



**WHEN DIGITAL
TRANSFORMATION
POLARIZES
THE ORGANIZATION.**



THE FALLACIES AND FALLOUT FROM INDUSTRY “BUZZ”.

Big data. IoT. AI. ML. Analytics. Cloud, and what sometimes seems like a never-ending string of other trendy tech terms, are often cited as catalysts for digital transformation. Ask 100 people, and you will get 100 different definitions and interpretations of what digital transformation entails.

I, for one, have no intention of imposing another. But I do want to separate the truth from the buzz that is constantly fueled by hype that all-too-often comes from the research and advisory firms of this world. Legitimate technology breakthroughs—like IoT, AI, ML and others—had their origin way before the industry hype became the norm, and it’s frustrating—sometimes even tragic—to see how much damage is caused by baseless and self-serving claims that disregard the most basic concepts many of these buzz words are founded on.

Unfortunately, meaningless hype ripples through every level of society, industry and workplace where hordes of executives, information specialists, data executives, architects, engineers and businesspeople manipulate each other in an effort to be heard, followed, and listened to.

In well-established enterprises with decades of legacy IT, the reliance on industry buzzwords, followed by a blind adoption of the latest technology crazes, creates multiple divisions and problems within the organization. Core objectives completely get lost, and existing complexities, lack of cost structures, forecasting, realistic delivery cycles, and the strategic integration of systems and solutions only get worse.

The resulting lack of operational knowledge, combined with infighting and turf wars, can literally bifurcate what is meant to be a unified and highly advanced system going forward into a number of fractured processes that not only fail to achieve their goals, but also cause devastating financial damage in the organization.

THE ROOTS OF DIGITAL TRANSFORMATION.

A good way to grasp the origin of digital evolution is to read Claude Shannon’s article, [A Mathematical Theory of Communication](#). Shannon, dubbed the ‘father of modern digital communications and information theory,’ published his theory in 1948, not only introducing the concept of information theory itself, but also outlining the fundamental process whereby a digitally sent message becomes one that is received. Digital communication has certainly come a long way since then. As manual and analog devices reached their saturation point, the digital capabilities of their offspring took center stage and continued to multiply. Later, the popular interpretation of ‘Digital Transformation’ was born, fueled by a growing need for digitization throughout the entire organization, a continually evolving data society, an always “connected” world, and today’s instant-gratification culture.

As a result, the never-ending growth and reliance on data, along with accelerating processing speeds, has created a fundamental shift, away from traditional client-server-based architectures and toward event-driven streaming architectures with distributed and parallel paradigms at their core.

Despite the hype and self-interests that continue to poison the digital-transformation environment, the process itself—as well as the need for event-driven architectures—is revolutionizing the workplace.



EMPOWERING THE DATA-DRIVEN ENTERPRISE.

With the rise of Machine to Machine (M2M) communication and the Internet of Things, we are now entering into the “Industrial Revolution of Data” (Hellerstein, 2008), where most data is no longer generated by people but by devices. Web pages, social networks, media content, and more are increasingly created by devices, and at a much faster rate. This proliferation of data is also referred to as “Big Data”.

According to The Economist, the amount of digital information now grows tenfold every five years. Increasingly, it is less about the quantity or size of the data and more about what to do with it.

Commonly available data analysis tools are unable to keep up with the increase in size, diversity and rate of data change. Consequently, the ability to analyze and manage skyrocketing amounts of data is a distinct competitive advantage.

This has led to the continued growth of real-time data processing and streaming data architectures. So much, in fact, that multiple reports contend real-time streaming has become the data-processing paradigm for the modern enterprise.

Streaming data sets the bar high for the most interesting future use cases—artificial Intelligence and event-driven applications most notably—giving rise to the number of frameworks, and tools for building and running event-stream processing at scale.



Figure 1: Data Information Knowledge Wisdom (Data Pyramid) - illustrates the Data Information Knowledge Wisdom (Rowley, 2007) hierarchy, showing data at the lowest level with the smallest level over understanding. This data needs to be processed and condensed in order to be useful in decision-making and building smarter products and services.

Such rapid growth in emerging streaming-data applications requires a true understanding of how data can be used to make strategic business decisions going forward. (See Figure 1.) The real-world demands of digital transformation leave no room for decisions based on buzz rather than facts.

