Beyond the Hype:

How to Get Real Value from AI in Analytics

Qlik® LEAD WITH DATA™

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The dawn of 3rd-generation business intelligence

Since its inception in the 1990's, business intelligence has evolved – significantly. What began as a highly technical process restricted to a few specialists in IT has become a much more accessible and intuitive endeavor, extending the power of discovery to users in every area of the business. But the promise of fully democratized data analytics remains to be fulfilled.

1ST-GENERATION ANALYTICS:
CENTRALIZED

2ND-GENERATION ANALYTICS:
DECENTRALIZED

3RD-GENERATION ANALYTICS:
DEMOCRATIZED

In the early days, a skilled team within IT managed a complex set of technologies that delivered pre-defined reports and ad-hoc responses to business requests for data. A user would formulate a question, submit it to a data analyst, and wait (sometimes for weeks) for a response, usually in the form of a new report.

With the advent of user-driven analytics, business users were given the power to prepare data, load it, and interact with it in intuitive, visual ways. We're still living in this era today. And while the benefits are clear, many lightweight visualization tools present challenges around governance and scalability, and their complexity limits adoption to power users.

Now we're on the cusp of the third generation of analytics. It's still the early days, but we're already seeing a shift toward creating a fully democratized framework where users of all skill levels can work with data to generate insight, collaborate, and take action to drive organizational transformation.

What's driving 3rd-generation business intelligence?

The emergence of 3rd-generation business intelligence would not be possible without a series of technical developments that have changed the data and analytics landscape:
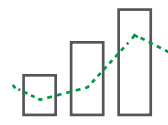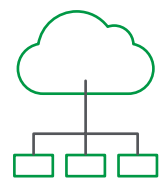
DATA

In recent years, we've seen a massive transformation in the volume, variety, and velocity of data available, both on-premises and increasingly in cloud environments. This requires organizations to have a comprehensive data integration and management strategy.
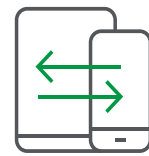
MOBILE, IOT, AND EMBEDDED ANALYTICS

The explosion of mobile and IoT devices has led to a tremendous uptick in the amount of data being generated at the edge of the enterprise. Naturally, organizations want to analyze that data – including at the edge. As a result, embedded analytics are becoming increasingly important.

INFRASTRUCTURE + CLOUD

Data is now spread across on-premise and multiple cloud sites, where organizations need to access it, manage it, and analyze it. At the same time, cloud infrastructure has greatly accelerated our ability to scale, and technologies like Kubernetes and Docker are providing the compute power needed to manage and analyze vast quantities of data.

ARTIFICIAL INTELLIGENCE

And finally, one of the most important capabilities unlocking the third generation of analytics is the development of Artificial Intelligence. In the context of analytics, AI leverages machine intelligence and learning to provide insights, automation, and new ways to interact with data, helping drive data literacy across the organization.

CAUTION: BIG CLOUD

While the cloud has generally been a positive development for innovation – especially in computer power, which is critical for AI – many of today's cloud vendors have a vested interest in capturing as much of their customers' data as possible.

Where AI hype outpaces reality

Increasingly, Artificial Intelligence is showing up in the products we use and the activities we engage in, from our workplace apps to our consumer experiences. In the coming years, AI will only become more prevalent. IDC predicts that worldwide spending on AI will reach $77.6 billion in 2022, more than double the $35.8 billion forecast for 2019.[1]

Venture capitalists are beyond eager to fund AI. They staked 1028 AI-related startups [in 2018], up from 291 in 2013, says researcher PitchBook.

"ARTIFICIAL INTELLIGENCE: SEPARATING THE HYPE FROM REALITY," *FORTUNE*, 1/22/19

Hopes are high. Promises are extravagant. And the potential, of course, is huge. But the reality on the ground today is considerably less grand. As a result, disappointment is common.

It doesn't have to be – at least, not in the realm of business intelligence. In the last couple of years, remarkable advances have been made, and they're available right now in existing solutions. You just have to understand a few basic principles and make some informed choices.

[1] IDC, Worldwide Semiannual Cognitive Artificial Intelligence Systems Spending Guide

HYPE VERSUS REALITY

40%
of "AI" startups have no AI.

