

SAP HANA

The Road to SAP HANA®

A Choice of Paths to Take

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Introduction: A Radically New Architecture for Information Processing

The SAP HANA® platform is **transforming data processing**. It achieves this impact through a radically new IT architecture that isolates all active workloads from reading and writing to disk, the most time-consuming task in data processing, and does so at a scale heretofore unimaginable. Now, next-generation applications can integrate high-speed transaction processing with in-depth analytics in real time, dramatically improving the effectiveness and efficiency of processes across the enterprise.

Innovations of this magnitude typically raise a number of critical questions, including the following:

- Who are the early adopters of this technology, and what have they gained?
- What if I postpone the decision until I see how other organizations have fared with it first?
- How long can I afford to stick with the tried-and-true prior-generation technology and not get left behind for good?
- Based on my answers to each of the questions above, when would it be right for my organization to embrace the change?

The goal of this paper is to give SAP customers, and those considering SAP® solutions, a framework for answering these questions. Specifically, it addresses what SAP HANA means for business processes and IT operations in general, and how different kinds of enterprises can leverage different adoption strategies to capture the most value from it.



Short cycle times, in-depth analytics, **up-to-the-minute data**: we never had these things before. Now we do.

What's the Big Deal?

To understand the transformative impact of SAP HANA on enterprise data processing, one needs to step back and see that IT systems, from the beginning, have had to serve two masters. On the one hand, they have to be the system of record. As such, they must capture transactions at market speed, process them accurately, classify them correctly, store them reliably, and retrieve them expeditiously. This effort typically goes by the name of **online transaction processing**, or OLTP, without which global commerce would come to a standstill.

At the same time, we have named these same application programs **management information systems**. As such, they are expected to inform business leaders about the past, present, and, ideally, even the future state of their businesses. They do this by analyzing the data collected in the system of record and presenting it in insightful ways. This effort typically goes by the name of analytics or business intelligence – or, more technically, **online analytical processing**, or OLAP – without which management is pretty much flying blind.

Here's the catch. The processing needs of these two tasks are so different that enterprise IT, since its very inception, has had to create two separate venues to conduct each one at scale. This was accomplished by replicating data from one or more systems of record and reorganizing it to support one or more systems of analysis – typically called data warehouses or, for departmental uses, data marts. The data management cycle required to support this relocation and restructuring effort is typically called **extract, transform, load**, or ETL, which inevitably introduces delays, errors, and compromises.

As a result of the “ETL tax,” the promise of OLAP has been only marginally realized even as OLTP has flourished in the modern era. In particular, any promise of real-time management could be fulfilled only in specialized, niche cases, like dynamic pricing of airline seats or algorithmic trading on Wall Street – until now. With the advent of SAP HANA, the game has changed.

The great breakthrough of the SAP HANA database is that it supports both OLTP and OLAP simultaneously by keeping all the data in one copy, all in memory, all the time. This means that different programs needing to look at data through different lenses can use the same data elements without delays, transcription errors, or compromises.

To be sure, OLTP likes to look at data elements in rows, while OLAP prefers to view them in columns. But because all the data is in memory, this is just a matter of changing a few indices; the data does not relocate. And because computing is now clustered in clouds – be they public, private, or hybrid – there is more than enough computing power to go around.

No-compromise OLTP **plus** no-compromise OLAP: that is the new terrain. Why does that matter? Actually, there are three pretty significant ways in which it matters:

- **No-compromise OLAP.** We've never had this before: all the data, absolutely up-to-date, accessible to business users to slice, dice, and discover as they choose, when they choose. For the first time, we are actually going to fulfill the promise to inform management decision makers in the moment of making the decision rather than after the fact.
- **Widespread use of highly detailed, deeply accurate simulations for risk management purposes.** Every industry entails risk, and all companies face situations where the consequences of failure can be catastrophic. Simulation allows decision makers to explore many options in parallel to determine their best risk-adjusted course of action. In the past, however, use of simulations has been highly curtailed for any number of reasons – lack of data, lack of processing power, or inability to meet a time window. A few high-end applications warranted making the exceptional investment; most did not. The in-memory database architecture of SAP HANA removes these constraints.
- **Continuous improvement of planning algorithms.** “We always knew that each plan would be wrong, but by the time we learned our lesson, we were already on to the next plan.” That unfortunate paradigm is no more. In the world of SAP HANA, lessons can be learned, processed, and applied in real time, which means continuous process improvement can migrate from being an academic aspiration to an operational reality.

