Building the Sentient Enterprise
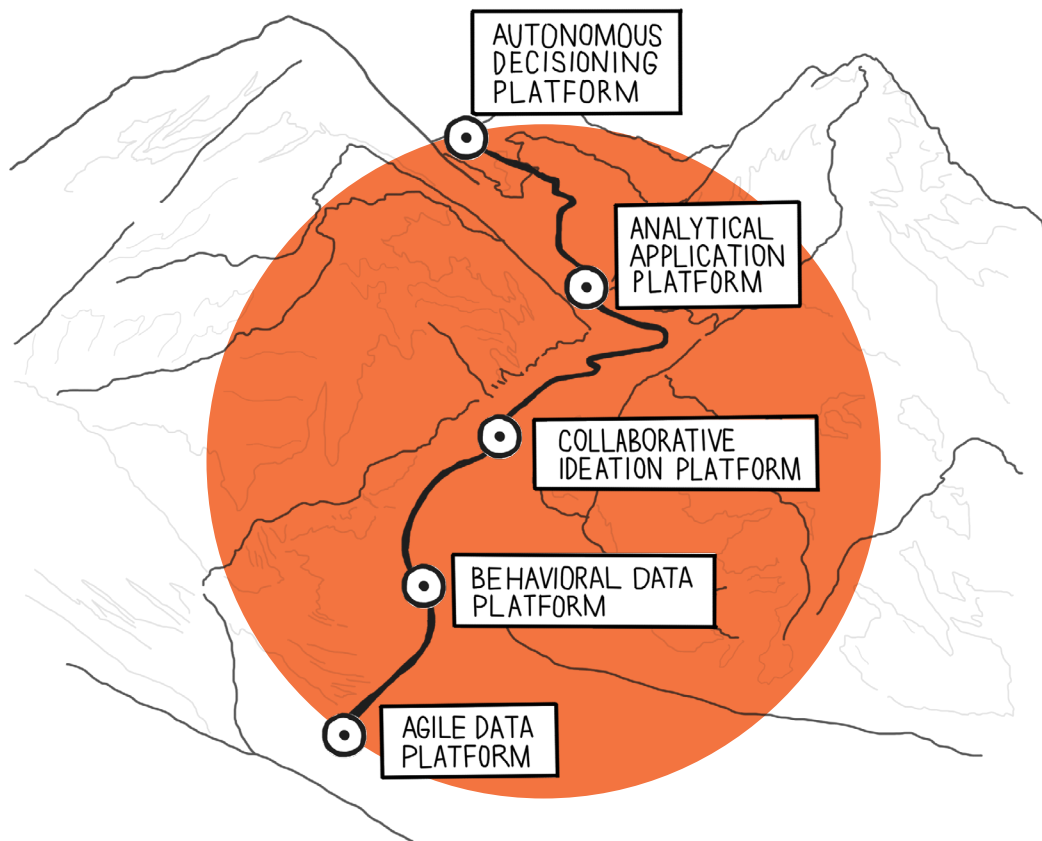
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A Brief Guide on Analytic Innovation
for the Future

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Introduction

This is a guide for executives and technology leaders to understand and utilize an analytics capability maturity model known as The Sentient Enterprise. Rather than a single prescription or methodology, The Sentient Enterprise charts an overall journey—a transformation of people, processes, and technologies—that large organizations can follow to mature their analytics capabilities for survival amid disruption and competitive advantage in today's hyper-agile, data-driven world.

A Sentient Enterprise can sense micro-trends, and quickly anticipate and adapt to market conditions.

Teradata President and CEO Oliver Ratzesberger and Northwestern University Kellogg School of Management Professor Mohan Sawhney developed The Sentient Enterprise model jointly. Together, they first conceived The Sentient Enterprise as a back-of-the-napkin concept over a long dinner meeting in 2013. They sketched out how their complementary perspectives— Oliver's as a longtime analytics practitioner, and Mohan's as an academic research and management consultant—could jointly illuminate the journey that enterprises must take to fully leverage data and analytics at scale.

