Creating an industrialized hybrid cloud

Integrating systems and services for digital transformation

IBM ®

Contents

Controlling, consuming and integrating disparate services

It's hard to believe, but there was a time when your IT consumers had to order from your menu. If you didn't offer a solution, they couldn't access it. End of story. In today's environment, if you don't provide the services your consumers want, they may well resort to using services from sources beyond your control, which can result in shadow IT. These quick fix band-aids often tempt small user groups. But short-term, "rogue" solutions that fall outside the IT governance framework could potentially cause problems such as siloed data or improperly vetted providers. These are problems for which you'll be responsible.

To avoid shadow IT, you need to not only fulfill but also *anticipate* business needs and offer viable solutions. Hybrid cloud gives you the flexibility to address the ebb and flow of user requirements. In fact, 7 in 10 decision makers say they'll always use a blend of traditional IT and cloud.[1]

With hybrid cloud you face a striking new reality: your services will almost certainly be delivered from different locations, and in many cases, sourced from different providers. **The challenge lies in controlling, consuming and integrating disparate services that are not delivered from one location, or any location**. According to IDC, "for an entire IT operation, the hybrid structure will be the glue that makes it work."[2]

In other words, the true value of hybrid cloud lies in its ability to integrate your IT operations and achieve digital transformation.
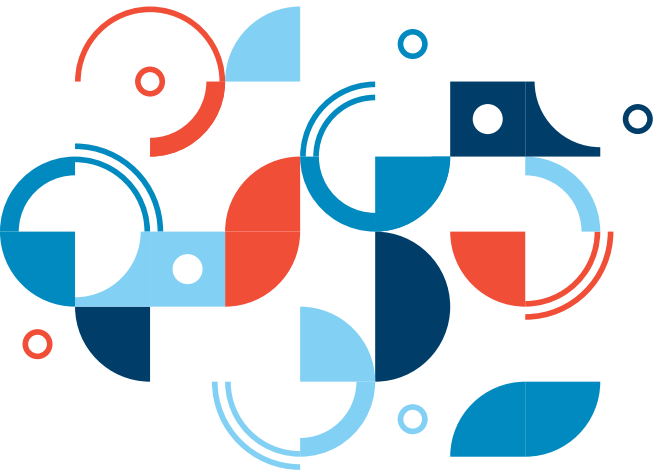
Accelerating digital transformation on the hybrid cloud

In a recent study, 85 percent of leading organizations reported that hybrid cloud is accelerating digital transformation in their organization.[3] How?

First, they master the basic benefits of implementing hybrid cloud: efficiency and productivity gains, including cutting costs and optimizing the value of their existing infrastructure. Then, the companies build on those advantages to use hybrid cloud to grow their digital business, such as product and service innovation, and expand into new markets.

But what's even more exciting is how these leading organizations use hybrid cloud to pioneer next-generation initiatives, such as cognitive computing and the Internet of Things—initiatives that can create entire new digital markets and business models. In other words, digital transformation.[4]

Hybrid implementations: Why do more than half fail to deliver?

Companies adopt hybrid cloud with high expectations, and one IBM study revealed four main objectives. Companies want to **enhance productivity** by distributing IT resources and management complexity to the cloud. They want to **improve security and reduce risk** by determining which workloads and data should move to the cloud and which should remain in house. Shifting from fixed IT to a pay-per-use cloud services model can **reduce costs**. And with the scalability of hybrid cloud, organizations can **better handle dynamic workloads**.[5]

Yet hybrid cloud is not a cure-all. In our experience, without proper planning, more hybrid implementations fail than succeed.[6] Why? Organizations are often not prepared for the inevitable challenges, most of which revolve around integration:

Governance and organization. Poor program management and lack of sponsor engagement are red flags, as are insufficient staffing levels and skill sets. Too often, organizations focus on the technical aspects of a cloud transition and underestimate the governance and organizational shifts needed to succeed.

Compliance. IT service delivery managed across multiple external resources requires a heightened level of oversight and compliance.

Complex, inconsistent platforms and services. Cloud is still rapidly evolving. A hybrid model involves adapting, synthesizing and integrating across multiple platforms, services and development techniques that are at varying levels of maturity and standardization.

Performance issues. Management and API support issues can sometimes create data communication delays that impact service delivery performance.

Services migration. Without proper analysis, services are sometimes migrated to an environment that's a poor technical fit or doesn't provide adequate return on investment.

The most basic benefits of a hybrid cloud depend upon integration—combining cloud services and traditional applications to deliver the composite business services needed to transform your organization.

