How to do a Business Network Analysis

by

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Format for the Evening

• **Presentation** (7:00 pm to 7:40 pm)
  – Essential Terminology
  – What is a Business Network Analysis
  – How to Do a Business Network Analysis
  – Pitfalls and Problems

• **Group Discussions** (7:45 pm to 8:10 pm)
  – Group task

• **Discussion and Questions** (8:15 pm to 8:45 pm)
  – Feedback
  – Types of Business Network Maps
Essential Terminology

‘Simplicity is the key to effective scientific inquiry.’

Stanley Milgram, Sociologist, 1973
• A node is a unit which may contain and pass on information – in this case they are individuals, otherwise known in the literature as ‘actors’.

• A connection between two actors means that there is some passing of information between them. These connections, also known as ties, mean an information network is established.

• An emergent network results from the myriad of decisions by individual actors to pay attention to, or not pay attention to, other actors - these decisions are egotistical.

Centrality

- Centrality is the degree to which an actor occupies a central position in the network in one of the following ways:
  - having many ties to other actors (degree centrality)
  - being able to reach many other actors (closeness centrality)
  - connecting other actors who have no direct connections (betweenness centrality)
  - having connections to centrally located actors (eigenvector centrality)

**Ego Roles and Brokerage**

**Coordinator** – an actor who brokers connections within the same group or sub-group. B is coordinating the actions of the sub-group and belongs to the same sub-group.

**Gatekeeper** – an actor who transmits information and other resources to the network from sources usually, but not always, external to the network. B is in the same sub-group as C and acts as the gatekeeper for A.

**Consultant** – an actor who intermittently takes the central lead by connecting others in the same group or sub-group, but who belongs to another group or sub-group.

**Representative** – An actor who transmits information and other resources from one group to another usually, but not always, external to the network.

**Liaison** – An actor who transmits information and other resources from one group to another group whilst themselves belonging to a different group. This can also apply to a sub-group.
What is Business Network Analysis?

‘Each of us is part of a large cluster, the worldwide social net, from which no one is left out. We do not know everyone on this globe, but it is guaranteed that there is a path between any two of us in this web of people’.

Albert-Laszlo Barabasi, Physicist, 2002
Our Definition

- Business network analysis is a methodology that elicits the capacity of an organisation to effectively engage in its activities.

- It provides the ability to examine quantitatively, qualitatively, and graphically macro and micro linkages between nodes, where nodes are individuals, projects, project teams, business units, entire organisations, or even business functions, policies or documents.

- A connection between two or more nodes means there is some sort of relationship and information is, or should be, passed between them.
Uses of Business Network Analysis

- Assess the state of social capital by identifying individuals and teams playing central roles, such as key knowledge brokers.
- Accelerate the flow of information and knowledge across functional and organisational boundaries by detecting and correcting information bottlenecks.
- Improve decision making in senior leadership and middle-management networks by mapping inter and intra organisational dependencies.
- Assess business operations by mapping communication and process integration following a restructure or reorganisation.
- Support collaboration by identifying potential partnerships and connecting people to people to ensure effective knowledge creation and sharing.
### BNA Components

#### Business Network Analysis

<table>
<thead>
<tr>
<th>BNA Type</th>
<th>Example Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational Interface Mapping</td>
<td>Please identify up to 10 people who work in external departments and who are important to you in your professional network. These can be people who provide you with information to do your work, help you think about complex problems posed by your work, or provide developmental advice or personal support helpful in your day-to-day working life. These may or may not be people you communicate with on a regular basis and must come from an organisation external to yours.</td>
</tr>
<tr>
<td>Project Interface Mapping</td>
<td>Please identify the people in other project teams that you rely on to provide information for your project. For each person you have identified please assign a score based on the amount of contact you have with them. 1 is the most amount of contact. 10 is the least amount of contact. Each score should be different.</td>
</tr>
<tr>
<td>Information Flow Mapping</td>
<td>Please identify the people in your department you have passed documents or e-mails to in the last month. These may or may not be people you communicate with on a regular basis, but they must be part of your department.</td>
</tr>
<tr>
<td>Collaboration Mapping</td>
<td>Please identify the people who are important to you in your professional network. These can be people who provide you with information to do your work, help you think about complex problems posed by your work, or provide developmental advice or personal support helpful in your day-to-day working life. These may or may not be people you communicate with on a regular basis and must come from within your organisation.</td>
</tr>
<tr>
<td>Social Capital Mapping</td>
<td>In your workplace who do you go to for information that helps you solve problems or capitalise on opportunities?</td>
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How to Do a Business Network Analysis
The Generic Process

