OPEN DATA CENTER ALLIANCE Cloud Adoption Framework

What I wish I knew before I signed up with my cloud provider!

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Executive Summary

Cloud adoption and migration discussions are being heard in all enterprises around the world. Many different viewpoints exist on this digital transformation topic – some see it as a technology initiative, to be driven by IT, and some businesses see it as a key to enabling and enhancing their business functions and reach. Leaders are regularly caught between these viewpoints, often driven by passionate IT specialists and business staff. It is important for business leaders who are responsible for deciding or driving a move towards cloud technology use, to be in a position to carefully consider their strategy and approach, and to make informed decisions, with at least a rough understanding of the consequences of the different choices!

The ODCA recently conducted a survey of companies who had implemented cloud technologies and asked the question **"What do you wish you had known about your cloud solution before purchasing it"**. The responses were remarkably insightful. It was clear that many were taken by surprise by the limitations of or resulting from their choice, and the additional work they needed to do to integrate their cloud solution into their existing environment.

The paper consolidates the insights and observations gleaned from that survey, and the concepts from the ODCA Cloud Maturity Model to provide business leaders with a base from which they can sketch out a mind map of some of the aspects, decisions, and consequences in regard to moving business functions and IT applications to the cloud. Specifically, this paper covers:

- *How to identify and select business functions, services and applications that could move to cloud*
- *Provide questions to ask to identify risks, caveats and benefits of different cloud implementation approaches*
- *Provide guidance on the additional changes that will be required to your Hybrid IT Operating model to support the cloud approach you choose*

This paper is designed to be used in conjunction with the Cloud Maturity Model. The Cloud maturity model provides multiple domains to identify the changes necessary to transform to a Hybrid IT Operating model to support a Cloud project. This document drives out the higher level decisions and strategy regarding cloud, which a leader must provide to their organization to guide their teams' thinking, decisions, designing and planning when considering which Cloud approach would be best to implement in light of their business IT functional requirements.

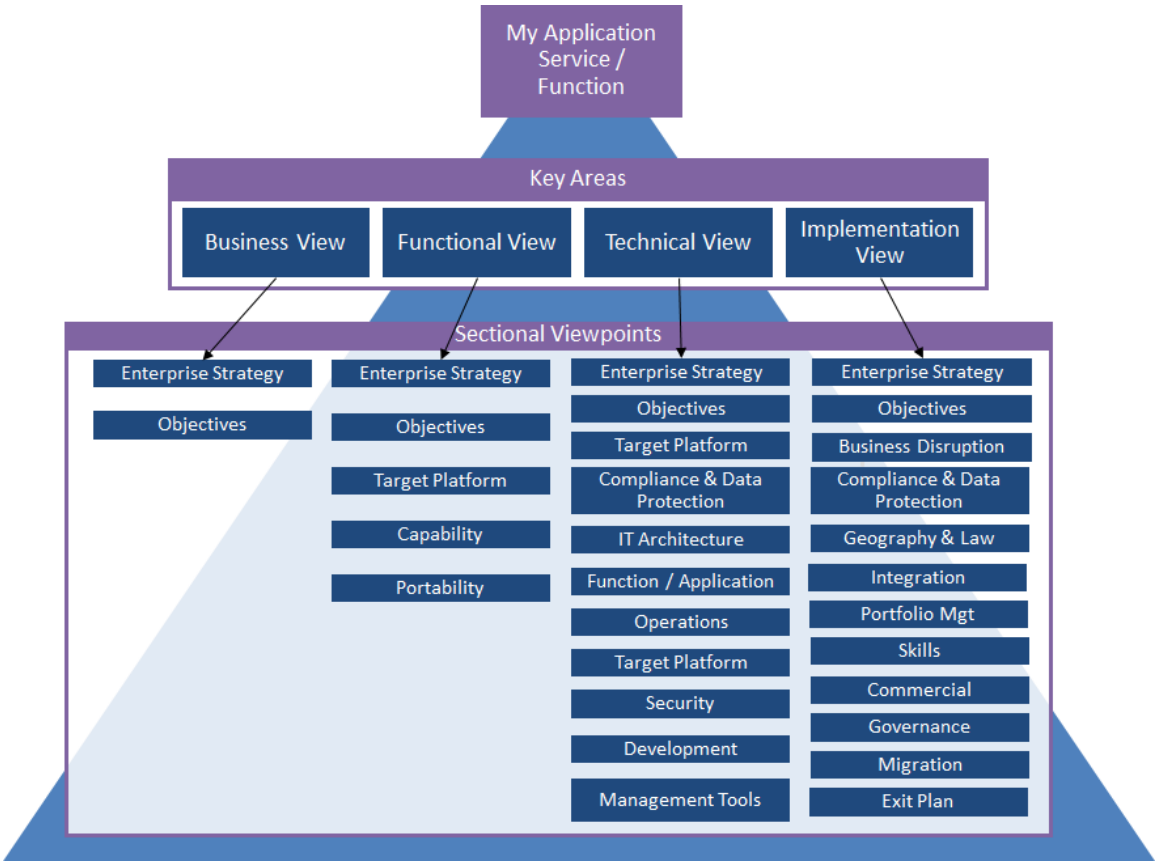
Introduction

Most enterprises are hearing from the analysts that in order to be a competitive survivor in the future, they will have to have migrate a significant portion of their business to cloud based services and technologies. The question however is “what does this really mean?” Simply taking an existing application or business function, and hosting it on a cloud platform seems to provide minimal real benefits. Although there is an initial reduction in the cost of holding spare infrastructure capacity, the infrastructure reduction gains are often outweighed by increased networking costs, additional integration costs, and costs involved in other changes to the IT operating model. So how can a business evaluate what is the best approach they should take to move to the cloud, in order to minimize the additional costs and still recognize the benefits brought by cloud adoption?

To assist a business to answer this question the authors of this document, who are experienced practitioners in the field of Cloud and Hybrid IT integration, have described common scenarios they have encountered, and have shared their insights and solutions to those problems.