There are many use cases that exemplify these and other breakthroughs that SAP HANA enables, and we are going to look at a number of them in this paper. The key concept to take away from this introduction is that SAP HANA removes core constraints that have prevented closed-loop management cycles at the enterprise level. It does not solve problems by magic. It solves them by high-speed iteration, short cycle times, in-depth analytics, and up-to-the-minute data. We've never had these before. Now we do.

How Disruptive Is SAP HANA?

Ironically, in terms of the technology itself, SAP HANA is actually exceptionally nondisruptive. That's because it adheres to long-established database interface standards for both OLTP and OLAP. As with any change in infrastructure, there will always be minor adjustments that need to be made. But we are a long way from the days of "parallel processing," when entire applications had to be rewritten from scratch (making "parallelize" a synonym for "paralyze"). Porting to SAP HANA is a matter of weeks or months, not years.

That said, on the business side of the house, the impact of SAP HANA is radically disruptive. Business processes have always been designed with a set of constraints in mind. When those constraints are removed, you have the opportunity to redesign processes using a different set of principles. But individuals and – even more – society resist change such that, when the bars are removed, we are sometimes reluctant to stray beyond the boundaries of the "cage."

This is why change management is such an important discipline. The more disruptive the change, the greater the opportunity – and the greater the risk. As an executive, you lead change by choosing which changes to make and when to make them – not an easy job.



CIOs have learned that there are several reliable **strategies for embracing next-generation technologies**. Which one you pick will vary depending on your industry's current state and your organization's orientation toward risk and reward.

When Will You Adopt SAP HANA, and Why?

Over the years, observers in the high-tech field have watched numerous technology adoption lifecycles unfold in surprisingly similar fashion. They follow a familiar bell curve, as illustrated in Figure 1.¹

The curve illustrates different attitudes toward adoption of a new and disruptive innovation. The two on the left are pre-disposed to embrace it, the two on the right to reject it, and the one in the middle is taking a wait-and-see approach. The gap between the visionary and pragmatist is called the chasm. It separates those who voluntarily embrace innovations from the rest of the mainstream market. "Crossing the chasm" is a critical milestone for any innovation because it signals mainstream support for a persistent presence going forward.

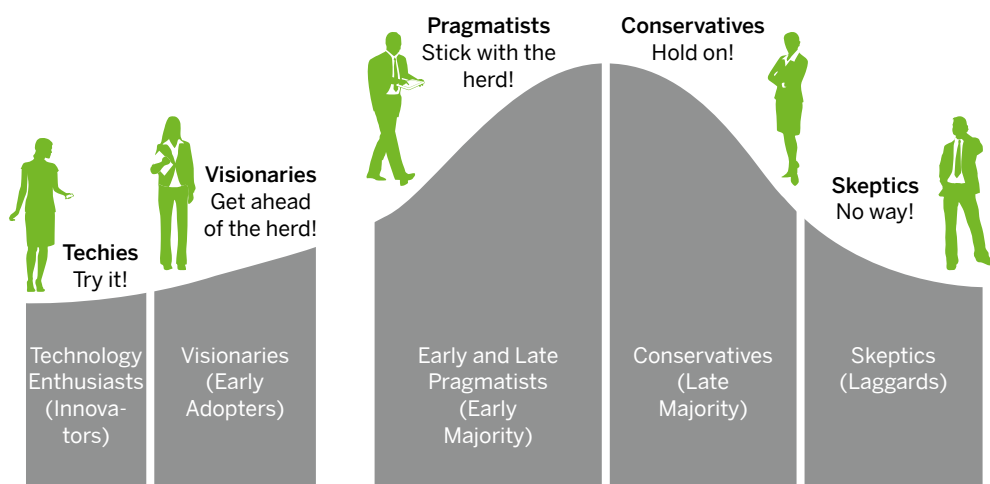
In this context, after many trials and tribulations, CIOs have learned that there are several reliable strategies for embracing next-generation technologies. Which one you pick varies, depending on your industry's current state and your organization's orientation toward risk and reward.

