



OPEN DATA CENTER ALLIANCE

Hybrid IT: Barriers & Challenges

Contributors

- Lucia-Marie Muench – T-Systems
- Matt Estes—The Walt Disney Company
- Ryan Skipp—T-Systems
- Shamir Charania - Stratiform
- Shawn Chapla – GlaxoSmithKline
- Tom Scott—The Walt Disney Company
- Wei Tong – Price Waterhouse Coopers
- William Dupley – Hewlett Packard Enterprise

Contents

| | |
|---|-----------|
| Contributors | 1 |
| Executive Summary..... | 4 |
| Introduction | 5 |
| Where is the world going? | 5 |
| Business Trends | 5 |
| Technology Trends..... | 5 |
| Globalization and Competitiveness..... | 6 |
| Why follow down this route..... | 6 |
| What will slow Hybrid IT integration down | 6 |
| Hybrid delivery..... | 7 |
| Hybrid application architecture and workloads | 7 |
| Hybrid dev ops..... | 8 |
| Hybrid service management..... | 8 |
| Hybrid infrastructure | 8 |
| Issues When Integrating | 8 |
| Barriers & Challenges to consider when integrating Hybrid IT..... | 9 |
| Barrier Class 1: Values, Cultures & Beliefs of the Enterprise..... | 9 |
| Barrier Class 2: Management, Leadership, Measurement | 10 |
| Barrier Class 3: Policies & Governance | 10 |
| Barrier Class 4: Organization, Jobs & Skills | 11 |
| Barrier Class 5: Technology, Process & Infrastructure | 12 |
| How to overcome | 13 |
| Supporting ODCA Information..... | 13 |
| Conclusion..... | 14 |
| Appendix A | 15 |
| Values, Beliefs & Culture related Barriers | 15 |
| Management, Leadership & Measurement..... | 17 |
| Policies & Governance | 19 |
| Organization, Jobs & Skills..... | 23 |
| Technology, Processes & Infrastructure | 25 |

Legal Notice

LEGAL NOTICE

©Copyright 2016 Open Data Center Alliance, Inc. ALL RIGHTS RESERVED.

This “Hybrid IT Barriers & Challenges” is proprietary to the Open Data Center Alliance (the “Alliance”) and/or its successors and assigns.

This ODCA document is licensed under the Creative Commons Attribution +ShareAlike (BY-SA) License. To view a copy of the license, visit <https://creativecommons.org/licenses/by-sa/4.0/>

If any derivatives of this document are published, the following statement must be identified: “*This document is based on the Hybrid IT Barriers & Challenges document created by the Open Data Center Alliance, Inc. (ODCA), but may contain changes to the original ODCA document which have not been reviewed or approved by the ODCA.*”

LEGAL DISCLAIMER:

THIS DOCUMENT AND THE INFORMATION CONTAINED HEREIN IS PROVIDED ON AN “AS IS” BASIS. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, THE ALLIANCE (ALONG WITH THE CONTRIBUTORS TO THIS DOCUMENT) HEREBY DISCLAIM ALL REPRESENTATIONS, WARRANTIES AND/OR COVENANTS, EITHER EXPRESS OR IMPLIED, STATUTORY OR AT COMMON LAW, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, VALIDITY, AND/OR NONINFRINGEMENT. THE INFORMATION CONTAINED IN THIS DOCUMENT IS FOR INFORMATIONAL PURPOSES ONLY AND THE ALLIANCE MAKES NO REPRESENTATIONS, WARRANTIES AND/OR COVENANTS AS TO THE RESULTS THAT MAY BE OBTAINED FROM THE USE OF, OR RELIANCE ON, ANY INFORMATION SET FORTH IN THIS DOCUMENT, OR AS TO THE ACCURACY OR RELIABILITY OF SUCH INFORMATION. EXCEPT AS OTHERWISE EXPRESSLY SET FORTH HEREIN, NOTHING CONTAINED IN THIS DOCUMENT SHALL BE DEEMED AS GRANTING YOU ANY KIND OF LICENSE IN THE DOCUMENT, OR ANY OF ITS CONTENTS, EITHER EXPRESSLY OR IMPLIEDLY, OR TO ANY INTELLECTUAL PROPERTY OWNED OR CONTROLLED BY THE ALLIANCE, INCLUDING, WITHOUT LIMITATION, ANY TRADEMARKS OF THE ALLIANCE.

TRADEMARKS: OPEN CENTER DATA ALLIANCESM, ODCASM, and the OPEN DATA CENTER ALLIANCE logo[®] are trade names, trademarks, and/or service marks (collectively “Marks”) owned by Open Data Center Alliance, Inc. and all rights are reserved therein. Unauthorized use is strictly prohibited. This document does not grant any user of this document any rights to use any of the ODCA’s Marks. All other service marks, trademarks and trade names reference herein are those of their respective owners.