In addition, the rise of data streaming requires familiarity with streaming-data architectures. From the early signs of analytics and the transformation of batch ETL to streaming pipelines and streaming analytics—to running complex event-processing and event-driven logic for mission-critical applications—the adoption of data streaming is the new norm.

Unlike legacy client-server systems, this requires:

- Choosing and integrating the right tools and stream processing framework
- Ensuring specific technology frameworks can scale according to your needs without compromising functionality
- Checking the framework's interoperability and integration with the existing technology stack
- Ensuring the chosen stream processor provides the appropriate latency and throughput characteristics to fit the application scenarios.
- Also ensuring the development teams have the knowledge, resources and skills they need to build, launch and profit from an entirely new IT paradigm.

No matter how you choose to define digital transformation, it's a legitimate game-changer that requires a deep understanding of event-driven streaming data applications and architectures—not meaningless buzzwords that ultimately do all of us a disservice.



A SHIFT TO THE CLOUD OR VIOLENT STORM?

The rise of the cloud has changed the face of Big Data. It's also changed the way modern enterprises run their businesses.

These changes have been anything but easy, and they aren't anywhere near complete. In fact, whether it's through a lift-and-shift migration or a complete re-architecting, almost every modern enterprise today is managing a hybrid—usually a multi-cloud—Big Data environment.

The problem? The shift to a hybrid environment has created a severe cost crisis. When enterprise IT organizations get their first few cloud bills, many are shocked. Isn't the move to the cloud supposed to save money instead of add more costs?

A study by [Bain & Company](#) asked more than 350 IT decision-makers what aspects of their cloud deployment had been the most disappointing. The top complaint was that cost of ownership hadn't declined. It had remained the same or, in some cases, even increased.

Additional findings showed:

- Poorly planned direct-match migration to the public cloud can cost 10% to 15% more than keeping workloads on-premise, leaving many companies disappointed and frustrated.
- 84% of workloads on-premise are overprovisioned; when companies migrate a workload to the cloud, they often send excess capacity along with it.
- Companies that “rightsize” their workloads to eliminate overprovisioning can cut costs by as much as 30% to 60%.
- Rightsizing creates opportunities for vendors as well—to help their customers scale, automate and operate via public, private and hybrid cloud models.

[Gartner](#) also estimated that “through 2020, 80% of organizations will overshoot their cloud IaaS budgets due to insufficient cost-optimization approaches.” *That's four out of every five organizations!* What's more, 45% percent of organizations performing lift-and-shift to cloud IaaS without optimization were predicted to overprovision by as much as 55%, and overspend by 70% during the first 18 months of deployment alone.

IT'S TIME TO GET OUR HEADS OUT OF THE CLOUDS.

Any business, any investment, and any project needs clear objectives if the goal is to obtain and measure achieved results (or lack thereof). Meaningful results take time, and with projects anywhere near as complex as migrating legacy systems to the cloud, tangible outcomes also require blood, sweat and tears.

Unfortunately, “taking time” doesn’t align with our instant gratification culture, even though it’s patently absurd to think that any transformation of lasting significance can happen overnight.

A pre-calculated plan with a realistic timeline, a manageable budget, an eagerness to learn, whereby everyone is working beyond their comfort zone—along with a proactive approach for dealing with setbacks—are crucial ingredients for achieving your objectives and future-proofing your systems, solutions, and processes.

Regardless of the nature of your business, whether you’re a hardware manufacturer, a service provider, a retailer, in the hospitality industry, entertainment, or any other vertical, you’ll be confronted, directly or indirectly, with software, new technologies, new frameworks, new infrastructures, and cloud. All of these scenarios will share one common

denominator—and that is data. From raw to processed, from information to knowledge, from basic data sharing to what some even call “wisdom”, data knows many levels.

Where your data resides on the data pyramid (page4), combined with your business, ambition, role and aspirations, defines how much work you’ll need to do to empower the possibilities of data, as well as to future-proof your system.

STEPPING OFF-THE-SHELF AND INTO THE FUTURE.

Moving to the cloud strategically and cost-effectively requires a level of active engagement and ownership well beyond what can be achieved with an off-the-shelf solution mentality. Priorities include:

- Cost optimization to extend your business-as-usual environment
- A focus on improving the customer 360 experience
- Becoming more proactive in deflecting costs
- Accelerating your timing and market launches
- Adapting and maintaining a disruptive mindset
- Streamlining the environment to reduce ongoing CAPEX and OPEX
- Connecting and communicating with your customers via mobile apps and devices
- And more likely than not, a combination of all of the above.

