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OPINION

Insight through open intelligence

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OPINION

Integration of business intelligence with corporate strategic management

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ABSTRACT The traditional model of competitive intelligence and its operationalization in most organizations appears to be inadequate to address the intelligence challenges arising from the speed of change in the environment, increasing data complexity, and growth of international activities. To address this challenge, this article borrows concepts from open innovation, applying them to all CI activities. We are suggesting going beyond the traditional model of an in-house CI unit with activities largely conducted by the units personnel and moving towards a cross pollination approach whereby others in the firm contribute to all CI activities including, for example, the selection of key intelligence topics and being involved in analysis and eventually towards a full open intelligence model in which key stakeholders and external experts also assist the organization in all aspects of competitive intelligence activity. In proposing a more open approach for intelligence, the authors recognize the concern that CI professionals will have regarding sharing intelligence and intelligence activities outside the CI unit and outside the organization. However, as pointed out in this article, organizations around the world have been moving quickly towards an open innovation model generally concluding that the benefits associated with opening up all elements of the innovation process, including R&D, outweigh the risks of intellectual property loss.

KEYWORDS Analytics, big data, competitive intelligence, open innovation

1. INTRODUCTION

With over 60 years of combined experience in competitive intelligence practice, research, consulting, teaching and writing (and areas related to intelligence) the authors of this article propose a reconceptualization of competitive intelligence. Weaknesses in the current definition and practice of competitive intelligence lead us to broaden out those involved in helping organizations' intelligence programs by incorporating several concepts from open innovation. We propose the integration of principles from analytics as well. We are calling this new intelligence concept "open intelligence". We feel that the current practice of competitive intelligence does not address challenges arising from the speed of change, the growth of international activities (not just selling internationally but sourcing) and increasing data complexity, but that by incorporating ideas from open innovation and analytics that these challenges can be met by tomorrow's competitive intelligence practitioners.

2. OBJECTIVE OF THE ARTICLE

The Journal of Intelligence Studies in Business has served for several years as the primary outlet for the exchange of intelligence ideas. The journal has had articles that attempt to define competitive intelligence. For example, Du Toit (2015) looked at academic scholarship in CI from 1994 to 2014, looking for a common definition and parameters for the field. Soilen (2016) through a survey of CI experts and an examination of articles in SCOPUS that contained the words competitive intelligence, attempted to develop a definition of CI and establish and a research agenda for the field. While these and other authors of papers in the journal have tried to define competitive intelligence, others have proposed the need to extend the domain of competitive intelligence. Nienaber and Sewdass (2016) proposed to expand the domain of CI to include workforce related competitive intelligence. Vriens and Soilen (2014) proposed extending the domain of CI to include disruptive intelligence. The idea of adding like this to the domain of intelligence generally represents an acceptance of the definition of competitive intelligence, but an expansion of its role or, put another way, a broadening of the key intelligence topics, to use Jan Herring's terminology. Still others have sought to broaden the domain of intelligence, pushing into or absorbing other similar or related areas. For example, Rostami (2014) wrote about integrating knowledge management with business intelligence. Calof, Richards and Smith (2015) suggested extending foresight to include both foresight and analytics and, in fact, many articles in the Journal of Intelligence Studies in Business have focused on business intelligence, for example Alnoukari and Hanano (2017) and Gauzelin and Bentz (2017). In short, the Journal of Intelligence Studies in Business has served not only as one of the primary journals for publishing scholarship about CI (Soilen 2016) but it is also a journal that has sought to define competitive intelligence including what it is, its scope and research agenda. In fact, the journal, in defining its publication topics, notes that it "publishes articles on topics including marketing intelligence, marketing intelligence, strategic intelligence, business intelligence, competitive intelligence, collective intelligence and scientific and technical intelligence".

