compares a network-based HIV prevention intervention, termed a Peer-Driven Intervention (PDI), with the standard form of street-based outreach intervention. The results suggest that the network intervention outperforms the standard approach with respect to number of people accessed, reductions in self-reported levels of HIV risk behavior and cost". More recently Amirkhanian et al (2003) reported on a "*Social Network HIV Prevention Intervention Program for Young Men Who Have Sex with Men in Russia and Bulgaria*".

Some of the knowledge about how social networks matter is now being summarised and distributed in more accessible forms, such as the Fact Sheets produced by the Centre for AIDS prevention Studies at UCLA(SF)[4]. A YouTube presentation on "*Applying Social Network Analysis to Behavioral Research on HIV/AIDS"* is now available online.[5]

The use of SNA in the evaluation of HIV/AIDS interventions

In contrast to the research uses of SNA in relation to HIV, there is very little literature on the use of SNA tools for evaluation purposes in relation to HIV/AIDS. The USAID funded guide on "*Evaluating Programs for HIV/AIDS Prevention and Care in Developing Countries*" makes only a few scattered references to reference to social networks. UNAIDS' "*Framework for Monitoring and Evaluating HIV Prevention Programmes for Most-At-Risk Populations*" makes one reference to social networks. "*Evaluating AIDS prevention programs*", produced by the National Research Council (U.S.) Panel on the Evaluation has no references to social networks. One notable exception is a section on SNA in Thomas Valente's (2002) "*Evaluating health promotion programs*".

HIV/AIDS focused websites have also appear to have given network analysis little attention. A search of the Measure Evaluation website produced one reference to social networks (related to respondent driven sampling[6]). A search of the UNIAIDS website for "social network analysis"

[4] CAPS Fact Sheet - How do sexual networks affect HIV/STD prevention? At http://www.caps.ucsf.edu/pubs/FS/networks.php

[5] "*An Introduction to Applying Social Network Analysis to Behavioral Research on HIV/AIDS"* at http://www.youtube.com/watch?v=CrYx25m8J9g

generated two documents, both produced in the 1990s. A UNAIDS best practice document (UNAIDS,1999) noted:

> "The use of social network analysis in the evaluation of peer education programmes is another example of an innovative methodology; it has been applied in youth programmes in Ghana and Thailand that address process issues such as recruitment, supervision, retention, initiation and intensity of contacts, quality/accuracy of information, referrals to other services, and coverage/range of efforts (Bond& Wolf , 1998;Wolf , 1998). The lack of published information on different types of innovative and feasible evaluation methodologies that can be used with HIV/AIDS peer education programmes is an important gap to be addressed in future programme planning and research efforts"

Some years later, Rugg et all (2004) carried out a systematic review of evaluations of HIV/AIDS programs published since 1985. They noted that the move towards more community oriented interventions has not been matched by associated changes in evaluation activity: " a substantial number of interventions (25%) used peers to assist with intervention delivery but only 12% of the studies focused on the community setting and even less (6%) on outreach approaches."

Outside the realm of HIV/AIDS evaluation SNA methods have received more attention. The Fall 2005 edition of New Directions in Evaluation was devoted to Social Network Analysis in Program Evaluation" (Durland, 2005). Articles on social network analysis have repeatedly featured in the journal Evaluation.[7]

How could SNA be useful in the evaluation of HIV/AIDS programs?

In this section of the report I outline three types of usage of SNA tools. The first is in the context of organisations where there is some kind of agreed plan of what is expected to happen, and this plan might already be describing by a kind of logic model (explained below). The second is in organisations where the expected developments are not so clearly articulated. The third is in more complex settings involving multiple organisations, each of which may have a plan of some kind, but where there is no central plan, or planner.

Before introducing some methods that can be used some it might be useful to explain the difference between network diagrams and network matrices, and how they are related. The matrix below includes a list of Ghanaian NGOs, across the top row and also down the left column. These were all funded by a NGOs & Governance program called G-rap[8] which I worked

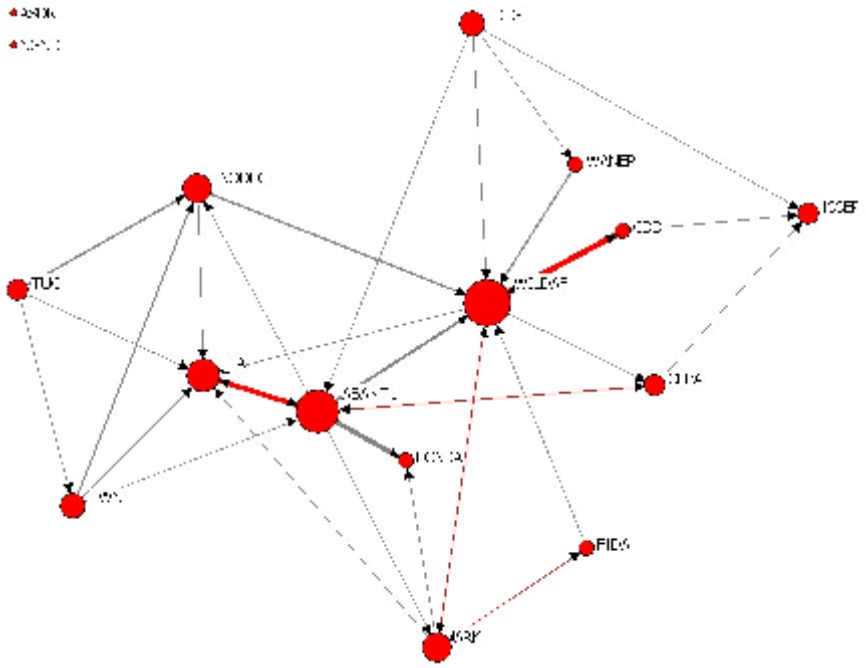
[6] Comparison of PLACE and RDS at http://www.cpc.unc.edu/measure/news/comparison-of-place-and-rds/?searchterm=social%20network

[7] E.g. January and April 2009

[8] http://www.g-rap.org/

with in 2005-7. Through an analysis of their progress reports we established which organisations had worked with which other organisations in the last year. The frequency of these reports of working relationships is contained in the cells of this matrix. Each cell describes the relationship from the row actor to the column actor.
So, for example, looking at the first row this matrix shows us that ABANTU reported working with ARK, CEPA, FOSDA, IEA, ISODEC and WILDAF. If we look at WILDAF, in the bottom row, we see they reported working with ARK, CDD, CEPA, and IEA. But not ABANTU. ABANTU's reference to this relationship was not reciprocated. This may suggest the claim was incorrect, or it might suggest a status difference, with one being more keen to report a relationship than the other. A matrix like this presents information from both parties to a particular relationship, and it shows all the possible relationships between all the actors involved. Extra value can be obtained by adding in summary column and a summary row, which in this example would tell us how many other NGOs ABANTU reported working with, and how many other NGOs reported working with ABANTU, respectively.
As will be shown further below, matrices like this can produced through discussions in workshop settings, and they can also be used as a means of collating data from respondents to survey sources. The downside is that the larger they get the harder they are to analyse, even when using summary rows and columns.