MMC VENTURES, "THE STATE OF AI 2019: DIVERGENCE"

The beauty of Augmented Intelligence

What's the key to successful AI in analytics – today? Augmented Intelligence – an approach that brings together the best of machine intelligence and human intuition to speed time-to-insight, surface new and unexpected discoveries, and drive data literacy for users in any role and at any skill level.

While there are niche applications for Artificial Intelligence that completely rely on machine automation, most complex business problems require human interaction and perspective. Augmented Intelligence creates a multiplier effect, where the human-machine collaboration outpaces anything either the human or the machine could do on its own.

And that's not the only benefit. When people are involved in the analytical process, they tend to have confidence in the results – whereas any conclusion that comes fully formed from a black box will naturally raise doubts. Augmented Intelligence breeds trust, resulting in more buy-in and ultimately more adoption of analytics and the insights it provides.
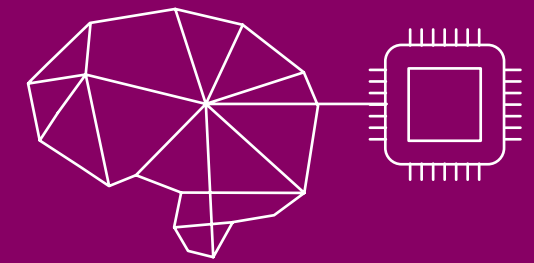
"When it comes to BI, you need both man and machine. That's where you get the best decisions. Machines, especially when AI is injected into BI products, can help people generate the initial insights. But then humans, using their experience and intuition, can validate those insights and interrogate them."

WAYNE ECKERSON, FOUNDER AND PRINCIPAL CONSULTANT, ECKERSON GROUP

## What does Augmented Intelligence look like? Existing capabilities include:
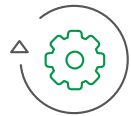
AUTOMATING TASKS

AI can speed time-to-insight by automating a wide variety of tasks for the user, including combining data sets, preparing and transforming data, and creating visualizations. For example, when a user wants to analyze a set of data, algorithms can determine the relationships within it, profile the possible dimensions and measures, and suggest the right forms of visual representation and analysis.

SUGGESTING INSIGHTS

Today's machine intelligence can use a variety of algorithmic techniques to offer visual, descriptive, and predictive insights based on input from the user and relationships in the data. Examples include the auto-generation of charts, narratives explaining key findings, and prediction of future trends.
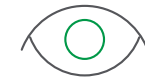
OFFERING PERIPHERAL VISION

When an analytics solution has the capacity to associate data based on a user's intent and selections, the insights suggested by machine intelligence are context-aware. As a result, users gain a type of peripheral vision; based on the questions they ask, the machine points them toward adjacent and hidden insights they'd never otherwise have seen.

SUPPORTING CONVERSATIONAL INTERACTION

AI supports powerful new ways to interact with data, such as through conversation, voice, and augmented reality. The user can ask a question in natural language, and the system will understand the intent and analyze the data to generate the right responses. It will also express those insights visually for the user to explore further, powerfully boosting the innate human ability to visually detect patterns.

Augmenting the user across the analytics cycle

You don't have to wait to reap the benefits of AI-enabled analytics. Existing technologies can enhance human intuition across the entire analytics lifecycle:

1. ACQUIRE

When connecting to a data source, the system uses smart connectivity and data-cataloging to automatically profile the data – and then leverages the metadata in the workflow for augmented data suggestions:

• Smart connectivity

• Data catalogs and reuse

• Data augmentation suggestions

2. PREPARE

Assisted by smart data profiling and automation, business users can combine, transform, and load data from multiple sources – enabling them to bring raw data to an analytics-ready state without relying on IT.

• Assistance linking sources together

• Smart data profiling

• Automated data transformation

3. VISUALIZE

AI assists users in creating visualizations by suggesting the best chart types and accelerating the process – so they don't have to write complex SQL queries or become data experts.

• Chart generation and suggestions

• Integration with 3rd party ML platforms

• Custom visualization extensions

4. EXPLORE

As users explore their data, the machine looks at their search criteria, together with the overall data set, and generates a variety of insights to explore further – including visual, associative, and narrative.