With this article, the authors seek to add to this theme within the journal. We propose a reconceptualization of competitive intelligence with the incorporation of concepts from open innovation and contributions from analytics. We write this article to the CI community and in doing so invite feedback from those who read it. A version of this article has been published in Competitive Intelligence Magazine (Summer 2017) but this is geared more towards an academic audience. It is our collective view that how we look at and practice competitive intelligence has to change in light of several changes in the environment that will be described in this article. We draw upon many concepts in open innovation as we seek to push the boundaries of competitive intelligence and expand the role played by both those within organizations and outside of it in driving the organizations' intelligence initiatives. We seek to be part of a growing dialog within the pages of the Journal of Intelligence Studies in Business about how competitive intelligence should evolve in the future, and invite those who read this article to lets us know what they think.

3. THE CHALLENGE

While there have been many changes in the business environment that competitive intelligence has had to address, there are three that the authors of this article seek to highlight, that we feel are amongst the most important changes and also those for which we feel traditional views of intelligence have had difficulty addressing, at least according to our experiences and discussions we have had with leading practitioners and researchers in competitive intelligence:

1. Speed of change,
2. Increasing data complexity
3. Growth of international activities (not just selling internationally but sourcing)

These challenges are explained in greater detail in this section.

3.1 Speed of change

In 2011, Harvard Business School professor and noted management thinker John Kotter wrote:

> "Anyone in the business world – even casual observers of it – knows that it's currently experiencing a rapid rate of change. New companies spring up seemingly overnight. Products and services that were revolutionary two years ago are rendered obsolete if they don't adapt to market

changes fast enough. The rate of change in the world today is going up. It's going up fast, and it's affecting organizations in a huge way. The evidence of this can be seen almost everywhere—life-cycle of products, number of patents filed in the US Patent Office, amount of cell phone activity across national boundaries—on and on and on. And what's particularly important is that it's not just going up. It's increasingly going up not just in a linear slant, but almost exponentially."

What does this mean for competitive intelligence? Many intelligence projects will need to be done on a frequent, almost daily basis to reflect the rate of change in these areas. Looking for both the emergence of threats and opportunities needs to be done in time so that managers can act in a timely manner, but the rate of change is also greatly compressing the amount of time available to gather, analyze and make sense of the information.

3.2 Increasing data complexity

At the SCIP conference in Atlanta (May 2017), a dominant theme among many of the keynotes was increasing data complexity and the need to develop approaches to deal with and in fact take advantage of big data. Steven Hughes opened the conference with a talk "Big Data is our Future" and day two had Major General Neeraj Bali present a case study from the Indian army in which big data figured prominently. Among the numbers quoted in the presentations: 31.25 million messages sent every minute, 30 billion pieces of shared content on Facebook every month, 2.77 million videos viewed every minute, Google users perform 40,000 searches per second, more than 196,000 databases published annually by the U.S government, and by 2019 one million minutes of video will be uploaded every second. It would take five million years to watch all the videos posted each month.

The internet of things (IoT) with increased machine to machine communications, data gathering sensors, and more, was also mentioned as both an opportunity and challenge for competitive intelligence. Social media, Twitter, and blogs also generate data that can be used in intelligence programs. It's not that the traditional primary sources from interviews are not important for intelligence, but the growth and availability of these online videos, discussions, and materials does provide

great opportunities on the collection side of intelligence. The problem, however, is coming up with a way to cope with all this data. IBM, in their big data and analytics hub, wrote about the four Vs of big data (IBM, 2017) which we are collectively terming "data complexity":

1. Volume or scale of data. For example, most companies in the US have 100 terabytes of data stored, six billion people have cell phones;
2. Velocity/analysis of streaming data. For example, 1 Terabyte of trade information captured by the New York stock exchange each day, 18.9 billion network connections – 2.5 per each person on earth;
3. Variety or different forms of data. For example, 400 million tweets sent per day, 4 billion hours of video watched on YouTube each month, 30 billion pieces of content shared on Facebook each month;
4. Veracity or uncertainty of data: Notably, 1 in 3 business leaders don't trust the data they use to make decisions, poor data quality is estimated to cost the US economy alone $3.1 trillion per year.