The same data show in the matrix above can also be shown in the form of a network diagram. This has the merit of highlighting the structure of the relationships which are not visible to eye when looking at the same data in a matrix format. In the diagram below e can now see who is central (WILDAF), who is peripheral (FIDA), who has many working relationships with others (big circles) and who has few (small circles). We can see "cliques" of organisations, where everyone was working with everyone. We can see reciprocated (red) and unreciprocated (grey) relationships. And we can see the unconnected organisations (ASDR, NGND). The downside of this second means of representation is that it is more difficult (but not impossible) to construct it using participatory means.



The use of network analysis is not something new in development programs. Almost all accounts of Participatory Rural Appraisal methods make reference to Venn and network diagrams or one kind or another. "Venn diagrams involve the use of circles of paper or card to represent people, groups, and institutions. These are arranged to represent real linkages and distance between individuals and institutions. Overlap indicates flows of information, and distance on the diagram represents lack of contact" (Petty, 1997). Where real Venn diagrams are used limits are quickly reached on the number of actors and relationships that can be represent, because of the complexity that results from using many overlapping circles, which are both difficult to draw and to read. Networking tools used within PRA practice tend to be highly variable in the conventions used to represent actors and relationships, and thus more difficult to compare. The advantage of the Social Network Analysis tools is that they can be used with much larger networks, and they are linked into a wider body of knowledge about networks, their measurement analysis and visualisation.

1. Within organisations: Moving from Logical to Social Frameworks

Many evaluation manuals and guides will make reference to the use of Logic Models to map out how a project is supposed to work, and thus provide a comparator against which to assess what has actually happened. The Logical Framework is probably the most widely know form of Logic Model, at least with the world of development aid programmes[9]. While it uses a tabular structure others make more use of diagrams. But common both approaches is use of a linear sequence of events. For example, in the

[9] But not the only one, there are other forms (Kellogg, 2000). It uses a tabular structure whereas others make more use of diagrams

UNAIDS "Framework for Monitoring and Evaluating HIV Prevention Programmes for Most-At-Risk Populations makes use of diagrams showing a chain of Inputs>Activities>Outputs>Outcomes>Impacts, and the associated details of what is expected at each of these stages[10]. In their review of evaluations of HIV/AIDS programs Rugg et al (2004:37) noted that "All agencies endorse a simple "input-activities-output-outcome-impact framework as the basic organising framework".

Though useful and widely used, these simple linear models have some drawbacks:[11]

- Many people have difficulty agreeing on whether something is an Activity or and Output, an Output or an Outcome, an Outcome or an Impact. These are not naturally occurring divisions in time, and the choice of which category to use to describe an event is very dependent on where the observer is. Your Output might be my Input. This difficulty is compounded by the fact that often it is not very clear where the boundaries of "the project" are.
- Because the model is based on a sequence of stages over time, the process of causation is one way, and there is no meaningful way of showing feedback loops between different events. Time does not run backwards.
- Although there are multiple events described at each level there is no way of describing (a) how events at any one level interact with each other, and (b) how they then interact with the multiple events at the next level.

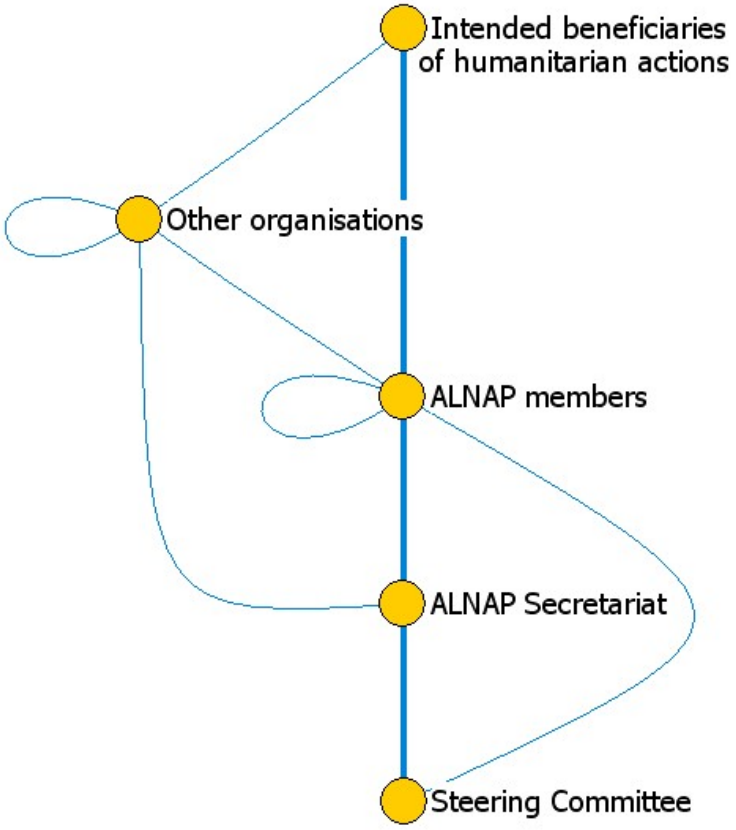
A SNA perspective provides some ways of overcoming these problems, while continuing to use such linear logic models if this is seen as a necessity. Other more adventurous options will be discussed further below.

The first step is to change what is being represented. An alternative to a temporal sequence of events is a sequence of actors, connected by their relationships. This can be seen as a potential impact pathway through a wider network of actors. Information, influence, money and material objects can all pass along this pathway, in both directions. The difference between these two views is captured in the diagram below, developed while working for ALNAP on their Monitoring and Learning Plan. This shows how the traditionally described rows in a Logical Framework can be re-focused to describe the expected change in each actor within a larger chain of actors (i.e. a *Social Framework*). The other columns of the Logical Framework, describing Objectively Verifiable Indicators (OVIs), Means of Verifications (MoV) and Assumptions, can still be used to describe what is happening with each actor in a Social Framework.

Relationship between rows in a Social vs. Logical Framework view of ALNAP

[10] See pages 5,8,49 of the UNAIDS framework.

[11] This criticism is based on the Logical framework as being the most commonly used structure for a logic model.

