

## Social Media and Social Networking Analysis for Knowledge Networking

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**Abstract** *A supplier social network (SSN) consists of a set of web-based tools, applications and exercises to support the formation of communities of inquiry and to promote learning through social interaction. This paper proposes a novel combination of social media and social networking analysis (SNA) tools to model and analyse interactive SSN frameworks. The data analysis considers, on the one hand, the SNA understanding of the supply chain components by using node and network level measures and, on the other hand, categorising and coding social media conversations for the quantity and quality of knowledge assets. In both cases, social media tools provide inputs to obtain outputs or results. Currently, the data collection process is carried out by an insurance supply chain. Validating the proposal will be forthcoming work where the data analysis will be compared between two different insurance supply chains based in two European countries.*

### 1. Introduction

Mula et al. [1] provide findings from current state-of-the-art social networking technologies and knowledge networking models. The paper presents an initial overview of social network analysis (SNA) applications in knowledge networks, which is one of the main fields to use SNA in health and security sectors [2]. In this context, large sized social networks and data reliability and results are the main limitations of SNA applications [3], [4]. Although many papers have presented the data collection method ([4], [5], [6], [7], [8], [9], [10]), it has been concluded that not all papers indicate them, and not many papers use automatic data collection. Therefore, the use of online platforms to generate some data as opposed to

traditional questionnaire-based approaches is identified as a further research direction.

In this paper, we propose using social media tools for automatically collecting data on knowledge networking collection in a supplier social network (SSN), and SNA tools for modelling and analysing these data based on different statistical metrics. This objective is aligned with the KNOWNET project, which seeks to assess the value of social networking for knowledge exchange across insurance supply chains (Grant, 2014).

The remainder of the paper has been organised as follows: Section 2 summarises the stages of our proposal; Section 3 shows the aspects considered to help understand the supply chain to be modelled and analysed; Section 4 presents the stage relating to SNA conceptual modelling and tool selection; Section 5 outlines the efforts needed to select the suitable social media tool for the considered supply chain; Section 6 presents the conclusions and further research.

## **2. Social media and SNA for knowledge networking**

Figure 1 shows the stages to take into account to combine social media and SNA tools for knowledge networking in an SSN. The first stage is, at the same time, the main objective of our proposal; i.e. to understand the supply chain to be modelled and analysed. Hence this stage requires structured and unstructured interviews with different persons in charge throughout the supply chain in order to identify the requirements to be used to define and analyse the Opportunity (current state, future challenge, scope), Estate Vision, Challenge (collaboration position, social media challenge, evaluation options) and the Assessment Team of the supply chain within the SSN framework. Then it is necessary to propose a conceptual model for exploring interactive knowledge networking across the supply chain under study. In parallel, it is necessary to define the social media tool to be used to automatically collect data. Here it is possible to either develop a social networking site from scratch or to use a commercial one. A detailed study on the two alternatives is required. The SNA conceptual model and the definition of the inputs and outputs of the social media tool will help us define the suitable SNA tool for measuring the selected metrics of the supply chain. In order to complete the knowledge networking analysis, a knowledge measurement tool is also proposed to carry out the analysis of the social media tool by categorising and coding conversations for the quantity and quality of knowledge assets.