Without integration, and a holistic view of your entire service portfolio in all its fluidity, you have disjointed environments that are unable to communicate consistently and effectively with each other. That's inefficient and expensive, far from the goals of a hybrid initiative.

The industrialized hybrid cloud: Integrated service portfolio management

Technically, a hybrid cloud is simply the blending of two independent operating environments where at least one is operating on an IT as a Service basis. Given that criteria, all you need to achieve a hybrid cloud is basic onsite infrastructure or a credit card to buy minimal cloud computing capacity. But at IBM, we view hybrid cloud as a powerful platform for organizations that aspire to digital transformation.

We call an appropriately integrated and governed adoption an industrialized hybrid cloud, one that progresses IT beyond the simple management of discrete components to the *integrated management of a portfolio of services.* Industrialization is built on standardized, repeatable and scalable operations—in other words—automation. This impacts multiple points of hybridity: legacy to cloud, cloud to cloud, separate domains with data and operational integration, and multiple speeds of processing and accessing IT.

An industrialized hybrid cloud encompasses **six primary characteristics**, as shown in Figure 1:

Integration. This includes both your data and services, and also integration of your service management with service delivery.

Visibility and control. Ideally, you'll have one overarching infrastructure that can monitor your services wherever they happen to be running, as we discuss further on page 5. Otherwise, you're faced with integrating services from multiple service providers that may come in different forms with different APIs.

Security. To use a medieval analogy, a castle used to be protected by a moat. Now, the castle is in the clouds and the moat has been filled in. In other words, security no longer has a fixed perimeter. Instead, you need an adaptive, cognitive focus on security and defense in depth throughout all the spaces in which your service is deployed.

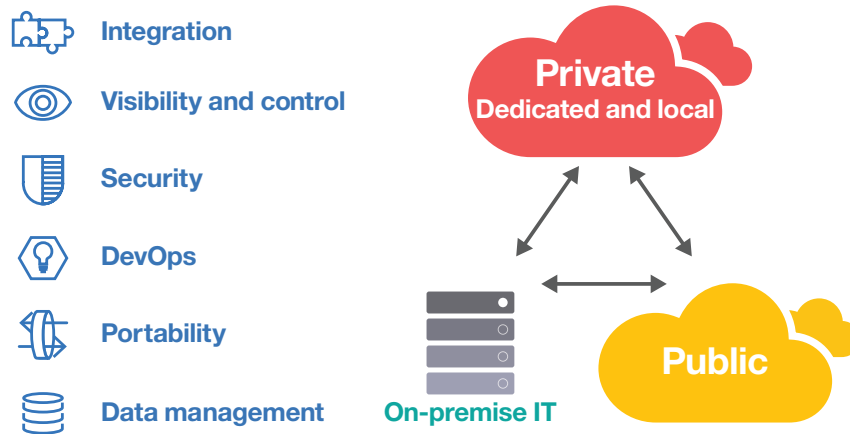## Industrialized hybrid cloud

- Integration
- Visibility and control
- Security
- DevOps
- Portability
- Data management

Private
Dedicated and local

On-premise IT

Public

Figure 1. An industrialized hybrid cloud encompasses six primary characteristics.

DevOps. Important questions to consider as your DevOps revs up for hybrid: How is your software development lifecycle tooled? How does it support release and deploy—in particular, across multiple platforms in multiple locations? Can you develop a service in one environment, test it in a second environment, and release it in yet a third environment? Do your tools support the multiple platforms on which your services reside?

Portability. Your workload architectures need to be agnostic to their operating system or environment, for easier maneuverability. Scalability and elasticity are key components as well. In fact, a recent survey of leading hybrid cloud adopters said 85 percent report that open standards and technologies are essential for portability and interoperability.[7]

Data management. You need to understand both what data *can run where* and what data *is running where*. This helps compliance management and interoperability. Also, as IT management becomes increasingly automated, data serves as a trigger point. You'll want that data to be reliable and accessible.

Note that in an always-on world, outages are increasingly unacceptable. Users will expect an industrialized hybrid cloud to meet higher levels of resiliency than existing on-premise environments. As you start to envision your industrialized cloud, these expectations must be addressed and engineered as well.