- **Go ahead of the herd to gain competitive advantage.** This is a voluntary **early-adopter** strategy. With this approach, the risk is in embracing an innovation that will not persist. It typically involves bold reengineering of one or more business

processes to create a dramatic gap between your enterprise's capabilities and its direct competitors. Think of what the older online retailers have accomplished with the early adoption of e-commerce or what the largest coffee retailer in the US gained by introducing free Wi-Fi in its shops before its competitors. The business model for early adoption is the **project** model, where a senior line-of-business executive in your organization sponsors the effort, and everyone is expected to support it in full.

- **Go ahead of the herd to mitigate a mission-critical risk.** This is also an early-adopter strategy, but one entered into under duress. This strategy typically involves an urgent reengineering of a business process that threatens to undermine the viability of the enterprise. Think of what pagers did for doctors on call, package tracking for express deliveries, or RFID for managing containerized cargos in military theaters. The business model for early adoption is the **solution** model, where a lead vendor orchestrates the assembly of the entire product in coordination with a process-owner sponsor who leads the reengineering at the customer end. If the solution catches on and is widely adopted in at least one niche market, the technology will persist, and the innovation is said to have crossed the chasm.

Figure 1: Technology Adoption Lifecycle



1. Figure and following content are adapted from a book by the author of this paper: Geoffrey Moore, *Crossing the Chasm: Marketing and Selling Disruptive Products to Mainstream Customers* (HarperBusiness, revised edition, August 20, 2002).

- **Go with the herd to capitalize on innovations “just in time.”**

This is a **pragmatist** strategy, which carefully balances risk and reward. It typically involves modest reengineering to achieve major productivity gains, often by streamlining or eliminating low-value-added tasks. Think of how scanners have changed retail checkouts, ATMs have changed check cashing, or GPS navigation systems have changed getting to your next appointment. The business model for pragmatist adoption is the **product** model, where there is a specialist organization to make sure the system works in support of a generalist population that simply uses it. This is the phase of adoption we call the “tornado,” when broad adoption takes place in many market segments simultaneously.

- **Postpone adoption to get more from your current investments, minimize disruption, and wait for a lower price.**

This is a **conservative** strategy focused on hard cost savings. It typically involves little to no reengineering, gains being achieved by plug-and-play replacement of less efficient mechanisms. Think of online bill paying, Web sites that take the place of printed brochures, or e-mail for mobile workers. The business model for conservative adoption is the **service** model, where an outsourced provider takes responsibility for operations and the end user simply consumes. This is what we call the “Main Street” phase of the market, where, over time, the innovation integrates with legacy systems and becomes part of a new status quo.

There is no right or wrong approach. The choice is always situational, and the same organization may adopt very different strategies depending on the technology and the times. So let’s look at each one specifically in the context of SAP HANA and when and why your organization might adopt it.

ADOPTING SAP HANA EARLY FOR COMPETITIVE ADVANTAGE

When you take the path for competitive advantage, by definition you travel alone. If others go with you, then you have not achieved the differentiation you seek to separate yourself from the pack. That is why the project model is the backbone of what we call the “early market” for disruptive technologies: you are blazing a new trail.

The key here is to radically redesign core business processes in light of the removal of old constraints. Here are three ideas to consider.