3.3 Growth of international

For many organizations, tomorrow or even today's competitor can come from outside their country. Customers may also come from countries from outside the organization's country. Technology and other changes can come from anywhere in the world. Managing in this environment requires the development of intelligence programs that gather information from many different countries, knowing what the best sources of information are in foreign environments and in some cases dealing with the fact that the best information for their intelligence program may not be in English.

The challenge for CI is how to integrate the opportunity provided by this volume of data along with our more traditional information sources while addressing the problems related to data volume, variety, velocity, veracity and internationalisation.

The combination of the rate of change, international factors and the big data challenge means that CI teams will need to come up with a way to increase the frequency of their intelligence project updates while integrating a broader array of data. Doing this

in the traditional one or two-person intelligence team is going to be difficult. The following lays out how we are proposing to add to the concepts of competitive intelligence to address these challenges. It is a reconceptualization of the phases of intelligence and the addition of concepts from open innovation to intelligence.

4. NEW IDEAS WITHIN THE WHEEL OF INTELLIGENCE

Traditional CI approaches revolve around some version of the wheel of intelligence approaches we have seen on leading organizations' use terms, such as:

1. Issue identification
2. Plan generation
3. Data acquisition
4. Data analysis
5. Recommendation

There are many variations of this approach based on corporate management structure and decision-making authority, size of the organization, and the type of issue to be resolved. But these five steps are really the crux of any "generic" CI effort in an organization. The Du Toit (2015) article explores these ideas in great detail and serves as a useful review of the CI literature.

The problem with this traditional approach is that the time for all of this to happen can exceed weeks or months before actionable insight can be developed. The sequential nature of the wheel of intelligence has been challenged in many past studies, but it is clear that in fast changing environments time can be a challenge for doing all these steps. Add to that the time for the organization to actually act on the insight and we are talking additional months added to the overall CI lifecycle.

Given the time frames involved, the impact of the 4 Vs associated with big data can make this traditional approach grossly inadequate and subsequently useless. Business disruptors and industry changes occur in the blink of an eye and through the globalization of the digitized world we live in, can affect regions and potentially world economics in a fraction of the time it took only 10 years ago. Data and insights that are months out of sync with reality cannot provide a competitive advantage to any organization,

Rather, an approach must be developed that takes into consideration the volume of information, the sources, the ability to manage the content, and the organizational flexibility to not only adapt, but to flawlessly execute on a regular basis, will be needed. There are several strategies that can be employed to help navigate the challenges stemming from this environment during this important data collection and analysis phase.

4.1 Data Generation

First, in terms of data generation, the sources and volume of data overall are exploding. As mentioned earlier, this growth is expected to continue at an exponential rate. There is essentially no such thing as a suitable environment for "batch" processing – anything not done as close to real time as possible will become useless. So, it is critical to know that the longer from the time the data is generated to analysis, the more misleading and outdated the data becomes – and all downstream activities of analytics, processing, insights and execution eventually snowball into an extremely high-risk business strategy.

That is not to say that one should just hang up the proverbial CI hat and chalk this environment as a no-win scenario. Rather, there are techniques available for moving closer to the "real-time" environment that will provide valuable insights and ultimately a competitive advantage for organisations.

There are many techniques (albeit some more advanced than others) that have shown great promise in a) getting better data, b) getting it quickly, and c) expanding the breadth of data collection to include more value-rich content. These techniques include:

1. Concurrent analyses methodologies – simultaneously collecting, analyzing and sharing the data with stakeholders in a reiterative parallel process, rather than serially collecting and vetting the data with stakeholders, which can take magnitudes longer in time and resources
2. Organizational efficiencies – built-in hierarchical structures that encourage quick data sharing and communication without long lag times to decision making and execution
3. Real-time data collection methods – ability to harvest content from thousands of sources to effectively pull valuable "golden nuggets" from the vast amount of overall data.

