

## **CHAPTER 7**

# **KNOWLEDGE MANAGEMENT FOR COLLABORATIVE SOCIAL MEDIA INTELLIGENCE**

### **7.1 Introduction**

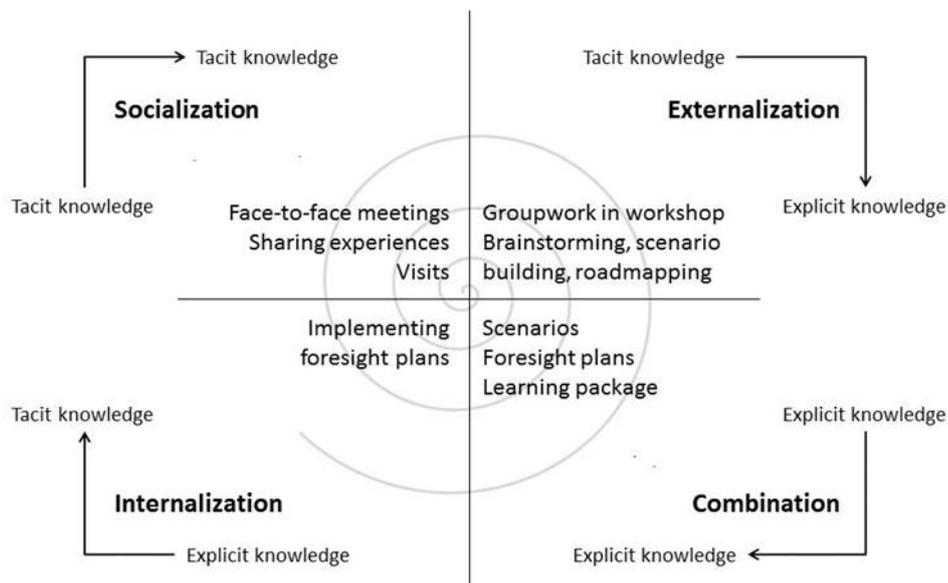
Business enterprises irrespective of their size are increasingly moving towards information based decision making process. The exponential growth of data generated by the organisations have paved the way to look into ways of extracting information. Knowledge Discovery (KD) is a branch of information management which helps in extracting useful and understandable high level knowledge, from complex and large volumes of data. Knowledge Management discipline has its origin in 1990s recognizing the fact that the value of an enterprise is determined by the knowledge they produce and transform. This was promoted by the ICT tools developed during this period emphasizing on how to transform, tacit knowledge to explicit knowledge documented. Business Intelligence (BI) is an umbrella term that represents computer architecture, tools, technologies, and methods

to enhance managerial decisions from operation to strategic level. Business intelligence uses machine learning techniques to adapt to the dynamic environment for optimization and prediction, for the better decision process.

Knowledge management is an extremely important function for the success of any enterprise. It started with digitizing and tracking with content management tools, which later gave way to collaboration tools. Social media helps in extending this to a better connect, between employees and information collection.

There are many definitions and models for knowledge management. One of the most important study with reference to the concepts of explicit and tacit knowledge is by Nonaka & Takeuchi [116]. They view knowledge creation as dynamic. They introduced the SECI (Socialisation Externalisation Combination Internalisation) model for knowledge creation and transfer theory. SECI model is based on tacit and explicit knowledge and transfer. Socialisation is the sharing of tacit knowledge through face-to-face communication. Externalization is trying to convert the tacit knowledge to explicit knowledge by developing concepts and models. Combination is when the knowledge in explicit form is combined with the existing knowledge. Internalization is the understanding of explicit knowledge. The four ways that knowledge types is combined and converted, explaining how the knowledge is created and shared in the organization are :

- Tacit to tacit
- Tacit to explicit
- Explicit to explicit
- Explicit to tacit



**Fig 7.1 SECI-model (Nonaka et. al 2001)**

Usage of Social media to collect and collate information to knowledge is a relatively new field of research. Traditional knowledge management initiatives in organizations focused on the conversion of tacit into explicit knowledge. This is captured and stored in the Knowledge repositories. Social media connect people and knowledge transfer takes place between individuals, who have built a relationship with each other. This is a