Executive Summary

Cloud computing has risen in the data center world and proposes to be an answer to many traditional IT challenges. These include improved time to market, leveraging open innovation, shared / community development, agility, increased availability, avoiding costs for expanding infrastructure and facilities, and aligning IT costs more directly to business product revenue. With the introduction of this technology, come a number of changes that must be well planned, ranging from compliance considerations, through IT skills, through Financial models, and on into operational models and organizational structure.

Some of these changes will encounter a number of barriers and challenges, which will require soft changes to be driven through the enterprise, and which must be well-planned. These may range from compliance considerations, through IT skills, through financial models, and on into operational models and even organizational structure.

The members of the Open Data Center Alliance (ODCA) including both consumer and provider organizations have shared their real world experiences, and based on these, produced a number of papers to document these experiences and resulting recommendations. This paper represents a viewpoint on some of the important planning that Business Executives, IT Executives, IT Operations Management, and Consultants should take care to consider and plan for, when bringing Cloud Technology into the Existing Enterprise's IT landscape. The result of this combination of Existing Enterprise Systems and Cloud Services is termed "Hybrid IT".

By **Hybrid IT**, reference is made to the use of traditional internal IT systems and cloud environments with the participation of external partners and systems and services simultaneously, so as to enable the Enterprise overall. Hybrid IT considers the multiple involved layers of people, process and technology across the enterprise IT ecosystem in context of the differing operating models that each IT Service type and that the internal and external delivery models drive. Some of the key

Since Enterprises need to ensure ongoing innovation and maximize opportunities in order to compete and survive, they have to begin to consider how new technologies can improve their position in the market.

In cases where an enterprise will use two or three cloud service platforms in combination (Traditional IT, Private Cloud, Public Cloud, Hybrid Cloud) , including various service bundling such as SaaS, PaaS, IaaS, and Info-aaS, amongst others, it is very important for them to plan how to govern and manage the services effectively and sustainably.

Many of the challenges that the organization will encounter as they adopt Hybrid IT do not come from the new IT systems themselves, but rather the enterprise's structure, processes, and operations models. This paper discusses some of the common ones to consider.

Introduction

Most enterprises in the world are now leveraging or considering the integration of cloud based services into their technology landscape. Their use cases may be wide, but the benefits almost always consolidate towards cost improvement, flexibility, agility, and enabling global competitiveness and access.

Although initial access to cloud may seem relatively mundane, keeping control of it and managing it as use sprawls over time can be challenging. Truly integrating it into the enterprise environment so that it can be governed, compliance maintained, and services managed sustainably usually requires some updates to the enterprise IT environment and applications. Through actually identifying, planning and implementing these changes in both their own enterprises and at some of their clients, and sharing the resulting experiences, the practitioners who contributed to this document recognized that a number of commonly occurring challenges and barriers must be identified or recognized, and solutions implemented (many of which are repeatable).

The writers of this document, as experienced practitioners in the field of Cloud and Hybrid IT integration, identify common scenarios they encounter, to share and help enterprises identify common problems and some of the typical solutions to those problems.

Where is the world going?

Business Trends

A number of forces drive businesses to constantly innovate and re-shape themselves in order to remain both competitive and efficient. These forces can also be represented as “trends” if one generalizes common factors. Some of major trends today include:

1. Much flat(ter) business hierarchies and organizational structures,
2. Virtual teams and global interconnections
3. Much higher individualism (such as own design of cars, shoes, etc. from a set of standardized options),
4. Significantly increased expectations of production speed, scalability, and delivery times
5. Digital native connectivity via current technologies and interfaces such as smart phones, watches and tablets for many types of daily interactions.
6. Demands and expectations of GenX and GenZ
7. Global Competition
8. Buyer Empowerment
9. New Business Models

Technology Trends

Some of the trends that the above forces drive at a technology level include:

1. Industry 4.0
2. Machine to machine interaction (M2M),
3. Internet of Things (IoT)
4. Big Data

5. Use of virtual reality technology
6. Increased bandwidth availability
7. High latency impacts
8. Move to Cloud Native application designs
9. Move to DevOps and Agile Application development
10. Hybrid IT application workloads
11. Data and application classification and compliance management
12. Digital device meshes (multi environment and device integration)
13. Mobile device access to all services
14. Integrated security and single sign on
15. Move from perimeter Security to Integrated Application based Security
16. Enabling an organization to analyze data in real time to enable foresight and insight, and not just hindsight!

Globalization and Competitiveness

As fast as companies release products and services, global competitors are paralleling those efforts, and every enterprise has to keep evolving and enriching their services which driving down their costs. In addition, in the globalized world, clients are demanding global reach from their partners, with capability and cost effectiveness at every outpost. Cloud technology is one tool that enables organizations to keep flexing and updating their services rapidly, scaling both globally and in direct alignment with actual needs and revenue streams. Additionally one has to quickly and cost-effectively integrate global partner delivery organizations, or even progress through mergers or acquisitions. In order to hurdle these steps efficiently, use can again be made of Hybrid IT concepts and approaches.