New view: Actors, who are part of a pathway	**Old view:** Stages in time
	Super-Goal Goal Purpose Outputs Activities
Nodes = Actors, or categories of actors Lines = Relationships (to other actors and amongst members of a category of actors) Thick line = Main relationship documented in the Social Framework. Thin line = Other relationships that are expected to be important, described under Assumptions	

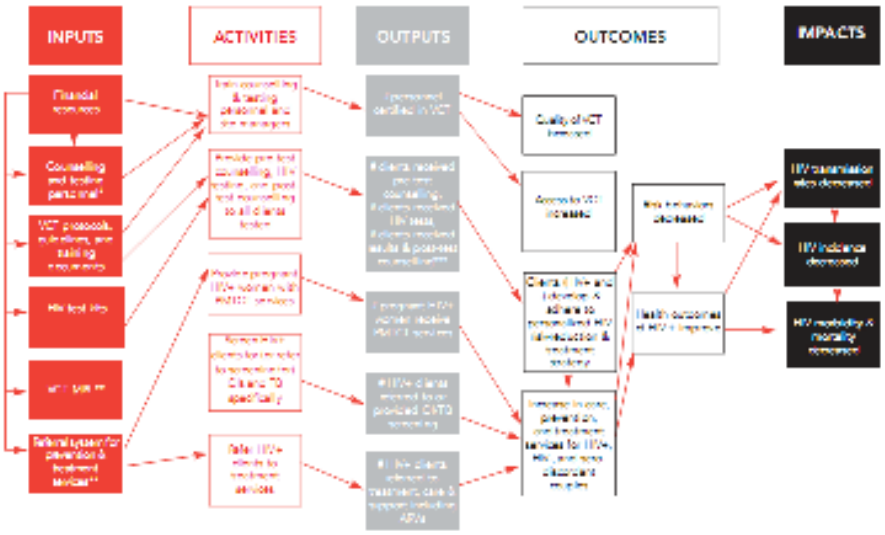
This more social framework has advantages: (a) The entities involved at each level are clearly defined and require no introductory courses on logic model terminology; (b) The notion of a chain of actors reinforces the idea that responsibility for change is distributed along the whole chain, (c) Clarification of details of the framework can easily be delegated to the actors concerned at each level[12], and (d) Multiple levels of responses can be built into each row. For example, the Secretariat can not only produce products and services for members, but also engage in monitoring their use and impact on intended beneficiaries.

The first step, described above, was to change *what* is represented. The second step is to change *how* relationships are being represented. The tabular structure of the Logical Framework is probably the most restrictive format of all, allowing no representation of how events at different levels are interconnected. Logic models are also captured using diagrams, such as

[12] Or those adjacent to them if they are not expected to be cooperative, as in the case of advocacy projects.

the one below, taken from UNAIDS Evaluation Framework below (page 49). This representation does give recognition to the fact that sometimes a single event is likely to influence many others, and sometimes a single event is likely to be influenced by multiple other events. It does not however show how events any one level are likely to be causally interconnected. Nor does it show any feedback loops, because it is committed to using time (input>activities>outputs>outcomes>impacts) as one dimension of the diagram. Because of this, the diagram is only part of the way towards being a real network model.

Figure 13: An Example Of A VCT Programme Implementation Logic Model



There are simple tools from SNA that can be used to document these complex relationships and help them inform evaluation efforts. In a recent review of a maternal health project in Indonesia, I projected an empty version of the (Excel) matrix below onto a screen, during a workshop with the project staff. The left column lists 16 Output indicators and the top row lists 11 Purpose level indicators. Taking one Purpose level change at a time (i.e. one column) I asked the staff to allocate 100 points across the various Outputs, according to the extent to which they though each output was expected to influence that Purpose level change. So, in the first column, outputs 1.2 and 4.1 were expected to have the biggest impact on the first Purpose level change (signaled by the 20% cell values). After all columns were filled in, I then used a summary column on the right to provide an overview of how much each output was expected to have an impact, across all the Purpose levels. This was then converted into a percentage "weighting", to inform the evaluation of these various outputs. Good performance on a highly weighted output was treated as more important than good performance on a lowly weighted output.

During such exercises hiding the summary rows and columns can be useful. It was not until the end of the exercise that staff looked at the summary row and noticed that the weighting for Outputs 4.1 and 4.2 were much lower than they had expected. They had previously thought this

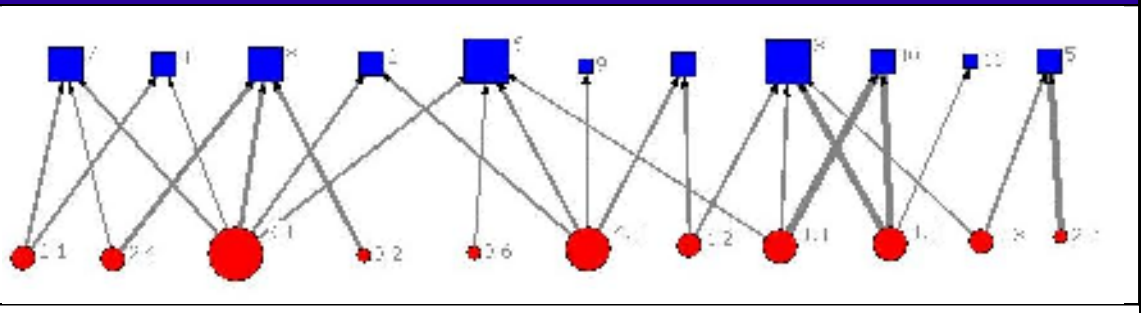
component of the project was more important. But though the process of making many micro-judgments, they had generated a different conclusion.

Output indicators x Purpose indicators matrix

Cells = causal links from Outputs (left) to Purpose (top). Cell values = relative strength of the link

The completed matrix shows some of the complexity of the causal relationships present in a fairly typical development program. It could be argued that in fact this matrix is more complex than is needed because not all the linkages between Outputs and Purpose are necessary for significant change to be achieved at the Purpose level. In the absence of an further opportunity to discuss the matrix with the project staff I could develop a simpler view by focusing only on those linkages which were above average in strength (i.e. cell values of 10 or more). The resulting network of linkages is shown in the network diagram below. It is still a complex set of relationships! However, in many projects there will not be 11 Purpose level changes tracked by indicators, three to five is more likely.

The strongest causal linkages between Outputs and Purpose level changes



Weiss (2000) and others have pointed out that in complex logic models decisions need to be made about which causal links to evaluate, they can't all be evaluated. In the diagram above one means of making this kind of choice is to focus on two types of nodes in the networks[13]: (a) Outputs that have many causal links to Purpose level changes e.g. 3.1 and 4.1 and (b) Purpose level changes that are affected by many outputs e.g. 6 and 3. If 3.1 and 4.1 Outputs are being delivered there will be widespread effects at the Purpose level. If 3 and 6 Purpose level changes are not happening then this may signal that little is happening at the Output level.