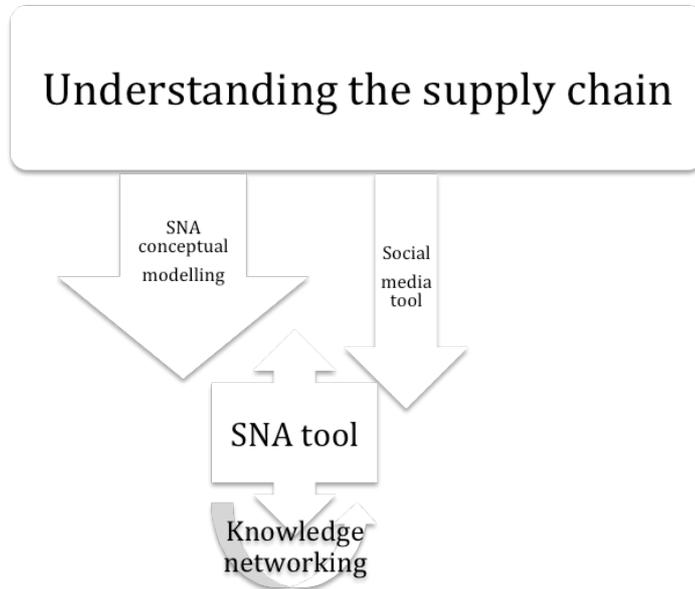


Figure 1. Proposal of the stages for knowledge networking

The following sections describe each stage applied in an insurance supply chain.

### 3. Understanding the supply chain

The first stage of our proposal is to understand the supply chain to be modelled and analysed, which is an insurance supply chain. The following requirements were obtained to define and analyse the Opportunity, Estate Vision, Challenge and the Assessment Team. These aspects are summarised as follows.

Regarding the Opportunity, the current state of the insurance supply chain is characterised by:

- It operating as a general insurer in Europe.
- While many tool systems have been built over the years, they tend to be transactional-focused; i.e., interchanging data instructions.
- There being a very good information system.
- It distinguishing between indirect and direct (claims).
- With the advent of social media tools, exploring new interaction technologies and routes for communication and collaboration is desirable.

In this context, the following future challenges were defined:

- Customers expect to be communicated and informed in a manner and by a method that suit them.
- Communication with third parties (brokers, affinity partners, suppliers, reinsurers, etc.) are worth reviewing and refining where it can add value.
- Internal communication to enable collaboration between departments and external parties is worth reviewing. Current systems seem very static and point-to-point. Here it is important to highlight the Yammer success [12].
- Future communication needs to enable dialogue by many routes to enable optimised performance.

The scope of these opportunities is all potential customer interactions, either Personal Lines or Commercial Lines, all potential supplier interactions for Indirect (Office Services) or Direct (Claims Services), and all internal interactions. It has been identified as having strong opportunities in Claims processes.

From the opportunities and the estate vision, we defined the following challenges related to the collaboration position, knowledge networking challenge and evaluation options.

#### *Collaboration position*

- A large number of employees
- Geographically dispersed sites
- Strong cohesive culture around brand values
- Many divisions. Not always aware of other divisions, actions, successes or capabilities
- Regulated industry. Compliance is absolutely essential
- Heavy investment in transactional tools. A data-driven industry
- Poor investment in non-transactional tools. Limited experience with social media, but growing

#### *Knowledge networking challenge*

- Business reluctant to invest time, effort or cash in non-transactional tools.
- Often seen as distractions
- Compliance with Regulator requirements will be an issue: tracking conversations, data, version control, etc.
- Who would use new collaboration tools over and above the systems they have today?

#### *Evaluation options*

- Determine business challenges and ways to resolve using collaboration tools and techniques
- Work with small teams initially, to then spread out to all sections

At this point, the knowledge networking team was defined for the Assessment Project.

#### **4. SNA conceptual modelling and tool selection**

Regarding SNA conceptual modelling, Capó et al. [13] propose a conceptual model for exploring interactive knowledge networking across insurance supply chains. A new organisational form is suggested, based on social networks, to make the creation, transfer and sharing of knowledge possible in this particular case. A knowledge network model is also proposed, represented within SNA techniques, to gain a better understanding of the knowledge creation and transfer process. In short, collaboration, mutual confidence and a similar way of thinking among supply chain members are very valuable characteristics. One conclusion drawn is that each company not only focuses on its own processes, but also views the global process of the entire social network working as a single body.

Regarding SNA tool selection, Mula et al. [1] identify the following main SNA tools: Agna, Anthropac, Bianche, Cytoscape, Fatcat, Java for Social Networks, Igraph, Iknow, InFlow, JUNG, Krackplot, MultiNet, Negopy, NetDraw, NetMiner, netvis, Network Insight, ORA, Pajek, PermNet, PGRAPH, Siena, SocioMetrica, STOCNET, STRUCTURE, UCINET and Visone.