As with all technology planning, it helps to break the problem down according to a number of viewpoints. One can then follow a step based process to identify the appropriate questions and answers per view point. The process to populate the viewpoints may require a number of passes, before the leader is satisfied that there is sufficient information and clarity to drive out a final strategy.

The following model illustrates the suggested viewpoints and their sub-elements, which align to and leverage the Domains of the ODCA Cloud Maturity Model (CMM).



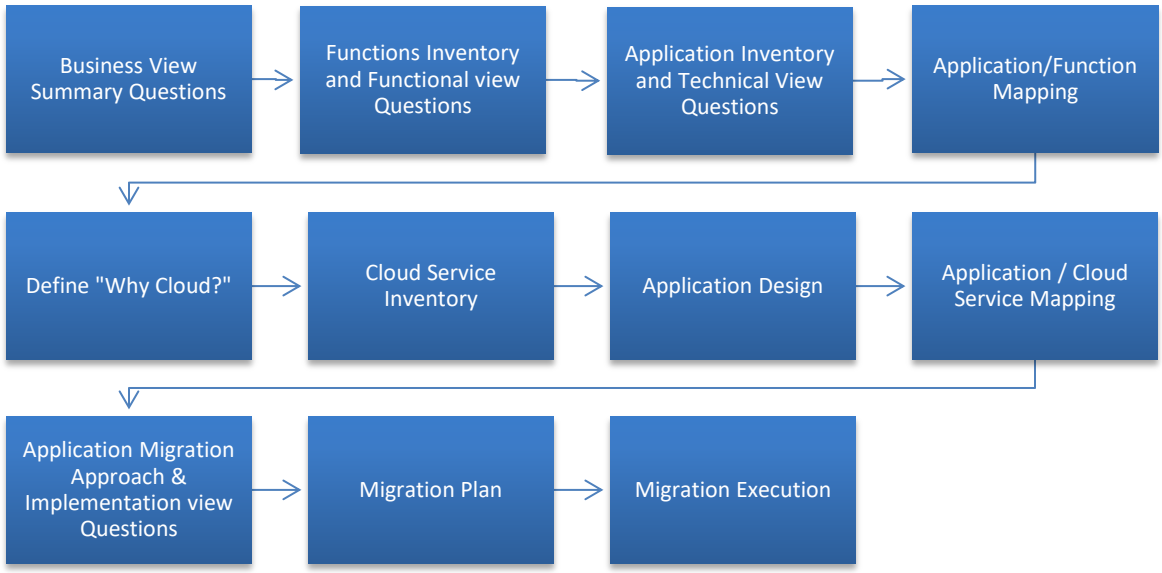
This paper raises questions for each viewpoint that we recommend a Strategist answers before choosing a specific cloud approach. The authors have also described why the question needs to be answered and what are the caveats and consequences of not answering the question before embarking on a cloud initiative.

Each enterprise is unique; constructed of unique organizational structures, products, services, operating environment and technology infrastructure. Decisions for moving business functions, services and applications to the cloud are unique to each individual enterprise. Yet, as more and more enterprises move business to the cloud, a general pattern for progressing through this change has emerged. The authors have found the greatest failures in cloud initiatives can be traced back to enterprises that have not developed all four viewpoints. In fact, the most common failure is associated with firms that have not developed the business and functional views and have looked at the transformation to the cloud solely from a technical and implementation viewpoint

Appendix A contains a set of questions that need to be considered in each viewpoint. There is also s supporting Excel set of detailed questions and outcomes supporting the questions in the Appendix. These questions have been compiled based on the experience of many enterprises that have implemented cloud solutions. We recommend that you answer each of these questions as you work through your transition to a Cloud Operating model.

Method

There are a series of steps which flesh out these viewpoints, possibly as a multi-pass process, represented generically as follows:



Business View

Business View Summary Questions

- ✓ The key to a successful move starts with understanding the business of an enterprise. The first step is to **identify the vision of the company, its business model, strategy and goals/objectives**, so as to guide the teams' decision making. Without a foundation in these objectives, it will be difficult to move to the second step. **Complete Appendix A Business view questions, and consider the Excel based detail questions supporting this document.**

Functional View

Functions Inventory and Functional view questions

- ✓ The second step is to **document the functions/use cases/ IT services of the Hybrid IT operating model that the enterprise** requires to achieve their Business goals. The ODCA Cloud Maturity Model (CMM) contains a template of common use cases and IT services to assist you identifying your functional requirements. **Complete Appendix A Business view questions, and consider the Excel based detail questions supporting this document.**

Technical View

Application Inventory & Technical view questions

- ✓ The third step is to inventory the **applications and technology services across the enterprise**. The CMDB is the best place to start, it should contain all the applications and relationships. Starting with an application inventory, applications should be grouped into classes based on size, complexity, dependencies and technology platforms. The ODCA CMM is a useful tool for analyzing the current state of (for example) the Data, IT Architecture and Infrastructure environments. **Complete Appendix A Business view questions, and consider the Excel based detail questions supporting this document.**

Application/Function Mapping

- ✓ Once all applications have been assessed, **applications should be mapped to the functions/ Use cases** they support.

Why Cloud

- ✓ Now **ask "Why Cloud?"**
    a. Assess why a specific cloud approach would be beneficial for that application/ asset group/ asset portfolio. Consider things such as speed to value, IT simplicity or currency, leveraging the innovation or scale in the marketplace, for availability requirements, and financial drivers/ business scaling requirements and benefits.
    b. Not all apps are suitable for cloud deployment, or can leverage the benefits offered by a service based model. Based on the characteristics of the application, complete a rough estimate of whether the application should move to the cloud or remain on premise, whether there is a clear cut provider choice, Consider things such as will the application need to be refactored, does adequate technical documentation exist, are there SME's still at the company, etc. Once the "why cloud" question is answered, we can assess the "how to adopt cloud" question. Things to consider in this question are, architecture impact, failure resiliency, cloud aware architecture, licensing etc.