4.2 Tools for data generation and analysis

Secondly, the use of specific data-management tools becomes a necessity in this data-rich environment. Public domain search engines fall woefully short in providing the content in a format that is user-friendly, and throwing low-cost physical resources at the problem only leads to more confusion and frustration in coordination and results in a reduction in speed to insights. Knowledge management tools or related automation mechanisms are crucial in order to navigate the volume of data coming from the web. This includes not only public domain source content, but social media, customer feedback, and paid sources. The key determinant in the appropriateness of the result will often depend on the robustness of the input content. Identifying and managing the resources that provide data into the automation tools is a critical area of development. Letting the tool do the "heavy-lifting" of analytics with source content that routinely numbers in the thousands or tens of thousands or more of sources and will ultimately provide a much better outcome over time.

From a practitioner's perspective, the value of the tool cannot be overstated. It has allowed organizations to be far more efficient and, overall, more effective in improving the analytics and arriving at actionable insights far faster than without the tool. An example of such a tool is one by which a comprehensive database repository can capture data and categorize it into several areas:

1. Content Repository – funneling hundreds or thousands of data sources into a central location
2. Content Search – performing Boolean, phrase, truncation or other searching mechanisms
3. Communication / Sharing – ability to cross-functionally share this information readily
4. Knowledge Visualization – transforming the data analysis into a useable, easily understood visualization for fast deciphering and application
5. Actionable Insights Decisions – arriving at the quickest time possible, the actionable insights to make organizational decisions

4.3 Analysis / Taxonomy

First off, it is important to know what is meant by "taxonomy" – this is the ability to categorize content in the classifications best suited to achieve the intelligence initiative. Think about the objective – if it is about a product launch or about how a competitor is performing, there is a set of criteria that needs to be established that acts as a catalyst to achieving the objective. What initial segments of the industry? Geographical areas? Specific products or general applications? How defined do you want to get into the details of what you are trying to determine? Therefore, the ability to analyze this data with the desired taxonomy is important, but one is not looking for a simple listing of relevant sources for a business need. Rather, the key OUTPUT element is to appropriately analyze the data that allows the user to identify and derive key content that can be immediately adjusted to include in the insights for recommendations. Many tools have dashboards that are customizable for the user's preferences and can be adjusted based on the parameters that the user requires. This is something used extensively by many successful organizations and is key to being able to get the data in the right format so that it is easily ported to a recommendations output.

Additionally, people-engagement is key here – ensuring that the content driven from the automation is relevant, timely, and actionable. You still have to utilize individual perspectives to make sure the dashboard outputs are in line with the company objectives and requirements for the need being investigated.

4.4 Organization- structure and culture

It's not just the process of competitive intelligence that needs to be modified in light of the new environment, but the organization itself will need to be looked at. There are two elements of this, one is the structure itself in that if the information is to be acted on quickly then mechanisms need to be in place to get intelligence into the hands of decision makers quickly. The idea, for example, of the pinnacle of CI being that it is included in the weekly or monthly senior management meetings needs to give way to real time, possibly daily intelligence updates. There is also the cultural element of organization. Far too many times senior management will be aware of the

content of the intelligence, but will either chose not to act upon it (due to internal feelings outside of the data results), or simply ignore it as a "nice to know" sort of factoid. Obviously, both are potential catastrophic behaviors that will only improve the competitor's chances of getting an advantage in the marketplace, especially given the speed of change mentioned earlier.

Therefore, company structures have to be shallow and decision making has to be quick. "Analysis-paralysis" has to be avoided at all costs. This can only be achieved where you have a "sponsor" at the executive levels of the organization who values the CI contributing efforts and can therefore prioritize and include the results in the strategic direction of the company.

5. OPENING UP THE INTELLIGENCE PROCESS: OPEN INTELLIGENCE

With the above ideas implemented in organizations, it becomes more likely that organizations will have the ability to handle the four Vs of data and the corresponding international and speed components of insight generation. However, there are concerns that with most intelligence units being one or two people, it will be difficult for the user to actually cope with frequent intelligence projects integrating massive amounts of data, dealing with fast changing environment and incorporating international elements into the model. Not only will it be difficult as will be pointed out in the next part of this article, but it might even be undesirable. Perhaps a better approach will be to open up the intelligence process. In the next section, we look at a very popular topic – open innovation, the opening up of organizations' innovation activities including research and development to people outside the organization – even competitors – and applying the concepts of open innovation to competitive intelligence.