Three facets of integration for an industrialized hybrid cloud

Ideally, an industrialized hybrid cloud gives you both choice and consistency, along with total access, control and transparency— as we've noted earlier, the integrated management of a portfolio of services. This involves three main nexus points of integration, as shown in Figure 2: systems and service integration, IT service management (ITSM) integration, and program management.
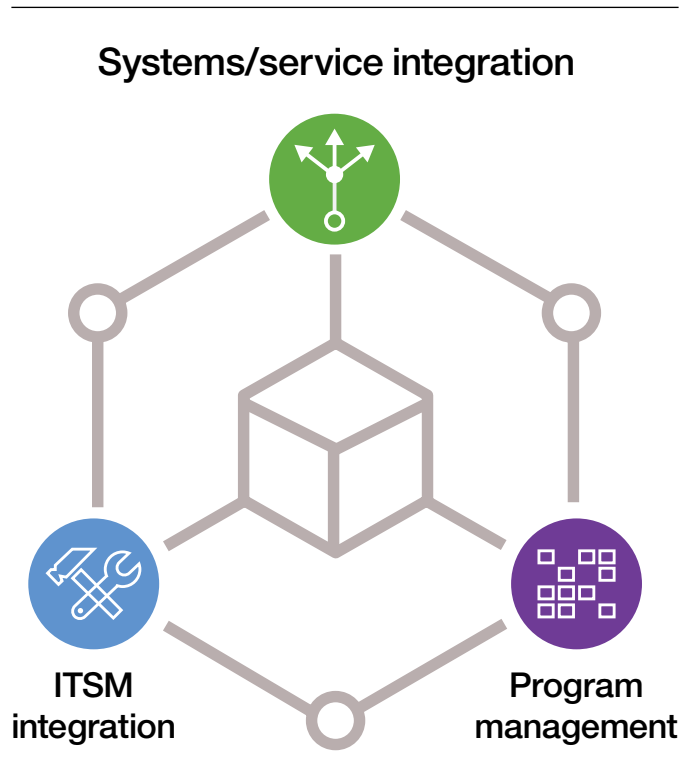
Systems/service integration

Figure 2. An industrialized hybrid cloud depends on three main nexus points of integration to deliver both choice and consistency.

Delivering composite business services through systems and service integration

Not so long ago, IT systems were like an exclusive club. It wasn't easy to gain access. Each major service would employ closed point-to-point linkages with other services. For example, a call center service would connect to a warehouse for order entry, and the warehouse would convey inventory information to salespeople. Any change to the system would create a domino effect, impacting downstream components. As a result, new services could not be incorporated without re-engineering integration points. To further create challenges, the governance processes behind the scenes were often in silos. These were hardly flexible, plug-and-play scenarios. Change was difficult and agility was a foreign concept.

An industrialized hybrid environment combines both cloud and traditional services to deliver agile, composite business services through **systems and service integration**. A hybrid cloud offers numerous techniques for integration, such as Service-Oriented Architecture (SOA), Representational State Transfer (REST) and new types of APIs. Such techniques create a common language and/or interface that masks the complexities within various services. In effect, it creates a common, shared approach that can cycle services in and out with ease.

Controlling and managing the hybrid environment through service management integration

Your hybrid environment will encompass multiple delivery channels and service providers—and could even be required to accommodate multiple service levels. How to conquer this challenge? A recent survey of leading hybrid cloud adopters said they were 2.6 times more likely to use **highly integrated service management** to improve levels of quality and service.[8] It's only logical that enterprises will want and need to manage their cloud environments with the same rigor as their own data centers.

In fact, steady-state data centers often include a command control system for IT operations, a "single pane of glass" that summarizes system status. But in the hybrid world, how do you monitor services that are being run from multiple sources, providers and environments? How do you achieve the required control, management and orchestration?

With cloud, much more of this management can and should be automated. As a result, you'll want to consider an automated tooling and management system that monitors the breadth of your services and helps you meet service level agreements (SLAs). Note that in addition to services, the tools themselves require integration into the hybrid environment, again in an automated fashion. In fact, leading hybrid cloud adopters are almost three times as likely to use sophisticated automation to manage and orchestrate their hybrid environments, including provisioning and configuration of systems and workloads.[9] It's this level of integration and automation that gives an industrialized environment its power.

Controlled change over time through program management

We often talk about a cloud strategy as a **transformation** or a **journey**. Those concepts are important, because they describe a process in which large portions of the IT domain will change—if not right away, then eventually. Therefore, *managing change over time* is a critical dimension. We use the term **program management** to describe the art of managing extensive IT transformation over the long term, as opposed to managing short-term projects or standalone initiatives.

At IBM, we're often called upon to assess an organization's cloud journey that has stalled completely, or perhaps has achieved some but not all of its objectives. Several troublesome themes consistently emerge, including:

- Insufficient organizational readiness, maturity and skill level
- Reluctance or inability to standardize
- Poor program management and sponsor engagement
- Inadequate automation

From our experience, we've learned that paying close attention to the following checklist can guide your journey and help avoid stumbling blocks:

- Determine a cloud deployment model for services, data and workloads
- Integrate with existing enterprise services
- Address connectivity requirements
- Develop governance policies and service agreements
- Assess and resolve security and privacy challenges
- Consider a backup, archive and disaster recovery plan

To summarize, you will need to prioritize a focused program management approach. *This weaves a series of initiatives together over time* to achieve your goal of an industrialized hybrid cloud.