Cloud Service Inventory

- ✓ Having completed the business, functional and application assessments, the analysis turns to all the cloud provider(s), (provider(s) can be both external and internal), and identifies the **cloud provider(s) products and services** and creates an inventory of possible cloud solutions.

Application Design

- ✓ The next step is to work through each application in the inventory to **document its design**; ensuring that each application's architecture, service dependencies, technology platforms, risk and compliance posture and operational support requirements are documented.

Application / Cloud Service Mapping

- ✓ With this detail in hand, the designer maps the applications or service **the cloud provider** services.

Implementation View

Application Migration Approach

- ✓ The next step in the process is to **determine the migration approach** for each application. An application's value to the company should be weighed against the effort, risk and complexity of rewriting the application to take full advantage of the cloud. In some cases, a lift and shift approach that simply moves the application as-is to the cloud, is the best balance of risk/reward (even if this approach minimizes the value of hosting the application in the cloud). In other cases, if the application's value to the company is sufficient and the risk posture low enough, it may be viable to support refactoring or re-writing the application so as to take full advantage of the cloud platform. In some cases the applications should be replaced by a SaaS service. The ODCA Cloud Maturity Model (CMM) should also be used in this step, to identify the impact on all the domains of implementing the new application ecosystem and to identify the additional work that will be required in those domains to successful implement the operating model to support the cloud application ecosystem. **Complete Appendix A Business view questions, and consider the Excel based detail questions supporting this document.**

Migration Plan

- ✓ A migration plan should be completed for each application in the application inventory. Having classified each application for its potential move to the cloud, appropriate project management processes may then be applied to develop a migration plan and ultimately **deliver the migration of selected applications** to selected clouds. The Migration plan should also include any additional work that will be needed in the domains identified in the ODCA Maturity model to ensure the IT operating model is able to manage the new cloud delivery model.

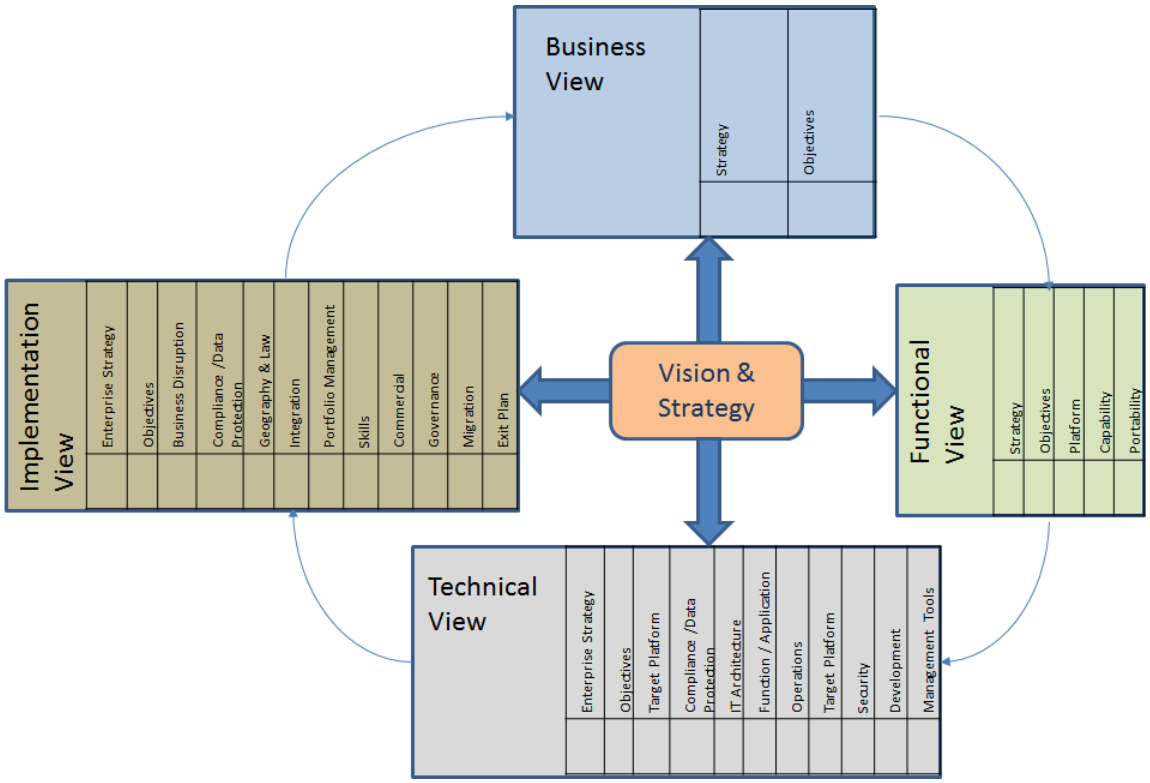
Migration execution

- ✓ According to the migration plan, migration from selected applications to selected cloud services should be executed step by step. Eventually the business function, which is used to be support by selected application, will be hosted by the new cloud services. This transfers the active business function transformation from on premise, to cloud.

Resulting Output

Once the business leader and their team (in possible additional passes) has worked through the defined process steps above and selected / answered the appropriate questions relevant to their situation, they should be in a position to document the resulting strategy for the business function in regards the most suitable cloud positioning and approach.

The result may look something like this, but it is up to each leader to determine their own favorite representation:



From here, the leader should be able to communicate their proposed strategy broadly, and have some idea of the caveats and consequences of their selected options. (All options have caveats – and it is best to know about them up front!)