A Sentient Enterprise represents an end state where an organization can manage vast amounts of information from new and existing sources—leaving algorithms and analytics to make the bulk of decisions autonomously, and human intervention for strategic and pivotal moments of change and business impact. Such an enterprise can sense micro-trends, and quickly anticipate and adapt to market conditions. To reach this end state, we've organized The Sentient Enterprise journey along five dynamic stages, or platforms of capabilities:

1. The Agile Data Platform is the technology backbone for analytics capabilities and processes, providing a balanced and decentralized framework and a foundation for agility moving forward.

2. The Behavioral Data Platform captures insights not just from transactions, but from complex interactions around the behavior of people, networks, and devices. As we build this platform, customer sentiment and behaviors get elevated to mission-critical importance for the enterprise.

3. The Collaborative Ideation Platform lets the enterprise socialize insights across the community of analytics professionals through crowd-sourced collaboration, gamification, and social connections within the organization to see which ideas, projects and people get followed, liked, shared, and tagged.

4. The Analytical Application Platform leverages the simplicity and logic of the consumer app economy to deploy analytical capabilities as internally packaged-up workflows; self-service apps that can be used by the entire business analyst community.

5. The Autonomous Decisioning Platform is where sentience is achieved, with advanced algorithms helping the enterprise make more and more tactical decisions on its own—without human intervention—so people can put more focus on strategic planning and major decisions.

We should clarify that our use of the term platform in The Sentient Enterprise model does not imply a specific hardware or software platform. Rather, it refers to a realized organizational capability made up of people, processes, and technology working together.

From the spark of insight at their first meeting, Oliver and Mohan's years-long collaboration has since led to ongoing research and development of The Sentient Enterprise model, executive workshops, identification of corporate use cases, and the writing of a full-length book—*The Sentient Enterprise: The Evolution of Business Decision Making*—released by Wiley Publishers in September 2017. While the body of work has grown, The Sentient Enterprise remains guided by a North Star pursuit—analytic agility at scale—that drives the enterprise to become proactive, self-decisioning, and even sentient.

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Laying the Groundwork for Agility

Our goal in taking The Sentient Enterprise journey is to bring the enterprise to new levels of agility by eliminating some all-too-common pain points in analytics:

- We're spending too much time sifting through data, instead of making decisions.

- We're constantly in reaction mode, putting out fires instead of charting the future.

- We can't seem to make decisions fast enough, given that our brains don't scale the way data can.

- In frustration, we sidestep governance to create our own data marts and "Wild Wild West" data anarchy that only adds to the data drift, error, and duplication.

- As a result, such difficulties erode workforce morale and efficiency.

These are significant hurdles to analytic agility. And since agility is our most important North Star aspiration, let's take a moment to define exactly what we mean by it. As it relates to data, we define agility as the ability to decompose—or break down—big problems or systems into smaller ones, so they're easier to solve and collaborate around.

> **Agility is your most important North Star aspiration.**

Our pursuit of data agility, therefore, is to decompose and standardize data itself. The more we succeed in this, the more we create an organization that is proactive and frictionless in its ability to sense micro-trends and seamlessly handle data; autonomous and scalable as it listens to large amounts of data to make more and more decisions on its own; and evolving as advanced algorithms continue to improve on themselves. The five Sentient Enterprise stages are designed to create such agility, and preserve it even as we manage more and more complex analytical tasks.

Stage 1: Agile Data Platform

For most companies, bringing The Sentient Enterprise vision to life involves a wholesale makeover in how we manage and manipulate data. It's all about getting the whole organization on a much more agile footing with data. That's what we're doing in setting up the Agile Data Platform, the first of the five stages in The Sentient Enterprise journey.