• Non-linear exploration and search

• Algorithmic and predictive insights

• Conversational analytics
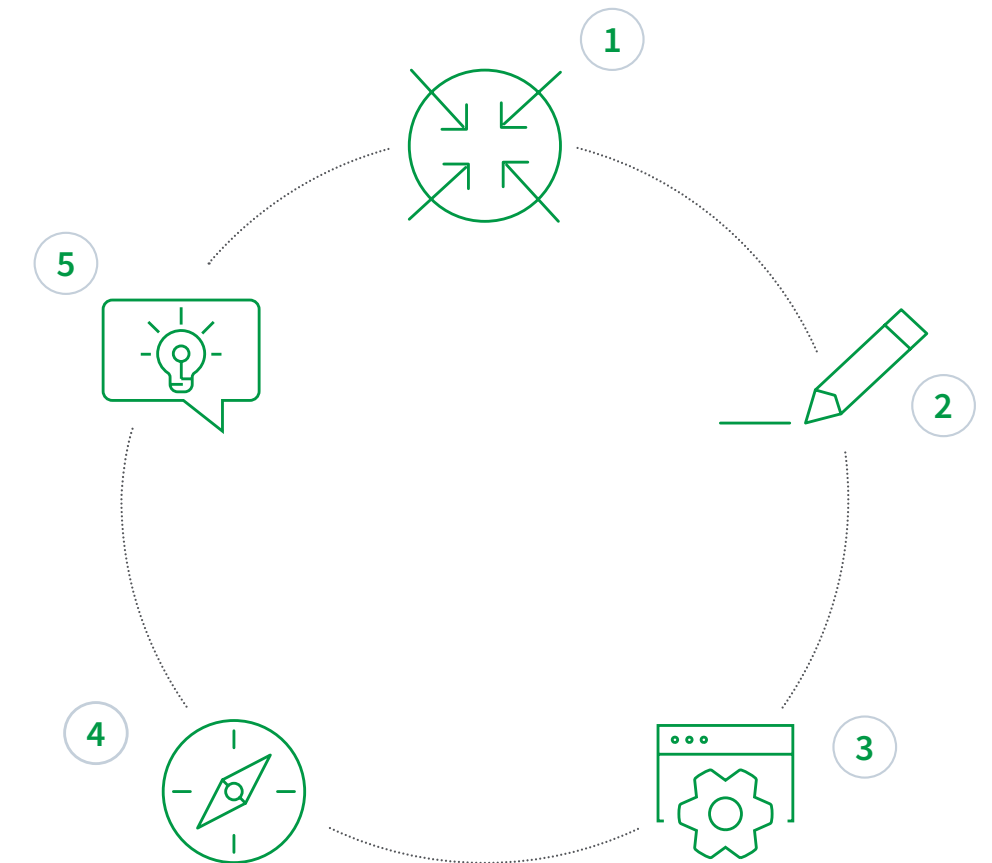
5. SHARE

At this final stage of the workflow, users gain assistance in sharing their findings, collaborating with others, and embedding insights into business applications and workflows.

• Insight management

• Embedded analytics and workflows

• Alerting and notification

Key considerations for AI in analytics

How can you select an analytics platform built to maximize the value of AI – today? When you're evaluating solutions, consider the following:

1

Does the solution have a powerful, scalable calculation engine?

If the platform simply layers AI capabilities on top of a relational database, you'll run into limitations. Instead, look for a solution that gives users the power to search and explore all the data in any direction, with no pre-aggregated data or pre-defined queries.

2

Is the solution built on an open, extensible platform?

It's not enough to tack on a few AI capabilities. You'll want the freedom to build anything you need as your business, industry, and marketplace evolve. Choose a platform that can be extended to handle new use cases, and embed insights generated by AI within operational apps and business workflows.

3

Is the solution context-aware?

The system should be able to understand user context and/or intent when accessing data and surfacing insights. If not, so-called "natural-language" interactions won't be natural – or relevant – at all.

4

Does the system use machine learning to improve over time?

As users interact with data, the machine should learn from context and intent, improving the accuracy and relevance of suggestions over time. Ideally, the system should understand the user's role, skill set, and business context and provide appropriate interactions.

5

How explainable are the insights generated by the machine?

If your only option is black-box AI, chances are good that users will become distrustful, compromising adoption and collaboration. Look for a system that provides visibility and explainability into how insights are generated and which data was used.

Caution: Relational databases are limited

As you've seen, AI is already delivering real value in today's analytics platforms. But there's an important caveat: If your solution is based on relational database and query-based technologies, any assistance from AI will be throttled. That's because the architecture is fundamentally limited.

What's a relational database?

