Data is easy. Deciding is hard.

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Ugly Research
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Data isn't being delivered the way decision makers want, and they're part of the problem. It's time to rethink the data-to-decision process.

The data-to-decision process is broken.

Data isn't being delivered to decision makers the way they want. And they're part of the problem.

Here's what our research says about barriers getting in the way. The entire data-to-decision process needs to be computable: From data, to analysis, to action, to outcome.

To be recognized as peers and business partners, analysts need to connect actions with outcomes, and do more to manage the decision process. Meanwhile, decision makers should strengthen analytical skills and explain their rationale. For this to happen, we need to resolve these six issues:

Data is easy: 3 issues for the tech community.

1. Too much 'Ooh, shiny!'
2. False dichotomy: Data-driven vs. human intuition.
3. Value is not self-evident: Show people how to use data.

Deciding is hard: 3 issues for decision makers.

1. Visualize decisions, not data.
2. Build a decision culture, not a data culture.
3. Unleash data's explanatory and predictive power.

3 issues for the tech community.

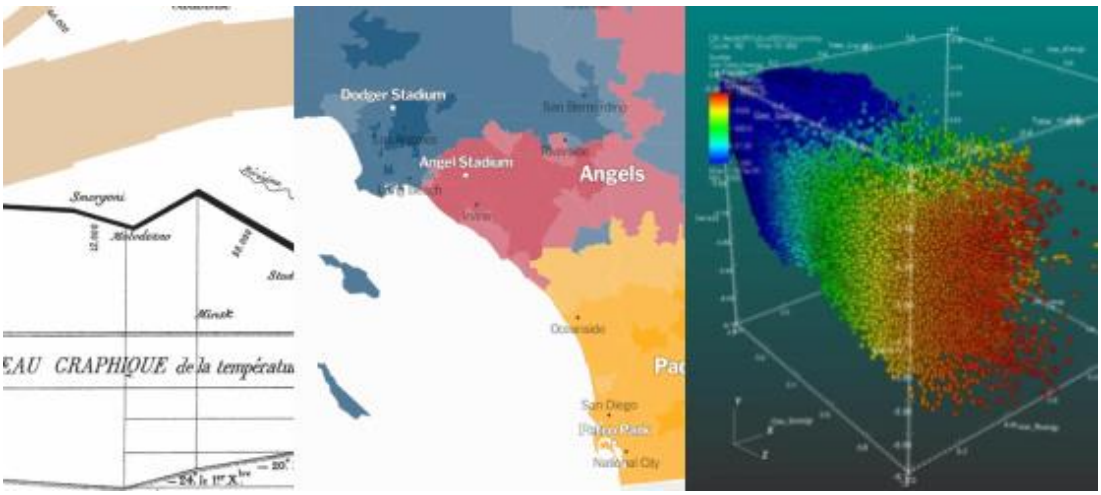
The challenge: Create engaging processes that show people how to use data, and connect actions with outcomes.

Tech issue #1. Too much 'Ooh, shiny!'

Machine learning, predictive analytics, tech wearables, and industrial Internet of Things. Visualizations help analysts tell their data story, so decision makers quickly see relationships and absorb complex information.

> "Chock them so full of facts they feel stuffed, but absolutely brilliant with information. Don't give them any slippery stuff like philosophy or sociology."
>
> -Ray Bradbury, *Fahrenheit 451*

Form over substance. But some would have you believe cool charts are the end game. In that respect, data is too easy (Altman). Consider today's fashionable data visualizations, and the dreaded infographic. Plus the statement by the CEO of Tableau, speaking to the *New York Times*, that visualizations should include "No more than 18 colors at once. You can't consume more than 18."



Sources: Edward Tufte, Flowing Data, Wikipedia

BI gets bigger, not better. Business intelligence usage is flat. A popular 2014 survey reported a 6% decline in those finding significant impact, down to only 28% (Swoyer of TDWI). Frank Bien tells the hard truth: "The common view of the past five years is that users are stupid and that data needs to be spoon-fed to them via pretty pictures…. It's time to strike a new balance: to join 'big data' to business data in such a way that it serves the business - and doesn't just grow a big data repository."