> **Key Features of the Agile Data Platform**
>
> - Layered Data Architecture and Virtual Data Marts for safe collaboration, without data drift and duplication
>
> - Emphasis on self-service provisioning for business users
>
> - Centralized access to data for decentralized use cases
>
> - Innovation focus is on prototypes vs. requirements-driven processes

Beginning with the raw, atomic data, our architecture must render information at multiple levels of complexity, and assign lanes and roles so we can overlay many different kinds of users onto the same data—the context within which these multiple users are familiar. To do this, our Agile Data Platform is founded on what we call the Layered Data Architecture.

The lowest staging layer contains atomic data that is stored in its original fidelity from source systems. This layer can be manipulated by the most technical data engineers or data scientists in your company. The higher up you go, however, the more pre-defined the structure is, and the more intelligible the analytics become to more people in your enterprise.

By the time you get to the aggregational layer, business users can comfortably access and categorize data sets by customer attribute, location, revenue, or any number of criteria that might be useful to them. Still further

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up, the presentation layer is the most structured and predefined. This is where various groups can access numbers through different interfaces, but still see the same data.

Finally, the Data Lab is the user-owned sandbox that supports experimentation and self-service. This is where we have a very unique tool for company-wide collaboration without chaos—something we call the Virtual Data Mart (VDM). The VDM replicates many of the conditions that lure colleagues to the traditional data mart (perceived agility and minimal red tape) without the pitfalls (e.g., data drift, duplication, and error). VDMs let users rapidly access production data along with their own data to quickly execute specific use cases; but, these activities do not alter the production data itself.

The Layered Data Architecture and the VDM are key pillars of the Agile Data Platform. They drive our frictionless, self-service analytics ecosystem of centralized access for decentralized use cases, and help us collaborate while controlling access and governance to data that is increasingly vast, complex, and behavioral in nature.

Stage 2: Behavioral Data Platform

The Behavioral Data Platform addresses the cultural shift toward thinking and acting in terms of patterns of behavior, not just transactions. From industrial settings and fleet logistics, to personal driving or shopping habits, behavioral data is the source of valuable insights for the business. By maturing our analytics to clarify such patterns and context, we can predict and prevent setbacks in anything from machine performance to human buying habits.

With customer-centric metrics like the Net Promoter Score now a top priority, we need to optimize customer behaviors and the data that reflect these behaviors. The Behavioral Data Platform enables this by hosting collaboration among data scientists, business analysts, and other users within the Layered Data Architecture to dig deep into the areas where transactional information can't begin to take us. For instance:

"Yes, John bought a Ford Mustang; we can see that transaction. But what about the other consumers who didn't buy? Were others on the path to buying a Mustang, but changed their mind at some point? And, if so, where was that point—and what was the reason? How can we learn to spot non-buying behavior like this in the future? When and how should we intervene to get them back on the path to purchasing?"

Answering questions like these involves surfing tremendously large data volumes and varieties of information, within which lie patterns of activity across multiple channels of data that are associated with positive or negative customer outcomes. Once we get to that point, business colleagues can help the data scientist understand the data and validate it.

Key Features of the Behavioral Data Platform

- Capacity for 10-100x data volumes necessary to handle behavioral data

- "Design for the unknown" by avoiding premature structure or context applied to data before we know how we'll use it

- Examine patterns and interactions between transactions vs. just the transactions themselves

- Encourage creativity and collaboration in pulling signal from the noise

Throughout, you can see how gathering insights from behavioral data involves a large amount of collaboration to test assumptions, plug knowledge gaps, and gut check theories. That means our Sentient Enterprise needs a platform to enable everyone in the company to work together seamlessly and at scale.

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Stage 3: Collaborative Ideation Platform

The Collaborative Ideation Platform is where crowd-sourced collaboration, gamification, and social connections are established within the enterprise to connect humans and data in new and fast ways. This platform is built on the principle that we can merchandize analytic insights across our enterprise community—the same way we merchandize products or social media trends online.