Supporting ODCA Information

The ODCA has already produced some content which can enable identification of solutions: Referenceable ODCA Content

a) **Cloud Maturity Model** – consider all the different important Domains applicable to your specific Use Cases when creating your project plan for integrating cloud based services.
b) **Architecting Cloud Aware Applications Best Practices** – the typical design patterns to decide between, and important considerations for each.
c) **Cloud Co-existence with Existing** Enterprise – the many layers of interacting interfaces that must be catered for are identified
d) **Commercial Framework** – important considerations and approaches to contracting Hybrid IT partners are discussed
e) **Provider Assurance** – Aspects which need to be taken into account regarding compliance and operations are listed in this paper
f) **Cloud Procurement** – the systems, processes and skills which are necessary to enable business consumers to obtain access to Hybrid IT services dynamically, are discussed in this paper
g) **Data Compliance** – A number of important aspects of data management in a Hybrid IT scenario are detailed.

h) **Hybrid IT Barriers & Challenges** – Look for and address specific common barriers that prevent successful cloud enablement

Conclusion

We have seen in this paper that Hybrid IT can deliver many advantages to an enterprise. We have also identified that there are a number of considerations and caveats that the enterprise should analyze, then evaluate and implement mitigations where appropriate. These actively planned mitigations will help to reduce barriers to hybrid IT adoption, thereby potentially increasing the ease with which the enterprise can achieve the expected returns, advantages and benefits that the technology should help them recognize.

These mitigations usually have to be addressed through a structured project, as part of the formal Hybrid IT Roadmap project, and it is extremely advantageous when this project carries the Executives' mandate, since this is a key enabler to addressing barriers sustainably, in a holistic implementation initiative.

Appendix A

Specific Questions to Consider

The questions below are designed to be sufficiently generic to range from Baker to Banker, but obviously the practiced consultant will need to fill in additional industry appropriate questions in between. Once these outcomes are documented and their consequences are understood, the strategy for the application should be in sufficient level of detail to make decisions, and hand over to project management for execution. These questions are further supported by a set of more detail excel based questions.

1 Business View

The business viewpoint guides any decision making by the various technical teams, ranging from architects, through project planning. It identifies the objectives that the business wants to achieve, specifying expected business outcomes and business functionality that the resulting environment should deliver.

1.1 Motivation

Core Consideration	Have you defined what the Business Reasons are and what the expected Business Outcomes are for a cloud transformation? (Do the business drivers align with the rate of technology adoption (maturity) needed in order to achieve strategic goals?)
Explanation	Examples of Business outcomes that a cloud approach might enable: • Scalability (Capacity) • Globalization • Cost Control • Use of External Development (Agility) / (Consistency) / (Flexibility) • M&A / Partnering • Capex Reduction (Cost Savings) • Time to Market improvement • Agility (To Respond to Market Opportunities • Cycle Time / Speed to Fail Reduced FTE (Opex Reduction through Automation)

1.2 Measurement of Objectives

Core Consideration	Have you considered what Business KPI's will be measured to demonstrate that the Desired Outcome has been achieved
Explanation	The business KPIs should defined in the following four categories for the Private Sector: • Revenue Growth • Operating Margin (after taxes)

	• Asset utilization (Capital Intensity) • Market and Customer expectations The business KPIs should defined in the following four categories for the Public Sector: • Policy Outputs and Outcomes (Political Value) • Efficiency (Financial Value) (Social Public Value) • Quality of Service Experience (Direct User Value) Public Trust (Foundational Value)

1.3 Cost Benefit Model

Core Consideration	Have you considered what a comprehensive Cost Benefit Model should be for the proposed Hybrid IT Solution?
Explanation	Cost areas that should be considered: • Upfront costs (public or Private Cloud): Costs associated with building a Private cloud service or costs around increased security gateway technology. Consulting charges, Vendor Management, Cloud Coordination, User training, • Public Cloud Recurring costs including Ingress, Egress charges, Pay per use charges (bandwidth, storage transaction. services etc.), stand by charges (these are charges you incur even if you are not using the service) • Public Cloud Termination Cost • Workload and Process Migration costs • IT Operating Model Transformational Costs • Costs of existing assets (infrastructure, Licenses) that have not yet depreciated or support contracts that have not expired Benefits areas that should be considered • **Tangible Benefits:** Capex Cost reduction:, OpenX Cost Reduction/Transformation: , Enhanced productivity (change of maintenance to innovation ratio): , Optimized resource utilization: ,Improved security/compliance: ,Access to skills and capabilities:, Access to the best applications: , Access to complex applications such as Big Data tools: , Scalability On-demand provisioning or computing resources: , Improved agility: , Improved Customer satisfaction: , Improved Reliability, service availability and performance • **Intangible Benefits:** Avoidance of missed business opportunities. (A cloud application (SaaS) may be the critical element to land a new business or expand into new markets. Ability to focus on core business: Employee satisfaction/innovation:, Collaboration: , Risk transfer : Improving a Company Capability: ability to improve capability of company Legal/audit: ability to improve audit compliance

	or reduce time to demonstrate Technical alignment: to Company strategy

1.4 Operational Costs

Core Consideration	Have you considered what the initial and ongoing costs will be?
Explanation	The costs of Cloud services are often a great surprise. The variable charges for bandwidth, ingress and egress charges, and standby charges are generally unexpected or underestimated, as well as HR training and development costs. In addition, the upgrade path is usually based on migration to a newer version, which drives a different model of costs than in-place upgrades. Where internal operations costs may currently exist, an external Service Provider may need to take over these functions, also driving costs, albeit on a pay-per-use basis. Unfortunately, by the time a production environment goes live on the cloud services, an enterprise is committed and the cost of exiting that cloud solution s high

1.5 Broad Environment Perspective

Core Consideration	Have you considered the cost implications (positive or negative) for your organization when one part decides to move to the cloud?
Explanation	E.g. A business unit moves off to cheaper external services, but leaves the original central IT services, licenses and infrastructure in place which still have to be carried by the rest of the organization - i.e. costs actually increase for the overall “remaining” business