Not everything is an actionable insight. It's trendy to describe dashboards or statistic as insights. Indeed, some of them are. Yet boil-the-ocean projects typically get in the way of achieving a specific purpose. Bertolucci reminds us that "Just saying 'insight' and 'innovation' is a wonderful thing, but first and foremost you need to focus". Tyler Vigen's Spurious Correlations project illustrates how pointless analytics can be (e.g., association between drowning and Nicholas Cage).

It's a mistake to describe analytics adoption as a battle between two mythical beasts: Data Driven and Human Intuition.

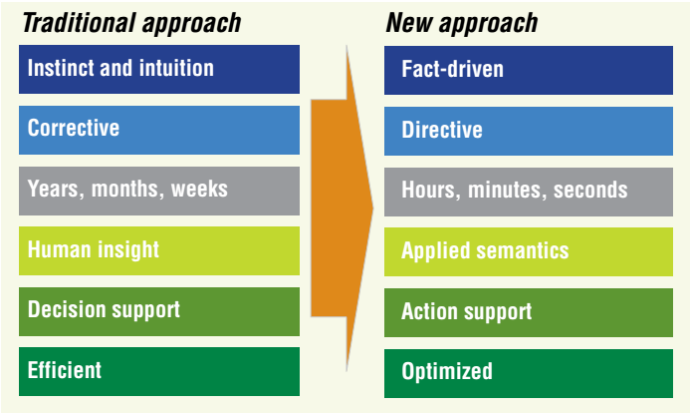
What insights would really benefit decision makers? Hard evidence showing which actions can influence results. Plain-English explanations of useful decision methods. Prediction of what's will happen if they choose door number one, two, or three.

Tech issue #2. False dichotomy: Data-driven vs. human intuition.

Members of the tech community sound inexperienced when suggesting that, until now, people's decisions were based solely on intuition. As if they're rescuing us from the information dark ages and ushering in a time of data-driven enlightenment.

Smart decision-making is more complicated than becoming 'data-driven', whatever that means exactly. Consider the challenge of augmenting the performance of a highly skilled professional. Investor Vinod Khosla claims technology will replace 80%+ of physicians' role in the decision-making process. "Human judgment simply cannot compete against machine-learning systems that derive predictions from millions of data points" (quoted by Stephanie Lee). Perhaps so, but it's tricky to blend evidence into patient care processes: Karen Nanji describes mixed results from clinical decision support technology.

Intelligent enterprises will adopt new ways of working.

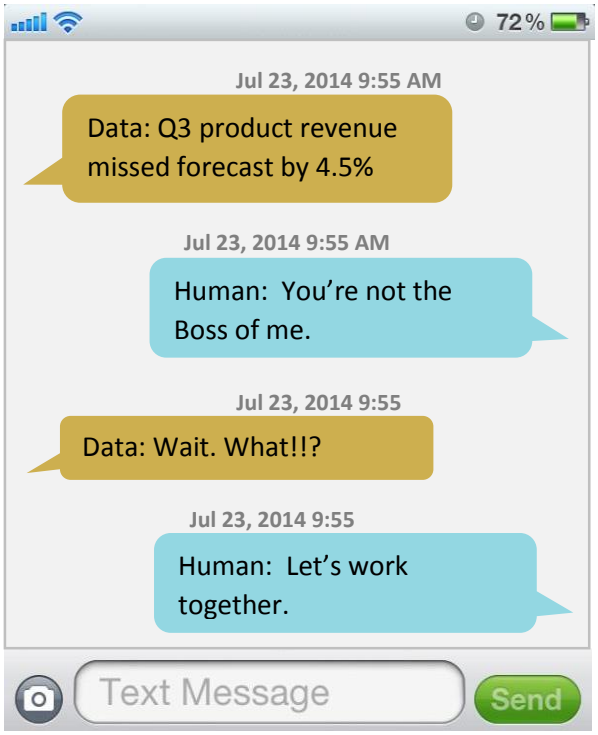


Source: Business analytics and optimization for the intelligent enterprise (IBM).