In this case, a training manual on SNA aims to introduce basic concepts of reticular data analysis (or SNA) by using analytical tools and data representation, such as UCINET and NetDraw. In order to implement the initial SNA concepts, we did a practical exercise. Throughout the exercises, we constructed matrices (Section 3), graphed them (Section 4), analysed the data through three centrality measures, rank, grade and degree of intermediation proximity (Section 5), and, finally, we analysed the network structure from four measures by grouping: clique,  $n$ -clique,  $N$ -clan and  $k$ -plex (section 6).

#### **5. Selecting the social media tool**

The insurance supply chain has plenty of experience in using structured transactional data, but are looking into different ways to incorporate and employ unstructured data. Social network software platforms are one of the investigation areas. The insurance supply chain is already using Yammer as a generic micro-blogging suite. This proposal should provide more data and experience for this investigation. Within this scope, information security and customer privacy are of

primary concern for both regulatory and business risk reasons. The business value is uncertain, and the used cases and patterns are not clear. Social media tools should help clarify these points and provide insights into risks and advantages.

Project management of a claim process may involve the coordination of subcontractor activities, communication with clients, etc. All the important activity in a claim is logged into project management software. It would be interesting to see if social media tools could augment this process with extra communication, synchronisation, unstructured discussion, collaborative notes in a wiki, etc. They work with contractors, where some do the required work directly, while others are aggregators that subcontract and coordinate parts of the work.

Currently, communication and coordination are done over the phone, by email and through the in-house project management system. Communication is mostly hierarchical: upwards from the subcontractor to the contractor to the main insurance company; downwards from the insurance company to the contractor, to the subcontractor. The social media platform could provide an opportunity to short circuit some of the communication on a project-by-project basis, which may help improve coordination, and provide other opportunities to derive better value for customers and the insurance company. There is some concern about the willingness for close collaboration as some partners are also competitors. Evidently, the need for confidentiality is crucial. A different possible case study could involve the personnel responsible for R&D: risk assessment, modelling and product development. The project structure is similar; the insurance company personnel communicate with their peers for partner organisations, who may involve third parties. This scenario may provide more flexibility as there is less time pressure and possibly fewer constraints. The risk of accidentally exposing client data is also cut. Furthermore, there is growing interest in 3D and Virtual World integration [14], specifically in capturing a cloud of on-scene photos, their stitching and reconstruction of the scene, e.g., a house with flood damage, in a virtual environment. The scene could be made available later for off-site inspection, secondary opinions, planning, and other actions related to claim management.

Before selecting the suitable social media tool, the following information about using a custom-made platform as opposed to a commercial one was analysed. The claim process is usually well-defined and thorough in all insurance companies; it complies with the current regulatory system and is straightforward in accounting and reporting terms. All major events are logged and processed by the software systems in place. Unfortunately, its nature does not currently allow an extra context about the status of the claim to be captured. For example, it often takes a couple of

phone calls to the appropriate supplier to learn about the current status of work on a damaged property. This extra work may result in slower, possibly suboptimal experience for answering client queries. All communication flows through the insurance company given the centralised nature of the claims process. In some cases this may cause unnecessary slowdowns. For example, coordinating and scheduling work on a property with more current information available can offer time compression possibilities, which would reduce the total length and, consequently, the cost of a claim.