As the Enterprise considers leveraging cloud applications and interfaces towards this type of enablement they have to also remain compliant, secure, and integrated with their existing internal applications, control systems and governance. One cannot just blindly stumble into cloud – it has to be planed through the construction of a Hybrid IT Roadmap, and in this planning one has to consider barriers and plan to address or remove them entirely, otherwise ones global aspirations and hybrid IT extensions could quickly become knee-haltered.

Why follow down this route

As seen in the previous section, once one is competing in this globalized arena, and leveraging partnerships to achieve it, cloud and Hybrid IT become more and more critical to business service enablement. In addition, the enterprise can now leverage pre-developed applications from the cloud thereby avoiding costly development lead times and costs, releasing new functionality almost daily. Use of these pay-per-use services also help to scale costs in direct proportion to revenue, and frees the organization to focus on core services rather than generic ICT.

What will slow Hybrid IT integration down

The cloud represents a powerful new paradigm in computing—one that enables highly scalable applications and services to be accessed over the Internet on an as-needed basis, --- one that has significantly changed how IT is built, delivered and operated. No longer is IT contained within the four walls of a company, now it is a combination of internal and external applications integrated into one Hybrid IT model. This new Hybrid IT model supports a new style of business and the democratization of IT. In a democratized IT model, anyone can create IT services. IT no longer needs to be involved in every application development exercise, now business units are able to build and provision their own IT systems using SaaS and public cloud services.

There are five domains to hybrid IT operating model. These domains are:

- Hybrid Delivery
- Hybrid Application architecture and workloads
- Hybrid DevOps
- Hybrid Service Management
- Hybrid Infrastructure

Hybrid delivery

A hybrid IT model's Services are no longer delivered from within the walls of an IT organization. They now can come from the public cloud, SaaS providers, private clouds, virtual private clouds, and traditional services. IT needs to facilitate three roles to deliver a hybrid delivery model. These three roles are:

Service broker: IT is responsible to facilitate the provisioning of services from any source to the customer, facilitate the chargebacks for those services, and provide one-stop shopping through a common portal for their customers

Service provider: IT is responsible that the services that they provision through their portal meet required service-level agreements, and ensure that the services offered meet the policies of the enterprise

Business innovation enabler: IT is responsible to provide a new role to help a customer identify what is the best method of delivering workloads. They need to be able to recommend sass services, platform as a service, or other delivery models to their customers.

Hybrid application architecture and workloads

A hybrid IT model application transactions can be delivered from four possible sources. These sources are

- SaaS providers
- platform as a service
- traditional application services
- cloud native services

IT must be able to integrate these four different application delivery vehicles into one hybrid application stack.

Hybrid dev ops

A hybrid IT operating model requires development and operations to be integrated into one seamless supply chain model that will enable traditional application acceleration and cloud native application design and continuous deployment and delivery.

Hybrid service management

A hybrid IT operating model requires the IT processes and IT service management technology are able to manage a hybrid IT application workload and infrastructure architecture as one service. It requires a transformation of the process model to a cross IT supply-chain process model similar to what is been implemented by the IT4IT model proposed by the open group, also the IT service management architecture must be able to provide an end-to-end view of the service regardless of how the services delivered.

Hybrid infrastructure

A hybrid IT operating model requires that a developer be able to provision their own infrastructure using API calls. That infrastructure can be located in public cloud suppliers such as AWS, Microsoft Azure, private cloud supply, or traditional infrastructure

Issues When Integrating

For every enterprise, the adoption of new technologies and methods is not without challenge. These challenges slow down the efficiency and effectiveness of a technology implementation. Many of them may also not lie directly with the technology itself, but with the organizations readiness and willingness to really incorporate the new technology and the processes and thinking that go with it. There are two classes which must be considered – barriers & challenges:

1. What is a barrier – a barrier is a blocker – something that HAS to change before the integration of the technology can move forwards
2. What is a challenge – a challenge usually is a deficiency – something that is needed to enable the technology (e.g. Hybrid IT), but is not yet catered for.