2. Within organisations: Moving beyond linear models

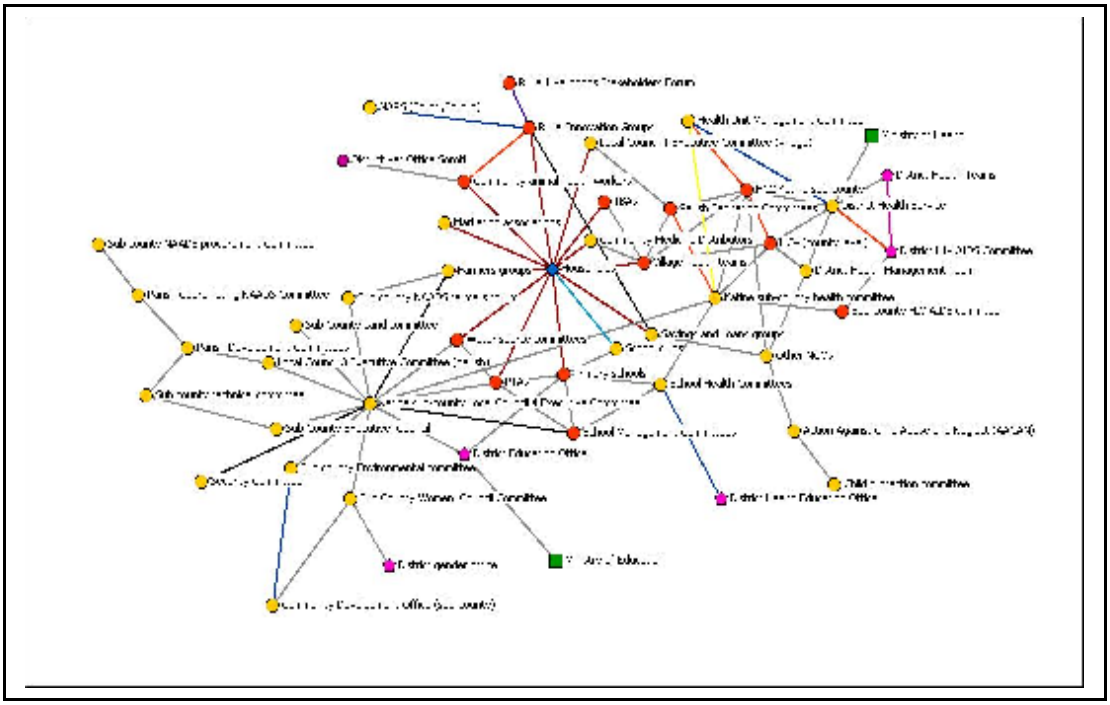
SNA tools can be used to capture a project's theory of change in other less constricted ways, which will be introduced below. However, the ability to use SNA tools with linear logic models is important, because it provides a form of "inter-operability", defined as "the ability of diverse systems and

[13] In SNA terms these are nodes with a high "out-degree" and a high "in-degree"

organizations to work together (inter-operate)"[14]. Because of their simplicity linear logic models will be around for some time yet, so we need to find the best ways of working with them.

Mapping and modeling

All network descriptions are simplifications, leaving out the details we think are less important, either about other actors and or about other kinds of relationships. In Uganda I found that the staff of the Katine Community Partnerships Program[15] had collated a large set of data on the different organisations that were present in the local community, including some information on their relationships with each other. This data was in an Excel file but it was not yet being used. I was able to import this data from Excel into a SNA software package known as UCINET. UCINET then converted the data into the network diagram below[16]. I used the diagram in my first visit report on the Katine project, to communicate some of the complexity of the setting where the project was taking place. It was later used by AMREF project staff for similar purposes.



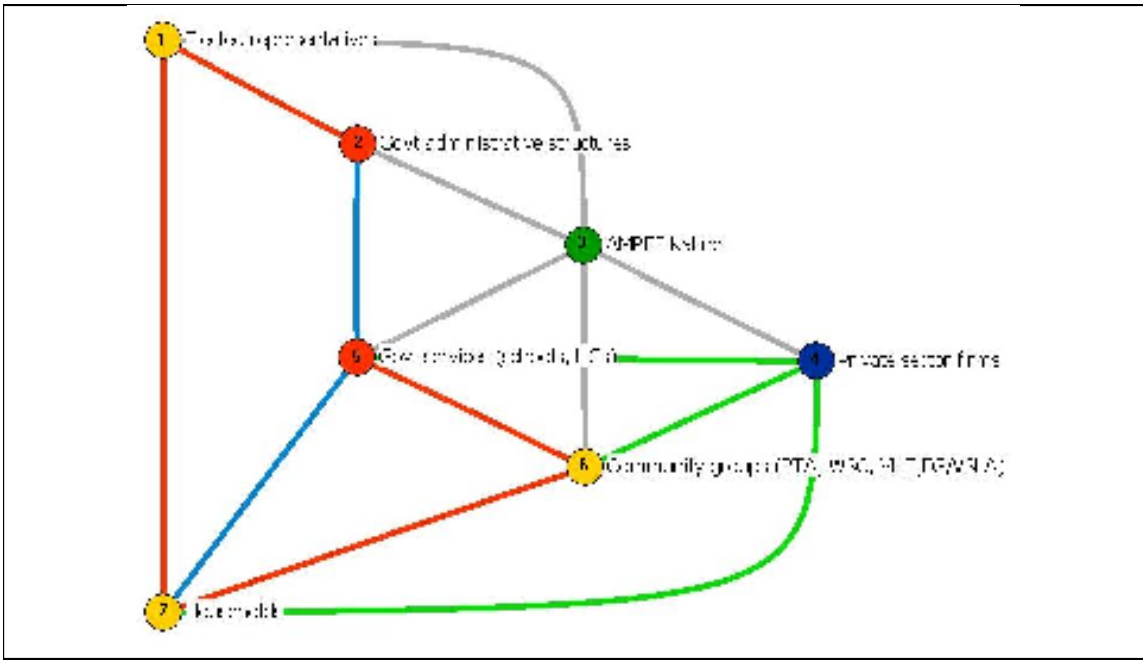
This was a *map*, a complex description, as accurate as possible, but nevertheless a simplification of reality. As part of a discussion with the project staff about different options facing the project I later developed much simpler *model* of the project, highlighting the relationships possible between seven major categories of actor in Katine. This was used to highlight the different *possible* ways in which new practices, introduced by AMREF, could be communicated within the community, and then adopted

[14] See en.wikipedia.org/wiki/Inter-operability

[15] Funded by the Guardian and Barclays Bank. See http://www.guardian.co.uk/katine

[16] Some extra information was also needed from AMREF staff, to identify, categorise and connect some of the actors and relationships in this network.

by relevant groups. For example, the use of new varieties of cassava, and training packages for Village Health Teams, Parent teacher Associations and others.