6. OPEN INNOVATION

Our notion of open intelligence is based on open innovation concepts which were pioneered by Henry Chesbrough. In 2003, Chesbrough wrote "open innovation is fundamentally about operating in a world of abundant knowledge, where not all the smart people work for you so you'd better go find them, connect to them, and build upon what they can do". He went on to explain that:

"open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model".

Up to this time, innovation was seen as an exclusively internal organization function: R&D inside the organization came up with the ideas and then the organization determined (again internally) which ones to pursue to development and commercialization. Open innovation implies opening up the entire innovation process to "smart people" outside the organization. Elaine Watson in 2012 wrote about Coca Cola's open innovation program. Coca Cola's Chief Procurement Officer, Ron Lewis, summed up open innovation and its importance to Coca Cola when he said:

"…our goal is to be the best at innovation in the industry and the way we're doing that is via an open network. And there is a good chance that the source of such innovation may well come from outside Coke's R&D department. We want to be the best at connecting the dots."

Finding ideas outside the organization and connecting the dots are certainly the objectives in open innovation and definitely areas where CI has a role to play. In a 2008 Harvard Business Review article by Huston and Sakkab on Procter & Gamble's (P&G) open innovation initiative, it was noted that as of the 2006, 35% of their new products had elements of open innovation with 45% of the initiatives in the product development portfolio having elements that were discovered externally, with a goal for 50% of innovation to come from outside the company. P&G even established a policy of licensing new products/technology to competitors if P&G had not commercialized it within three years of development.

In opening up the innovation process, open innovation researchers do note that part of this opening up is also to parts of the organization that traditionally had not been consulted/included in innovation efforts. For example, Volkswagen, in looking at car engine design, allowed individuals from outside the engine group to bring ideas forward and

become involved in the selection of which ideas would go forward into design.

Hansen and Birkinshaw linked open innovation to each element of the innovation value chain. In their Harvard Business Review article "The Innovation Value Chain," they looked at key questions to ask and performance indicators to identify how "open" the innovation process was (Table 1). The typical company has virtually all idea generation done in-house. To open up the R&D process to other "bright" people, they talk about cross-pollination with other units across the organization providing input to R&D, and external input from people outside the organization who contribute to the R&D idea generation process. We have seen examples of this in many industries. We mentioned earlier about Volkswagen opening up engine R&D to people outside the R&D department. Bed, Bath and Beyond, in working with "Edison Nation," put a call out for inventors from around the world to provide ideas that could result in new products sold in Bed, Bath and Beyond. This goes beyond idea generation to using an open approach for both idea generation and conversion with Bed, Bath and Beyond doing the diffusion. After 14 years of research and writing on open innovation (14 years after Chesbrough introduced the topic) there have been enough case studies and papers written that it is safe to say that there are examples of each element of the innovation value chain, idea generation, conversion and diffusion being done through open innovation.

7. FROM OPEN INNOVATION TO OPEN INTELLIGENCE

Innovation was opened up because despite the risks (e.g. loss of intellectual property) the benefits associated with allowing people external to the R&D unit both inside and outside the company to assist with all aspects of the innovation process were too great. Organizations have found that with the speed of change and the need for faster and better innovation, it was beneficial to allow other people to have a role in generating ideas, evaluating them and even helping with commercialization. Given the complexity and volume around data and intelligence, it is clear that similar to open innovation, it is time to for CI to consider opening up all phases of the intelligence process to deal with similar challenges: the need for quicker intelligence, the need to cope with frequent environmental change, and the need to deal with the complexity posed by big data. The following discussion explores how this would work by going through some of the elements of the traditional intelligence wheel.