WHERE THE CHALLENGES BEGIN AND THE SOLUTIONS LIE.

Because moving to the cloud (or, as the buzzword calls it, “digital transformation”) is usually a massive undertaking, it must be approached both holistically and incrementally. A holistic perspective keeps everyone focused on the long-term outcome and viability of the solution, while an incremental mindset helps to ensure you proactively address the challenges that lie ahead. Areas of concern include:

- Understanding your data
- Making your data accessible
- Integrating legacy systems with new architectures
- Setting short-, mid- and long-term milestones
- Deciding what and what not to move to the cloud
- Understanding, logging, measuring and tracking your consumption costs
- CAPEX versus OPEX balancing initiatives
- Data ownership and data governance
- Evolving from batch to event-driven paradigms
- Identifying the steps to migrate from legacy, to cloud-ready, to cloud-native deployments
- Identifying your resources, skills, and training needs
- Pursuing strategic cloud partnerships and alliances
- Protecting your long-term flexibility and desired levels of cloud agnostics
- Defining your use case scenarios and required scalability
- Selecting the proper distributed and parallel paradigms
- Forecasting your data consumption to anticipate cost patterns
- Keeping your core business and personnel on target.

The ability to modernize your applications and consolidate your platform in ways that future-proof your solution is ultimately what digital transformation is all about. As I have tried to show in the high-level list of digital-migration steps above, moving to the cloud strategically is neither easy nor routine.

But it's not only worth it, it's increasingly mandatory for business survival. Short cuts never work, but smart planning, objectivity, and the right resources can transform your business in ways that were literally unheard of a decade ago.

HOW TO CONTROL YOUR FUTURE.

Some mistakes go unnoticed with no consequences whatsoever. Some mistakes cost lives.

In the world of IT, the situation is no different. Mistakes are going to happen as a matter of course, and the vast majority of these are routine and easily correctable. On the other hand, as organizations increasingly need to rely on emerging technologies and cloud-based solutions to survive, the wrong mistake at the wrong time in the wrong environment can literally put an organization out of business.

Regardless of the different domains that come into play—and the perceived list of priorities—the following items need to be controlled at all costs. Failure to do so can literally be a game-ending mistake.

CONTROL YOUR OWN DESTINY.

Sometimes situations occur that make dependency on an outside vendor seem like the right move. In fact, as IT systems become more and more integrated, it's virtually impossible for any enterprise to function without a strong vendor ecosystem.

That said, when planning the NextGen organization, its future proof-architecture, its services, and its roadmaps, keeping your core specialties

and added value under your own control is crucial. To give them away is tantamount to putting your future in someone else's control.

Where the situation gets particularly muddled, however, is in deciding what an organization's streaming, event-driven solutions should specifically entail. This is because data for reporting, billing, intelligence analysis, cost controls, and value-added services gets intermingled and often buried within multiple vendor systems.

Part of the digital transformation process should be to become less vendor dependent, to break existing silos and implement new tools, processes, and partner ecosystems, and to stimulate the organizational DNA to drive innovation and acceleration. Consequently, to avoid vendor lock-in and reduce outside dependencies, organizations often pursue a hybrid partner strategy. The same holds true for IT systems, software solutions, and cloud infrastructures.

Yet, a hybrid strategy alone isn't enough to protect a company's proprietary offerings—or its future. Organizations must also keep focusing on their primary skills, and retaining and repositioning of resources, while accepting that software development will increasingly become part of their core business.

Future exit strategies need to stay in place, as do performance-control procedures, scalability requirements, proactive customer insights, and customer linkage. A long-term roadmap is needed on multiple levels, ranging from internal and external stakeholder needs, resources, migrations, end-of-life exercises, security requirements, architectural visions, and implementation rules.

It's imperative to address what must remain within the core control of the organization, versus what can structurally be outsourced. This entire process should be done internally and be devoid as much as possible from outside vendors—ahead of time, rather during transition periods, or even worse, as an afterthought.

LOG, MONITOR, AND CONTROL YOUR COSTS.

Give 100 colleagues access to the new world of API's, proprietary microservices, and non-documented data sets, and you might as well give them the corporate credit card.