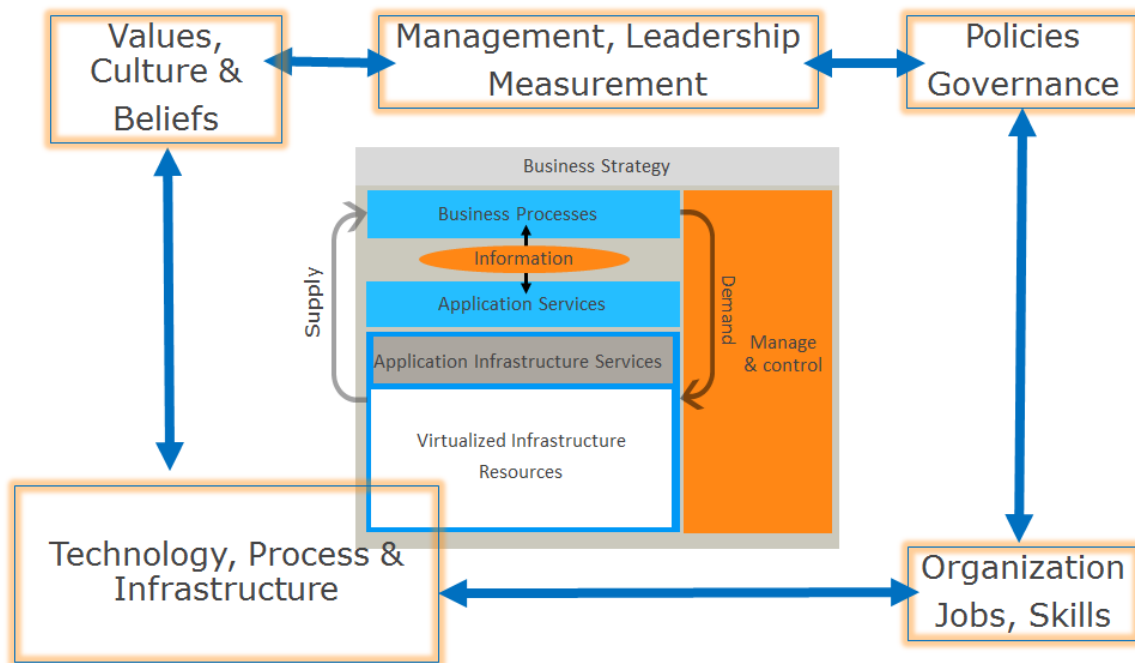
When considering barriers and challenges, the effect of leadership must not be underestimated. It is common that the organizations' culture is set by the management and executives, but manifests in the technical layers. One can end up chasing the manifestation of a barrier between different domains, only to eventually realize that it actually originates from a culture set by the executive layers. For example, Security may refuse to authorize a service, rather than pro-actively supporting and making constructive recommendations for solutions. This could be because the culture set elsewhere is not that of enablement of individuals to find solutions, but rather to identify deviants, and blame risk materialization on their mistakes.

Actors and roles must also be considered closely – those who are considered as trusted advisors to the business and IT can have large impact with their fleeting comments –

these parties need to be aligned to the business objectives, timelines, and concepts of Hybrid IT in a positive and constructive way.

Barriers & Challenges to consider when integrating Hybrid IT

Common barriers occur in most companies. The most regularly occurring ones have been grouped below according to a number of repeating classes. The list is not exclusive, and each organization will identify (if they are honest to themselves) their own special variants of these, and potentially some others. More detailed common barriers and challenges are listed in Appendix A, with some solutions identified that have been found to work, as well as a number of associated considerations for each. A diagram of the various barriers is represented, with detailed descriptions following:



Barrier Class 1: Values, Cultures & Beliefs of the Enterprise

Culture or belief conflict - Current corporate culture will not support the required process or activity to change or be improved to accommodate Hybrid IT needs.

Complacency in existing processes and established business practices that have deep rooted attitudes in how to conduct business creates a barrier to change.

Example: Businesses that have long established relationships may have new business requirements that no longer align with existing vendor capabilities, but because of legacy relationships, change cannot occur to enable delivery of the new capabilities needed by the business.

Entitlement is a key barrier. For example IT may think that they are in control of all technology and that the business has no right, understanding or capability to define their own requirements and use cloud based services beyond what they can do or offer.

Barrier Class 2: Management, Leadership, Measurement

Lack of leadership problem - Management do not lead, resource, fund or manage the changes required to enable the business through Hybrid IT integration.

Carrot and the Stick – Threats to change may be an incentive to adopt new technologies and practices but are short lived and may increase operational risk. While incentive programs will not only entice personnel to adopt new technologies and practices, they may also reduce operational risk if the incentives are tied to attainable goals that align with business needs and technology capabilities.

Adoption of management incentive practices to adopt Hybrid IT is needed to entice personnel to accept challenges of learning new technologies that may be outside of their comfort zone.

Organizational changes from the technology teams need to occur in order to get business adoption.

Examples: Top-down leadership fears decrease of authority; no overview is available about current IT costs, IT cost/expense allocation to enable them to lead and make decisions.

Management or Measurement system problem - The measurement system (reward or compensation system) doesn't reinforce the changing or improving of a process or activity necessary to support Hybrid IT. People deliver according to how they are measured – if the measurement does not incentivize innovation or drives them to leverage “existing “old” services more”, and then one should not expect them to actively support new ideas. This can manifest by “questioning everything new, against current proven environments”, slavish process adherence, outdated business process entrenchment, and avoidance of decision making on new solutions, amongst others.