One tech enthusiast compares IBM's Watson to a hospital CEO. Ron Shinkman asks if it could "be programmed to pore over business cases, news clippings, algorithms and spreadsheets to make the same recommendations?" Actually, that's what Watson does. But Shinkman overlooks the real opportunity: To *supplement*, not *replace*, a CEO's analytical skills.

Why IT Fumbles Analytics. In an excellent *Harvard Business Review* analysis of how decision makers assimilate data, Marchand and Peppard explain that management lacks "structure. Even when an organization tries to capture their information needs, it can take only a snapshot, which in no way reflects the messiness of their jobs. At one moment a manager will need data to support a specific, bounded decision; at another he'll be looking for patterns that suggest new business opportunities or reveal problems."

You're not the boss of me. There's a right time and a wrong time to look at data. As Peter Kafka explains, Netflix executives enthusiastically use data to market TV shows, but not to create them. Others agree data can interrupt the creative process. In *The United States of Metrics*, Bruce Feiler observes that data is often presented as if it contains all the answers. But "metrics rob individuals of the sense that they can choose their own path."



However, people *could* do better. Of course decision makers frequently *should* ignore their instincts. Andrew McAfee gives examples of algorithms that outperform human experts, and explains why our intuition is uneven (we need cues and rapid feedback).

The Economist Intelligence Unit asked managers "When taking a decision, if the available data contradicted your gut feeling, what would you do?" Most preferred to crunch some more numbers. Only 10% said they would follow the action suggested. The sponsors of *Decisive action: How businesses make decisions and how they could do it better* concluded that while "many business leaders know they need to make better use of data, it's clear that they don't always know how best to do so, or which data they should select from the enormous quantity available to them. They are constrained by their ability to analyse data, rather than their access to it."

How do you challenge a decision maker? When data is available to improve a result, it must be communicated so it challenges people to apply it. One way is to provide initial recommendations, and then require anyone who takes exception to enter notes explaining their rationale. Examples: Extending offers to customers on the telephone, or prescribing medical treatments.

Tech issue #3. Value is not self-evident: Show people how to use data.

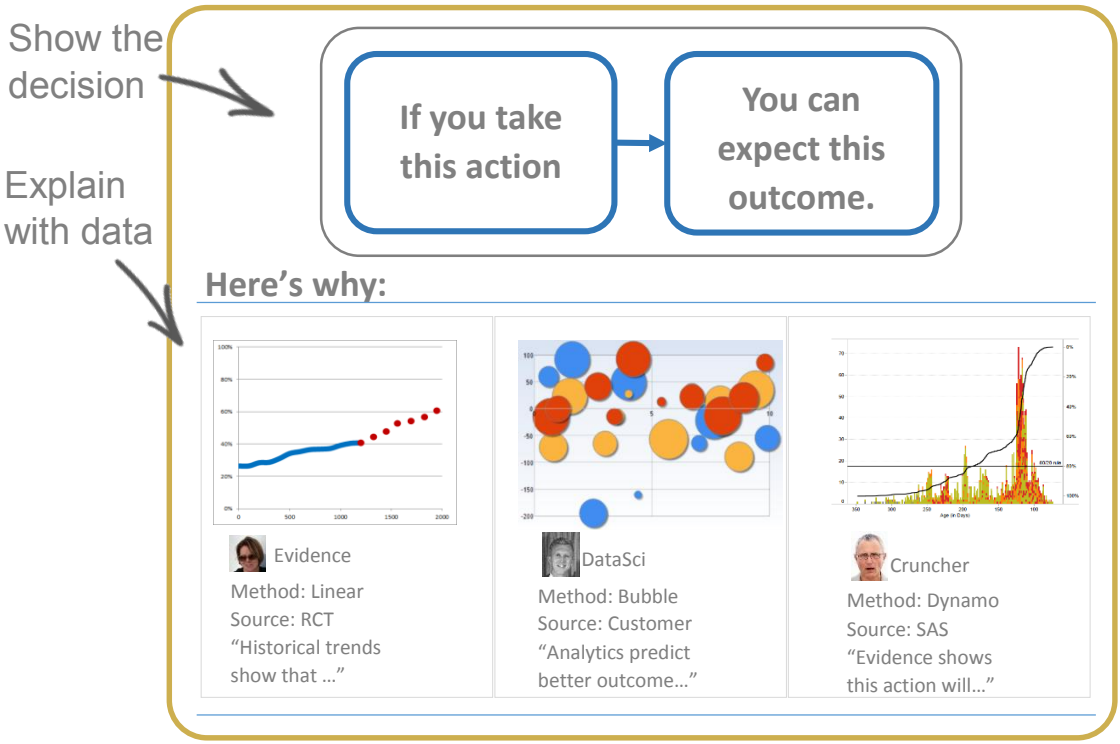
A compelling presentation to decision makers will propose and answer these questions: How are the findings connected to identified business *objectives*? What analytical *methods* were used? *Who can use* these findings, and *where are they applicable*?