1.6 Cost Forecasting

Core Consideration	Have you considered how difficult it is to forecast and plan for operational costs associated with the cloud?
Explanation	Cloud costs can vary for many reasons. Some of these reasons are: • Pricing models fluctuate frequently • Calculations change frequently (calculating under the hood, often we don’t have visibility to them – e.g. data egress costs) • Price across vendors vary (as do calculations)

1.7 Rationalization Consequences

Core Consideration	Have you considered that you may have to consolidate or externalize other business activities or eliminate/re-skill staff to actually achieve or maximize the cost savings that the move to the cloud should have delivered?
Explanation	The Cloud solutions may eliminate jobs within your enterprise. There is cost to this both a financial basis and on employees. Employees that fear their job is going away will begin to disassociate from the enterprise. This can be very detrimental to the enterprise. The cloud cost savings are often built on the premise that Opex expense (people) will be reduced, so the only way to

	realize this gain is to lay off the staff. Another area of impact is that to recognize the gain of moving to the cloud is that other business activities (jobs) will have to be consolidated or externalized). The same employee concerns and costs will happen in this case as well.

2 Functional View

This view considers how the service should be used, and what key requirements need to be considered. These may include compliance dimensions, business criticality, and platform options, depending on the function.

2.1 Required Business Capabilities

Core Consideration	Have you defined the Business Capabilities required from the Cloud service, the Use Cases & Functions needed to support the expected Business Outcomes? Have you assessed whether the Business is capable of supporting Cloud service adoption (their ability to deal with possible business function and process changes)?
Explanation	Understanding of own organization. The better the use cases are defined, the better the criteria available to evaluate the different cloud solution approaches. The most common failures in Cloud initiatives are in Enterprise that have not: • Clearly defined the business reasons for moving to the cloud, and the outcomes expected. • Clearly defined the business capability changes as result of moving to the cloud • Defined the use cases which the cloud solution will deliver to the business
Choices	1) The business must react to changes caused by cloud adoption, which may lead to some chaos if there are no documented plans and guidelines at hand for them to leverage (as and when needed.) 2) Define use cases up front and drive the required business changes from the beginning, to ensure positive outcomes of cloud adoption.
Caveats & Consequences	Reactive response may be cheaper in the short term, but could cause longer term remediation costs

2.2 New IT Skills

Core Consideration	Have you considered the new IT skills and capabilities needed to support a cloud environment? (Are the capabilities of the architects /engineers currently sufficient to support a cloud environment?)
Explanation	Cloud solutions require new Business and IT skills and Technologies to enable effective cloud adoption/migration. These new capabilities have a cost and require time to develop and implement. Critical areas of new IT capability include Security, Network and API management.
Choices	1) No pre-assessment on IT capabilities to support cloud environment (assume current skills are adequate). 2) Pre-assess whether current IT team are capable of supporting and

	operating the cloud environment before making further decisions. - If not currently capable, adapt the cloud service adoption intention or involve a partner which has the skills; - or make a plan to contract or build IT skills and capabilities to make it possible;
Caveats & Consequences	During the implementation of cloud service, realise that IT may not be completely capable of supporting the cloud environment. Develop the IT skills, or hire externally, potentially extending project budget and delaying project timelines deadline.

2.3 Use Cases & Functions

Core Consideration	Have you considered the current business scenario and considered the applicable Use Cases & Functions needed to support business objectives and strategic goals? - Have you assessed your cloud provider's services, to understand the functionalities, and which components are essential for your organization, and which are optional? (Architects should help develop use cases that support the long term goals of the business that align engineering implementations. Architects also need to help identify the essential services that are actually needed, and which elements are "nice to have".)
Explanation	Understand what is needed in context of the cloud service provided by the vendor: Which functions are must-have-features, and which are optional. The Use cases should be realistic and achievable. They need to be defined in the following areas • Hybrid Delivery • Hybrid application workloads (SaaS) • Hybrid DevOps (PaaS) • Hybrid Service Management • Hybrid Infrastructure (IaaS)
Choices	1) Choose cloud service based on a comparison between vendors and their costs / features / functions against each other. 2) Select the cloud service(s) based directly on the (minimum acceptable) identified business requirements.
Caveats & Consequences	Chosen cloud service may not meet business expectations - additional services must be considered; low ROI on cloud service. Choosing too many features or options from the cloud service which aren´t necessarily needed, drives costs up.

2.4 Cloud Provider Match

Core Consideration	Have you considered the criteria for assessing a cloud provider's ability to meet the Business Availability and Continuity requirements of your organization? - Service Levels - Availability - Incident Support - Performance - Interoperability and portability
Explanation	Cloud Service Providers may not offer the service levels for cloud services, that your Business units really require. Utilization of cloud providers neccesitates that architecture and deployment models be re-evaluated to ensure SLA's can be met.

Choices	1) Accept the cloud service provider's service levels (their standard SLAs) so as to achieve the businesses' cost considerations. 2) Identify and define the minimum service level requirements (incl. portability, service and data availability, performance, functionality and maintenance) and minimum security requirements that business require achieving their business continuity requirements, and select a provider and cloud type based on those.
Caveats & Consequences	In an emergency, the business continuity may be harmed, due to the unexpected outages of cloud services. Buying based directly on business availability requirements may drive surprising costs – re-check the real availability requirements for that business function!