Foundational disciplines for an industrialized hybrid cloud

In the rush to achieve integration and digital transformation, it can be easy to overlook an important fact: **integration requires planning and discipline**. In this section, we'll explore establishing foundational disciplines that create the solid ground you need for your industrialized hybrid cloud. These encompass industrialized hybrid cloud architecture, service portfolio management, and governance and organizational considerations.

Industrialized hybrid cloud architecture: Automation and use cases

An industrialized hybrid cloud architecture needs to be viewed first and foremost through the lens of automation. Customized architecture will undoubtedly always be in the mix, and certain service management tooling can handle non-standard environments. However, you'll want your service management tools both automated and integrated into your hybrid architecture. An architecture that incorporates automated, repeatable service management ultimately becomes more flexible.

Other considerations: From a business perspective, you'll need to evaluate quality, cost, agility and service resiliency as detailed in SLAs. For your infrastructure, what are your storage, network and other computing resources? How about locations, usage, availability and performance? You'll need to manage a catalog of available services, respective service providers and SLAs. Implementing solutions with services that meet requirements is critical. Business units will need to normalize expectations for nonfunctional requirements, architecture and service-level agreements.

To get a handle on these various perspectives, we recommend establishing use cases, or patterns. Evaluating these core use cases frames strategic discussions about hybrid cloud directions and purpose.

Figure 3 illustrates seven core use cases that are applicable to hybrid cloud adoption and were modelled by IBM.

However, don't limit yourself to these specific patterns. Your organization should recognize the repeating patterns that most align to your cloud adoption journey. Then, target your efforts to the consistent application of the patterns or use cases that matter to you. Identify where cloud brings you value,

and what will help you meet your current goals. Determine how you will measure that value and govern adoption, then implement and integrate in a repeatable, standardized manner.

Note that establishing use cases or patterns helps you develop the appropriate criteria for your cloud decision model, an important process described on page 10.
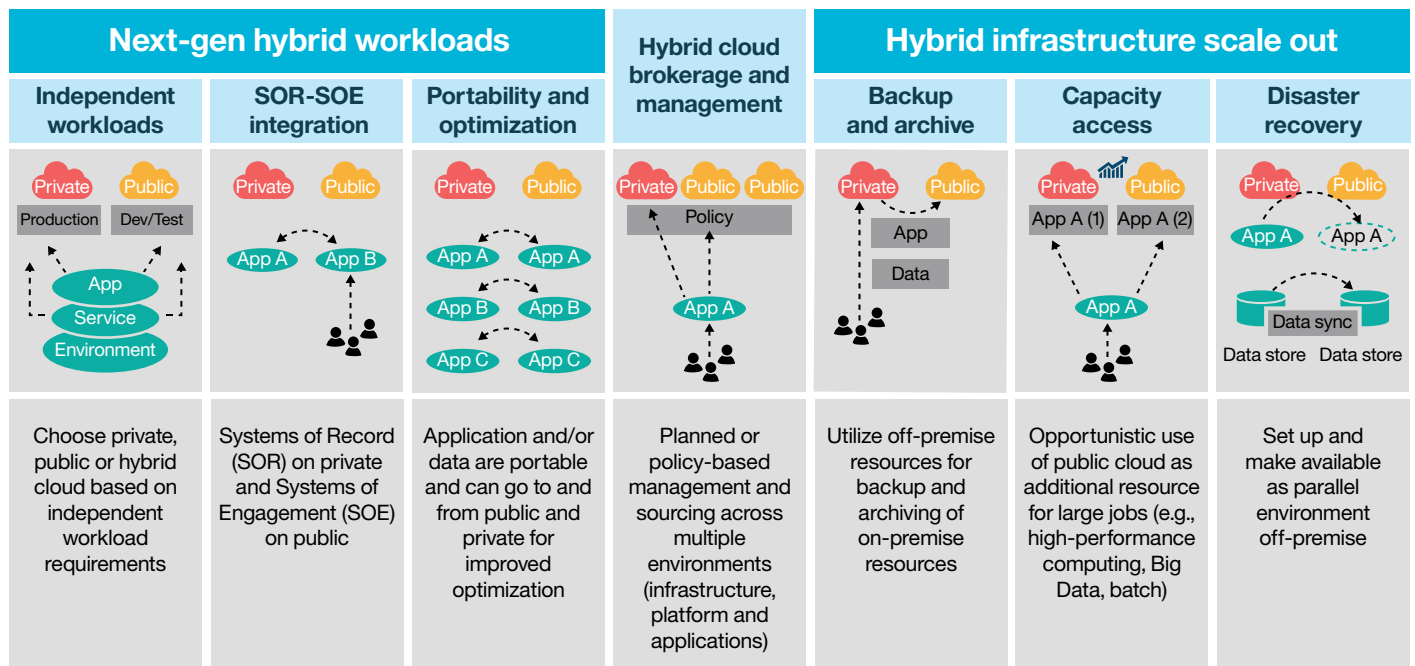
Next-gen hybrid workloads			Hybrid cloud brokerage and management	Hybrid infrastructure scale out		
Independent workloads	**SOR-SOE integration**	**Portability and optimization**		**Backup and archive**	**Capacity access**	**Disaster recovery**
Choose private, public or hybrid cloud based on independent workload requirements	Systems of Record (SOR) on private and Systems of Engagement (SOE) on public	Application and/or data are portable and can go to and from public and private for improved optimization	Planned or policy-based management and sourcing across multiple environments (infrastructure, platform and applications)	Utilize off-premise resources for backup and archiving of on-premise resources	Opportunistic use of public cloud as additional resource for large jobs (e.g., high-performance computing, Big Data, batch)	Set up and make available as parallel environment off-premise