There were a number of different pathways whereby information from AMREF (Node 3 above) could possibly lead to changed practices by government services (Node 5 above) and then produce benefit for households (Node 7 above:

- Direct pressure from **households** on **government services**
- Pressure on **government services** expressed via **community groups,** representing **households**.
- Pressure on **government services** expressed via **government administrative structures** pressured by **elected representatives,** pressured by **households**.
- Pressure on **government services** expressed via **government administrative structures** pressured by **elected representatives,** pressured by **community groups,** representing **households**

The intention was to discuss those alternate pathways with the project manager, to help articulate which of these pathways they felt was most realistic. Knowing this would then help guide subsequent monitoring and evaluation efforts. The right people could be interviewed.

Looking inside and outside the network

What is left out of a network map can be as important as what is included. The relationships in the diagrams above are formal relationships, as documented by AMREF. Interviews with members of some of the

community groups highlighted the importance of other groups that were not documented in the excel database or the network diagram. Particularly the local churches that many people belonged to. For members of the Village Health Teams their church congregations were both potential sources of support, and people whose day to day behavior they needed to influence. Other less visible sides of these networks also needed to be documented and understood. For example, how the memberships of the different community groups (including their executive committees) overlapped, and how these overlaps affected their functioning. Having one person on two different committees might facilitate the flow of information between these committees, but at the same time they might be pressured for time and not be as active participant as others. One example reported was a meeting that had been cancelled because the chairman was busy at another meeting that he also had to chair.

Matrix versus network models

In the Katine example the complex map and the simpler model were both in the form of a network diagram. But matrices can be used for the same purpose of simplification. The matrix below shows the frequency of different kinds of contractual partnerships between grantees of the PETRRA project in Bangladesh[17]. This was produced by counting the frequency of different kinds of relationships between five kinds of grantees (more than 60 in all), as documented in a large network diagram. This simplification does not help with the identification of different influence pathways, but is useful in highlighting the kinds of partnerships between types of organisations that are existing and prompting thought about what kinds of relationships the project should encourage more versus less of, in the future. The most common applied research partnership had been between Government and NGOs (43), but the project manager was looking to a future where there were more NGO-private sector partnerships (5) and NGO-University partnerships (4).

	NGOs	Government bodies	International organisations	Private sector	Universities
NGOs	29	43	10	5	4
Government bodies	43	8	9	4	4
International organisations	10	9	2	3	2
Private sector	5	4	3	3	0
Universities	4	4	2	0	0

[17] "Poverty Eradication through Rice Research and Advocacy" project, funded by DFID and implemented by IRRI.

3. Amongst multiple organisations: Where there is no central planner

Both of the examples above come from single organisations, in charge of particular projects. Developing a single plan of what needs to be done is relatively easy for single organisations but very difficult for a group of autonomous organisations. Even within individual organisations events may unfold without a central plan. In contrast to corporate plans resulting from a deliberate and controlled process, network structures can often be considered as emergent outcomes[18], resulting from the local decision making of many individual actors.

The process of mapping those networks, and feeding back the results to the network members, has the potential to facilitate decentralised planning and evaluation processes, without impinging on each actor's autonomy. Two incomplete examples will be described. They are incomplete because the opportunities present were not exploited for reasons beyond my control.

The first example shown below, is a network diagram showing how a set of Ghanaian NGOs, funded by G-RAP[19] are connected up to each other, via their shared membership with a number of issue coalitions in Ghana. This network has evolved over time, as a result of a multiplicity of independent decisions by the various NGOs concerned. I obtained the network data from an online survey of the NGOs concerned. The intention was that this diagram, and other related information, would be presented at a workshop involving all the NGOs. In that setting, questions could then be posed about the aggregate structure, in order to provoke thinking about the participants' de facto collective strategy, and where it might need changing (if at all). For example, which coalitions most needed to be coordinated with each other, and were the right NGOs providing a useful linking role between these, through their membership of both coalitions? This would require larger strategic thinking about how multiple advocacy issues need to be connected up. More practical / logistical questions could also be raised? Was it in the collective interest that so few of the NGOs belonged to the Governance Issue Forum (16), or that so many belonged to the Coalition on the Women's Manifesto (8)? The resulting discussion could lead to the participants deciding to change the network structure, either through their own individual actions and/or by joint agreement.

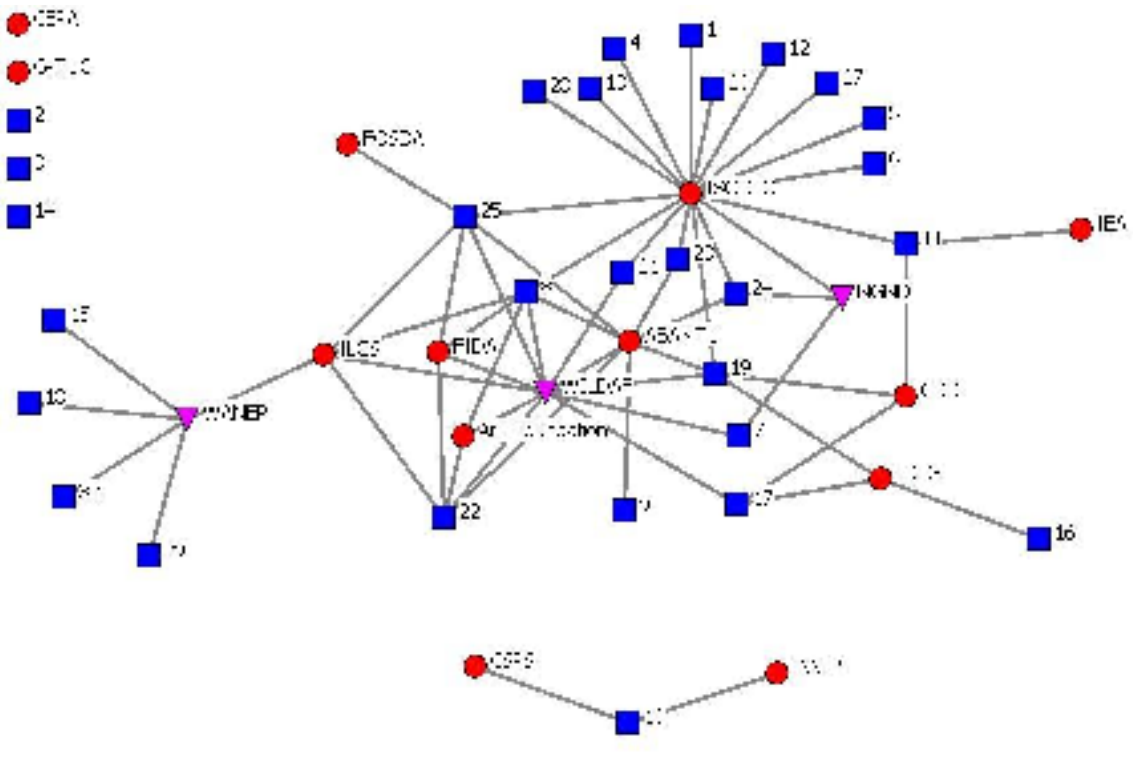
In this use of SNA tools an important distinction can be made between *mapping* and *navigating*. Mapping can be done relatively easily by an outside like myself, collecting the network data by means of an online survey, and then producing the network map, using UCINET. But the evaluation of the emergent structure is probably best done by the participants themselves. They are in the best position to know what changes to make to the structure, through their own local decisions. However, an outsider can help by identifying useful questions to pose to participants in a workshop setting about the network structure, to help them evaluate what has emerged. For example:

[18] Emergent in the sense that no one participant foresaw the shape of the final aggregate plan, but it was the result of their aggregated decisions.

[19] Ghana Research and Advocacy Project, http://www.g-rap.org

- Are the right coalitions linked to each other by enough NGOs?
- To what extent should the NGOs specialise, by each focusing their work on one or two coalitions, versus all NGOs be working with all the coalitions
- Where does the engagement with some coalitions need to increase versus decrease? Many NGOs are engaged with the coalitions in the centre of the diagram (on the next page), but few with those on the periphery.
- Is there a risk that information about some coalitions may be only available from the one NGO who belongs to that coalition?

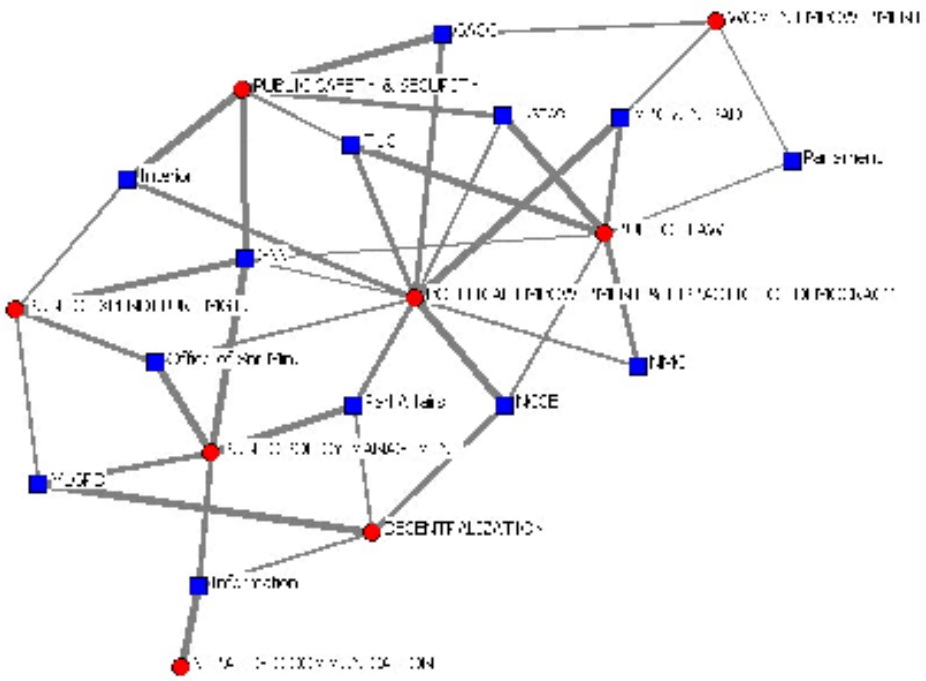
The emergent NGO strategy – How issue coalitions are linked by NGO membership of those co



Key: Blue squares = coalitions; Red circles = NGO respondents; Purple triangles = NGO respondents who are = NGO membership in a coalition.

The second example comes from a consultation process associated with the development of the second Ghana Poverty Reduction Strategy (GPRS), in 2003. This involved representatives from different sections of government identifying development priorities for the next five years, through a number of GPRS working groups. One of the consultants facilitating this process asked the 13 participants in the Governance working group to prioritise 8 different governance objectives, from the perspective of their section of government. The results were collated in a two-mode matrix (participants x objectives, with cell values in a row indicating the relative priority of each objective for each participant. Later on I was able to import this data into Excel and produce the network diagram below. Here the 13 different sections of government are represented by the blue squares, and the 8 different governance objectives are shown by red circles. The thicker links shows participants' higher priorities and the thinner links show their lower priorities (with only the top 3 prioritised visible in the diagram).

As part of the process of developing the GPRS plan all the agreed objectives then needed to be articulated into more operational details. This is a challenge when many objectives are only partly shared by members of the various working groups. One means of doing this was proposed, using the network diagram below. The membership of sub-groups working on specific objectives could be based on those gave it highest priority. For example the four participants who all prioritised the "women's empowerment" objective in the network diagram below. Consistency of approach between plans made by any two sub-groups could be the responsibility of those participants who gave high priority to both of the objectives being addressed by these sub-groups. For example, Ministry of Interior who gave high priority to Public Safety & Security and Public Expenditure Management. Unfortunately this process was not pursued, possibly because some participants were not being comfortable with not having a say about every objective. Trust may have been an issue.



A third example of decentralised planning facilitated by network tools is now in process. This was designed both as an intervention to aid capacity building amongst grantees, but also to produce a baseline set of data about capacity building needs. In a workshop attended by partners of Global Witness participants were asked to generate a list of their organisational capacity development needs. This formed the left column of a matrix. The top row listed the partners present. The cell entries indicated who has what need, and equally importantly, who can help address that need. In the next step, each partner will be asked to prioritise the needs listed in their column. Partners will be then encouraged to self-organise mutual help relationships with others who have expressed the same needs in the same "needs" row. This "needs and offers" matrix will be updated at later date , to identify (a) what actual connections were subsequently made between partners, and (b) how the aggregate picture of needs and offers has changed. This peer network approach to capacity is very different from the more common approach of the funder also being the capacity builder, or capacity building services being built by purchasing third party services.

The uses of theory

Earlier in this paper I pointed out that SNA tools do not come with a specific theory of change, and that this is a good thing if SNA is to be useful for many different kinds of evaluation purposes. However, there is a large and accumulating body of literature on the significance of different types of network structures in different settings[20]. This

[20] See the journals Connections, Social Networks, and Journal of Social Structure

knowledge has potential uses in an evaluation, providing participants with ways of interpreting the networks they are part of.