3 Technical View

This viewpoint begins to detail down into the functions' design, standards and tooling that should be considered

3.1 Cloud Provider Capabilities

Core Consideration	Have you considered the capabilities that you will need from a cloud provider in order to meet your requirements, and how you will adopt new vendor capabilities and features?
Explanation	Before selecting providers or their products, assess the general capabilities which can be obtained from the cloud, against the technical requirements of the enterprise. This will help ensure focus on fitting the provider to the requirements rather than the other way around.
Choices	Find the highest level capability or combination of elements to solve the requirements: - Does a SaaS solution exist which meets the requirements? If so, then select this option. - If no, then can you integrate PaaS solutions together to meet requirements? If so, then select this option. - If no, then determine what IaaS capabilities will be required to support your new development, which may be in the cloud, on premise or a hybrid approach.
Caveats & Consequences	You may find that a combination of choices (e.g., filling a functional gap in a SaaS solution with PaaS or even bespoke development) will be required. The highest level capability may mean the least amount of development, but the most trade-offs in functionality and requires the most potential integration. Organizations that are unfamiliar with cloud are highly encouraged to engage cloud providers in demos of services and capabilities with subsequent hands on proof of concepts. Note: while traditional IT vendors have generally informed customers about new products and services by means of sharing roadmaps, this has not yet proven to be a common practice among cloud providers. Agile organizations should strive to shorten the time between when a new cloud capability is announced and when the organization is in a position to leverage it through updated cloud native architectures and processes, if applicable.

3.2 Analyzing Applications for Target Platform

Core Consideration	Have you considered how you will assess target applications to determine cloud applicability, and select the appropriate cloud platform (vendor selection) and cloud vendor services?
Explanation	A critical step prior to moving applications to the cloud is to understand the make-up of applications targeted for move to the cloud. Their platform, service construction, internal workflow, architecture, technology, SLA's, business continuity requirements, risk posture and more; are required as input into a cloud vendor, and cloud service selection process. From this, a match to one of the business' preferred cloud vendor's can be determined – e.g. an application build on .NET with a SQL Server database may be a more appropriate fit for Microsoft Azure over AWS or Google.
Choices	Collect and analyze applications targeted for migration to the cloud, understand their architecture, taking into consideration an application's fit for: * Cloud provider A vs. Cloud provider B * Cloud deployment model – IaaS or PaaS or SaaS or a combination of these * Cloud Migration model - Lift and shift vs. refactor vs. cloud native (degree of refactoring/rewriting) e.g. containerizing or micro-service architecture
Caveats & Consequences	* Failure to understand the application architecture, function and technology will impair your ability to select the optimal cloud platform, cloud deployment model or migration development choice (degree of refactoring) * Defaulting to lift-and-shift (merely replacing on premise infrastructure with the equivalent in the cloud) will prevent the enterprise from realizing the full potential of the cloud. * Deploying to IaaS services by default may prevent the enterprise from increasing agility and reducing costs which could be realized from re-architecting the target business process to take advantage of higher value PaaS/SaaS services.

3.3 Integration between Existing Applications & Cloud

Core Consideration	Have you considered how you will integrate your existing applications and enterprise landscape with cloud services?
Explanation	Usually new cloud solutions will require some level of integration with existing systems (either on premise or other cloud). Whether just simple data replication at one end of the complexity spectrum, to integration at business function level at the other, new cloud-based capabilities will invariably need to connect in some fashion to those already in use, securely. In addition, for compliance and operations purposes, some level of Service Management level integration is usually necessary including event integration and security integration, as well as for monitoring and similar management tooling layers. Network interfaces, bandwidth requirements, and controls need to be considered.
Choices	Depending on the functional and technical requirements, integration may be necessary at the application and/or the data level, both of which have various options: Security Level: - Per transaction authentication for application and data transfers - Security gateway - OAUTH2 API architecture Application level: - Event- / Message-driven - Direct native API-level calls / RESTful services

	- API-level via an abstraction layer Data level: - Shared database - ETL/ELT - Data replication/synchronization - Data virtualization - File ingestion. Note: may be direct file transfer or even physical media (e.g., AWS Snowball)
Caveats & Consequences	* Must take any requirements for data integrity into account, including confidentiality and auditing. * Data-centric integrations may require some level of ETL. * The tighter the level of integration, the more difficult and costly it may be to change solutions in future. Loose coupling via well-defined interfaces helps extensively. * Key point is to ensure the appropriate security architecture is in place, particularly with regard to SaaS integrations.

3.4 Connecting Enterprise to Cloud

Core Consideration	Have you considered how you and/or your clients will connect to your cloud services?
Explanation	Whether adopting a fully SaaS solution or evolving to a hybrid computing model with integrations between on premise systems and PaaS/IaaS, issues of network latency and capacity need to be considered. One has to additionally consider whether your clients will first connect to your corporate network (e.g. via a website), and then route to the cloud based service via your network, or if they will connect directly via the internet to the cloud based interface that you provide to them. There are merits to each approach.
Choices	* VPN over public Internet (not valid for many SaaS services) * Direct connection (e.g. MPLS etc.) * Open Internet based connection * Secure separate connection for privileged account access * Provider specific connection services
Caveats & Consequences	* Major suppliers generally provide support for most models, but that may not be the case for niche providers. * Data transfer costs, particularly for very large amounts of storage, may be prohibitive. * For geographically dispersed user populations, leverage providers with CDN capabilities to address latency. VPN over Internet may not provide a consistent level of service depending on specific business requirements. Vendor specific protocols and transfer costs must be considered carefully

3.5 Cloud Service Levels

Core Consideration	Have you considered how you will measure SLAs for cloud services?
Explanation	Cloud providers' SLAs cover infrastructure uptime, incident response time commitments, etc., but generally do not include end user experience i.e. performance or response time on transactions. The consumer's experience is becoming a critical measure of service value, and poor performance will often be considered the same as being unavailable; this could be paraphrased as *"'slow' is the new 'down'".*

	The goal should be to provide better overall service delivery to the user, therefore that should be the focus of the SLA.
Choices	* Incorporate cloud services into existing service level monitoring for on premise systems. * Contract for 3rd-party monitoring of your cloud services. Implement, set thresholds and monitor a battery of synthetic transactions to simulate end user behavior.
Caveats & Consequences	Your cloud vendor's SLA covers only the portion of the infrastructure under their own control, within their data centers and in their application (PaaS/SaaS). You will need to join it to SLA data for your environment (or your clients) in order to properly analyze user and client environments and pinpoint real potential problem areas. Like operations management, incorporating cloud services into existing SLA monitoring may require changes to existing processes and/or existing monitoring instrumentation where possible. * Incorporating SLA monitoring for cloud service transactions into your current on premise model may be more challenging if they have a different paradigm (i.e., performance- vs. incident-based). You may want to consider fail-fast scenarios where slowdowns beyond acceptable levees result in automated traffic siphoning to alternate services or auto scaling of existing application instances'