- **Use SAP HANA to act on information faster to preempt a competitive response.** The most obvious example of this concept is algorithmic trading on Wall Street. Regardless of what we think about it from a regulatory or social point of view, the technique has clearly generated enormous competitive advantage simply by enabling trades to be made faster than others – even when speed is measured in milliseconds. But this principle can be expanded beyond the financial sector to any process that is managed via an exchange or an auction. That might encompass buying digital inventory to present ads online or bidding for commodity materials in construction, transportation, or chemicals.
- **Use SAP HANA to act on information faster to capture a window of opportunity.** The idea is to engage a customer or a consumer when he or she is in the act of shopping in your store, browsing on your site, or buying something in your checkout process. Think of how sophisticated online retailers do this so effectively with a technique called “collaborative filtering” when you shop online. Here, the computer



The single best time to **adopt a disruptive technology** is when it helps break the back of a heretofore intractable problem.



With SAP Business Suite powered by SAP HANA, SAP customers can now **build intelligence directly into core transactions** to change their business processes as needed or simply invent business models not possible before.

systems scan your purchase history, compare it to that of other customers, find the best matches, figure out what other people have bought that you have not, and then suggest those items to you. Or consider leveraging SAP HANA with RFID-enabled customer loyalty cards to detect when a valued customer is in the store. They perform the same magic by informing the sales associate so that he or she can facilitate a better shopping experience.

- **Use SAP HANA to adjust marketing-program tactics dynamically to optimize total program yield.** The days of launching a marketing program on a “fire and forget” basis are long gone. Google has shown us that data-driven decision making is no longer optional; it is a fundamental requirement. And why not? The computing is free – at least as far as mega-processors like Google, Bing, Facebook, and Twitter are concerned. Now, effectively, it’s free for you too, with no delays and no overhead. Whether this involves an ad campaign, a product launch, or an end-of-life closing sale, why wouldn’t you use design in IT feeds from initial responses to more finely tune offers downstream?

The key to getting a great return from early adoption is to focus on a blockbuster effect and not to compromise on this core vector of innovation. This takes unwavering support from top management. What you are doing is visionary – meaning unprecedented and highly disruptive to the status quo, both of which will raise concerns among the pragmatists and conservatives in your ecosystem. They will argue for compromise, caution, and curtailment – all perfectly sound tactics for normal times, but ones that sound the death knell for a breakout growth initiative. If you go down this path, you need to be confident you can reach the end of it.

ADOPTING SAP HANA EARLY TO MITIGATE RISK

The single best time to adopt a disruptive technology is when it helps break the back of a heretofore intractable problem. Typically, these problems involve business processes specific to a particular industry, situations where there is not a big enough market to attract the attention of established vendors. Consider the hassles that publishers and authors go through to account for royalty payments, for instance, or the intricacies involved for risk managers in determining their institutions’ exposure to exotic financial derivatives. Likewise, procurement managers in the airline industry have to cope with volatile fuel prices.

All these problems can be addressed effectively by good algorithms applied in a timely manner to the relevant data. But all too often, trade-offs are involved, and the organization bears the consequences. With SAP HANA, these trade-off constraints are removed.

While this is not the place to go into specific applications for your particular industry, here are some cross-industry problem areas where your organization might be looking for relief:

- **Collaborative forecasting and replenishment.** When SAP HANA is applied to the sales and operations process, organizations are able to assess the impact of fluctuations in capacity positions at contract manufacturers on sales forecasts in real time, model alternative scenarios, and cut the planning cycle time. In addition, companies can find important differentiators in their ability to perform what-if scenarios on combined demand, supply, and finance data; integrated analytics; and contextual collaboration related to key planning decisions.
- **Engineering change-order evaluations.** Major systems contracts, be they in aerospace and defense, architecture and construction, or IT and telecommunications, inevitably experience engineering change orders and the midcourse corrections necessary to implement them. When these pile up, or when they are particularly far-reaching, existing IT systems cannot keep up with the simulation demands. With SAP HANA, however, there is no data to move and nothing to delay or curtail these simulation runs. As a result, enterprises can make more reliable estimates and negotiate better outcomes both for themselves and for their clients, while maintaining schedules on their work in progress.
- **New-product introductions.** There are few things in business that entail more enterprise risk than introducing new products. Failure can be nearly catastrophic. Besides considerable out-of-pocket costs down the drain, there is opportunity cost and brand damage associated with a failure. Fortunately, in today’s digital economy, numerous early-warning signals from a variety of data sources can help you fine-tune your launch in real time – provided you can process them fast enough to take action in a timely manner. Some of these signals come from your own SAP databases, but many also come from external sources. The IT challenge is to normalize the data and analyze it in near-real time. Before SAP HANA, this just wasn’t practicable. Now it is.

Whether or not these particular examples strike a chord with you, it is highly likely that you have your own problem processes that put your enterprise at more risk than anyone would like. Take some time to identify which ones most concern you and consider whether next-generation processing with SAP HANA could help give you more control.

ADOPTING SAP HANA JUST IN TIME FOR MORE EFFECTIVE OPERATIONS

“Just in time” adoption of new technology means doing it at the same time as other enterprises similar to yours. Typically, everyone knows that change is inevitable, but no one wants to make a move too early. Now, the worry converts from going too soon to being left behind, and there is rapid mass adoption across many industries at the same time.

That’s what happened with client-server applications and Web sites in the 1990s, with virtualization and IP networking in the 2000s, and with smartphones and tablets right now. Inevitably, it will happen with SAP HANA and other in-memory computing solutions. This is the herd dynamic with which we are all familiar, but it does beg a key question: where will the ROI come from to pay back this investment?

The short answer is productivity gains. Productivity comes in two varieties: effectiveness, which is the art of doing the right things, and efficiency, which is the art of doing things right. When adopting disruptive innovations, the goal in the first wave is to be more effective. Once the systems get established and people settle in, the focus can shift to becoming more efficient as well.

A great example here is SAP Business Suite software. SAP Business Suite is a family of applications – such as enterprise resource planning (ERP) and customer relationship management (CRM) – that SAP developed within the last four decades to help run business processes effectively and efficiently. SAP Business Suite is now powered by SAP HANA.

What does this mean for SAP customers? They can now build intelligence directly into their core transactions to change their business processes as needed or invent business models not possible before. The applications can also allow real-time planning, execution, reporting, and analysis on live data. And business users can now work with real-time information to do their day-to-day jobs and make better-informed decisions. That puts a lot of effectiveness improvement into one package.

Here are some fundamental areas where running your enterprise applications on SAP HANA could change the way you do business for the better:

- **Financial closing.** Global corporations, especially those with long histories of mergers and acquisitions, run multiple instances of ERP applications around the world, and, not uncommonly, from more than one vendor. This makes financial closing a nightmare because there is no effective, centralized point of control. SAP Business Suite powered by SAP HANA provides that point: a single, multidimensional database that supports both accounting and consolidation. Analyses and audits can get as granular as they need to, with formerly delay-inducing processes taking place in minutes instead of hours. Intercompany transaction reconciliations can run in parallel, leveraging automated matching algorithms that eliminate slow and error-prone manual processes.



The complexities of global business generate an **ever-escalating demand for analytics** within ever-shrinking windows of time.



- **Sales management.** The questions are never-ending: When was the last time we called on Customer X? How is Harry doing since we put him on probation? How much of the forecast for this quarter is closed? What are the odds for closing the rest of it? What are our best cross-selling combinations? How is the Europe team doing? How much pipeline do we need to meet forecast? Now you can get answers to decision makers in real time.
- **Inventory management and manufacturing resource planning.** Manufacturing automation is one of the most read-intensive and compute-intensive applications in the entire suite of enterprise applications, so organizations inevitably curtail management practices to accommodate processing constraints. For much of the time, this works well enough. But when a particular part goes on allocation, a supplier goes offline, or a customer calls to expedite a shipment, then you want to interrupt the usual cadence to address the immediate concern. This is where SAP HANA shines. Even as normal production proceeds apace, you can investigate and simulate to whatever extent needed to cope with the current crisis.