Show why it matters. Accenture's extensive research has found that "most organizations measure too many things that don't matter, and don't put sufficient focus on those things that do, establishing a large set of metrics, but often lacking a causal mapping of the key drivers of their business."

SAP's chief data scientist emphasizes the importance of someone "who can translate PhD to English. Those are the hardest people to find" (as told to James Willhite in *Getting started with big data*). Kerem Tomak, who manages 35 retail analysts, has learned "A common weakness with data analytics candidates is they're happy with just getting the answer, but don't communicate it" (speaking with Shane O'Neill of *Information Week*).

Tech designed for decision makers. Shown below is one way to demonstrate the value and use of data. A specific decision is visualized, explicitly connecting an action with an outcome. This causal connection is explained with data.

Demonstrate Value: Connect Actions & Outcomes



Source: Ugly Research.

3 issues for decision makers.

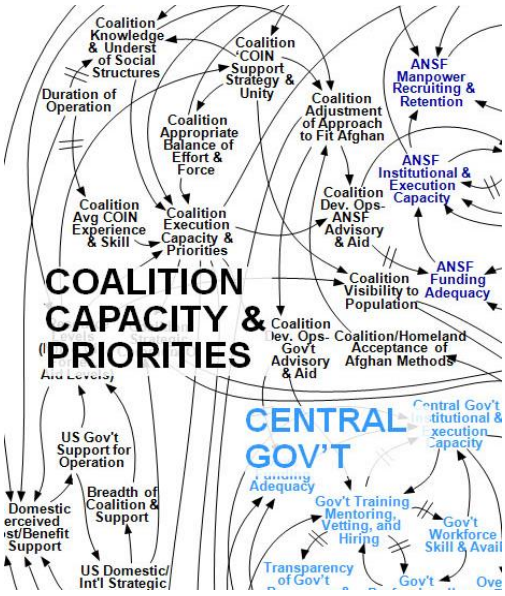
As decision makers, we've been slow to break bad habits: We don't transparently show our rationale. We don't hold people accountable for their decision processes. We don't do enough to strengthen our analytical capabilities, and rely too heavily on expert advisers.

> "There needs to be a user interface between the data and the decision maker."
>
> -Sean Gourley. CTO Quid

Decision issue #1. Visualize decisions, not data.

Decision-making would be less painful if we could more easily see what the decisions are. In *Analytics in action*, Accenture underscores the "need to industrialize the insight-action-outcome sequence". Instead of sales forecasts, we should visualize sales management, connecting specific actions and outcomes along a continuous data-to-decision process.

We Have Met the Enemy, and He Is PowerPoint



Source: New York Times.

Better than a persuasive guy with a PowerPoint. Tom Davenport provides a great example in *How P&G presents data to decision-makers*. With Tibco Spotfire, P&G developed a common language and created seven models that guide the analysis of various problem domains. These include "key variables, how they should be displayed visually, and (in some cases) the relationships between the variables and forecasts."

