Collaborative Business Intelligence: Socializing Team-Based Decision Making

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Abstract

For many of us, making decisions is a challenge; for others, it can be torture. Despite nearly half a century of work in decision support and business intelligence (BI), many businesses' decisions look vaguely dysfunctional.

If we examine how most organizations really make important and innovative decisions, we see that most are made by teams (permanent or transitory) of people rather than by individuals. It's high time we designed an effective approach to true decision-making support—what we might call *innovative team-based decision making*.

This article presents a new model we call iSight that maps the path from the information cues that signal change is required, through the team interactions and implementation, and on to measurable and repeatable innovation. The key to this progression lies in informal information—the conversations and meetings, messages, and e-mails that record the actual path of decision making but which are largely lost today. Capturing and using this informal information is increasingly possible as we move to a world where nearly all information is digital.

Our iSight model provides the first comprehensive framework in which team-based decision making can be understood, designed into software solutions, and implemented in highly innovative and forward-looking organizations.

Is Business Intelligence Working?

In the mid-1990s, Gartner analyst Howard Dresner popularized the term *business intelligence* (BI), words that suggest deep thought and extensive, rational decision making. However, what we get from vendors and IT is closer to what we used to call a decision support system (DSS). Dan Power (2007) identifies five classes of DSS, within which BI fits mainly as a data-driven and, to a lesser extent, model-driven DSS. The actual focus of BI tools is on the collection, analysis, and presentation of largely numerical, mostly internal information to individual decision makers. The assumption is that having provided enough "good" information, IT can stand back and watch the business make "better" decisions.

This is only occasionally true, at best, as shown as far back as 1999 (Gigerenzer et al, 2000). In recent years, much of the focus has turned to operational BI and big data—making ever-faster, smaller decisions based on ever-larger data sets. Yes, the world of business is spinning ever faster and daily decision making has to keep pace, but the type of change we're experiencing now is revolutionary. The social and economic fabric of our world is being torn apart and remade in constant and repeated seismic events. Sovereign debt ratings of formerly unassailable AAA countries are being downgraded. Previously blue-chip businesses in every industry have fallen as new kids on the block charm Wall Street.

Decision making needs to be fast and it absolutely must be innovative—in a different league from what we've done before. Such decision making is a team effort, *especially for decisions that require or produce innovation.* The truth is that such innovative decision making has little to do with the explicit, largely numeric data we've focused on for over 20 years.

Those of us who have worked in large enterprises have seen sufficient evidence to conclude that many decisions have a rather shaky relationship with facts and business intelligence, and limited relevance even to stated business goals. How many successful decisions have been declared as based on "gut feel" and unsuccessful ones blamed on "lack of reliable information"? How often have we seen political expedience override a strongly argued rationale?

Then there's the directive to "just take one more look at the figures" when the numbers contradict the group wisdom of the boardroom.

What are we missing? Our longtime focus on BI is blinding us to the fact that the most effective and productive path from *information* to *innovation* is through *interaction.* A few ideas do pop into our heads out of nowhere, but most of our best ideas—useful, productive ideas that can be implemented—are born from interaction with peers, colleagues, and even managers.

The human mind is ultimately a social construct, which leads us directly to social networking and Web 2.0, which represents the evolving democratization of the Internet. Creativity has been open sourced. Centralized control has given way to geographically separated cooperation. Social media (such as Twitter and Facebook) allow people to openly share their observations and opinions and expose themselves to feedback. The Web has sparked our innovation, helped us cooperate, and put the focus on teams.

Unleashing such innovation and collaboration within the business environment is not only desirable; it's mandatory. The generation now entering the workforce expects nothing less. In the corporate world, however, we need more structure and control. Enter Enterprise 2.0 (McAfee, 2009)—the business flavor of Web 2.0. For decision making, Enterprise 2.0 opens up enormous opportunities for interaction. It promises to unleash the creativity of decision-making teams who gain access to external information and shared insight. It offers real-time collaboration with peers and superiors that can drive innovation and accelerate decision cycles. Furthermore, it presents new opportunities for the business to directly harvest and benefit from the wisdom and experience of "edge workers"—those who work intimately with customers, prospects, products, and partners. This is true decision-making support.