As these examples demonstrate, the complexities of global business generate an ever-escalating demand for analytics within ever-shrinking windows of time. In traditional computing architectures, this results in a set of trade-offs that have defined the limits of enterprise IT for the entire modern era. SAP HANA completely resets the bar. While it is possible to imagine a new set of boundaries imposing a new set of trade-offs, practically speaking, most enterprises simply will not encounter them. Instead, the burden will shift to management to raise its expectations for effectiveness.

ADOPTING SAP HANA LATER ON FOR MORE EFFICIENT OPERATIONS

While those of us in the high-tech sector continually advocate for early adoption of our latest technologies, the truth is that all adoption lifecycles map to a bell curve of one sort or another. Late adopters typically “inherit” technologies as they become integrated into the next generation of the systems used to run the business. Late adopters don’t “adopt” cloud computing; they just discover one day that their computing happens to take place in the cloud. E-mail is delivered to a smartphone.

Video communications via Webcam comes with a laptop, or a GPS comes with a new car. And the same will hold true for SAP HANA.

What late adopters are not likely to do is use SAP HANA to reengineer business processes for greater effectiveness. Instead, they will appreciate the fact that it makes their existing processes more efficient. For example:

- **Accounting.** Whether processing receivables more efficiently to bring down days sales outstanding or processing payables more efficiently to qualify for maximum discounts, SAP applications powered by SAP HANA let you automate manual processes. And real-time analytics lets finance organizations catch potential credit risks earlier in the cycle when there is a better chance of favorable resolution.
- **Contact centers.** A digital economy is putting ever-increasing pressure on frontline systems for customer service and support. A big part of the challenge is simply giving contact center operators “Google-like” search functionality to determine the status of the caller, the current state of their transactions with the company, and any additional context needed to respond properly to the situation at hand. These are all highly compute-intensive requirements that can make response times agonizingly slow. By speeding things up, SAP HANA not only makes the interactions happen more quickly, it also increases the confidence of both the consumer and the operator that a proper resolution is underway.
- **Procurement.** Long purchase histories and complex bills of material can burden procurement decisions with mountains of paperwork. No wonder that most decisions default to the incumbent under the current terms. But in an increasingly competitive global economy, leaving any money on the table is a big mistake. Procurement applications running on SAP HANA put analytics side by side with transaction histories to provide a 360-degree view of the relevant vendors. These applications also enable real-time monitoring of internal compliance with purchasing from preferred sources.

The above is just a sample. Every department has its set of inefficient processes that automation can help streamline. The challenge has been to get the resources and assign the time. In an SAP HANA-enabled world, the resources are already in place, and there is no additional optimization to be done. Things just work smarter, faster, and simpler.

Maturity Model

While the technology adoption lifecycle gives CIOs a **strategic** model to think through when and how their enterprise wants to adopt a disruptive innovation, the maturity model, similar to a “stairway to heaven,” provides a **tactical** model for actually managing the change (see Figure 2).

The stairway begins with “no-regrets” moves. These are low-risk, high-return applications that are relatively nondisruptive. In the case of SAP HANA, running it underneath the SAP NetWeaver® Business Warehouse application is a good example.

The next step involves taking on one of those nasty problems discussed above in terms of “early adoption under duress.” Here, you are using the disruptive nature of SAP HANA to break the back of a heretofore insoluble problem. Fraud detection in telco and finance is a good example; real-time auctions for online advertising is another.