Ferraris vs. geopolitics. Of course many problems can't be easily diagrammed. Wladawsky-Berger reminds us of the difference between figuring out a Ferrari (predictable) and geopolitics (not so much). Applying "big data and data science to help with strategic decisions is in its early stages."

Snowden and Boone explain that "*Simple* and *complicated* contexts assume an ordered universe, where cause-and-effect relationships are perceptible, and right answers can be determined based on the facts. *Complex* and *chaotic* contexts are unordered – there is no immediate relationship between cause and effect, and the way forward is determined based on emerging patterns."

A repeatable, visual decision process requires transparency.

Be brave. Transparency requires a culture shift. Barriers include people's nervousness about scrutiny of their methods, the difficulty of capturing complex analysis, and concerns about proprietary knowledge.

The National Pharmaceutical Council led a recent effort to shed light on how health insurers make formulary decisions. As explained by Dean et al., investigators found it next to impossible to systematically capture a complex decision rationale.

> "Companies fail to embed analytical insights in key decision processes so that analytics capabilities are linked to business outcomes."
>
> -Accenture, *Analytics in Action*

Close the loop. Disconnected processes pose another challenge, even when individual steps are well executed. Example: In private conversations with analysts at a multi-billion dollar energy producer, it's clear they use sophisticated methods for valuing potential investments. However, they are frustrated that once an annual list of candidates is developed, there's no consistent portfolio analysis for making company-wide decisions, and instead too much reliance on the persuasive guy with a PowerPoint.

Decision issue #2. Shift from a data culture to a decision culture.

Shift focus from data to decisions. James Taylor of Decision Management Solutions suggests beginning with the decision in mind, "identifying the decisions that matter to your organization, the decisions that make the difference between hitting your targets and missing them, the decisions that 'move the dial….' It means beginning with a model of decision-making and only then moving on to identify the analytics and data, big or little, that will be required."

Process is king. In a decision culture, people are expected to collaborate on repeatable processes, applying the right analytical method to each decision. A bad result doesn't necessarily reflect a bad process – or a bad decision maker. In *Are analytics shifting power from executives to employees?*, Gary Cokins describes how decisions are being redistributed within the organization: More people have more data, and are involved in more decisions. So there has to be a process.

Innovating for decision makers. How is technology helping people? Data scientists are setting up labs where business managers can sharpen analytical skills. Computerized Provider Order Entry systems embed logic and medical evidence to improve healthcare decisions. Predictive analytics tools make it easier to explore possible outcomes. And prescriptive analytics technology recommends actions (such as replacing manufacturing equipment), tracking and reporting actual outcomes to close the loop.

Decision issue #3. Unleash the power.