Innovative Team-Based Decision Making

A decision-making team is simply a group of people who have come together to address a business challenge. Team members may come from a single or multiple units in the organization; the team may be brand new or its members
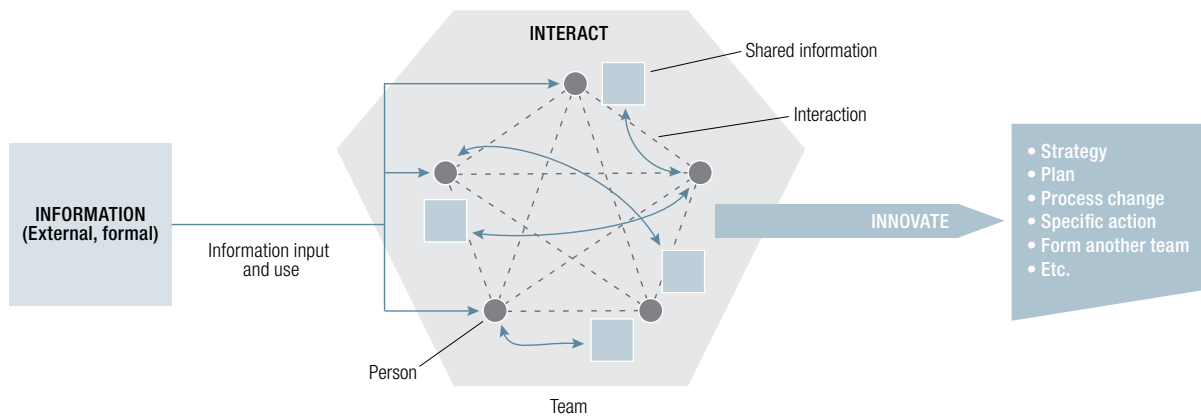
Figure 1. The current decision-making ecosystem.

may have worked together on previous assignments. The team may be based in a single location or be virtual.

Besides the people on the team, we note that in order to function, the team needs (1) information artifacts that are used, shared, and created by the members and (2) a web of interactions between the members. This ecosystem is shown in Figure 1. It's fairly simple and informal. It's the way it works today, and it's also the way it *doesn't* quite work—we lose so much of importance that goes on within the work of the team, such as:

- **Context.** The business environment and background to the decision, the team members involved, and initiating and closing actions

- **Interactions.** All informal communication among team members and with external parties, including meetings (face-to-face and electronic), telephone calls, instant messages, tweets, and even e-mail, if not stored centrally

- **History.** The performance of team members, the unfolding of thought processes leading to options considered and discarded, the timing of events and when information was requested/received, and a formal record of how innovation occurred

- **Consequences.** Closing the loop between expectations set in the decision and what actually happened in the real world

A typical example is a team brought together to investigate and plan the CEO's vision of a new process. Its members come from across the business and from IT, bringing their skills and knowledge of process and information needs, approaches, and tools. After the CEO briefs the team, members begin to gather documentation on their PCs or even in a content store or team room tool. As the project progresses, the team interacts with one another, using and creating further information.

When a new team member comes on board, the only information about what has occurred so far is what exists in the team's formal documents. Knowledge about previously discarded options exists only in the heads of the original team members, and the new team member wastes time and energy exploring invalid options. Eventually, the team concludes on a new strategy and plan for the process, and presents it to the CEO, who is only partially satisfied. Some information had been lost—the only record of the CEO's briefing is in the participants' handwritten notes, which are inconsistent and incomplete. The team returns to work suitably chastened.

The lost information and undocumented work points clearly to a need for some mechanism to formalize the team's process and progress.