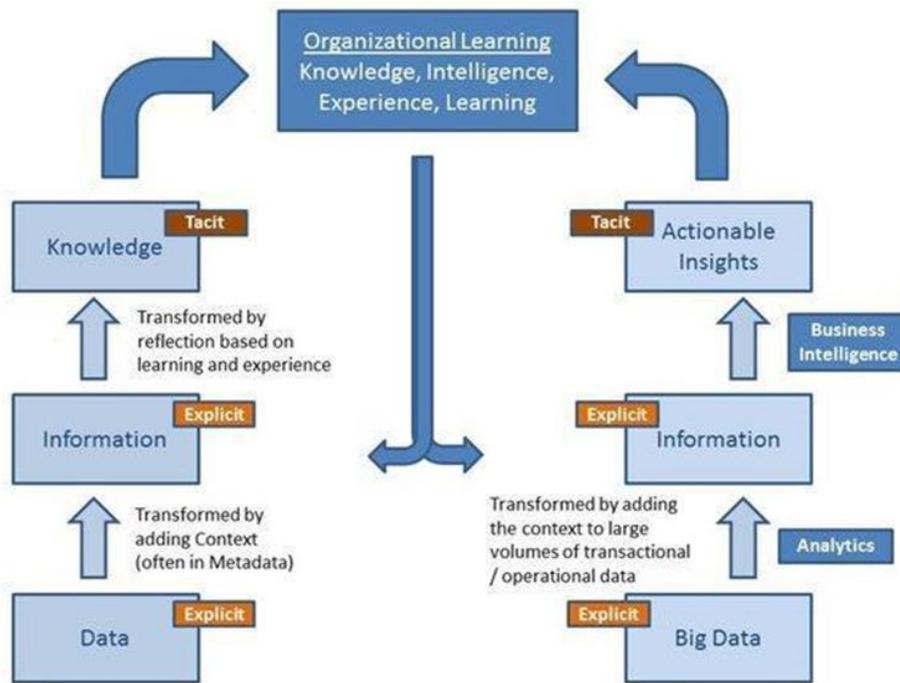
conventional process which does not consider the social context and hence has not been successful in many instances. Social computing platforms encourage the idea of processing and capturing knowledge through informal existing network easily. Tools like online social networks, collaboration tools like wikis, folksonomies create a new form of knowledge management. The major shift in process is the role reversal of usage from consumers, to the corporate environment.

Offering an alternative understanding of knowledge, the knowledge-in-practice perspective suggests knowledge to be represented, created and translated through the work practices and the social context that individuals interact in. In recent years, companies have started to use internal social networking platforms, i.e., Enterprise Social Networks, to support collaboration and knowledge sharing. Based on a literature review, this chapter discusses how Enterprise Social Networks can help enable and understand knowledge work. The intent of this chapter is to inspire the dialogue between research and practice and support future investigations in the field of Enterprise Social Networks.

Social media data falling into the category of big data is transforming the entire knowledge management process giving us insight and extracting business value from the large data set. The data analytics help in identifying and producing actionable insights.

Jed Cawthorne [117] modified the SECI model incorporating the processing of new information developed from running powerful analytics tools against

the large data sets be turned into knowledge. Figure 7.2 below shows the new knowledge spiral.



Ref: <https://www.cmswire.com/social-business/knowledge-management-and-big-data/>