3.6 Cloud Service Management

Core Consideration	Have you considered how you will manage (ITSM) and govern cloud-based services?
Explanation	Operations management of cloud-based solutions may require changes to existing processes (change & configuration management, monitoring & alerting, incident & problem management, security etc.). This includes moving from alarm based service architectures to performance based service architectures, and the performance protection enablement tooling, which is predictive and pinpointing in a cloud native environment.
Choices	* Adopt the provider's tooling entirely and manage the cloud separately from on premise environments. * Where integration is possible, connect vendor tooling into current processes and tools incl. CMDB, CI & data models, event and alert management and integration, capacity management and planning, change management, service level reporting and business service reporting. * Adopt 3rd-party cloud management platforms/tooling which provide a layer of abstraction from the vendor-specific mechanisms.
Caveats & Consequences	* Availability of and level of integration options for tooling will vary by provider. Some will provide a high level of integration (via APIs, 3rd-party solutions, etc.), while others will be nearly "black box". The network is a particularly crucial part of cloud service integration - management and control of all aspects of it must be considered from end-to-end, especially if applications come from a LAN environment (low latency), and will now be operating over a WAN (high latency). A Proof of Concept or a pilot test is a particularly useful tool to evaluate solutions to the potential problem. * Due to the SOX requirements for Change and Configuration management logging, it is often necessary for specific industries to have access to this information, for successful audit purposes. * Deep integration of provider tooling into current processes and systems will likely need to be repeated with each provider. * Even for cloud services which provide a level of customer-accessible management and/or monitoring capability, the degree of control/visibility will

	invariably be of lesser granularity than you will have with on premise. * Multi-cloud management is still an evolving market, consisting of both established ITSM vendors and newer, niche players, with consolidation in the industry ongoing. Organizations may need to adopt multiple products/vendors to address gaps in capabilities. Organizations must take care to select a model for tracking instantiation and destination of virtual instances. Tracking every instance that spins up and spins down, for an auto scaling application can result in so many CI records that the CMDB inhibits service mismanagement rather than enabling it.

4 Implementation View

The implementation viewpoint addresses the migration method, as well as the operations of the business function, in the target environment.

4.1 IT Funding Model

Core Consideration	Have you considered the changes in IT Funding model?
Explanation	Changes in roles and skills of personnel need to be developed and planned for prior to adoption in order to enable transition to different spending models. A move to the cloud will necessitate that cap-ex centric **traditional** IT finance models migrate to op-ex centric **models.** These can be utilized to support charge-back or show-back with the business.
Choices	1) Keep all ICT budget with IT department 2) Implement Show-back or Charge-back with the business 3) Distribute all costs and control to the business, and fund the IT organization independently
Caveats & Consequences	Pre-existing spending models are challenged and are either confirmed as being relevant and valuable or are discarded as antiquated and or are no longer relevant.

4.2 Security & Change Management

Core Consideration	Have you considered how the cloud providers' approach to making changes to their services will impact your business?
Explanation	It is important to understand if the business function that you move to cloud needs to come under the enterprise governance and control in some way, and which processes must be considered, and how
Choices	1) Accept Cloud Providers' model and locate systems accordingly, accepting cloud provider software baselines as differing from Enterprise 2) Integrate Cloud Provider and Enterprise IT and synchronize software baselines
Caveats & Consequences	Define interfaces to my Change Management environment, and increase your processing speed to sync with the cloud provider's notification timing. The cloud user has no control on rejection of updates/changes, so must accept them, while understanding any potential impacts to the overall business process or function Incomplete information on changes may result in a need for updates to your

	processes and risk assessments

4.3 Certification & Compliancy

Core Consideration	Have you considered the capabilities (or potential lack thereof) of the subcontractors/suppliers to your cloud provider?
Explanation	In certain cases of compliance, and for critical systems, it may be necessary to know what the qualifications of the staff and subcontractors of the cloud provider. This may also extend to being able to leverage vendor support on certain of their products - without certain qualifications being in place, support may not be available when it is needed from the vendor.
Choices	1) Require evidence of certifications and compliance, with supporting material 2) Accept the supplier's ability to run according to its service commitments
Caveats & Consequences	Certifications and operations process and compliance requirements must be understood and contracted up front. Ensure access to security, performance and availability reports/data if accepting the cloud provider's ability to run according to it's service commitments

4.4 Enterprise Security Perimeters

Core Consideration	Have you considered the degree of necessary integration between your on premise and public cloud environments?
Explanation	It is necessary to provide clear guidance as to how public cloud based services will be incorporated into the enterprise landscape, otherwise the project can become mired in bureaucracy as different teams argue with each other or block progress.
Choices	1) Maintain secure Enterprise perimeter and create separate Cloud Security Domain 2) Extend the Enterprise perimeter to the public cloud with enterprise VPN and similar based protection as offered by the providers 3) Keep enterprise perimeter as is, and allow users to create and manage own credentials in the cloud, with a set of rules and policies regarding what they may use the cloud for.
Caveats & Consequences	Without this, multiple credentials will have to be maintained, and system interoperability may be reduced between the Enterprise and the Cloud App. Update security and risk management processes, and extend the security operations

4.5 Service Location & Law

Core Consideration	Have you considered the requirements (legal, regulatory, etc.) which may impact the geographic disposition of cloud services?
Explanation	Based on the enterprise use case, one has to decide which elements of the business function may be placed where to enable the most effective achievement of the objective.
Choices	1) Limit service and/or data location to being within specific geographies for legal compliance purposes 2) Allow any location, based on best performance or costs, accepting local law & compliance 3) Keep data and transactions within the enterprise perimeter, only allowing user interfaces to be located on the cloud
Caveats &	Consider enterprise compliance requirements, and which law should be

Consequences	applied regarding transactions and data persistence - data seizure and cross border compliancy differ extensively

4.6 Remediation on Quality Issues

Core Consideration	Have you considered acceptable response to your vendor not meeting quality of service expectations?
Explanation	Be clear up front on performance criteria, and how to obtain that performance, so as to set expectations with the business.
Choices	1) Accept the default service, knowing that there may be a cost to quality impact 2) Negotiate a proprietary deal, with associated costs to ensure adequate quality of service
Caveats & Consequences	Cost savings may result in quality or feature reduction. This may be OK if the features aren't needed or the business is more tolerant to performance vs. cost.