Decision Making: In the Beginning Is the Word

The need to make a decision arises from some novelty in the environment, either internal or external. We become aware of some change or new information that requires a response, and we must decide what that response will be. For example, if we see a drop in customer demand, the emergence of a competitor, or a problem in the supply chain, in each case, something has changed; some new information has emerged—good, bad, or indifferent—and we must decide what action is the appropriate response.

Decision making, then, is a reaction to change. Its goal, in the broadest sense, is innovation. This is the beginning and the end of decision making. *Information*, observed in the world, is the trigger. *Innovation*, materialized in action, is the goal—and as shown in Figure 1, *interaction* is the bridge between the two.

Information has always been the focal point for business intelligence. In this, BI is correct. However, BI is too restrictive, both in the scope of the information considered and in confining itself to the data provisioning and analysis that is only part of decision making. The actual information required comes from a wide variety of sources. First is internal, hard (highly structured and modeled) information, long recognized by BI. Second is soft (loosely, variably structured) information such as documents, images, and videos that exist both inside and outside the organization. Further information—hard and soft, such as spreadsheets and presentations—is generated in the BI environment itself and is used by decision makers as well. All of this we call *formal information*.

Such formal information in the decision-making environment must be, and generally is, managed to ensure quality, reliability, and availability for decision makers. As I've shown elsewhere (Devlin, 2009), such management does *not* necessarily involve pushing it all through a data warehouse. What is required is a comprehensive

environment for storing and managing all information artifacts, optimized for their specific structures and uses.

As we saw in the previous example, informal information also exists—composed almost entirely of soft information generated as part of the decision-making process, such as phone calls, instant messages, and conference recordings. This information is generally lost in the casual process shown in Figure 1 because there is no single place to collect and manage it. However, such informal information is the key to understanding and managing interaction.

A New Vision of Team Decisions: The iSight Model

Figure 2 shows a new model—which we call the iSight model—for innovative team-based decision making. Comparing it with Figure 1, we see a number of changes. First, the individuals in the team are defined in terms of their primary role: investigation. Second, the activities of the team are brought together and managed in a functional block: the interaction. Third, the information resources—both formal and informal—of the team are integrated in a single, logical store.

Personal iSight: Investigation

When an individual acts alone within a team decision context, her primary role is to investigate information and, in the process, gain personal insights into its meaning, significance, and implications. There are four constituent functions:

- **Integrate.** Collecting formal information from the business, the world at large, and other team information, the user creates new and combined information artifacts in the personal realm.

- **Interpret.** Human interpretation supplies meaning and judgment to information received. It often requires detailed analysis and integration of further information to provide a sufficient understanding of the situation and possible causes. Interpretation is rational; it is the typical analytical behavior that is the focus of today's BI and office productivity tools.
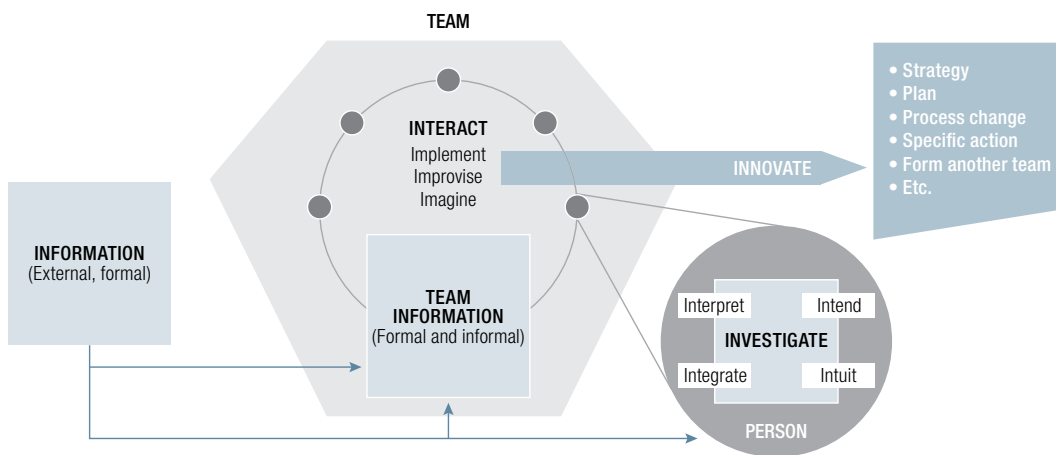
Figure 2. iSight model of team-based decision making.