Figure 3. Seven core use cases that are typical of those applicable to hybrid cloud adoption.

Service portfolio management: A lifecycle approach

A key benefit of an industrialized hybrid cloud is its ability to keep pace with ever-shifting business requirements. While some foundational services will remain stable, other services will reach obsolescence more quickly. The fast-moving, agile nature of digital transformation calls for ongoing assessment and disciplined, thoughtful management of your service portfolio.

Note that moving services to a hybrid model is not a "one-time" event. Instead, consider it a new operating model with its own lifecycle. As depicted in Figure 4, this approach encompasses market and customer input, service design and transition, service operation, and even retired services. Cycling back with continual improvements refreshes and renews your service portfolio.

For IT to truly be a strategic partner to the business, service portfolio management is a critical discipline. Companies that implement service portfolio management achieve significant advantages, such as creating consumable business services that generate business value and even revenue streams. In effect, IT evolves from a cost center to a service provider.
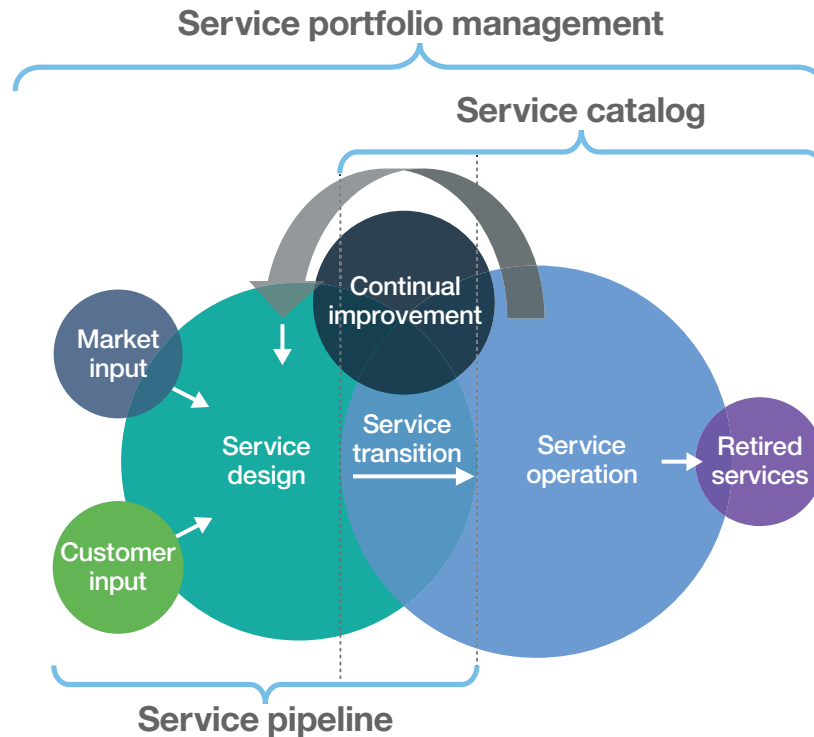

Figure 4. Service portfolio management is an ongoing process that is even more critical in the fast-moving, agile world of cloud.