**Fig 7.2 SECI Model in the context of BigData**

## 7.2 Knowledge Management and Social Media

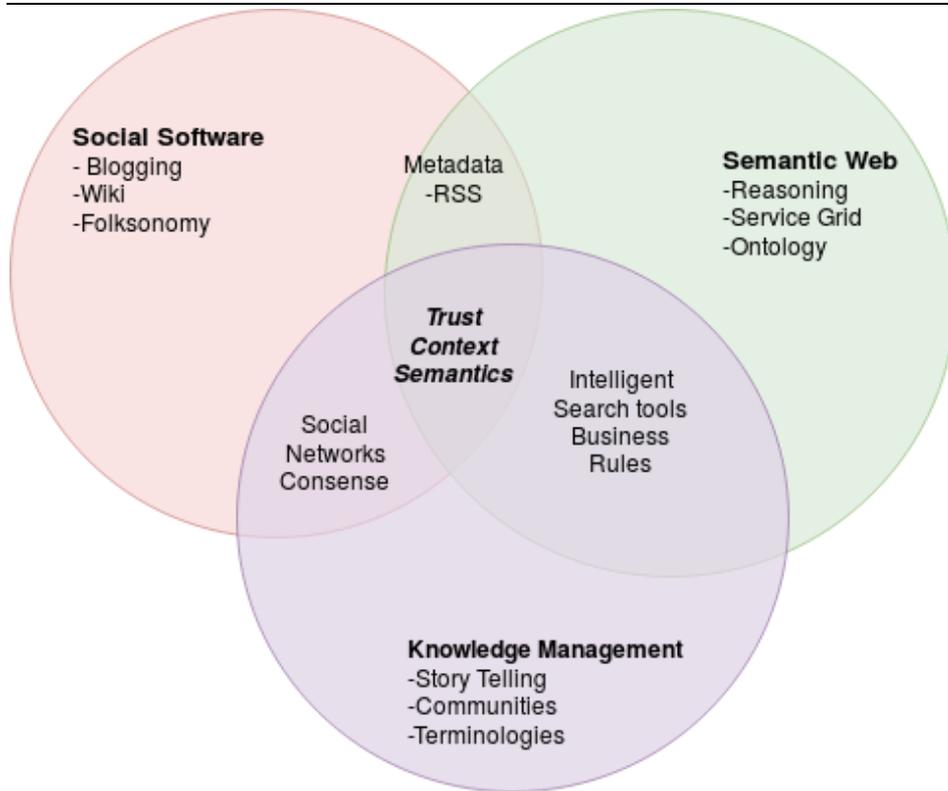
Knowledge management and social media have many similarities. Both are technology enabled, contributed by individuals to create new content intended for sharing and future use.

There are critical differences also between them. Knowledge management is

what the enterprise management wants the employee to know, based on what they feel important for the job. Social media is what the peers talk about.

Knowledge management in an enterprise is the information about the enterprise and collection of knowledge for the enterprise. Social media is an easy channel to get started. There is a great need for enterprises to tap the knowledge of the employees as well as consumers. Social media if combined with the knowledge management system or knowledge base software will give a good insight into the hidden properties. Social Media is a natural platform for the dynamic emergence of people centric communities, where information is shared, the opinion expressed and engaged in various discussions. Business enterprises are increasingly turning to social media as a source of market research. From traditional, profile-based expertise location systems to Web 2.0 social networking and tagging applications, experts channelled through social media have opened an exciting new era.

The connect between the Social Software, Semantic web and Knowledge Management is shown in the fig 7.3. Social Software can be visualised as a tool for human and technology interaction, supporting KM at different levels.



Ref: [https://www.alacra.com/wp-content/images/circles\\_2.gif](https://www.alacra.com/wp-content/images/circles_2.gif)

**Fig 7.3 Knowledge Management and Social Software**

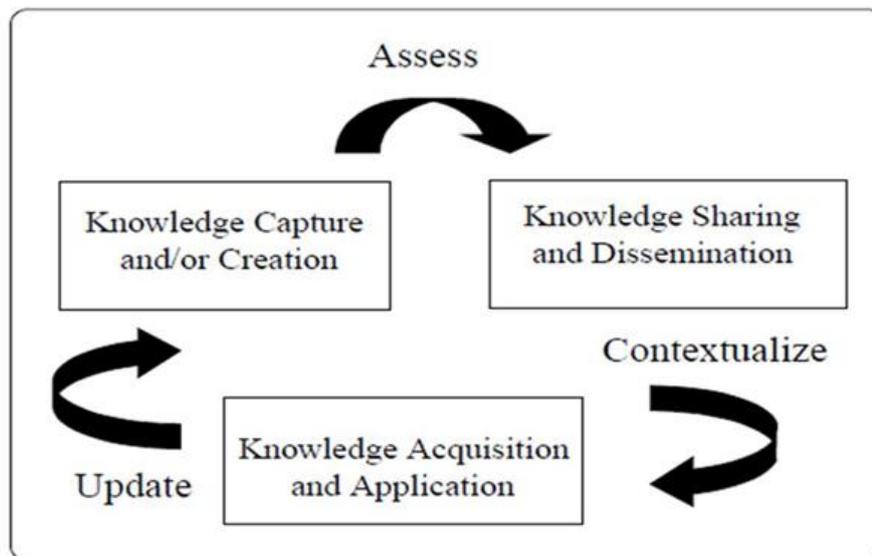
There is a need to connect knowledge flows between the people concerned. Cooperation and collaboration are complimentary in the age of social media.