In 2002 I was asked to help provide advice and training on how STEPS, a Bangladeshi NGO network, could monitor and evaluate its achievements. One method, which was pre-tested in a workshop with network members, made use of Burt's (2000) analysis of the "network structure of social capital". This distinguished two aspects of social capital, as it exists in network form. One is in the form of a dense set of interconnections between network members, which is seen as the basis of trust. The other is in the form of individual members' own particular linkages beyond the network, their means of brokering access to influence or resources between the network and the wider world[21]. Especially those linkages not available to the other members of the same network. The actual linkages existing within and out from the STEPS network were then documented and compared to what might be seen as an ideal set of internal and external linkages, based on Burt's views. Linkages within the network were not very dense, and tended to focus on two members only. All members had their own specific links to external resources (often in the form of donors) but fewer had external links that could be used for influencing purposes in their field. More importantly, mutual knowledge about the existence of these links seemed limited.

Scalability

SNA tools are scalable, in two ways. Firstly, they can be used to map and model relationships between entities of many different sizes, ranging from those between individuals in a village, to those between countries engaged in international trade. Secondly, you can describe and analyse networks of any number of entities from 5 to 5,000 people or more, thanks to the computer power that is now widely available.

In addition, it is possible to connect network representations involving different levels of scale. For example, in the course of an annual planning process G-rap staff developed a matrix listing its information products (newsletters, website, reports to donors, etc), and the various categories of audiences they thought should be interested in these products. The individual cell entries in the matrix detailed which products were expected to be of interest to which audiences. A summary row provided aggregate information on the total number of products aimed at each audience and a summary column provided aggregate information on how many audience categories were being targeted by each product. This network representation showed the expected connections between a micro-view (one organisation and all its products) and more macro-view (of multiple other organisations as expected users of those products). It is easy to imagine other versions of matrices that connect between different scales in the same way. Such as a matrix listing staff of a grant making organisation and the various grantee organisations they would be monitoring. Because of the ability to connect representations at different scales matrices can be seen as modular building blocks of larger representations.

Similar capacities are present in many network visualisation software packages. Multiple individual actors can be aggregated and converted to one single actor representing this group as a specific category[22]

[21] This is often now referred to as bonding and bridging social capital.

[22] E.g. Visualyzer, produced by mdLogix

Challenges

In a recent review of the use of SNA tools for evaluation purposes the editor noted that "One of the criticisms of the field of SNA is that the bulk of the work is academic and does not bring forth simple or practical applications" (Durland, et al, 2005). In this paper I hope I have addressed this criticism by providing a range of practical applications that do not involve mastering a large new terminology or require advanced mathematics.

In my view, perhaps the main challenge with the use of SNA tools is the excess of riches. There is multiple forms of software around for the analysis and visualization of networks, too many to be reviewed here. I have used UCINET/NetDraw[23] and Visualyser[24], and am likely to use NodeXL in the future[25]. Within each of these there is an apparent excess of facilities for analysing and visualizing networks. This may be a reflection of the wide range of uses that SNA software is put to. For "newbies" the most immediate practical challenge is more basic: how to load the raw data and produce a useful visualisation and perhaps generate some basic metrics describing that network. Within this in mind, Louise Clark (2006) has provided a very useful guide to NetDraw, a free and widely available network visualisation program.

Another important challenge to note is that of confidentiality. When respondents are asked about their networks they don't just talk about themselves, they by definition also talk about others, even though others may or may not be aware of this. Making network data public available may appear to say things about people that they did not disclose themselves, or give permission to others to disclose. This is in contrast to survey data about individuals' own attitudes and behavior, where each should be able to control what is made public about themselves.

Opportunities

SNA tools originated in academia, although it they are now being used much more widely, by government and business. Within the SNA literature that I have read there is relatively little reference to the possibilities of participatory forms of analysis of SNA data. This may reflect the sometimes excessive focus on structure and the associated neglect of the attributes of the actors themselves, when trying to understand a network – It is as though researchers have said to themselves "If the actors' attributes are not important, why bother talking to them". There are of course some who have seen how useful getting an inside view really is, such as Cross and Parker (2004) in their work on networks within business enterprises, and some evaluators included in the New Directions for Evaluation special issue on SNA (Birk, 2006:77).

In my view there is great potential for the development of participatory forms of SNA, for use in evaluations. For example, in identifying what networks to map (which kinds of actors and what types of relationships), and in the development of predictions about what the aggregate network will look like (i.e. the participant's hypotheses). This does require some pre-familiarisation with what can be done, and some basic terms that can be used to describe the attributes of networks. More work on the development of *simple*

[23] At http://www.analytictech.com/ucinet6/ucinet.htm
[24] http://www.mdlogix.com/downloads/VisuaLyzer2.0setup.exe
[25] http://www.codeplex.com/NodeXL

network visualisation tools, including pro-forma matrices of the kind used in this report, could also be useful. A good example is the very simple toolkit, called Net-Map, for engaging small groups of people in mapping networks of interest to them, developed by Eva Scheffer[26]. The use of SNA tools could be well informed by the participatory ethos that was central to the use of PRA and PLA.

There are two broad areas where SNA tools could be used specifically for the evaluation of HIV/AIDS interventions. The first is in the evaluation of changes in the *networks of individuals* who have HIV, are at risk of HIV infection and others who are in contact with these groups. Here the results of SNA-based research into HIV transmission and prevention should be informing the design of interventions, and the evaluation of those interventions. This use has been foreshadowed in quotations given earlier in this report.

The second area is the evaluation of changes in the *networks of organisations* who are involved HIV/AIDS prevention and treatment, and others that help and hinder their effectiveness. This is the area where many of the examples of SNA tools given in this paper might be most applicable. However these representations need to connect with more community level network analysis reaching down to the level of individuals and families affected by HIV/AIDS. This can be done using some of matrices discussed above, where rows represent events on one scale (e.g. staff of an organisation) and columns represent events on another scale (e.g. different organisations that are contacted by those staff).