Three key measurement systems commonly exist:

1. Graphic rating scales: List of job duties, with a 1-5 rating scale. Compensation ties to higher scale results – i.e. does not easily support new or unknown situations.
2. Management by objectives: Goals, timelines, and employees assigned responsibility to them, achievable by any method. Compensation ties to goals achieved in specific times.
3. Forced ranking: e.g. High performance (20%), Average (70%), Low (10%). Considers achievements against peers and past own performance. Compensation is based on the ranking result.

Barrier Class 3: Policies & Governance

IT Governance – The existence or alternately even the lack of existence of effective governance and control can strongly influence successful Hybrid IT establishment. Command and control methods around IT Spend, IT Architecture or IT Delivery can be

limited to the commanders' level of understanding of Hybrid IT, and what risks and decisions they are consequentially prepared to take. Lack of effective controls can cause leaders to be very hesitant about adoption of external resources and services.

Policy without governance will create barriers to adoption as it disconnects the efforts to develop new technology capabilities from the potential risk they can present.

Business Policy & Governance - Financial policies and practices are often serious barriers. This is often present in many public sector organizations where “above the line” operating budgets (i.e. operating expenses not including depreciation) are under an especially high level of scrutiny. Also, capital budgeting and operating budgeting typically go through different processes and are governed differently.

Cloud adoption regularly leads to an increase in the operating budget, making it difficult to get business cases approved, even if the total cash view (OPEX + CAPEX) over a reasonable time period (e.g. 3-5 years) is positive. Mitigation typically comes when organizations become knowledgeable about accounting rules and how they pertain to cloud, and how they can be applied to suit a given scenario (IaaS/PaaS/SaaS); cost modelling best practices; building business cases based on non-financial benefits; etc.

Audit Management can be a tool to build bridges between policy and adoption. Views around sufficient policy and control existing to take advantage of cloud can also be seen as adversarial if the supporting governance is not in place. Different sets of policies can divide resources and add complexity.

Examples: Security responsibility is divided between business, risk & compliance, IT, various security functions, and developers.

Barrier Class 4: Organization, Jobs & Skills

Job description, skills or organizational problem - The current job descriptions, skills of the employees or organizational structure will not support the process or activity to be changed or improved to effectively enable and support Hybrid IT.

Additional resources may even be needed to free up existing personnel to learn new skills. Not having sufficient mechanisms to develop personnel can cause fear and anxiety about adopting new technologies and changes in the business environment.

Threats can be perceived when there is organizational disparity with Hybrid IT requirements, and when different teams block each other or try to “hijack” budget, investment, or procurement control, or even deliberately exclude other teams from opportunities, investment benefits, and access to certain services.

Example: Management may bring in “outside” consulting to evaluate “Cloud Opportunities and Capability” rather than utilize internal resources or develop skills of the technology teams to meet this need, raising a perceived threat to internal “experts” resulting in them resisting or undermining the project.

Example: No cross-organizational teams, Missing IT expert skills (transformation from being a basic “IT operations department” into “cloud consultation team to the business” needs to happen).

Example: Rapid cloud and technology evolution is typically faster than the enterprise can keep up with, thereby meaning there are lost opportunities or capabilities to the business which they may be paying for but not using. Consequentially the business unit's switch to diverse or simpler services that they are able to understand and deal with, but lose opportunity because of perceived individual cost savings! A process needs to be established to prevent loss of the value of consolidated resources.

Barrier Class 5: Technology, Process & Infrastructure

Information system: **Application System is inadequate or not existent** – The required Application system with defined interfaces and defined functions for integration does not exist, or its service levels, (hours of operation, reliability, or performance) will not allow the process or activity to be changed or improved.

Information System: **Data is not collected or available** - There is no data collected or the data is not available to the people who need it to make decisions about how Hybrid IT can be integrated, or not in the form they require it.

Information system: **Infrastructure is inadequate, or non-existent** - The infrastructure system does not exist or its capability or service levels, (hours of operation, reliability, or performance) will not allow the process or activity to be changed or improved – for example it is batch driven or manually updated, or has no defined interfaces for automated event triggered updates.

Information system: **Service or Service Levels inadequate, or non-existent** - The service does not exist or is not defined or its service levels, (hours of operation, reliability, or performance) will not allow the process or activity to be changed or improved.

Physical layout or location problem - The location of people will not allow the process or activity to be changed or improved.

Service Delivery technology problem - The technologies used to perform the process or activity (machines, phone system, remote computer access etc.) will not allow the process or activity to be changed or improved.

Process design, ownership (accountability), or **handoff** (inter-process accountability) **problem** - The process is not documented or followed, or not owned, or there are too many owners. The process or activity is fractured with too many handoffs or insufficient responsibility for it to be effective.

Example: Costs of Software Licensing are not considered when migrating to cloud – many of these can scale out of control, and beyond the real needs of the business. Alternatively the cloud environment requires a deep review and re-designs in order to effectively control software costs for the various licensing models.