In looking at open intelligence, some of the language of open innovation from Hansen and Birkinshaw can be related to CI:

- In-house: This will refer to the traditional model of intelligence where most aspects of the intelligence process are done within the CI unit;
- Cross- Pollination: This will refer to supplementing the in-house CI unit with input from others and other units

Table 1 Hansen and Birkinshaw innovation value chain.

	IDEA GENERATION			CONVERSION		DIFFUSION
	IN-HOUSE Creation within a unit	CROSS-POLLINATION Collaboration across units	EXTERNAL Collaboration with parties outside the firm	SELECTION Screening and initial funding	DEVELOPMENT Movement from idea to first result	SPREAD Dissemination across the organization
KEY QUESTIONS	Do people in our unit create good ideas on their own?	Do we create good ideas by working across the company?	Do we source enough good ideas from outside the firm?	Are we good at screening and funding new ideas?	Are we good at turning ideas into viable products, businesses, and best practices?	Are we good at diffusing developed ideas across the company?

of the organization to assist in all aspects of intelligence development;

- **External:** This will refer to supplementing both in-house and cross-pollination with people outside the organization such as key customers, suppliers, experts, and other stakeholders to assist with intelligence development.

8. INTELLIGENCE PLANNING

There are many aspects of intelligence planning that could be discussed that could benefit from open intelligence but for the purposes of a basic exploration of the concept we will look at one: intelligence topic generation. Intelligence topics are traditionally developed by the person responsible for intelligence based either on their understanding of management needs or through direct consultation with management. We call this the traditional in-house approach to topic development. In CI, we talk about it in terms of "what is keeping the CEO up at night", "what key decisions are being made". Cross-pollination (opening up the process to units outside intelligence) would involve allowing others in the organization to contribute to the intelligence topic generation process. Personnel in R&D, for example, understand the technical environment well and might have some interesting perspectives on what topics need to be investigated. Those in maintenance or service may have ideas based on the complaints and problems that customers are having. Taking an external perspective (fully open), imagine if customers, suppliers, and other stakeholders—possibly even including competitors—provide input on the intelligence topic selection process. Nan Bulger, in a 2015 article, wrote about integrated intelligence and said that the purpose of intelligence is to "help your customers' compete in the market and help your customers make money". If the purpose is to make customers more competitive (a business to business objective – B2B) or simply to satisfy customers (both B2B and more traditional consumer markets), then would it not make sense to ask them what topics are most relevant to them? Or perhaps show customers suggested intelligence topics and ask them which one would result in intelligence that would help them better position themselves with their customers?

It's not just idea generation of topics that could be done in an open intelligence approach, topic selection could also be done this way. We can envision a Delphi approach where people from outside the CI function rank the intelligence topics, thereby helping the intelligence team determine which ones are more relevant to other units of the organization and to key stakeholders.

9. COLLECTION

Open intelligence applied to collection is something that on the surface CI already does very well. The profession understands the importance of gathering information from broad sources both within and outside the organization. They get the need for diverse sources of information but there are a few aspects of collection that we want to bring up in the context of open intelligence. To what extent is information being entered into the intelligence system from other units of the organization (cross-pollination)? From outside the organization (external)? This is not about where information comes from but who is providing it. In an open intelligence environment, information is being directly entered into the system by stakeholders and by people in other parts of the organization. Open intelligence also requires that CI practitioners extend collection sources to recognize data variety – to what extent (where relevant) is online video, social media, and so forth being integrated into intelligence efforts? How is the internet of things figuring into collection plans? Imagine what could happen if organizations addressed variety, velocity and volume. This no doubt will require the use of technology but given rates of change and increased data (and data complexity) this will be needed. One thing to consider is that, in the big data world, 80% of what is available is unstructured or semi-structured (text, images, and sound). Therefore, some form of unstructured data technology will become important.