An Afterword

In the final chapter of "Global Advances in HIV/AIDS Monitoring and Evaluation" (Rugg et all 2004:168), Michael Patton[27] said:

> "Speaking of systems and perspectives, another overall impression I came away with from reading these chapters is how deeply entrenched mechanistic linearity is in evaluation. I do not share the authors' enthusiasm for the endorsement by all participating agencies of simple input-activities-output-outcome-impact framework. This strikes me as an especially limited framework for understanding HIV/AIDS" Citing two national programs in Brazil and Uganda he noted how "Interdependent change occurred in religious communities, political policies, educational institutions, community organising, public health and criminal justice. Under such circumstances…complex systems change mapping and networking models hold more promise than do traditional linear models"

Referring to his training work in South Africa with wide range of people and groups, all involved in the battle against HIV/AIDS, he noted

> "In such an environment, facing such a massive problem with such huge societal implications the autonomous program may not be a meaningful unit of evaluation analysis" and …
>
> "In defense of the authors, I acknowledge that the M&E approaches presented here represent mainstream evaluation thinking, which is precisely the problem"

[26] http://netmap.wordpress.com/2008/05/01/net-map-training-in-washington/

[27] An internationally recognised expert in the field of evaluation. See http://www.evaluationwiki.org/index.php/Michael_Quinn_Patton and http://en.wikipedia.org/wiki/Michael_Patton

References

Amirkhanian, Y.A., Kelly, J.A., Kabakchieva, E., McAuliffe, T.L., Vassileva, S. (2003) "*Social Network HIV Prevention Intervention Program for Young Men Who Have Sex with Men in Russia and Bulgaria*" AIDS Education and Prevention. Volume: 15, Issue: 3, June 2003 Page(s): 205-220

Barabasi, A-L. (2002) *Linked: The New Science of Networks*. Perseus Publishing, Cambridge, Mass.

Behrman, Jere R., Hans-Peter Kohler and Susan Cotts Watkins. Forthcoming 2009. "Lessons from Empirical Network Analysis on Matters of Life and Death in East Africa. . In Network-based Strategies and Competencies, eds. Paul R. Kleindorfer and Yoram Wind. Wharton School Publishing, Upper Saddle River, NJ

Burt, R.S. (2000) "The Network Structure of Social Capital" in Sutton, R.I. and B.M. Staw (eds) *Research in Organisational Behavior*. 22. Greenwich: JAI Press. Available at http://gsbwww.uchicago.edu/fac/ronald.burt/research/NSSC.pdf (site visited: 23 September 2004)

Clark, L (2006) *Network Mapping as a Diagnostic Tool*. Published by DFID, CIAT and CIBTA. Available online at http://www.mande.co.uk/docs/networkmapping_LC06.pdf

Durland, M.M., Fredericks, K.A. (Eds) (2005) *New Directions in Evaluation was devoted to Social Network Analysis in Program Evaluation.* Jossey Bass/AEA

Freeman, L.C. (2004) *The Development of Social Network Analysis: A Study in the Sociology of Science*. Empirical Press, Vancover.

Heckathorn, D.D., Broadhead, R.S., Anthony, D.L., Weakliem, D.L., Aids And Social Networks: HIV Prevention Through Network Mobilization. *Sociological Focus* Vol. 32 No.

2 May 1999, available online at
www.respondentdrivensampling.org/reports/sociological_focus.pdf

Kellogg Foundation (2000) *Logic Model Development Guide*. Battle Creek, Michegan.

Salganik, Matthew J. and Douglas D. Heckathorn. 2004. Sampling and Estimation in Hidden Populations Using Respondent-Driven Sampling. *Sociological Methodology*. Vol. 34. (2004), pp. 193-239

Klovdahl, A.S., Potterat J.J, *(1985)* Social networks and the spread of infectious diseases: the AIDS example. *Soc Sci Med*. *1985*:21 (11):1203–1216.

Morris, M. (2004) *Network Epidemiology: A Handbook for Survey Design and Data Collection.* Oxford Unversity Press.

Petty, J., Vodouhê, S.D. (1997) Using rapid or participatory rural appraisal. Chapter 6 in *Improving agricultural extension. A reference manual*, by Swanson, B.E., Bentz, R.P., Sofranko. A. J.

Rehle, T., Saidel, T., Mills, S., Magnani, R (Eds) (2006) "*Evaluating Programs for HIV/AIDS Prevention and Care in Developing Countries*" Family Health International.

Rothenberg, R., and Narramore, J. (1996). The relevance of social network concepts to sexually transmitted disease control. *Sexually Transmitted Diseases*. 23(1):24-29

Rugg, D., Peersman, G., and Carael, M. (2004) Global Advances in HIV/AIDS Monitoring and Evaluation. New Directions in Evaluation. Number 103, Fall 2004. Jossey-Bass / AEA.

UNAIDS (1999) Peer Education and HIV/AIDS: Concepts, uses and challenges. Available online at http://data.unaids.org/Publications/IRC-pub01/jc291-peereduc_en.pdf

UNAIDS (2007) *A Framework for Monitoring and Evaluating HIV Prevention Programmes for Most-At-Risk Populations.* Available online at http://data.unaids.org/pub/Manual/2007/20070420_me_of_prevention_in_most_at_risk_populations_en.pdf

UNAIDS (undated) Monitoring and Evaluation Modules, available online at http://data.unaids.org/Topics/M-E/me-modules-a4_en.pdf

Valente, T.W. (1995) *Network Models of the Diffusion of Innovations* (Quantitative Methods in Communication), Hampton Press.

Valente, T.W. (2002) *Evaluating Health Promotion Programs*. Oxford University Press

Wasserman, S., Faust, K., (1994) *Social network analysis: methods and applications*. Cambridge University Press, 1994

Watts, D.J. (2003) *The Science of a Connected Age*. Hienemann, London Oxford University Press, 2004.

World Bank (2005) *Committing to Results: Improving the Effectiveness of HIV/AIDS Assistance* (Operations Evaluation Studies), World Bank Operations Evaluation Department, Washington

Additional Resources: Books on Evaluation and HV/AIDS (by age)

Castleman, T., Deitchler, M., Tumilowicz, A. (2008) *A Guide to Monitoring and Evaluation of Nutrition Assessment, Education and Counseling of People Living With HIV*. Available online at http://www.fantaproject.org/downloads/pdfs/M&E_NAEC_Jun08.pdf

Ainsworth, M., Vaillancourt, D.A., and Gaubatz, J.H. (2005) Committing to Results: Improving the Effectiveness of HIV/AIDS Assistance (Operations Evaluation Studies)

Kaplan, E.H. (2002) Quantitative Evaluation of HIV Prevention Programs (Yale ISPs Series)

Holtgrave, D.R. (1998) Handbook of Economic Evaluation of HIV Prevention Programs (AIDS Prevention and Mental Health)

Aggleton, P (1992) Does it Work?: Perspectives in the Evaluation of HIV/AIDS Health Promotion

Panel on the Evaluation of AIDS Interventions, Social, and Statistical Sciences Committee on AIDS Research and the Behavioral, National Research Council, and National Academy of Sciences (1991). Evaluating AIDS Prevention Programs

World Health Organization (1991) Psychosocial Aspects of HIV and AIDS and the Evaluation of Preventive Strategies: Report on a WHO Meeting (WHO Regional Publications, European)