### **7.3 Knowledge Management Framework**

The standard accepted practice consisting of three activities has been identified by Dalkir [118] for the knowledge management process as :

- Knowledge Capture & Creation

- Knowledge Sharing & Dissemination
- Knowledge Acquisition & Application

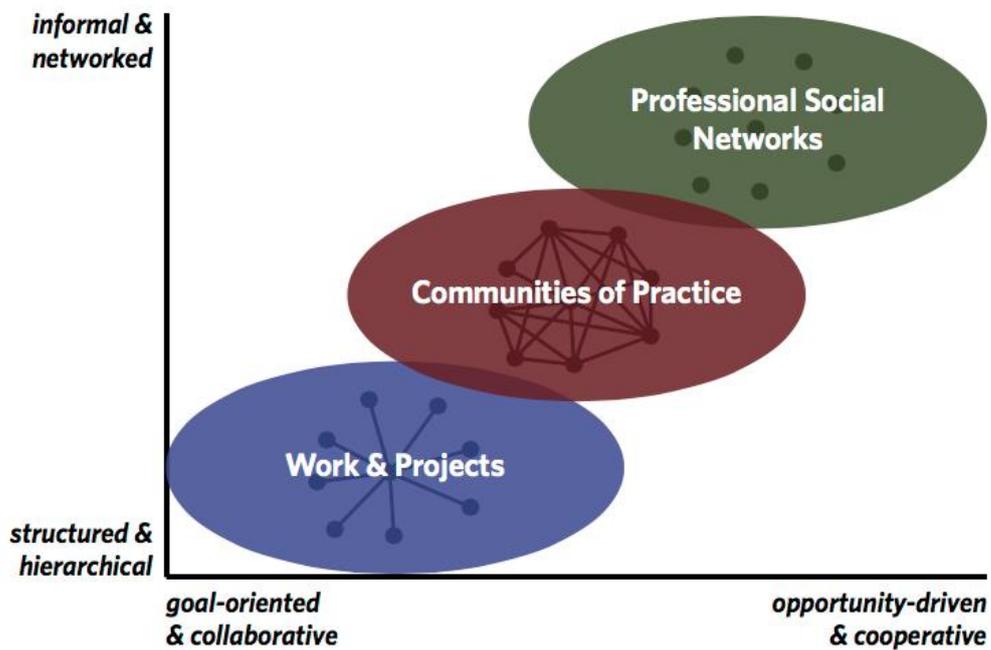


**Fig 7.4 Integrated Knowledge Management Cycle**

The Integrated Knowledge Management cycle is depicted in the fig 7.4. Social media has become the mainstream media allowing individuals to contribute which has generated new avenues and challenges to facilitate sharing and collaboration. The challenges identified are :

- Getting information from Tacit into the database.
- Integrating expert knowledge into a learning process.
- Enormity of data available in the dynamic and unstable environment

- Unstructured nature of data
- Capturing, improved collaboration and sharing within the organization.



Ref: <http://jarche.com/2015/08/cooperation-for-the-network-era/>

**Fig 7.5 Integrating Informal Networks into Knowledge portal**

There is a need to integrate the informal networks also into the knowledge portal which is shown in fig 7.5.

## **7.4 Data Collection**

Using any form of knowledge to one's advantage is known as knowledge management. Knowledge management in organisations mainly depends on the tacit knowledge of the organisation and explicit through formal training. The concept of collective intelligence, commonly known as crowdsourcing is the new paradigm of knowledge management. Crowdsourcing is the method of tapping the knowledge pool for ideas and insights. External crowdsourcing is mostly done through social media which costs hardly anything. The conventional method of feedback and data collection involved carefully designed surveys. The role of social media is to listen to the conversations in an unconventional way. Comments are posted and discussions are promoted on social networking sites, blogs, micro blogs and various discussion forums. This provides a lot of data.