That's why the need to log, monitor and control your costs is hardly news to anyone; however, with so many complexities involved in moving to the cloud—along with more and more proprietary consumption-driven offerings from vendors—controlling these seemingly routine processes is far more critical.

When storage, compute and bandwidth levels of consumption forecasts are either ignored or improperly estimated, what might sound like pennies on the dollar /GB/month is almost certain to lead to an ROI or OPEX disaster. In fact, it's bound to happen when unanticipated volumes are activated on an hourly basis throughout the organization.

The situation becomes even more problematic when the organization can't articulate or quantify its use case types, numbers, amounts of needed lifts and shifts, work on hybrid infrastructures, cross-departmental processes in multiple environments, or deal with a shift from traditional CAPEX to OPEX budgets.

Unless logging, monitoring, and exposing consumption-driven costs are made clearly visible at every level of the company, nasty surprises are inevitable.

CONTROL YOUR OWN DATA AND RESPECT THE DATA GOVERNANCE OF YOUR CUSTOMER.

Data control is the cornerstone of every digital transformation initiative:

- Unless data is accessible, it's game over.
- Unless data is secure, it becomes a liability.
- Unless data is manageable, it becomes unaffordable.

- Unless data is processed and understood, it's useless.
- Unless data is streaming, it's outdated.
- Unless data is geographically identified and regulatory-compliant, it's a smoking gun.
- Unless data is accessible now, it defeats its very purpose to begin with.

If even one of these listed bullets is missing, you have already shot yourself in the foot. Streamlining, transforming, and moving to your organization's NextGen solutions requires careful data-pipeline planning across every hybrid infrastructure.

Current US-based laws, like the Patriot Act and the Cloud Act, as well as the EU's privacy shield arrangements, simply cannot warrant EU data governance as it's presently instituted in the GDPR laws. As a result, Europe needs to identify and invest in its own cloud

infrastructure, transatlantic privacy, and the alignment of data-ownership laws.

Fortunately, European initiatives like GAIA-X and IDSA have recently been launched in a move to create a data-sovereignty constitution. In parallel, their aim is to develop a regulation regarding the formation of EU-owned datacenter nodes as an alternative to existing world mandates.

Data ownership and end-user data control, in addition to concepts like data purses, data-dignity mechanisms, and data lineage all need to be taken into account in the creation of new, data-driven organizations. Privacy by design is no longer an afterthought. It needs to reside at the core of every platform, stack, application, and algorithm design.

While it is certainly a monumental task, it's nevertheless possible. On the other hand, retrofitting in an attempt to fix game-over mistakes is a waste of time.



THE MOVE FROM MYTH TO REALITY.

Like a car engine designed for a specific type of vehicle, no streaming platform is capable of handling all use cases. A platform may be a platform, but like an engine, its performance, cost, maintenance, and required engineering expertise are dependent on what the platform is built for in the first place.

The same holds true for off-the-shelf event-driven platforms and proprietary PAAS. These offerings will always run multiple and diverse pipelines according to their inherent levels of performance, security, and support.

Consider some of the new economy giants, like Uber, Airbnb, Netflix, Facebook, and LinkedIn. You will find many overlapping architectures and deployed technology frameworks within these market leaders. Most of them run on hybrid infrastructures, and several are even forced to invent new distributed computing frameworks.

With hardly any exception, all these players run their own architectures, their own use-case-tweaked stacks (yes, plural), and are cloud-native and cloud-agnostic at the application level. What they all have in common, however, are two unwavering components: *data and software control*.



USE-CASE DIFFERENCES DICTATE CUSTOMIZED INTEGRATION PATHS.

Regardless of whether an architecture is Lambda or Kappa, use-case types will always drive flow patterns, data volumes and specific latency requirements throughout the stacks. All will operate under different enterprise-specific data-governance laws and key security policies which, in turn, necessitate specific integrations.

In addition to standard industry certifications, organizations will also have their own internal and external company policies. As such, buying something off-the-shelf is either impossible or will slingshot the company into a complete vendor lock-in situation.

Additionally, most enterprises don't move to the cloud in greenfield environments. Unlike new economy players with the luxury of starting from scratch, most companies are forced to deal with decades of legacy environments. Difficult choices must be made on when and where to start a strategic transformation.