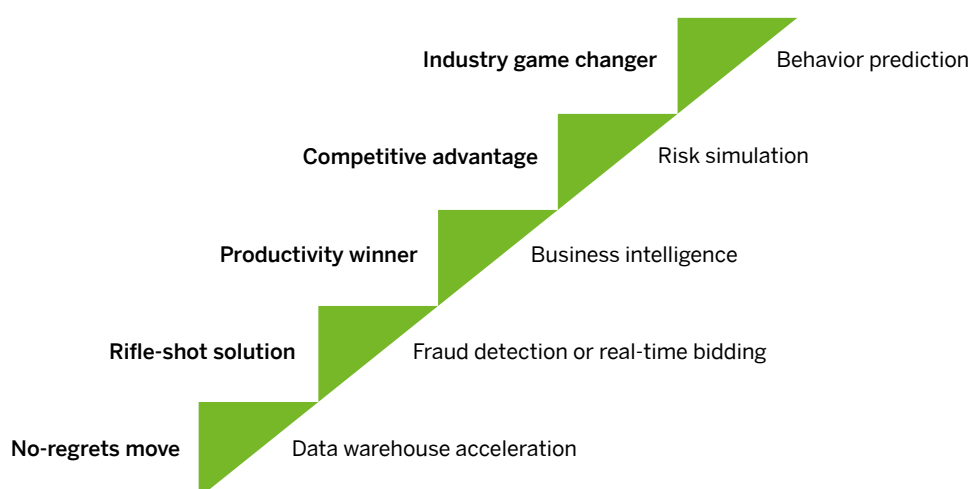
“Productivity winner” is a mainstream adoption tactic, sometimes called adopting the “killer app.” This approach is a real winner because it makes everyone look good. Running SAP HANA underneath your business intelligence tool set is just such a technique.

“Competitive advantage” is a much-overused term in high tech, to be sure, but it is certainly valid in this context. SAP HANA makes possible things that were unthinkable a few years ago. If your enterprise can be the first to act, it can get ahead of its competitive set.

At the top of the stairway is the “game changer.” This is an application that fundamentally alters the balance of power in your industry, typically leading to the fall of the old market leader and the meteoric rise of a new one. The ability to predict consumer behavior noted in the figure is simply a placeholder for whatever magical capability you could come up with.

The overall purpose of the maturity model is to help CIOs calibrate where their organization currently stands in relation to any particular adoption lifecycle and what their reasonable alternatives are for action in the short term. It can also be a great road map as you seek to engage and enlist your line-of-business colleagues in future IT investments. Finally, it makes a good guidepost for helping the IT organization itself prioritize projects and initiatives relative to one another.

Figure 2: Maturity Model As a “Stairway to Heaven”



What Next?

SAP HANA represents the centerpiece of SAP's innovation agenda for the remainder of this decade. It is the core enabling platform upon which a universe of next-generation applications will be built, some by SAP itself, some by its ecosystem of independent software vendors and systems integrators, and many by in-house enterprise IT teams around the world. In other words, this is going to be a very big bandwagon.


The question is, when is the right time for your enterprise to get on it. In this paper, we have provided a framework to help you make that decision. If it has resonated with you, your next step is to engage with your SAP team to explore the business drivers that warrant investing in SAP HANA sooner rather than later. From that vantage point, you can then explore the

enabling applications that can deliver against those drivers, seeing what is available today, what is in the pipeline, and what is greenfield space for leapfrogging your competitors. And with that perspective, you can engage with your line-of-business colleagues to assess where these opportunities fit in the overall priorities of your enterprise and build your IT plan accordingly.

Wherever your decisions may lead, rest assured that you will have our support. We are honored to have you as an SAP customer today, and we look forward to earning the right to keep you as a customer tomorrow. The actual road to Hana on the island of Maui is long and twisting. We have done our best to straighten out the track to SAP HANA, and we look forward to seeing your vehicle on it.



Business processes are always designed with a set of constraints in mind. When those constraints are removed, there is always the opportunity to **redesign the process** based on a different set of principles.



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