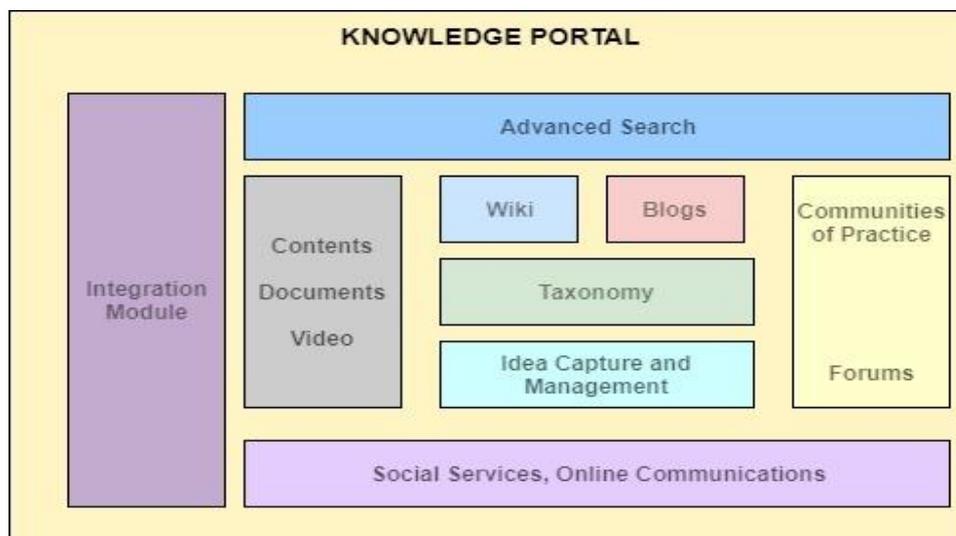
The knowledge base includes blogs and wikis, or other types of online content. Social media is a place where knowledge is shared. In such a scenario, we need to explore the flow if the user base is willing to share that content because unless your friends and followers view your posts, your influence will not expand.

Neighbour talking to the neighbour is a personal opinion. Co-worker talking about a common issue in the office is also a personal opinion. These are expressed in public forums. It is also on record for an extended period of time. These social media conversations are monitored and analysed in the

strategic decision making process. To handle a large volume of comments, text mining tools are used.

## 7.5 Semantic Search platform for the Knowledge Portal

Semantic Knowledge Management solution is a combination of different state of art technologies and tools, built on Open Source platforms, to manage documents, tacit and implicit knowledge, electronic assets, knowledge and best practices banks and toolkits; as well as to build Communities of Practice and other expertise sharing and experiential learning platforms of the institution. Fig 7.3 shows the contents and requirements integrated into a Knowledge Portal.



Ref:<https://www.slideshare.net/dmitryku/knowledge-management-km-tools>

Fig 7.6 Knowledge Portal

As the learning extends, the capacity to look and contextualize the information and knowledge becomes more critical, leading to the creation of Semantic search and linking platform for the knowledge management solution. Utilizing the Open source libraries and robust algorithms of Data Science and Statistical techniques demonstrated in the field, the Semantic search helps clients to build a semantic web to link and contextualize knowledge, allowing organic discovery and suggestions based on topics and interests as opposed to minor catchphrases.

DotNetRdf library is used to work with a lot of different technologies including Microsoft Dot Net applications, SQL Server/ODBC and many other compatible systems; it is also able to use SQL Azure to create a Triple Storage in the cloud. The solution stores BLOB data in BLOB storage, not in the database. The relationship rules for the content so trawled and indexed is as per the standards laid down in ANSI/NISO Z39.19-2005 . The content so generated is stored in indexes, which support the SKOS (Simple Knowledge Organization System) framework, RDF (Resource Description Framework) specifications, and OWL (Web Ontology Language).