This gives rise to an incremental approach with manageable and isolated steps. Attempting to slingshot the process is certain to polarize IT strategies, teams, and data streams, and will ultimately bring any form of innovation and migration to a complete standstill.

DIGITAL TRANSFORMATION MANDATES NEW MINDSETS.

New software-development challenges, new tools and changing environments will require sufficient space for your IT and R&D people to flourish. Failure to establish a solid digital transformation paradigm is likely to lead to a hodge-podge of disparate decisions and vendors. Costs will grow exponentially, and new target architectures will never be reached.

Moving decades of daisy-chained batch upon batch architectures simply cannot cope with the transformation requirements. Integration through old and new JDBC, ODBC, Change Data Capture, data lakes, data warehousing, BI tools, as well as new streaming platforms will be crucial. The same is true for different storage types.

One can only imagine how much a massively bi-directional IoT use case, where assets come and go in a 24x7 ad hoc basis, will put different strains on your stack. Compare that to a massive data ingress use case with needed analytic requirements, or a use case where batch systems need to be connected to drive platform consolidation through intense data wrangling, data transformation and normalization scripts.

Similar technology frameworks and components will be present; however, they will be encapsulated in specific

tuning and dimensions, security implementations, scalability, and latency implementations, and surrounded by integrations toward sources and sinks.

Good luck with finding a single off-the-shelf stack that does it all.

FUTURE-PROOF DOESN'T MEAN FOOL-PROOF.

In general, the term “future-proof” refers to the ability of something to continue to be of value in the distant future—the item in question doesn’t become obsolete. In modern English usage, the informal term “fool-proof”, or it’s more derogatory equivalent, “idiot-proof”, describes designs that cannot be misused, either inherently or inadvertently. The implication is that design is easy to work with even by someone without the skills to use it properly.

But in reality, this is a naïve idea at best. Douglas Adams wrote in [Mostly Harmless](#), “a common mistake that people make when trying to design something completely fool-proof is to underestimate the ingenuity of complete fools”.

Unfortunately, I’ve seen “fool-proof” mistakes happen too many times to ignore what Adams has to say. Keeping your future under your control implies, by default, that you must proactively manage and maintain all aspects of your core business before, during and after digital transformation. Relying on “fool-proof” technology or 3rd-party

proprietary solutions just doesn’t work.

Protecting your exit strategies, safeguarding data governance, and increasing your organization’s data and software literacy will always require heavy lifting on management’s part as well as the need to work through steep learning curves and what are often difficult changes along the way.

Oftentimes, such a daunting task doesn’t seem worth the investments it requires. But it is. In the mid- to long-term, keeping your value-added differentiators under your control will be fundamental for protecting your market position.

FROM POLARIZATION TO UNIFICATION.

Digital transformation goes beyond the organization’s IT, CIO, or CTO divisions. In fact, it applies across the board.

Data-driven-societies aren’t just driven by technology. They’re also characterized by patterns of relationships between individuals who share a distinct culture, including the specific cultures of companies themselves. So, whether it’s at the society level or the organizational level itself, a data-driven environment requires at least a minimum of data savviness.

The responsibility for promoting a data-driven culture falls on the shoulders of upper management. So does keeping a data-blasting shift outside of the

organization from eviscerating the company of its core competencies. Unless the end game is kept in sight from the very beginning, too many processes outsourced to too many 3rd-party vendors can lead your company—and your business—to a point of no return.

Which is why so many digital transformation projects have failed to deliver their expected outcomes. Instead, budgets are often completely out of whack. Good people leave. Companies lose their historical insights. Projects come to a grinding halt. The entire organization is divided, if not completely torn apart.

None of this needs to happen if all aspects of the digital transformation process are aligned and well-managed—both within and beyond the IT and R&D departments. To achieve the outcomes you want, the entire management team must start by understanding what the future needs to be.

The priorities are to:

- Listen to your core people
- Invest in new development and integration
- Don't rely on a on a flat percentage of OPEX/CAPEX budgets
- Apply cost-cutting where appropriate
- Select specific uses cases to test preliminary launches
- Integrate rollouts with legacy systems
- Continually expose people to the new norm
- Bundle available resources and skillsets together
- Work in short bursts of deliverables
- Demonstrate in-progress results
- Evangelize the message from the top down.

Most importantly, don't try to stuff five liters of water into a one-liter glass bottle. If you do so, the bottle has no choice but to burst.



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