- **Intuit.** Internalized (or tacit) information and knowledge become the basis upon which a user has flashes of inspiration about what is really going on, possible solutions, and so on. This intuitive spark, for which minimal software support is possible, is driven by personal intention and accelerated through team interactions.

  Interpretation keeps us in the rationalistic, cause-and-effect world of Newtonian physics—the land of the left brain. Novel thought arises in intuition, in the realm of the right brain. It is also inspired by live discussion between co-workers, which is part of interaction.

- **Intend.** Another highly personal and internal behavior with minimal software support, the user is motivated by business, team, and personal goals to gather and analyze information, make conclusions in a particular direction, and play a role in decision making.

Interpretation and intuition have no direction. For direction, we need to set intention. Intention drives behavior. At its simplest and purest, intention drives the business analyst in search of complete, relevant information. More deeply, intention drives the interpretation in a particular direction in order to prove or disprove hypotheses. More deeply still, intention drives the decision-making process toward a business goal such as maximizing profit or reducing customer churn. More darkly, perhaps, intention includes personal goals, which may be overt and aligned to the business's objectives—but may also be covert, even illegal, and aimed primarily toward personal gain.

In terms of software support, integration and interpretation have had the most attention, with the continuing evolution of BI tools and an almost exclusive concentration on numerical data. Intention and intuition are hidden aspects of the personal sphere; they cannot easily be supported by software tools. However, we can envisage that software can develop to a stage where some support is possible. For example, software could detect and record intention through pattern analysis and data mining. The most obvious reason would be to track and prevent illegal and inappropriate decisions. Another reason would be to facilitate distinguishing between the intended and collateral effects of decisions.

Team iSight: Interaction

As noted, the interaction function is the link between the behaviors of individuals and the actions of the team as a whole. Interaction is the engine that drives the team together and toward the goal of making a decision.

From a team view, interaction focuses on the ongoing orchestration of the individual interactions of team members and the information they use and create. It means monitoring all team conversations and gatekeeping all inbound and outbound information. For the individual, to interact means to step up to the whiteboard, grab a marker, and begin drawing boxes and arrows, all while talking animatedly.

For the team environment, interaction is capturing the drawings and the conversation, extracting meaning from them, relating the content to other information artifacts, and storing it all for future use. Think team room software … on steroids. Although not all conversation is recorded digitally, we now have the technology to do so. Of course, such recordings raise issues of privacy and personal freedom. However, the more of the conversation that is recorded, the greater the proportion of informal information that can be captured, analyzed, and reused.

Humans are social animals, and business is a highly social entity. Personal intention, intuition, and interpretation are enhanced through social interaction. Social networking refines our interpretations, expands our intuition, and tests our intentions. Business decisions are increasingly being made collectively, either openly and democratically or covertly in an autocratic environment. Business thrives when there is interaction among colleagues, contacts, and customers, and further serves as the inspiration for or source of innovation.

In a world where businesses are increasingly international and geographically dispersed and where people are increasingly more comfortable conducting social intercourse online, an ever larger set of information is exchanged electronically, discussions are going digital, and conclusions are reached in the ether.

More than ever, all of this information can be stored, tracked, interpreted, and reused. We have reached a tipping point where social networking and collaboration tools can provide the framework for decision making and enhance the process itself so that decision makers can obtain real benefits. These benefits include savings in time and expenses; reuse of prior experience and artifacts;

and, most important, improvements in the quality, effectiveness, and tracking of decision making.