Relational databases were designed in the 1980's, originally to drive transactional systems. And they still do that job well. But they were never intended to support the free-form, exploratory nature of modern analytics. With relational databases, developers have to make assumptions about which questions users will ask and "hard-wire" them into the system. When users are "inside" their data, they can navigate only within the slice of data pre-selected by the developer.

When these solutions try to leverage AI to generate insights, they hit limits – because they still don't have a complete picture of the data.
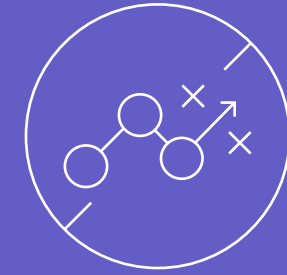
LIMITED DATA? LIMITED LEARNING.

Without **access to the complete enterprise data schema, starting with all known associations across the data values, and associative indexing**, machine learning capabilities are hobbled. It's like giving someone just a few chapters of a novel and asking them to determine the underlying themes.

Where relational models throttle AI

The limitations of relational databases become amplified when analytics technologies start to leverage AI, particularly in these areas:

- **Learning from data**. Any successful AI system learns from data. To do that, the AI needs to be able to associate any data point with any other data point in the entire enterprise schema. But analytics solutions built on relational databases limit the AI to accessing narrow slices of data – and a machine can't learn from what it can't see.

- **Mimicking human interactions.** In a relational database-based system, any natural-language interaction will be severely limited in the insights it can generate by the pre-selected relationships among the tables. The so-called "discussion" won't have any of the context that a user would experience in a conversation with an actual human.

- **Correcting human bias.** Humans frequently make mistakes in reasoning because we're holding onto existing preferences and beliefs, even in the face of contrary information. We look to data analytics to counter this weakness. But analytics solutions based on relational databases hinge on data relationships that human developers have selected before analysis begins. And they tend to confirm – not counter – cognitive bias, because they limit users to looking at a single line of questioning instead of allowing them to pivot when a new thought arises.

Augmented Intelligence with Qlik®

Our goal at Qlik is to make people smarter using machine intelligence – without restricting them to predefined questions selected by developers or analytical frameworks dictated by machines.

To that end, we've taken Qlik Sense® to the next level with the introduction of the Qlik Cognitive Engine, which works in combination with our Associative Engine to offer context-aware suggestions and automation aligned with user behavior and intuition.

Because our Associative Engine is aware of selection state at each step in a user's exploratory process, and because it knows all the data that both associated with and unrelated to that context, our machine-driven analysis and insight suggestions are powerfully context-aware – and, accordingly, powerfully relevant.

THE ASSOCIATIVE DIFFERENCE®

Our unique Associative Engine brings together unlimited combinations of data — both big and small — without leaving any data behind. It offers users unprecedented freedom of exploration through interactive selection and search, instantly recalculating all analytics and revealing associations in the data. And by keeping all visualizations in context and retaining both associated and unrelated values in the analysis, the engine helps users discover hidden insights that query-based tools miss.
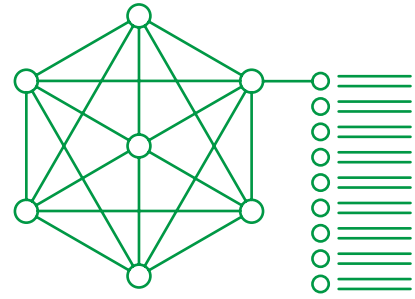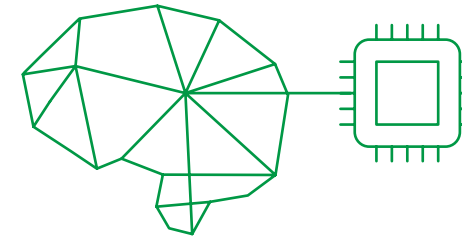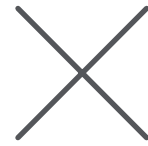
Associative Indexing × Augmented Intelligence = AI^2

By suggesting new ways to look at data based on user behavior, algorithmic techniques, and associations in the data, Qlik Sense gives users "peripheral vision" that guides them to hidden insights and helps them see the previously unseen.

This would not be possible without access to the complete set of enterprise data, the ability to index and understand all the associations within it, and a vehicle for users to explore and interact through visual or conversational interfaces.

Our Cognitive Engine drives a range of AI capabilities, including visual and associative insight suggestions, natural language interaction, recommendations for combining data sources, smart data preparation, and assistance with chart creation.