Social networking software seems to fit in well with capturing extra context, which is unavailable to the existing system. It can be a substitute for or an enhancement of current phone calls as it provides an immediate recall of current and past statuses, free-form inquiries, etc. It may be possible to obtain more in-depth input from the supply chain than is currently feasible; for example, acquiring feedback directly from the builders, rather than from only the aggregator supplier, reduces the aggregate administrative workload of everyone involved. Social networking platforms, similarly to Facebook and Twitter, provide lots of opportunities for team building, which are otherwise not possible or feasible in this setup. The social networking platform can also open specific queries like: "Who is the most appropriate for...", "Does anybody know...", similarly to the wider audience within the supply chain, which takes it closer to an internal knowledge market. Undoubtedly, enhancing the personal networks of people within the supply chain would strengthen the overall structure by providing benefits to all the businesses involved. However, some concern has been raised about the competitive nature of some suppliers, which may be reluctant to participate. At the same time, it is possible to form part of the social network without revealing sensitive information, and this coupled with features like private groups or discussions, should limit competitiveness concerns. As it is a fairly open discussion, care must be taken to not break regulatory compliance and, as such, it may require some degree of monitoring and moderation. Parts of the system may overlap existing systems.

By using a customised social media platform, developers should access all the social graph data, and enable a richer more informative analysis, than the Yammer access alone. Factoring the fact that the platform provides wiki and blog functionality, it should enable richer interactions in one place than currently possible; for example, a discussion can evolve into a position paper that has been collaboratively prepared on the wiki; generating and maintaining topical FAQs, with associated discussions. Generally speaking, this scenario is deemed to be of a low implementation complexity, but requires minimal development efforts beyond the core planned platform capabilities.

'Help' is a new initiative business direction where the company aims to provide value to customers beyond what is provided by their insurance policies. For example, a customer policy may not cover drain pipe replacement. In the traditional approach, the company's involvement stops after a claim has been made and after assessing that this service is not covered by the insurance policy. In the Help approach, the company would search in the supply chain for suitable service providers and would recommend them to the customer. It may not often be clear which suppliers can provide the required service. Currently, problems are resolved on a case-by-case basis using the company's directory of suppliers and making a number of phone calls. It is suboptimal for both the customer, who has to wait on the line for a returned call, and the insurance company as it sometimes involves much intensive effort and time. Using the social networking platform provides opportunities to improve the customer service in the insurance company's Help approach by providing an *ad hoc* catalogue of cases and queries, with answers from suppliers; a kind of internal marketplace for services with attached feedback and discussions. The core functionality of messaging and wiki should suffice. As a fairly open discussion, care must be taken to not break regulatory compliance because as such, it may require some degree of monitoring and moderation. Furthermore, using the social networking platform provides opportunities for the ideation and development of innovation proposals. If the platform can provide a mechanism for rating proposals, it can be utilised to support funding decisions.

As for claims project management, the social networking platform can be used as a medium to save the project process data that have not been captured by currently existing tools and systems. This can help reduce customer queries processing times, and to improve transparency and customer satisfaction. If the platform incorporates project timelines and tasks, it is possible to use it as an effective communication and project information capturing tool. The aim is to improve the recall of current and past status, free-form inquiries, etc. It would be beneficial to obtain more in-depth input from the supply chain. In complex claims, it is often required to obtain targeted *ad hoc* discussions with a selected audience to make better decisions, for example, in cases of larger scale coordination, fraud assessment, and others. It may be beneficial if there is a means to quickly establish and pool together resources to enable better coordination, access to the current claim status, stakeholder updates, etc.

According to the previous one, the following requirements were defined for the social media platform:

- The Blogging and Microblogging framework, including:

- Micro-posts – short text
- Replies – micro-posts posted in reply to other micro-posts
- Twitter-like markup with hashtags (#hashtags), usernames (@username), group tags (!bangtag), automatic link rendering
- Hashtag/keyword channels/content streams
- Wiki pages, using an extended markdown syntax
- Blog Pages, using an extended markdown syntax, including:
- Content moderation, including flag for moderation, moderation queue, approval, barring of content
- Groups – including joining groups, with group channel/content streams, private groups
- Basic user profiles
- User blog streams, river of news style
- Private-only content access
- Minimalist, mobile-first web design
- Minimalist system administration

A scenario, or use case, is a brief description of a business scenario which the software has to be able to model or solve. It contains:

- The people participating in the scenario (actors)
- A brief description of the scenario
- Goals – the business objectives involved
- Current business challenges, which may require improved solutions
- Example(s) illustrating the scenario in action
- A scenario may contain or refer to other higher or lower level (more detailed) scenarios

Claim project management for a flooded house can be described as a scenario, where a project manager collects all the claim data and coordinates the actions of partners, assessors, builders, etc. Scenarios serve as a guideline to define functional specification. A user story briefly explains: the person using the service (actor); what the user needs the service for (narrative); why the user needs it (goal); and acceptance criteria. They help split work into bite-sized chunks, which makes it easier to predict development time, and to track and prioritise tasks. Acceptance criteria help define and perform quality control. The following user stories should be implemented: follow a person; stop following a person; flag message, blog, wiki post for moderation; moderator approve; add group owner; remove group owner; make a private group.

After taking into account all the requirements to be used by the social media tool as input to the SNA tool and, in short, for knowledge networking in insurance supply chains, it was concluded that Yammer would be the selected social media tool as its current use and confidentiality motives from the insurance company were the main reasons for this choice. The investigation is currently underway and now the challenges are how to analyse the logins and keywords from Yammer conversations, evidently respecting confidentially aspects; how to include and measure impact, and to assess the '3-D' elements in the results as a desired need to be addressed. Accordingly, a knowledge measurement tool to carry out the analysis is being developed. As such, we will be able to carry out all the analyses relating to the insurance company's Yammer platform (categorising and coding yammer conversations for the quantity and quality of knowledge assets). In order to validate our proposal, this will be tested to analyse the data from two different insurance supply chains.

Figure 2 shows the different system components for the analysed insurance supply chain

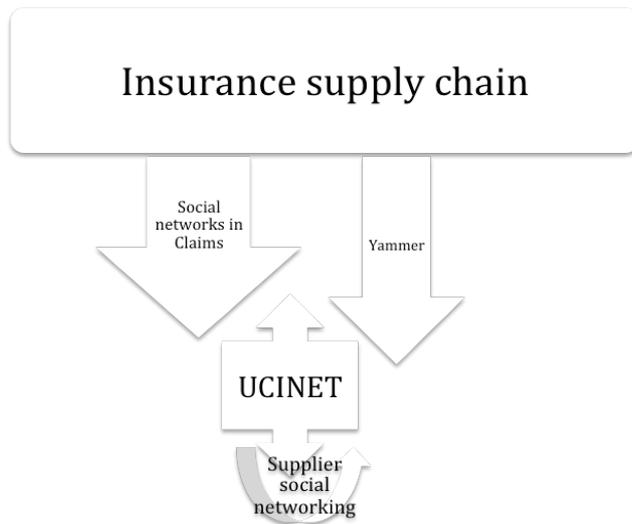


Figure 2. Stages for SSN in an insurance supply chain

## **6. Conclusions**

In this paper, we propose a combination of SNA and social media tools to model and analyse an SSN. This proposal has been defined through different stages for knowledge networking: understanding the supply chain; SNA conceptual modelling; SSN data collection from a social media tool; and data analysis from SNA and knowledge measurement tools. Here an insurance supply chain has been analysed to define the Opportunity, Estate Vision, Challenge and the Assessment Team for SNA conceptual modelling. The Yammer platform has been selected for the social media tool.

This proposal is currently being investigated. As forthcoming work, field trials are being planned with two real insurance companies. This implies developing new challenges of validating theoretical concepts developed into practical applications. These field trials are most complex given the magnitude of the processes and data to be addressed, and evidently due to having to guarantee the important security and confidential constraints of companies in insurance supply chains. Other identified research works relate to: (1) retaining knowledge and facilitating collaborative decision making in insurance companies; (2) introducing the use of a collaboration platform to support note-taking in SMEs; (3) discussing the use of a platform to consider knowledge and individual cognition in product life cycle management systems; (4) exploring and assessing other quantitative tools that can be applied, such as Analytic Network Process or multivariate statistical analysis, in order to identify relationships among key collaborative variables.

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