Governance and organizational considerations: Avoiding triage mode

As we depict in Figure 5, all too often organizations resort to "triage" or "rapid response" mode to accommodate accelerating, dynamic cloud requirements. In an environment in which integration is the key to success, this type of rapid response often means adopting technical solutions with disparate interfaces and disjointed processes. Service providers are selected in an ad hoc, uncoordinated manner.

Unfortunately, extensive governance and organizational issues overwhelm, and a very human reaction is to ignore them. As a result, these issues are often addressed minimally, if at all.

While overall intentions are good, environments are still sub-optimized and threaten your ability to take full advantage of cloud.

Assessment and preparation are key. Ideally, organizations should employ a structured approach to evaluating governance, service and organizational considerations *before a hybrid cloud implementation*. Evaluating potential issues and developing a plan to address and mitigate them creates a more manageable implementation. This addresses challenges such as skills, standardization, organizational behavior and governance as part of an overall transformation plan and helps reap benefits more quickly.[10]
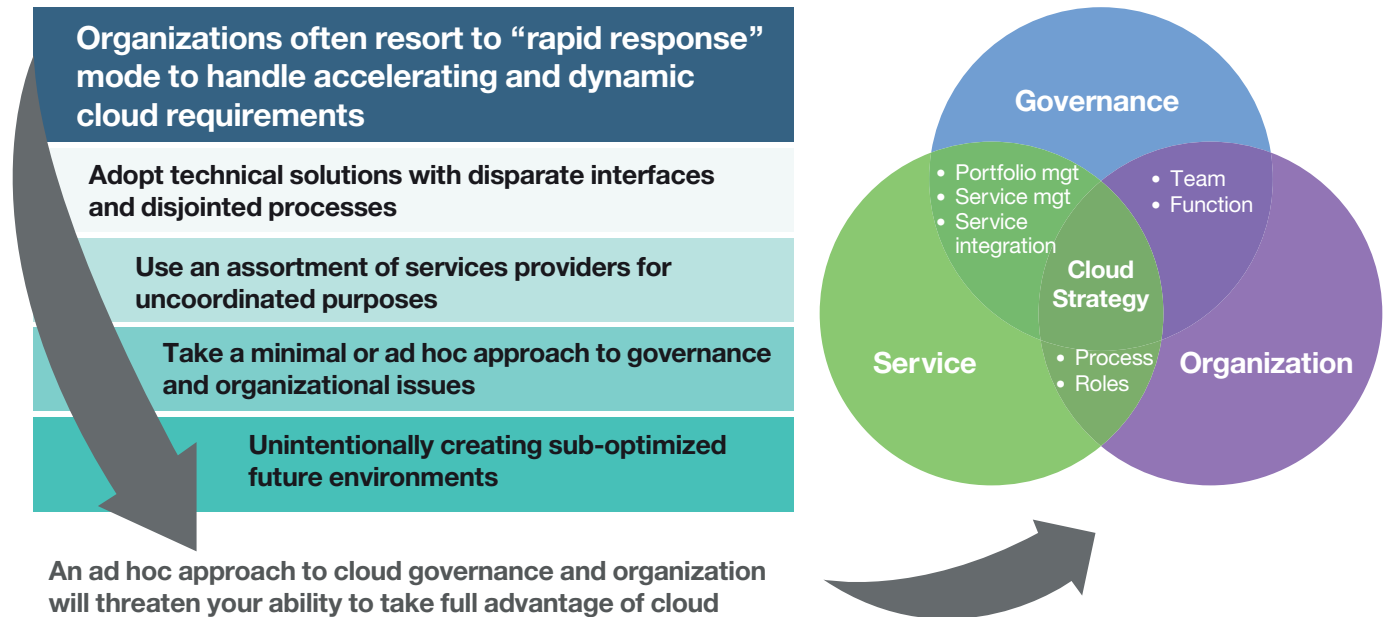

Figure 5. Ideally, organizations should employ a structured approach to evaluating governance, service and organization considerations *before a hybrid cloud implementation.*

Designing your cloud decision framework

Charting a course to an integrated hybrid environment takes time and involves a series of key decisions. Some, perhaps many, of these decisions will be new to your organization. In our experience with hundreds of clients, **investing the time up front to establish a decision framework is a key, critical success factor.**

An example framework is depicted in Figure 6. Creating the strategic drivers (guiding principles, governing board and so forth) is an initial step, with the outcomes guiding the downstream transition initiatives.

In addition, your architectural initiative will generate a defined set of use cases, or patterns, as shown on page 7. These patterns are an important part of the decision model, because they frame deployment activities and force the standardization inherent in successful hybrid deployments. In our experience, 80 percent of deployments should be driven by established patterns, reducing engineering costs and optimizing cost options.