In the Collaborative Ideation Platform, we promote and recommend questions, people, and answers that an employee might be interested in based on his or her previous queries and activity. For example:

"One of your business analysts is working on a sales demographic project and types the query, "Who are all the repeat customers that are male?" The system makes auto-complete suggestions, based on what other users have asked before. Next, the system recommends other people in the company working on similar projects, just like LinkedIn and Facebook might recommend friends to you, or Amazon recommends products based on what you've previously bought or searched."

Our internal merchandizing approach for analytics is so akin to online and social media that we've adopted the term, "LinkedIn for Analytics." This intuitive way of connecting humans with data—and with each other—is a vast improvement over traditional analytic approaches.

Now is a good time to highlight how all the agile systems we've set up in stages 1-3 come with underlying instrumentation that lets us track everything that's happening, and conduct analytics on analytics. Just as it sounds, we're essentially performing analytics on our own analytics community, charting their interactions and insights to learn what data is most relevant and useful to the enterprise. This provides quality control and efficiency for our data insights. Now, we need a platform for repeatability to apply those insights efficiently across the enterprise.
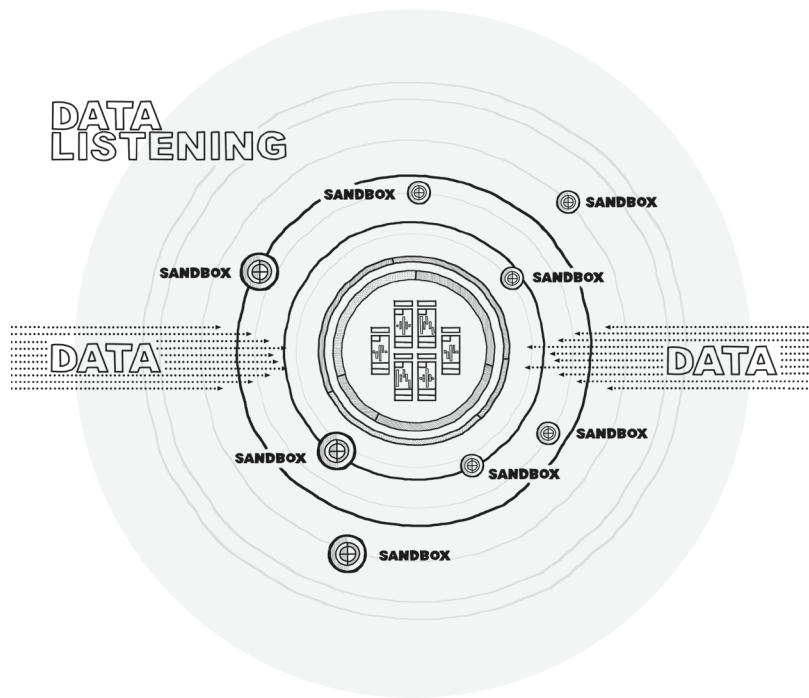
Key Features of the Collaborative Ideation Platform

- Avoid "anti-social" analytics by removing silos and sharing best practices
- Trust the wisdom of the crowd with social-media style collaboration
- Merchandize analytic insights by promoting and recommending the most promising data sets and experiments
- "Analytics on analytics" for quality control and seamless governance of collaborative insights

Stage 4: Analytical Application Platform

The Analytical Application Platform is about codifying our hard-won analytic insights into applications, or apps, for repeatability and analytic follow-through across the business user community in our organization. As with consumer apps, our stage 4 Analytical Application Platform embeds complexities, simplifies the development process, and creates data engines that "just work." Once embedded in an app created by a developer or two, these easily accessible, packaged-up analytic workflows can be used again and again by thousands of colleagues.

Using apps in this way prompts us to rethink how to direct and "listen" to data in the enterprise. In a traditional ETL process, for instance, people make an after-the-fact request for IT specialists to extract, transform, and load data. Imagine if, instead, we had a system for app developers to listen to data and its context as it arrives in real time. Fortunately, we do just that in stage 4 by developing capabilities for enterprise listening to support our Analytical Application Platform.