10. ANALYSIS

The traditional view of analysis has the person responsible for intelligence applying any one of several dozen formal analytical techniques to information that has been gathered. This is a straightforward and logical process that fits with the in-house view of intelligence. We have added to this in the earlier section in mentioning some online/technological analytical tools but it's still conceptually about the CI unit engaging in the analysis and then sending the results with recommendations off to the decision makers. A few things that we

have seen over the past several years have caused us to question whether this should be changed to incorporate the open intelligence approach. The first was a presentation by Johan Van Zyl, CEO of Toyota Europe NV/South Africa on the Toyota South Africa intelligence system. During the presentation, he talked about how the client for the intelligence joins with the intelligence team during the analysis phase. This provides the intelligence team with client insights and perspectives on the data. We have also seen various foresight initiatives where experts from around the world were invited to provide analytical input either as part of expert panels or in Delphi approaches to help organizations make sense of complex environments. Volkswagen provides a very interesting open innovation example in this respect. They set up a virtual exchange where participants from throughout the company received play money that they could "bet" on what they thought were the better ideas. Whichever idea attracted the most "virtual money" on the exchange was the one selected.

There are two aspects then to think about in applying an open intelligence approach to analysis. The first is who do you open the analysis process up to (i.e., who is invited in)? And the second is the kind of analytical techniques you use to integrate broader involvement. An in-house approach (like in open innovation – so call this closed) involves only having the intelligence unit doing the analysis. Cross-pollination would involve allowing others inside the organization to participate in the analysis process and external would require inviting in outside experts, stakeholders and others. For cross-pollination and external initiatives, traditional analytical techniques would be combined with techniques such as Delphi and expert group approaches. The foresight field has a lot of techniques that should be used that integrate broad groups in the analysis function.

A final aspect of analysis that ties in with the concept of rapidity of change is the frequency of analysis. As mentioned in the collection section, organizations will need to refresh and reanalyze their data on a frequent basis. Automated analytical approaches (software and other online tools) will become more important in addressing the need for more frequent data refresh rates, broader data types, and the need for more frequent analysis.

11. COMMUNICATION

Traditionally, intelligence is given to the client after being developed by the intelligence unit. There are variations in this approach with some suggesting providing the analysis but not the recommendations (the true intelligence) to other managers in the organization and in some cases making the non-sensitive information gathered for intelligence available more broadly throughout the organization. But, generally, it's about targeted intelligence being developed and given its sensitivity being provided to those with the authority and requirement to receive it - "a need to know basis only". The open innovation groups have discussed at great length the sensitivity and concerns with sharing intellectual property more broadly than just in-house (in the R&D unit) but have generally concluded that despite the risk the potential benefits are big. Similarly, for intelligence, there will have to be discussions around how broadly intelligence should be communicated. Under the cross-pollination approach, intelligence results could be shared with others in the organization (besides the client) but perhaps only those who have appropriate security clearance levels. Under an external approach (full open intelligence) the intelligence would be shared with trusted stakeholders outside the organization. This certainly is done within the government intelligence environment (within the five eyes community for example – Australia, Canada, New Zealand, the United Kingdom and the United States) and it might make sense to share intelligence findings with key customers or suppliers to get their perspective on the intelligence. Again, this fits with the integrated intelligence concept but more importantly provides an additional level of validation on intelligence results and helps provide unique perspectives on it as well.

12. IDEAS FROM ANALYTICS AND IT TO ENHANCE THIS NEW APPROACH

To a certain extent, the analytics field has proposed IT-related solutions to address some of the problems described in this article. IT systems enable organizations to expand geographies, shift time zones, and build linkages among people (e.g., collaborative groupware) that enable the rapid transfer of knowledge across boundaries (Dodgson et al., 2006).

While an IT system enables co-creation through information flows, the data are only useful to the extent that managers can

generate insights that help their businesses. In a co-creation environment, different stakeholders might interpret the same data in different ways. Analytic tools, such as machine learning, can help to enable consistent interpretation of data across the co-creation ecosystem

The use of analytics in innovation however, is not well-understood (George & Lin, 2017) and we are certainly proposing an innovative approach to competitive intelligence. Nevertheless, many companies are starting to learn how best to leverage the power of these advanced technologies in generating and in implementing new ideas. George & Lin (2017) provide a framework for considering the different ways in which analytics could be integrated into innovation. The aspect most relevant to open intelligence is the role of analytics as a driver of organizational transformation. As such, analytics could influence both product and process innovation by capturing and translating data more effectively to better inform transformation decisions.