Where to go next with Augmented Intelligence

Instead of being frustrated by overinflated hype or waiting until your organization reaches "analytics maturity" to take advantage of AI, you can leverage machine intelligence capabilities today – to help users discover hidden insights faster, automate analytics creation, and offer conversational interactions – all of which will greatly boost adoption and data literacy throughout your organization.

At Qlik, we plan to continue building a range of new AI capabilities into Qlik Sense®, all driven by our Cognitive Engine. And our open APIs enable developers to build their own smart capabilities and embed analytics in operational applications on top of our engine. Our partner ecosystem has already created a variety of smart analytics in areas like natural-language generation, advanced and predictive modeling, and immersive analytics.

With the Qlik Associative and Cognitive Engines working together on an open, multi-cloud platform with limitless possibilities, Qlik Sense® is positioned to deliver the best of AI and 3rd-generation analytics now and into the future.

Interested in a complete checklist of considerations for AI? You'll find one on the following pages.

What to consider when you're evaluating AI in analytics

Use this checklist to make sure you get the most possible value from AI:

1 **Does the solution have a powerful, scalable calculation engine?**

✓ Do analysts have to create all calculations ahead of time – or can the solution break out data and perform calculations on the fly, as users explore their data?

✓ Can users define two subsets of data and compare them against each other?

✓ Can users posit what-if scenarios and evaluate results? Can the machine predict the outcomes?

✓ Can users quickly assemble unique combinations of data from a wide variety of sources, both big and small, while remaining within a governed framework?

✓ Does the solution respond at the speed of thought, even when challenged by a large number of users and massive volumes of data?

## 2   Is the solution built on an open, extensible platform?

✅ Does the solution offer a full set of open APIs and platform capabilities, allowing developers to build new capabilities and extensions?

✅ Does the solution give you the ability to embed analytics in your applications, allowing users to immediately take action based on insight?

✅ Does the solution have an active partner ecosystem with existing extensions for AI-powered capabilities?

✅ Can you easily integrate analytics within existing workflows and systems?

✅ Can you easily integrate – and maximize the value of – specialized data science tools to build models?

✅ Does the solution enable your developers to build new types of analysis for new use cases, including Augmented Reality, voice integration, and computer vision?