• **Determine the unit of analysis.** This is arguably the most important step, as it determines how data is collected and which tools and analysis techniques should be employed.

• **Determine the questions.** The questions depend on the unit of analysis, and what you want to discover.

• **Collect the data.** Typically the questions are answered using a survey. The survey can be done in person, on paper, or be web-enabled. Where appropriate data collection can also be done using data-mining techniques. For example intra-departmental e-mail traffic could be mined. In the case of a policy relationship mapping exercise the documents are parsed for key words, headings and other relevant attributes.

• **Import the data into a visualisation tool.** Typically data is entered into an Microsoft EXCEL workbook or database, and then imported into a visualisation tool.
Visualisation and Analysis Tools

- HolisTech® uses UCINET (NetDraw), NetMiner II, NetMiner III, NetMap Analytics, and PAJEK depending on the requirement. The visualisation tools also provide some ‘back-end’ statistical analysis capabilities.
- Colours and layers are more easily applied in NetDraw.
- Spring diagrams are easier to layout in NetDraw.
- NetMap Analytics is very good at Step Analysis.
- UCINET is good for analysis, but the understanding of the measures is assumed.
- NetMiner brings analysis and visualisation together. The strength of NetMiner is the visualisation of many of the measures, and particularly centrality measures.
- PAJEK, NetMap Analytics, and NetMiner III are best at handling very large datasets.
- An essential sub-set of data analysis is the ‘common sense’ check!!
Note the central hub-nodes which are characteristic of a small-world network.

A small-world network is a class of random graph where most nodes are also neighbours of one another. Most pairs of nodes will be connected by at least one short path.

Small-world networks also have a power law distribution.
NetMap Analytics – actKM Network 2006 Step Analysis

Patrick Lambe

Three Steps – i.e. Patrick Lambe’s ‘Reach’
Pitfalls and Problems

‘Science is built with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house’.

Henri Poincare, Mathematician, 1901.
Caution!!

• Mathematical approaches to network analysis tend to treat the data as ‘deterministic’. That is, measurements are viewed as an accurate reflection of the ‘real’ or ‘final’ or ‘equilibrium’ state of the network.

• Observations are usually regarded as the population of interest rather than a sample of some larger population of possible observations.

• You must understand your organisation, the data, the resultant network and the assumptions you are making!

Centrality Measures - Closeness

• Closeness Centrality
  – being able to reach many other actors.
  – analyses the centrality structure of a network based on geodesic distances among the nodes.
  – the extent to which the most direct paths connecting an actor to each of the other actors in a network are short rather than long.

• A high closeness score means an actor can access many other actors and is relatively independent of the influence of others.

• But … this measure’s utility degrades if the network is not fully connected and has many isolates. Some authors suggest it should not be used if the network is incomplete.
Note the clustering of like nodes. This is characteristic of a scale-free network.

A scale-free network is a specific kind of complex network. In scale-free networks, some nodes act as 'highly connected hubs' (high degree), although most nodes are of low degree.

Scale-free networks have a power law distribution.

A high closeness score means an actor can access many other actors and is relatively independent of the influence of others.

But remember there are many isolates in this network therefore closeness probably is not an appropriate measure.
Eigenvector Centrality

- Eigenvector Centrality
  - analyses the centrality structure of a network based on the iteratively weighted degree of the nodes.
  - measures actor centrality taking into account the centrality of the actors to whom the focal actor is connected.