In terms of open innovation, its defining feature (relative to closed innovation) is the gathering and processing of data from external stakeholders. He and Wang (2016) argue that social media can be used for improving interaction with a wide variety of these stakeholders. In addition, it can be employed in co-creation efforts during product development. In an analysis of IT strategies and open innovation, Cui et al. (2015) suggest that outbound, inbound and coupled processes involved in open innovation can be leveraged in different ways through IT. Whereas inbound and outbound innovation tend to involve one-way flows of information, coupled processes embrace the co-creation concept in which partners and other stakeholders are involved throughout the innovation initiative.

In summary, companies can enhance the chance of open intelligence success by expanding the breadth and depth of information processing (Ciu et al, 2015). Information technologies can help to enable breadth in that these systems can gather and process information from a wide variety of sources. Analytics, however, can help with depth, leading to insights that might not have been previously considered.

13. CONCLUSIONS

Speed of change, needing to address international dimensions of business and information and increasing complexity of data (volume, variety, velocity and veracity) will require a rethink and possibly reconceptualization of how we develop intelligence. Open intelligence, our concept which is inspired by the popular and growing field of open innovation, provides an approach for addressing this challenge. However, it will require that the competitive intelligence function opens up to others inside the organization (cross-pollination) and at the most open, from others outside the organization (the external approach). Table 2 provides examples of this within planning, analysis and communication. This may make some intelligence practitioners nervous due to the potential for the intelligence to be seen by some that they do not wish to see it, but this is no worse than the potential loss of intellectual property that can arise in open innovation. Yet, many of the world's largest companies have adopted aggressive open innovation targets and established open innovation programs. It is only by harnessing the information from broader networks (open intelligence), involving a broader array of experts in analysing information (open intelligence) and sharing the intelligence with appropriate stakeholders (open intelligence) that organizations will be able to deal with the speed of change and increasing complexity of data described in this article. Even planning (including intelligence topic selection) can benefit from an open intelligence approach.

Future competitive intelligence scholarship should look at the open intelligence concept. CI researchers should look for examples in which intelligence was developed using external networks. In this article, we have provided a few examples of where open intelligence concepts were observed (e.g., Toyota South Africa) but more examples should be sought out. The concept of open intelligence appears to address the challenges we have described in this article but further development and testing of the concepts is required.

To paraphrase Henry Chesbrough, the CI unit does not have all the smart people in the world working for it, but it could. The idea in open intelligence is to get the "best minds" working for the organization's CI program as a means for addressing today's challenges but also to maximize the ability to identify and take advantage of opportunities.

Table 2 Open Intelligence – Examples within the wheel of intelligence.

	Traditional model – In house (CI unit)	*Cross pollination – across the firm*	*External*
Planning: where the topics come from	Senior management driven: "what's keeping them up at night" CI practitioner driven: "We know what's needed"	Other parts bring forward and help to select the intelligence topics – they know what key issues are from their unit's perspective	Key stakeholders have a unique perspective on the environment. What's important to them? What do they need to be competitive?
Analysis: Techniques and methods	Our unit knows how to make sense of the information. Craig Fleisher and Babette Bensoussan have shown us the techniques.	We still need Craig and Babette but let's have others from the organization help us make sense of the information. We will need group analysis approaches-exchanges, Delphi	Who are our five eyes for intelligence? Let's harness the power and insight from key customers, suppliers, other allies, experts etc. We will need group analysis approaches such as exchanges and Delphi
Communication	The intelligence is provided to the client – need to know basis	The intelligence is shared with those in the organization that could provide perspective on it and are cleared to see it.	The intelligence is shared with key people outside the organization that can provide perspective and we trust to see it

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