COMPUTER VISION MEETS DATA ANALYTICS

One example of an emerging AI capability: a drone that can fly over an environment, recognize an emergency, and pull live data to help humans make on-the-spot decisions. For example, in a highway collision, a drone could recognize that one of the damaged vehicles has a gas leak – and provide that information (as well as current traffic patterns and most-efficient-route data) to first responders.
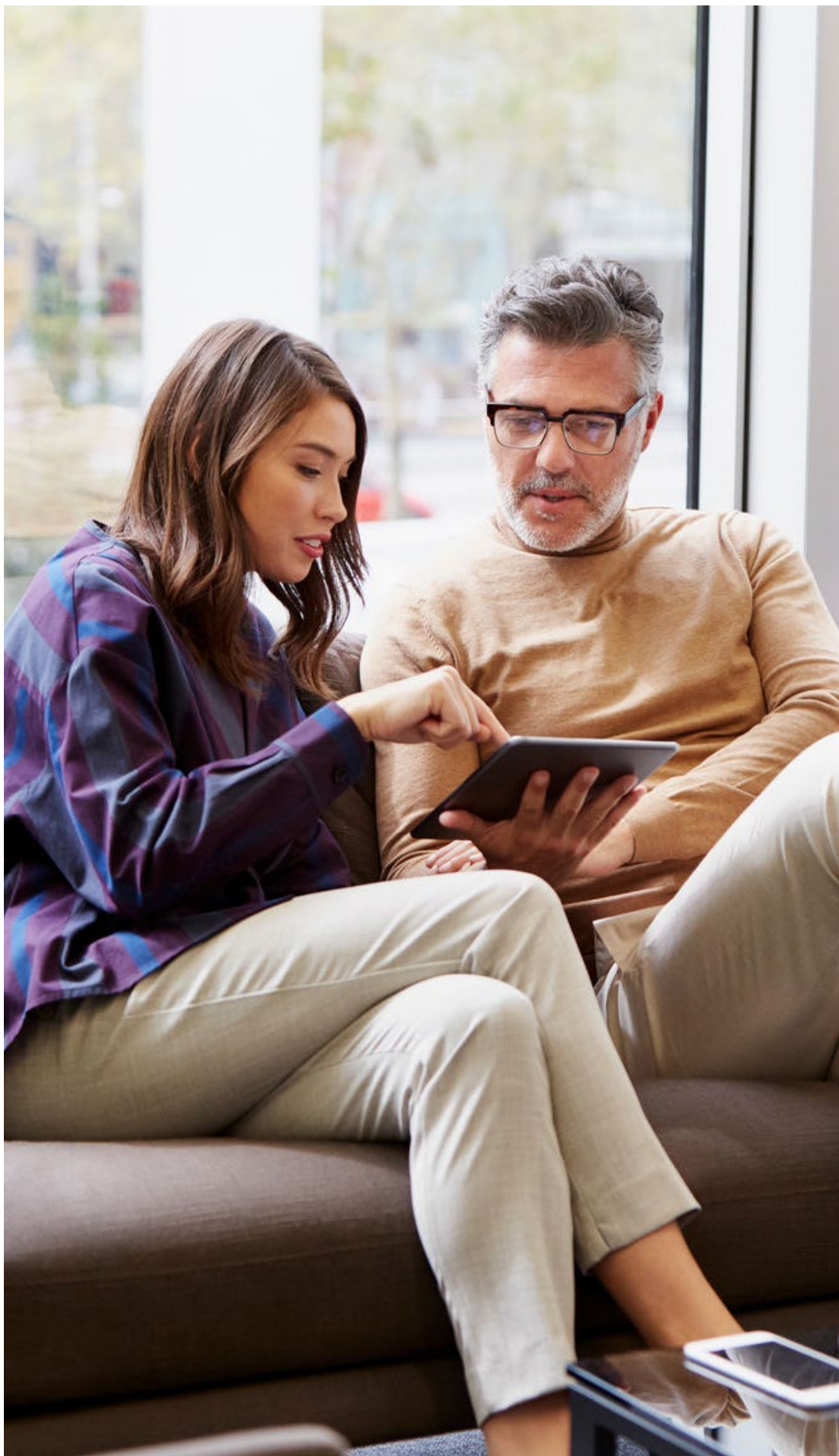
3   **Is the solution context-aware?**

✓ Does the system have the capacity to understand the user context and/or intent when accessing and associating data?

✓ Can the system maintain a global context across all analytics and interaction paradigms?

4   **Does the system use machine learning to improve over time?**

✓ As users interact with the data, does the machine learn from the context and intent, improving the accuracy and relevance of suggestions over time?

✓ Can the machine use algorithms to identify influencers, outliers, trends, and correlations?

✓ Can the machine learn from a number of different sources, including user interaction and feedback, data, and other analytics artifacts?

NO NEW ALGORITHMS

Today's AI doesn't involve the invention of new algorithms; nearly all algorithms are widely and openly known. Instead, the convergence of several new technologies (cloud-computing power chief among them) has made something else possible: the combination of algorithms. And that combination much more closely approximates what the human brain can do. For example, in the past, trend analysis alone was a big lift, whereas today, computers can run a trend analysis and a correlation analysis at the same time.

5   **Does the solution provide visibility into how calculations are made?**

✓   Does the solution offer only black-box AI – or can users see how calculations are made?

✓   Does the solution engage the user in the exploration, discovery, and analysis process?

✓   Does the solution build – or reduce – trust in users?

6   **Can the solution meet users where they are?**

✓   Can the solution understand the user's skill set based on behavior and offer appropriate interactions?

✓   Can the solution understand the business context and offer appropriate interactions, including known questions, investigate questions, and predictions of future outcomes?

✓   Can the solution distinguish among user types – from CEO to analyst to salesperson – and provide appropriate interactions?

Ready to learn more about Qlik's approach? Check out our website to see demos, read analyst reports, and watch on-demand webinars.

START EXPLORING

ABOUT QLIK

Qlik's vision is a data-literate world, one where everyone can use data to improve decision-making and solve their most challenging problems. Only Qlik offers end-to-end, real-time data integration and analytics solutions that help organizations access and transform all their data into value. Qlik helps companies lead with data to see more deeply into customer behavior, reinvent business processes, discover new revenue streams, and balance risk and reward. Qlik does business in more than 100 countries and serves over 50,000 customers around the world.

Qlik Q LEAD WITH DATA™