Example: Everyone wants to control and manage your API's for you (which management and control is in fact very important), but they create lock-in to their technology once you select "their" tool.

Example: Register API's (possibly in the CMDB) so as to track and understand them and their relationships to various systems – once many API's are in operation, it becomes hard to know which systems will be affected when small updates or changes are made to this part of the eco-system.

Example: No application categorization exists, no data management systems exist, server use and utilization information which is needed to enable management and control is missing.

How to overcome

In order to begin the process of identifying barriers and challenges, an open honest neutral review of the current environment must be performed. Even more importantly, the executives and management must be prepared to admit to the problems identified and that change actions may be necessary. What must I do?

1. Admit that there are barriers & challenges
2. Don't blame others – take responsibility for those that you can
3. Define ideal / workable solutions
4. Create implementation plans for the solutions, including a change mandate

A number of repeating barriers are identified in Appendix A with information on the most successful approaches to dealing with these barriers

Supporting ODCA Information

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

- a) **Service Catalogue** – this paper identifies a number of the key considerations and systems enabling interactions between Hybrid IT environments and providers
- b) **Cloud Co-existence with Existing Enterprise** – the many layers of interacting interfaces that must be catered for are identified
- c) **Commercial Framework** – important considerations and approaches to contracting Hybrid IT partners are discussed
- d) **Provider Assurance** – Aspects which need to be taken into account regarding compliance and operations are listed in this paper
- e) **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
- f) **Data Compliance** – A number of important aspects of data management in a Hybrid IT scenario are detailed.

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 aspects that the enterprise need to think about first, and analyze, then consider and implement mitigation actions where appropriate. These 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 often have to be addressed through a structure project, usually 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

Following are a list of typical example Barriers and Challenges per Barrier class, with some of the dependencies and solutions that various ODCA members have identified could overcome them. The barriers are grouped into 2 classes – “Quick-wins”, and those enabling “Increased Maturity”.

Values, Beliefs & Culture related Barriers

| Short name | Trust |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Internal IT struggles to give up control of/visibility into how things work “under the covers” with external cloud providers. |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Partnering between Business and IT to make the journey to hybrid IT collaborative. – Build Confidence about execution on policy requirements |
| Solution | <ul style="list-style-type: none"> – Start with small, non-critical projects to build confidence and trust in the partner and between Business and IT, the technologies and processes, and the education of partners about the enterprise's requirements / control sets and how they meet them |
| Important considerations | <ul style="list-style-type: none"> – Evolve internal IT to take a “layered” approach (i.e., SaaS, PaaS and IaaS). Then consuming, for example, IaaS, may be more transparent as to whether it’s internal or external. – Consider an audit of the partner, and their certifications (e.g. CSA) |

| Short name | Resistance to Change |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Teams are not keen to change what they know works, and what are comfortable with |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – All teams understand the reasons for Hybrid IT adoption – Understanding and measurement of what the benefits are, and team roles in achieving those benefits are defined |
| Solution | <ul style="list-style-type: none"> – Executives must set a clear mandate, objectives and deliverables for Hybrid IT. – Involved business units must be educated on their role and responsibilities in achieving these objectives. |
| Important considerations | <ul style="list-style-type: none"> – People respond to how they are measured |

| Short name | Loyalty to old partnerships |
|--------------------------|--|
| Description | – Current partners may have previously added value, but may not have capability in the cloud space, and are holding the organization back |
| Positioning | – Increased Maturity |
| Dependencies | – Documented business strategy, timelines & objectives, preparedness to address comfort zones |
| Solution | – Map out the business strategy, objectives, and timelines, then identify which partners are aligned / capable to enable this, and identify any changes which may be required, and their willingness to adapt to the new requirements, away from current comfort zones |
| Important considerations | – Contract values, exit clauses, communications requirements with partners, and documented roadmaps of features and functions for business services must be communicated clearly and in time, gain and loss analysis performed if changing partners |

| Short name | Traditional IT control of IT services |
|--------------------------|--|
| Description | – IT feel they are and should remain in control of all IT as they understand it, and of partnerships, and are the one responsible party to business – as business request cloud services though, IT have trouble finding their position in the chain |
| Positioning | – Increased Maturity |
| Dependencies | – Executive (Bus Exec) understanding of their services and the Hybrid IT enablement / business flexibility they bring |
| Solution | – Organizational change management is required to address changing roles, education, culture, enablement, measurement and responsibility sub-visioning |
| Important considerations | <ul style="list-style-type: none"> – Update RACI Matrix to delineate new responsibilities – Update Workflows & Approvals to include cloud – Create Business Function mapping to deployment authority – Document Business Transaction map/s |