For more information on this important step, see the IBM white paper Designing your Cloud Decision Framework: a consistent, structured approach to selecting cloud services at http://ibm.co/19WbrT7

Hybrid IT Decision Framework Flow	Is cloud a good fit based upon requirements and guiding principles?	Which service model(s) and adoption patterns are most suitable?	Which integration approaches should be used?	Which cloud provider should be chosen?

Example

Starting state
Traditional

Majority traditional or virtualized or pockets of cloud

Strategic drivers
- Reduce time to market - Agile and cost-effective delivery
- SI partnerships for multi-year transformation programs for all lines of business. Each requires agile access to development, test and production infrastructure.

Transition state
Public cloud

Gold public
Silver public
Bronze public

Managed public cloud
Self-service public cloud

Private cloud

Hybrid DC

Data centers

DC → CDC

Patterns

Patterns
- Target 80% of deployments driven by established patterns
- Reduce engineering requirements
- Optimize cost options

1. Software as service
2. Self-service public
3. Managed private
4. Private on-premise
5. Traditional

Future state
Public cloud

Gold public
Silver public
Bronze public

Managed public cloud
Self-service public cloud

Private cloud

Managed private clouds

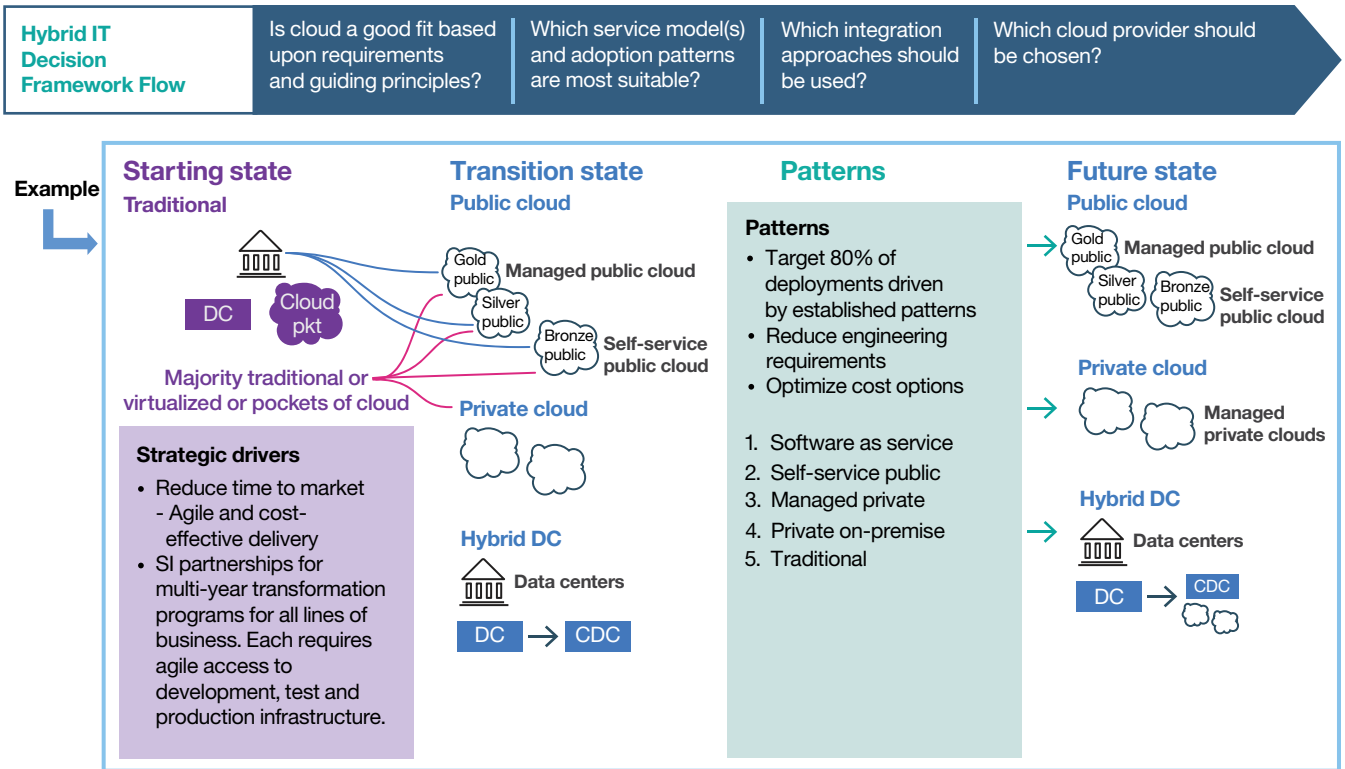**Hybrid DC**

Data centers

DC → CDC

Figure 6. Investing the time up front to establish a decision framework is a key, critical success factor.