4.7 Service Scale Limits & Timelines

Core Consideration	Have you considered the limitations imposed by cloud providers regarding changes in capacity and the resulting implications (cost, timing, functionality etc.)?
Explanation	Be aware that although the cloud can scale infinitely, that there are specific ways in which it scales, which may not align to the application design, and sometimes this can take over 24 hours. Often a Proof of Concept (PoC) or Pilot exercise on the application parts can confirm if the designed approach and cloud will work.
Choices	1) Pre-order sufficient capacity for a quarter, with a capacity forecasting process implemented 2) Order capacity on demand 3) Perform PoC's along the way on various parts of the service, and then the whole service.
Caveats & Consequences	Pre-holding capacity may cause additional costs, but being constrained may cause business impact

4.8 Service Levels

Core Consideration	Have you considered what level of support response time you will require from your cloud provider?
Explanation	Understand exactly what the service provider can offer, then be clear on the service transfer points, and where the IT or other organization takes over. This extends from human responses and tasks, to tooling and information transfer.
Choices	1) Leverage the vendor's services based on whatever they offer 2) Establish management services ourselves, for all the layers we can control
Caveats & Consequences	Check the vendors' recovery time and data protection commitments. "Works as designs" is a regular comeback which surprises businesses who may be impacted by an element they cannot control, at the Provider. Also check that their maintenance slots do not disrupt your business hours from a different time zone! Check the support operation process of the cloud provider and their integration possibility with my IT support team

4.9 Portability vs Proprietary Tools

Core Consideration	Have you considered the risk and implications of "lock-in" which may result from adoption of provider-specific features and tools?
Explanation	Be aware that many clouds offer rather proprietary tools, which do not easily transport or scale to other clouds. If one is sticking with one trusted cloud, then it is OK, but if that is not the intention, then the tooling may limit your ambitions!
Choices	1) Use only minimum infrastructural elements from the cloud provider, and leverage own methods to ensure portability (own PaaS, utilizing of services common across providers, implementation of portability tooling, use of a cloud broker) 2) Commit to a vendor and keeping the app on that platform, leveraging the vendors' solutions and tooling to gain maximum efficiency
Caveats & Consequences	Utilization of baseline service offerings may prevent use of valuable and market differentiating vendor services, limiting your ability to scale, perform and avoid outages Maintaining use of your own PaaS elements may drive costs up, reducing benefits of leveraging the providers shared options and resulting in all feature and function development having to come from your team.

4.10 HR Incentives

Core Consideration	Have you considered how to incentivize your staff to drive cloud adoption success?
Explanation	People perform to how they are measured - if you want them to pro-actively move forwards with the strategy implementation, then measure them accordingly!
Choices	1) Leave the staff goal, measurement and reward systems as-is 2) Migrate to cloud, understand the required staff behavior changes, then implement changes to goals and incentives 2) Define incentivization schemes up front, so as to accelerate the Cloud adoption process
Caveats & Consequences	The "trusted company oracles' may not buy in, and failed projects can become "example" arguments, Understand the motivation of the employees in order to align the reward and recognition to drive the proper output

4.11 Disaster Recovery

Core Consideration	Have you considered your requirements related to disaster recovery?
Explanation	Define recovery based on the criticality of the application, what must be recovered where with respect to RTO, RPO, and RCO
Choices	Implement Active – Active (real time replication at application or data level) Implement Active – Passive (asynchronous replication or log based replication) Implement Passive (regular data copies) Don't implement backup/recovery
Caveats & Consequences	Understanding the value return from a system or application is critical to ensuring that the right back up and recovery choice is selected. Selecting a lower level recovery solution could result in revenue loss or brand impact for a company. Conversely, a low value yield application with an expensive active-active solution is not cost effective for the organization.

	The type of data or transaction synchronization will have a large impact on network and security models, as well as potentially touching application performance. It is recommended that these behavioral characteristics are understood prior to selecting a disaster recovery solution.

4.12 Migration Methodology

Core Consideration	Have you considered which migration methodologies will best support your cloud projects?
Explanation	Different methodologies yield different results - a wrapped application may still not auto-scale and a re-hosted application may not leverage API based functions as effectively - be aware of the business objectives for the function.
Choices	Retire Lift and Shift (no refactoring) Refactor (re-writing code, changing platforms, but capped in effort) Cloud Native (a complete re-write to cloud platform, cloud design, cloud technologies Also known as the 5 R's (Retire, Replace, Retain & Wrap, Re-host, Re-envision)
Caveats & Consequences	The fastest simplest initial migrations may result in complex future scenarios (e.g. Lift and Shift) – putting effort into truly making an application cloud capable up front can save future costs and enable more long term benefits

4.13 Exit Planning

Core Consideration	Have you considered a potential "exit strategy" from your provider?
Explanation	If one does not have a clear plan and triggers documented, then exiting can become expensive and painful, with a need for legal events and evidence, and partner-relationship challenges
Choices	1) Define performance requirements, conditions and timelines now 2) Wait until it is necessary, then define it based on the situation
Caveats & Consequences	I wish I had realized the termination / exit cost, because I get/got locked into the proprietary services of the vendor. This is largely driven from lack of solution portability