Once the data is extracted, all the data graphs in various databases or indexes are loaded into the triplestore, which uses the open source OpenRDF and the Solr/ Elastic database, by mapping properties. External Graph data or linked data will be imported using a Semantic Web ETL tool, the Unified Views for RDF data.

Any content not meeting the standard for data stores like Dublin Core,

Metadata, etc. will be merged using entity mapping tools into SKOS and other metadata standards like Dublin Core, ISO 19115/19139 for GIS etc. For nonstandard metadata, the record linking tools like Solr or SQL join are used, and the OpenRefine reconcile API.

The use of the Semantic framework is limited by the actual input of Knowledge fragments and the linkages to the concepts. Since these fragments may change in time, and content keeps getting updated, the lifecycle and governance of the data are very important. Updated documents are tracked in the electronic asset management component, of our Knowledge Management system with versions. Knowledge fragments extracted from these are again stored in the Graph index, with version and tracking information. The updates and versioning are automatically done, in the data management from time to time, by periodic tasks.

The application keeps track of the fragments, version, and time stamp of capture and the source of the data. Open Provenance Model is followed which allow connections between different versions of the same knowledge fragment. This permits the system to find the best methods to process requests. The annotation based tracking is used to ensure the proper governance and assure connectivity to appropriate versions of the fragments. For this, versioning of documents are maintained in the content store, and the fragments version are maintained in the index and triple store.

Determining user intent is a major component of exploiting semantic technology. It is done by:

- Correctly interpreting a portion of the query or the query in its entirety
- Providing a “best guess” answer using the knowledge fragments, as validated by the training process
- Fine tuning and enhancing this knowledge base or Web of data by recording usage and user response; along with Machine learning techniques

Producing or publishing this information in the form of embedded metadata using HTML5 or as APIs is accomplished by adding microdata or RDFa Lite. To set up a simple, basic recommendation engine, we put together the following :-

- Ontology
- Taxonomy
- Demographic information and dynamic behaviour information about users ( both personal and global/statistical usage patterns )
- Custom inference rules
- A recommendation engine that merges the above

## **7.6 Developing and implementing Knowledge Management Frameworks**

### **7.6.1 Knowledge Management assessment and benchmarking**

#### **7.6.1.1 Knowledge Audit**

The organization of knowledge assets and learning culture of institutions are distributed across the organization. It can reside in known assets like knowledge bases, learning videos, documented processes and others as explicit knowledge like social media. It can also lie hidden with the personal domains and experience/ expertise of personnel as tacit knowledge. The spread of knowledge and learning styles can vary within an organization, from department to department. The organizational culture of learning can also be people oriented or technology oriented.

An audit of the organization attempts to discover and understand the levels of knowledge and learning assets, its state and quality; as well as the cultural fits within the organization.

#### **7.6.1.2 Needs Assessment**

The Knowledge Management needs of various organizations can vary; in fact, it can vary within the organization for the different departments or for the different categories of employees or users. By means of stakeholder interviews, surveys and brainstorming sessions; along with comparisons to comparable systems in use in other similar institutions, our KM Subject Matter Expert is able to understand and map the scope, need and expectations for the Knowledge Sharing.

### **7.6.1.3 Readiness Assessment**

For an organization to be successful in its Knowledge Management journey, it has to have a proper strategy, the right tools and it has to be prepared for the journey. The readiness of the organization is predicated by the support for similar initiatives. This includes the organizational readiness for the KM processes, current infrastructure for Knowledge Management, and other factors like existence of knowledge strategy, Board level support. Apart from these, the commitment, performance measurement, structures for organizational learning, culture of knowledge sharing, collaboration, communication and team-working, technical infrastructures, and security need to be examined and analysed.

Based on the results of this assessment, it was possible to plan a phased approach to the adoption of changes to the KM approach, strategy and related systems & procedures.

### **7.6.1.4 Benchmarking of the Current-state of KM**

The current state of Knowledge Management, and Knowledge Assets, against best practices in the industry, was studied. This process identified current strengths, gaps and opportunities which need to be addressed in the Knowledge Management Roadmap.