Summary: Paving the way for the digital transformation of your organization

Creating an industrialized hybrid cloud implementation can be complex but worth the effort. That's according to 9 in 10 leading organizations that say hybrid cloud has a higher ROI than either all-traditional or all-cloud environments.[11] And 85 percent of these organizations report that hybrid cloud is accelerating digital transformation.[12]

In Figure 7, we depict how the concepts we've discussed come together. Public clouds, private clouds and traditional IT are all integrated within the three nexus points of systems or service integration, integration, and program management. Architecture, service portfolio management, governance and organization provide the stability required to achieve this across-the-board integration.

Net result: the digital transformation of your organization through an industrialized hybrid cloud. You achieve a single consistent vision of what runs where and how it is performing.

The environment should be bullet proof, with recovery mechanisms in place that bolster immunity to security and resiliency challenges. Finally, your service portfolio is flexible and agile, with an integrated management system in place. This all creates a solid foundation for launching the next-generation of initiatives, such as cognitive computing and the Internet of Things, needed for digital transformation.

Why IBM?

A solid cloud computing strategy and program are critical to helping you deliver an integrated IT service portfolio that can spur digital transformation, and IBM Cloud Professional Services can help. Our structured approach, combined with rigorous methodologies, data-driven tools and extensive experience, can deliver the insights you need to make more strategic decisions, optimize your cloud investments and simplify the workload analysis process. In fact, Synergy Research has ranked IBM as the #1 hybrid cloud provider for the enterprise.[13] As well, The Forrester Wave named us a leader in hybrid cloud management solutions.[14]
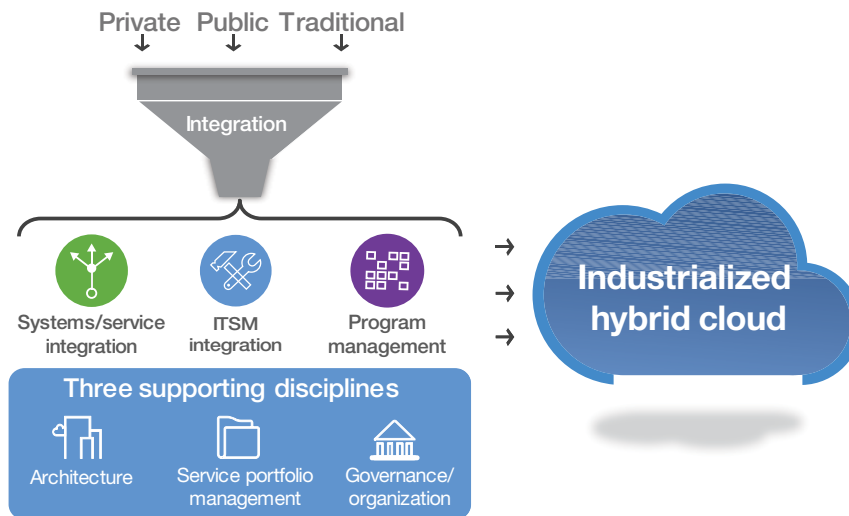

Figure 7. A powerful industrialized hybrid cloud implementation can pave the way to your digital transformation.

At IBM Cloud Professional Services, we help you **envision** what cloud means for your organization, **design** an approach that best meets your goals, and **build** an effective cloud service delivery strategy as well as your clouds. We can collaborate with you on any step of your cloud journey, including managing your cloud program. Our ultimate goal is to help you achieve **digital transformation** for your organization.

With expertise in 17 industries and global capabilities that span 170 countries, we help thousands of clients around the world benefit from new opportunities available on the cloud.

For more information

To learn more about IBM Cloud Professional Services, please contact your IBM representative or visit the following website:
ibm.com/cloudcomputing

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[2] IDC. "IDC Link: The Future of Cloud is Hybrid." IDC #lcUK25369415. Jamie Snowdon. January 8, 2015.

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[5] Ibid.

[6] Based on internal IBM experience.

[7] IBM Center for Applied Insights. "Growing up hybrid: Accelerating digital transformation." February 2016. http://ibmcai.com/2016/02/09/how-leaders-thrive-in-a-hybrid-world-2/

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[10] Hefner, Teresa. "Preparing for the hidden impact of cloud solutions: How cloud affects IT governance, organization and services." IBM. June 2014. http://w3-public.dhe.ibm.com/ibmdl/pub/sales/ssi/ecm/wu/en/wuw12348usen/WUW12348USEN.PDF

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