Enterprise listening involves building a central data listener where anyone can plug into the stream of data being collected in real time. We also make it simple for developers to access and upgrade capacity on the listener—an easy system

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for governance and access control: Based on the analytics-on-analytics we perform on provisioning and usage patterns of the apps, we know what's interesting and potentially valuable.

Using these apps, we're not deploying complex analytic workflows at scale. However, for the company to truly act as single organism—where the right hand intuitively knows what the left hand is doing—the agile business needs to build autonomous decisioning at scale.

Key Features of the Analytical Application Platform

- Avoid "reinventing the wheel" on analytic work-flows by packaging them as reusable apps

- Listen to data in real time vs. pulling and defining data after the fact

- Zero-cost deployment of apps, without added stress for IT

- "Analytics on apps" for quality control and optimization of app-driven insights

Stage 5: Autonomous Decisioning Platform

The Autonomous Decisioning Platform takes us to the threshold of organizational sentience by deploying algorithms, machine learning, and even artificial intelligence (AI) at scale to take the bulk of data sifting and decisioning off people's shoulders—saving human intervention for critical junctures.

The Autonomous Decisioning Platform is inspired by, and expands on, what's already happening in some sectors. Self-decisioning is a major area of research for high-frequency stock trading. In manufacturing, many quality control decisions are made by algorithms. Self-driving cars, which rely on complex algorithms to manage vehicle and traffic data to make decisions in real time, are taking self-decisioning to new levels of autonomy and sentience.

This is not unlike what we're creating on a company-wide level in stage 5, as we build the algorithmic capabilities to make the enterprise more autonomous. The key is to connect complex algorithmic processes across the business to communicate with each other, and help the company act more like a proactive organism.

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Throughout, a crucial component in stage 5 is analytics on algorithms, which sounds a lot like the "analytics on…" processes we've seen in previous stages. Only now, we're applying analytics not just to data sets or workflow applications, but to entire algorithms.

Key Features of the Autonomous Decisioning Platform

- Drive self-awareness by automating decisions and organizational functions

- Sense and respond to circumstances with fast, accurate, and intelligent algorithms

- Deploy artificial intelligence for deeper analysis and decisions around complex use cases

- "Analytics on algorithms" to refine and optimize algorithms for continuous improvement and better performance

As we learn to share and optimize self-decisioning algorithms throughout the enterprise, we get better at connecting them for a system-of-systems phenomenon that builds capacity to the point at which the organization essentially becomes self-aware—almost like a single organism that can sense conditions and be proactive with trends, forecasts, decisions, and strategies. We have reached, in other words, the end state of sentience.

Conclusion: The Litmus Test of Agility

If we've successfully made our way through all five stages of this Sentient Enterprise capability maturity model, we should have an enterprise that's capable of making more strategic decisions based on better understandings of both the breadth and depth of data at our disposal. That said, every company is different— your own particular journey through the stages will have its own peaks and valleys, its own landscape of opportunities, and challenges.

Much of this landscape will be defined by organizational culture. Choosing to go on The Sentient Enterprise journey involves a tremendous amount of change management that goes far beyond anything you could capture in an employee handbook or the typical strategic plan. You will need to put an entire culture shift into action at your company, with fiefdoms to engage or dismantle, and policies to overcome or create.

As you apply The Sentient Enterprise model to your own real-world business environment, remember the mandate we emphasized at the outset: to align people, processes, and technology in service of agility around data. Everything you do should be in service of agility— to establish it, build on it, and amplify it. You'll no doubt encounter plenty of situations and challenges in your company for which there's not a specific answer laid out in our Sentient Enterprise model. In those situations, remember that the ultimate litmus test is whether we've stayed agile as we scale the enterprise.

For more information on the Sentient Enterprise, visit **Teradata.com/SE**.

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