Management, Leadership & Measurement

| Short name | It's an IT Problem |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – Execs see cloud as purely in the domain of IT, and want to leave responsibility all centralized to IT. (An ancillary challenge is business see IT as getting in the way and would prefer to go ahead without IT's involvement, getting into engagements which are difficult to integrate, support or exit) |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Executive understanding of IT services and the enablement / business flexibility they bring |
| Solution | <ul style="list-style-type: none"> – Identify and mandate the responsibilities and organizational structure necessary to bring both agility and flexibility to the business |
| Important considerations | <ul style="list-style-type: none"> – Distribution of responsibility and authority – Stated re-positioning of IT as a consultant to the Business |

| Short name | Risk Management Role Definitions |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – IT can no longer be held completely accountable for internal and externally located applications |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – IT, Business and Security, Compliance and Risk Management must be updated on cloud services and associated responsibility. – All applications & data must be classified into categories for protection |
| Solution | <ul style="list-style-type: none"> – Transfer responsibility to the User – Create an appropriate Categorization framework for the Business applications – Update responsibility (RACI) frameworks |
| Important considerations | <ul style="list-style-type: none"> – Identify shared data and rules – Define control sets for critical systems early on |

**Open Data Center Alliance:
Topic: Hybrid IT – Barriers & Challenges**

| Short name | Lack of vision and direction |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – There is no executive vision, objectives, timeline or goals – each team just does as they see best |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Identify key role-players in the organization and solicit their support |
| Solution | <ul style="list-style-type: none"> – Address the key role-players and solicit an agreed set of objectives and timeline. – Map an action plan/roadmap with them to address key pain-points which current IT cannot address but Hybrid IT can potentially solve |
| Important considerations | <ul style="list-style-type: none"> – There must be a desire for movement and improvement – Don't take on historical IT problems – pick the areas that Hybrid IT specifically can solve, otherwise you will become bogged down |

| Short name | Lack of organizational hybrid IT strategy |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – There is no hybrid IT awareness when adopting cloud services, no mention of Hybrid IT strategy |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Hybrid IT awareness and correct understanding of what Hybrid IT is, and the impact of Hybrid IT. |
| Solution | <ul style="list-style-type: none"> – Perform a Hybrid IT barrier and challenge assessment – Develop a Hybrid IT strategy |
| Important considerations | <ul style="list-style-type: none"> – Existence of an organizational level Hybrid IT strategy – Hybrid IT Barrier and challenge identification |

| Short name | Not invented here |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – The Execs / IT believe that they know and understand Cloud, and can handle the migration themselves internally |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Understanding of the layers that comprise IT services – Documented ITSM & Integration requirements |
| Solution | <ul style="list-style-type: none"> – Consider the whole management, governance and control stack – Review the partner contracts and services against business requirements, and identify key change areas (both sides) |
| Important considerations | <ul style="list-style-type: none"> – Documented business requirements must exist – Understanding of IT Service Management & Governance needed – Avoid “partners” who may be leading the organization by the nose |

| Short name | Measurement drives Behavior |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – The existing measurement systems do not incentivize use of cloud and any experimentation or innovation |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Innovation culture – Compensation system in place – Measurements for individuals must be defined |
| Solution | <ul style="list-style-type: none"> – Acquire executive mandates – Create a cloud based set of KPI's – Allocate responsibility to individuals / roles |
| Important considerations | <ul style="list-style-type: none"> – Organizational level hybrid IT strategy |

Policies & Governance

| Short name | Transition from CapEx to OpEx financial model |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Internal financial processes for IT are often built around and geared toward CapEx funding - Existing Business Practices and Spending Strategies misalign with cloud |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – A comprehensive understanding of internal costs and usage of IT resources. |
| Solution | <ul style="list-style-type: none"> – Develop unit costing models for internal IT to allow for more informed decision making relative to adoption of cloud. – Implement a chargeback/show-back model and underpinning capabilities to effectively assign cost and consumption responsibility |
| Important considerations | <ul style="list-style-type: none"> – - CIOs/CFOs concerned about IT costs becoming less predictable. – - This can also complicate pricing comparisons between external cloud services and internal IT costs. – - OpEx model does not leverage “sweating” IT assets approach. |

| Short name | Risk Management Role Definitions |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Risk management continue to hold IT completely accountable for internal and externally located applications, over which IT has little control and so will resist supporting democratization of IT |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Security, Compliance and Risk Management must be updated on cloud services and who is responsible for what. – All applications & data must be classified into categories, for protection |
| Solution | <ul style="list-style-type: none"> – Create an appropriate Categorization framework for the Business applications, and update associated RACI matrixes |
| Important considerations | <ul style="list-style-type: none"> – Map business transactions across application landscapes – Identify shared data and rules – Define control sets for critical systems |

| Short name | Auditability |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Ability to satisfactorily audit an external provider’s processes, particularly in highly regulated industries. |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Ability to evolve/expand internal processes & controls to account for cloud based services. |
| Solution | <ul style="list-style-type: none"> – Partner with the responsible audit function in assessing potential cloud providers, up front |
| Important considerations | <ul style="list-style-type: none"> – Major cloud providers likely have already been down this path with prior customers, and developed processes/tools to accommodate the requirement. |