Three further functions support interaction within the team environment:

- **Implement.** This is the process of creating a collaborative team—people are added and removed, meetings are arranged, and documents are shared. Implementation covers the drudgery we forget until we're asked to create a team to solve some problem and struggle to gather phone numbers and e-mail addresses or book meeting rooms. Without the mundane activities of implementation, the magic of imagination and improvisation never materialize.

- **Imagine.** Imagining is the team-level counterpart of personal intuition. In an effective team, ideas arise as the team members interact. Conversation and challenge inspire new thinking within individuals; individuals feed their new thinking into the conversation, which in turn generates new ideas within the team. Conceptual combination—the synthesis and merging of previously separate, individual concepts— gives rise to new ideas.

  Brainstorming, group ideation, feedback, co-editing, mind-mapping, whiteboarding, and creating decision templates are among a wide variety of techniques used in team imagining. Some have been developed for physically co-located teams, where all or much of the interaction is face to face. Some techniques have been extended for electronic use or specifically created for virtual teams using Web 2.0 techniques to support electronic communication.

- **Improvise.** Although the drive in imagining is to expand the set of possible ideas and solutions, improvisation looks more closely at what is actually possible in the given situation while accounting for constraints such as budget, physical and staffing limitations, and competition. As shown in Figure 2, imagining, improvisation, and implementation coexist in a tight symbiotic loop; an effective team moves fluidly back and forth among the three. The discipline of improvi-

sation balances the creative energy of imagination; the team contracts or expands accordingly.

Consensus building, voting, and obtaining buy-in from team members and external stakeholders are all part of the social process of improvisation. Many of the techniques of imagining—such as co-editing, building decision templates, and mind-mapping—can also be used for improvisation to aid in the development and documentation of a solution that is likely to gain wider support and lead to a politically acceptable and implementable change in the business.

In the End Is the Word

Human interaction has, since time immemorial, been face to face. Such communication is highly effective and information rich. The invention of writing more than 5,000 years ago enabled interaction at a distance and provided a permanent record of the information conveyed. However, in comparison, writing is information poor. Until recently, our choices in interaction included proximate, rich information versus incomplete, long-distance information; fleeting, comprehensive information versus permanent, incomplete information.

Electronic communication and digitization have dramatically shifted the balance among information density, proximity, and permanence. We see the possibility of optimizing all three in the business environment—provided we store and manage the informal information currently lost in traditional, poorly tooled team decision making. Ungoverned or poorly managed information is always in danger of being lost; therefore, in the formal, team-based, decision-making approach, we must carefully manage such information. The central role of the interaction component—both within the team and as the linkage point between individuals and the team—allows it to moderate and manage all information input to and output from the team information store.

Today's social networking and team room tools support the capture and management of all text-based interactions and file sharing between team members. However, such interaction is slow and relatively information poor. Voice messaging is also now common, with the potential

for storing both audio content and text captured via voice recognition. Advances in processing power and bandwidth could enable storage and use of visual interaction.

As we move toward this more interactive environment, we can envision a more attractive environment for team members. Participation and trust levels increase. Meetings can be replayed to check what was actually said. Decisions can be more easily reviewed and revisited to understand how a particular outcome evolved and, if necessary, take action to avoid future problems.

> Decision making is a reaction to change. Its goal, in the broadest sense, is innovation. This is the beginning and the end of decision making.

At the heart of every decision is a *decision context* consisting of the people, their behaviors, and the information used. In a highly predictable business environment, the people and information involved in a particular decision context are relatively stable; whenever a particular type of decision is required, the same actors and information are involved, creating a tacit information store for future use.

In modern, fast-moving businesses, multidisciplinary teams of people are brought together on an ad hoc basis to deal with specific situations. In this case, only limited tacit knowledge can be carried forward, so it becomes mandatory to explicitly capture and store informal (as well as formal) information. In fact, capturing and storing the decision context are primary drivers for interacting. It's hardly novel now to simply facilitate interaction between team members and it does little to encourage usage; faithfully recording the decision context provides the incentive for team members to participate and enables the decision outcome to be reviewed for:

- **Coherence.** Closing the loop on the decision. Did we achieve the desired outcome? Were there unintended consequences and could we have identified them in the decision-making process?