## **7.6.2. Knowledge Management Strategy development**

### **7.6.2.1 Create Knowledge Management Framework**

Based on the assessment and benchmarking results, we then proceed to identify the key components of a Knowledge Management Framework

- **Roles:** All employees in the organization need to contribute to the Knowledge Management system.
- **Processes:** Several processes drive the Knowledge Management initiative in the organizations. Some of the processes, which are existing, needed some improvements; while there were new processes that needed to be set up.
- **Technologies:** Knowledge Management in an organization requires technology to support the new strategies, tools and processes, to ensure easy capture, curation and sharing of Knowledge Assets and Learning tools to all users, across wide networks and around the clock.
- **Governance:** Governance is a key aspect of the KM strategy, and it is proper guidelines on governance that can most impact the success of the initiative. Good governance practices measure the usage and effectiveness of the KM Strategy.
- **Communities of Practice:** Communities of Practice are the pillars of a successful Knowledge interchange. Communities formed to address specific ideas or issues, to share knowledge and practices are a powerful driver for Knowledge exchange, creating valuable assets and enhancing capability of the organization.

The infrastructure and tools, as well as processes required to set up such communities, as also the methodologies to develop a charter, identify focus areas, setup guidelines for roles and behaviour and help build the culture and behaviour for their success.

### **7.6.3 Gap Analysis and Change Management Strategy**

Based on the Assessment and Benchmarking done; and the Strategy developed, a GAP analysis is performed. The current situation, and the desired future state are to be compared to study the requisite changes, any additional structures and organizations changes required to meet the strategy. On the basis of this Gap analysis, a Change Management Strategy was drawn up and presented, outlining a phased approach to prepare the organization conduct user orientation and training, setup Knowledge teams, setup Knowledge bases and CoPs, set up KM tools and portals.

## **7.7 The impact of social media on knowledge management**

The Social media plays an important role in knowledge management from both an organizational and individualistic perspective. Social media is increasingly used by organisations for participation and knowledge sharing to improve business operations. Hence social media can potentially support a range of knowledge management (KM) practices.

- Knowledge creation and knowledge dissemination is a continuous process in social media

- Social media promotes Knowledge exchange.
- Individual and collective knowledge is integrated into a collaborative social knowledge management system.
- Social media facilitates tacit knowledge sharing.
- Social media can be efficiently used for customer knowledge management through crowdsourcing technologies.

Social listening or sophisticatedly said as social media monitoring identifies conversations online. Social media intelligence translates the information into actionable insights by categorising and understanding data.

## **7.8 Social Media Monitoring**

Social media monitoring is basically listening to conversations and gauging the brand's sentiment among consumers. This makes user rate against a sampling social media conversation within the large social networks. This is helpful for the brands having specific topics and discussions around any defined set of keywords like an explicit brand or any hashtag mentions. Organisations using monitoring solutions end up in the "buzz" delivered at high-level, with no insights or further actions. It gives a boolean measure of whether consumers like a brand or not. Business is looking for trends and discussions. But social media monitoring will not be able to generate these results as it is keyword based.