- An actor who has three highly connected actors linked to themself, will have a higher eigenvector centrality than an actor who has three partially connected actors linked to themself.
Note the central hub-nodes which are characteristic of a small-world network.

A small-world network is a class of random graph where most nodes are also neighbours of one another. Most pairs of nodes will be connected by at least one short path.

Small-world networks also have a power law distribution.

A higher eigenvector score means an actor can access many other actors and is relatively independent of the influence of others.

This is a more appropriate measure because the data is ‘normalised’ and takes into account isolates.
• IKMS network
  N = 220
  n = 26
  Egos = 5
  Alters = 21

• Response rate 12%

• Therefore the network is incomplete and the results are unlikely to be statistically significant or accurate!

• Note the alters did not respond but are represented – is this ethical?
A high closeness score means an actor can access many other actors and is relatively independent of the influence of others.

But remember there are many isolates in this network and it is incomplete therefore closeness is not an appropriate measure.
A higher eigenvector score means an actor can access many other actors and is relatively independent of the influence of others.

This is a more appropriate measure because the data is ‘normalised’ and takes into account isolates.
Group Discussions
Task (7:45 pm to 8:10 pm)

- Identify a business networking opportunity in your organisation and frame possible project suggestions.
  - Consider what type of maps you might require.
  - Consider the type of questions you might ask.
  - Consider what tools you might need.
  - Identify what problems and pitfalls you may face.
Types of Business Network Maps
Collaboration Maps

• The individual or project team is the unit of analysis.

• These maps can be used to:
  – Assess the state of individual and project team social capital by identifying trust, support, and advice networks.
  – Assess business operations by mapping the formal and informal process flows of an organisation.
  – Support collaboration by identifying potential partnerships and connecting people to people to ensure effective knowledge creation and sharing.
  – Support collaboration by identifying and weaving communities of practice.
Information Flow Maps

- Individuals, teams, departments or organisations are the unit of analysis.

- These maps can be used to:
  - Accelerate the flow of information and knowledge across functional and organisational boundaries by detecting and correcting information bottlenecks.
  - Accelerate the flow of information and knowledge across functional and organisational boundaries by identifying where increased knowledge flow will have the most impact.
  - Assess business operations by mapping communication and process integration following a restructure or reorganisation.
  - Assess business operations by plotting the path and time taken for a decision to propagate through an organisation.
  - Support collaboration by raising the awareness of the importance of informal networks.
Organisational Interface Maps

- The business unit or organisation is the unit of analysis.

- These maps can be used to:
  - Accelerate the flow of information and knowledge across functional and organisational boundaries by detecting and correcting information bottlenecks.
  - Identify opportunities for intra-departmental knowledge flow improvements.
  - Improve decision making in senior leadership and middle-management networks by mapping intra-organisational dependencies.
  - Assess business operations by mapping communication and process integration following a restructure or reorganisation.
Policy relationship maps provide a powerful way to understand how work, documents and policy relate to each other.

A policy relationship map can be used at the level of business units, departments or organisations to:

- Identify and then integrate current practice across core processes.
- Ensure internal consistency between documents and policies.
- Understand inter-departmental document relationships.
- Identify opportunities for knowledge flow improvements.
Project Interface Maps

- Projects are the unit of analysis.

- Project interface maps can be used to:
  - Accelerate the flow of information and knowledge across functional and project boundaries by detecting and correcting information bottlenecks.
  - Identify opportunities for intra-departmental knowledge flow improvements.
  - Improve decision making in senior leadership and middle-management networks by plotting project dependencies.
Social Capital Maps

• Individuals are the unit of analysis.
• Social capital maps can be used to:
  – Assess the state of social capital by identifying individual trust, support, and advice networks.
  – Assess the state of social capital by identifying individuals who have central roles, such as key knowledge brokers.
  – Support social capital by identifying potential partnerships and connecting people to people to ensure effective knowledge creation and sharing.
  – Improve decision making in senior leadership and middle-management networks by identifying and correcting structural holes in personal networks.
'I never commit to memory anything that can easily be looked up in a book.'

Albert Einstein
Essential Reading


More Advanced Reading


Discussion

Questions