- **Reuse.** Can the team knowledge be captured and reused in whole or in part for future decisions? Can we speed up similar decisions in the future? If so, how?

- **Participation.** Were there team members who were central to the decision? Were they overly influential? Were there under-contributing members? Were personal agendas or motivations at play in the decision and, if so, were they ethical and legal?

Early iSights: Collaboration, Content, and BI—In That Order

The focus of the iSight model is threefold. First, deep and extensive interaction in a well-managed team environment drives innovative decision making. Second, as the informal information from these interactions is stored and managed, it creates a platform for in-depth decision-making support. Third, analyzing and interpreting this informal information in an automated way creates tacit knowledge and allows teams to reuse previous experience in the future.

These three focus areas map directly to current software domains:

- **Interaction.** Social interaction and networks, especially between peers, are at the heart of Web 2.0 tools and techniques. They extend to Enterprise 2.0 and collaborative software, which aim toward specific business goals. These tools are at the core of iSight interaction.

- **Informal information.** In its broadest sense, content management stores and manages nontraditional, often highly unstructured information. Applying these tools and techniques to the informal information that underlies decision making—and creates much of the context for it—is an obvious step in the direction described for iSight.

- **Interpretation.** Business intelligence tooling has traditionally been applied to the formal, especially numerical, information of the business. Extending the scope of such tools to informal information and placing a greater emphasis on text analysis can provide the basis for a more automated and reasoned approach to the rational aspects of decision making.

Note that many BI tools have begun to implement "collaborative BI." This concept is substantially more limited than what we discuss here; it is not a true starting point for iSight. Collaborative BI currently starts from a model where individuals perform analysis and then share it and work through the analysis with peers and managers. The collaboration and content management described in the first two points above start from an entirely different set of information and with a very different goal: that of supporting the process of decision making rather than the individual decisions themselves. Furthermore, as we examine the full scope of information used in decision making, we can clearly see that the scope of the BI team in most organizations is far too narrow to cover everything we need.

Implementing the iSight model requires organizational collaboration and the tools to support it. Although the BI team's skills and knowledge are important, the focus of the iSight model is different from that of traditional BI. As collaboration becomes widespread (thanks, in part, to advances in technology), we can introduce the use (and archiving) of informal information while heeding privacy, control, and transparency requirements. We can also apply our BI tools to the archived content of our decision-making to enjoy the full benefit of this model.

Conclusions

The way we make business decisions is at a turning point. Traditional BI—collecting mostly numerical information from inside our enterprise, verifying the data's quality, and distributing it to business users—has been our sole focus. Big data—and business's demand for speed and innovation—are transforming how decisions must be made.

Added to this challenge, the arrival of the millennial generation—with its daily experience of digital interaction with peers and the world in general—in positions of responsibility in business is prompting forward-looking organizations to ask: Is there is a better way to make decisions?

To reach innovative solutions, organizations must adopt and embrace team-based decision making, and the broad use of digital communication and information storage will help us implement the iSight model we've discussed.

Enterprises can help team members innovate by storing, managing, and using the information generated but not captured as decisions are made, such as information from meetings, conversations, e-mails, instant messages, and phone calls. This informal information is the digital record of all the inputs that contributed to the decision-making process of gathering (formal) information, discussing it, hypothesizing what it means, suggesting and dismissing ideas, forming a consensus, and coming to a conclusion.

The iSight model shows the type of functionality required to make sense of informal information and illustrates how to use it to enhance the decision-making process. As a result, we can now envision an entirely new decision-making environment that supports all types of decisions—operational, tactical, and strategic—that require innovative, team-based thinking. The iSight model described here provides the first comprehensive framework in which team-based decision making can be understood, designed into software solutions, and implemented in highly innovative and forward-looking organizations. ■

Acknowledgment

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