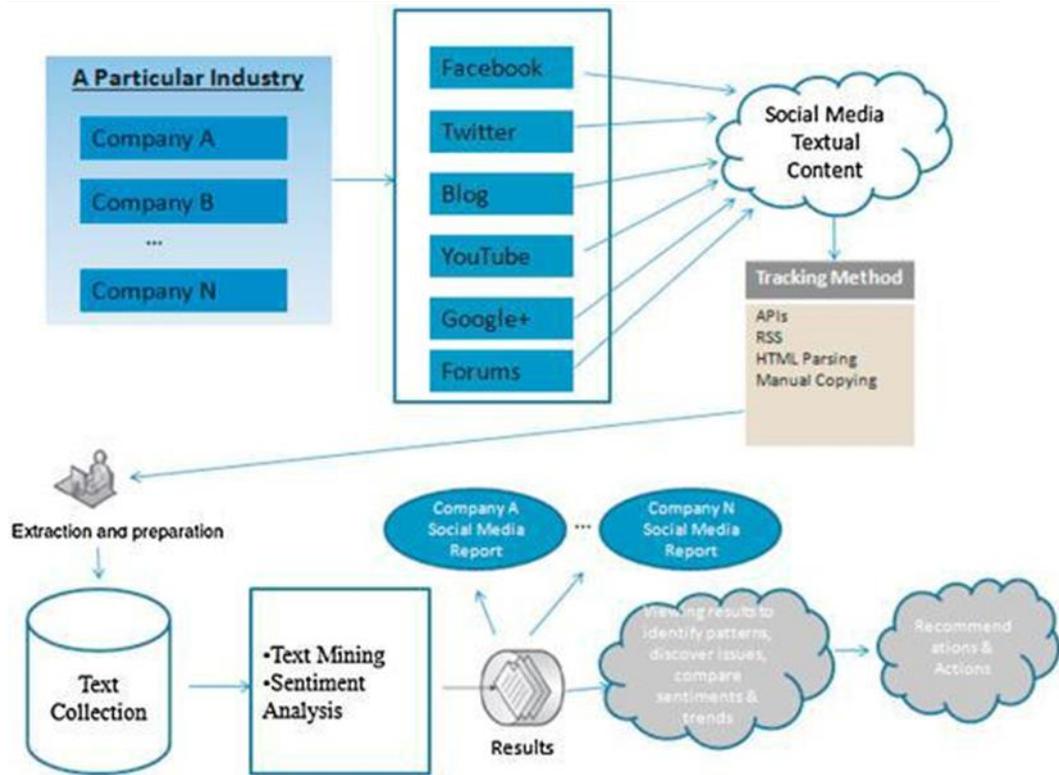
## 7.9 Social Media Intelligence

The social media intelligence includes social listening, data management and analytics with technologies that facilitated in making socially informed decisions.

The quality of data collected depends on the depth of the crawlers, historical data and the accuracy of search queries. The efficiency of data management depends on how the data is segmented and routed. This includes categorizing of social data, rules applied or filtering based on specific criteria.

Analysing each conversation or mention within a dataset and identifying a number of key attributes at the individual level is a complex process. Processing includes sentiment analysis, opinion mining NLP, automated influencer identification etc. It helps in translating the conversations into actionable insights. Social media intelligence is evolving as a means of distributing knowledge with alerts, open API's and other unique ways to consume and update information on the pulse of online conversation.

Many studies are done on creating effective solution incorporating semantics for better intelligence. Opinion mining techniques with ontology and taxonomy defined are used. Sentiment analysis is done and then intelligence is used for predictive analytics. He et. al [119] has developed a tool social media competitive analytics called VOZIQ. They are calculating sentiment scores from tweets which reflects the business performance.



Ref : <https://doi.org/10.1016/j.im.2015.04.006>

**Fig 7.7 : Social media competitive analytics framework with sentiment benchmarks for industry-specific marketing intelligence.**

This is explained in fig7.7 In our experiments, we have adapted the basic idea from He et al [119] and modified to our requirement.

### 7.10 Findings

SENTIMATCH integrates the search and semantic web features into the framework of our Knowledge Management solution. The framework supports the full life-cycle of Knowledge and its Management structures,

which includes creation, curation, governance and security features among others. The crawler gets into directories, structured databases, unstructured media with metadata, images (using OCR – the TESSERACT engine), RSS feeds, WIKI and Web links, Zip files, Sidecar files (XMP, THM, etc.), Locations, etc. SENTIMATCH tags based on rules and Named Entity Recognition; parse regular expressions and other custom plugins, finally storing the data in database or index.

The database is initially populated by importing standards based ontology from schema.org and industry and institutional taxonomy, supplemented by other Open Source and Multilateral agency taxonomies and standard thesauri, like WikiData for its list of names and Wiktionary for the use of verbs. Base Ontology is further supplemented by the related reference ontology available at Schema.org to meet organization standards and guidelines. Knowledge Management Framework utilising social media interactions are created.

### **7.11 Future Thoughts**

Social Media as a business tool needs to be engaging customers real-time with presence across all the platforms. Social data has become an influencer in our decision making process. Social media opened up new opportunities which lead to a converted customer by listening to online conversations considering volume, demographics and geo-location.

While helping marketers with valuable insights to target the right audience,

we need to think beyond text analysis. A huge amount of data is generated and it is difficult to leverage this untouched insights. Social media intelligence is evolving beyond text mining to image recognition and analysis.

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