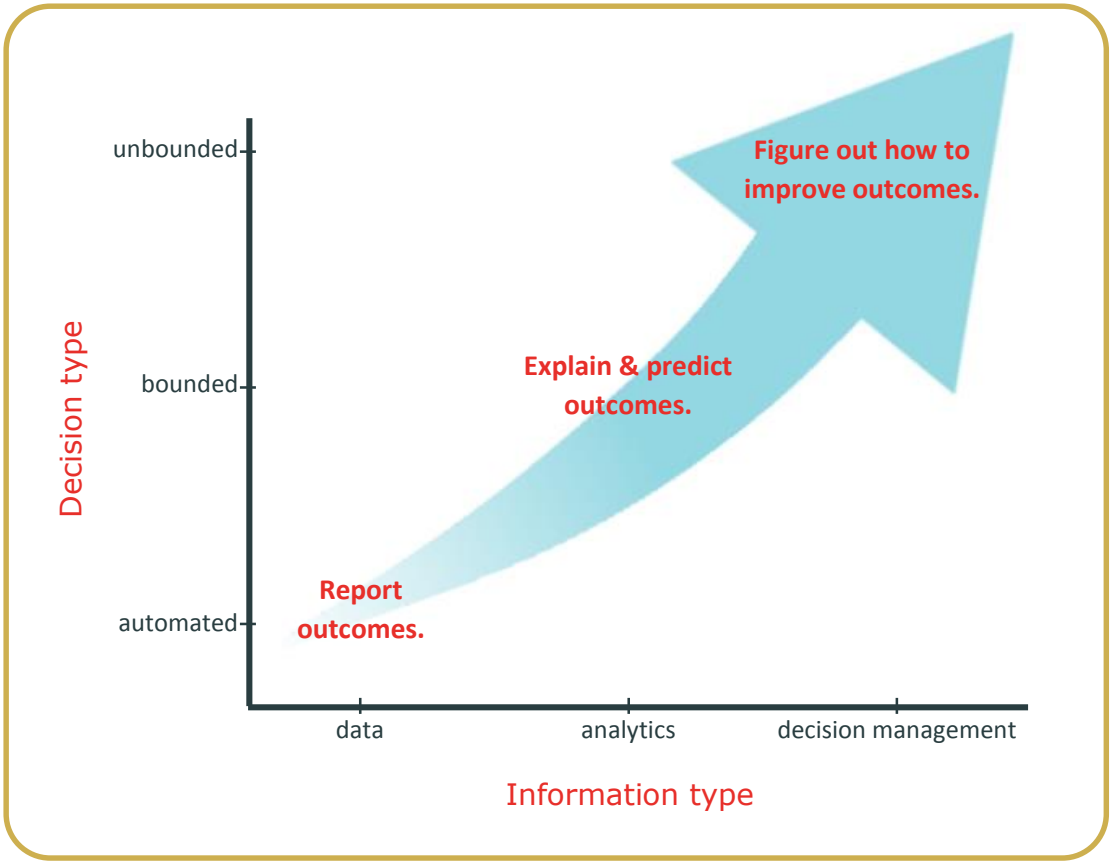
Data's explanatory and predictive power can help us make better decisions. But explanations and predictions aren't being managed rigorously as part of the data-to-decision process.

Explaining is tricky. To *explain* is to describe facts and their consequences, linking action with outcome. All this gets deeply philosophical - see Cornwell's work on scientific explanation.

Decision makers need practical explanations that are structured pieces of a data-to-decision process, not one-off visualizations.

David Stodder of TDWI finds that only 45% of applications for visual analysis include 'embedded explanations' – but these are typically for bounded decisions. We're doing too much reporting, and not enough explaining, as shown below. We need to solve the problem of embedding explanations of big, unbounded, managerial decisions.

What's Next? Structuring Explanations and Predictions



Source: Ugly Research.

Prediction: Bright future ahead. To *predict* is to claim a certain outcome will be the consequence of a certain action. Predictive analytics make evidence more tangible, giving decision makers a practical way to explore possible outcomes and achieve a comfort level with the actions they consider.

To fully benefit from data's predictive power, make prediction part of a systematic data-to-decision process. Decision makers should expect to see explanations integrated with predictions.

Shmueli has explored the distinction between explaining and predicting. They're closely related, but in research circles, explanation gets most of the attention. Prediction is often considered unscientific, and treated like a second class citizen. That needs to change.

> If you don't turn data "into a usable prediction, it's hard to consume it."
>
> -James Taylor, CEO Decision Management Solutions

The Last Word

Fixing the data-to-decision process will require us to shift our thinking, collaborate on user interface design, and break bad habits. To be recognized as peers and business partners, analysts need to connect actions with outcomes, and help manage the decision process. To get more value from data, decision makers need to strengthen analytical skills and transparently explain their rationale.

Fancy charts are not enough. The entire data-to-decision process needs to be computable: From initial data, to analysis, to action, to outcome. The trick is creating something that's straightforward, but capable of representing complex decisions.

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About Ugly Research.

Ugly Research is a tech company based in Oakland, California. We are changing how decision makers get their data. Our current project is PepperSlice. Join us at PepperSlice.com, or email us at ur@uglyresearch.com.

Tracy Allison Altman, PhD is the founder of Ugly Research. Dissatisfied with how data was being delivered, she created something specifically for decision makers, and it has morphed into PepperSlice. Tracy is on Twitter @UglyResearch.