| Short name | Risk Management Role Definitions |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – IT can no longer be held completely accountable for internal and externally located applications |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – IT, Business and Security, Compliance and Risk Management must be updated on cloud services and associated responsibility. – All applications & data must be classified into categories for protection |
| Solution | <ul style="list-style-type: none"> – Transfer responsibility to the User – Create an appropriate Categorization framework for the Business applications – Update responsibility (RACI) frameworks |
| Important considerations | <ul style="list-style-type: none"> – Identify shared data and rules – Define control sets for critical systems early on |

| Short name | Lack of Cloud Use Policy |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – The business has access to any cloud, and uses them randomly, disabling any single view of the Enterprise IT landscape |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Define a Commercial framework for cloud services contracting – Select a defined but sufficient range of partner options |
| Solution | <ul style="list-style-type: none"> – Establish a formal cloud use policy, including the authorized cloud partners and cloud service request processes and purchase processes and responsible parties for each process |
| Important considerations | <ul style="list-style-type: none"> – Management of “company credit card” based purchases – Defined rules which are communicated to all business units – Defined process and penalties for non-compliance – Defined cloud service request processes. |

| Short name | Spending Practices and Forecasting |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – Internal financial processes are not able to take advantage of pricing opportunities due to existing spending models. |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Internal spending practices are built around structured spending polices which require approvals in order to respond to opportunities. |
| Solution | <ul style="list-style-type: none"> – Develop proactive spending models that can take advantage of market opportunities such as “Market Places” and “Spot Market” purchasing based on financial triggers and forecasting policies. |
| Important considerations | <ul style="list-style-type: none"> – Need to have a strong data analytics, forecasting and established KPI’s in place to leverage a proactive market |

| Short name | CAPEX vs OPEX |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – Various business requirements result in the need for CAPEX based allocations, depreciation and reporting, which mis-align with Hybrid IT models. |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Business requirements for cost assignment and control, as well as any public reporting requirements (e.g. public sector organizations). |
| Solution | <ul style="list-style-type: none"> – Partition and assign CAPEX & OPEX aspects accordingly, with the appropriate reporting to support them. – Align individual business unit to a parent account, allowing tracking of all instances and resulting transaction costs for the company |
| Important considerations | <ul style="list-style-type: none"> – Detailed financial reporting capabilities must exist tracking systems, services and business units accurately – Because accounts are associated with business units, usage reporting and audit compliance reports should be enabled. |

| Short name | Financial Control |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – IT Budget (& control) distribution to business units resisted by IT and Finance depts. |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Understanding of cloud and the agility that it can create for the organization |
| Solution | <ul style="list-style-type: none"> – Budget control and Procurement authorization process must be defined and put in place |
| Important considerations | <ul style="list-style-type: none"> – In order to manage costs, regular reporting must enable management to govern and control their consumption of resources, in proportion to the business process and value. – Un-involved units (e.g. HR & Finance) can be tempted to buy disproportionately functional systems online. Fit-for-purpose concept needed |

| Short name | IT Governance Framework and internal control |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Current IT governance framework doesn't consider cloud service, so it does not support hybrid IT. Lack of governance on cloud services will bring critical risks for the IT management and business continuity. |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Governance team needs to understand business imperatives, business applications, cloud services, and application & data classification. |
| Solution | <ul style="list-style-type: none"> – Updated or integrated IT Governance Framework including cloud specific governance processes and rules – Updated management / control framework to include cloud |
| Important considerations | <ul style="list-style-type: none"> – Expend lifecycle IT governance approaches to cover cloud specific characters. <ul style="list-style-type: none"> ○ Governance procedures ○ Risk management ○ IT assets management |

Organization, Jobs & Skills

| Short name | Threat to the status quo |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – Internal IT (and other) staff may see external cloud as a threat (less need for internal IT if capabilities can be obtained elsewhere). |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Recognition by management that internal IT not only learns/understands technology but also knows the business. |
| Solution | <ul style="list-style-type: none"> – Leverage the knowledge of internal IT and the other teams to make the evolution to hybrid IT successful, and become the IT Business partner/consultant in solving business problems. |
| Important considerations | <ul style="list-style-type: none"> – Expand career paths for internal IT staff with development of cloud-centric skill sets. – Training and career development sessions on cloud skills. – Take the threat out of Hybrid IT – emphasize the potential and opportunities |

Open Data Center Alliance:
Topic: Hybrid IT – Barriers & Challenges

| Short name | Business want control but not responsibility |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – Business units want to be able to order and configure services themselves, but not to take accountability for their effectiveness, efficiency, compliance and other aspects (functional & non-functional requirements) |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Application classification (Policies to lead business decisions) – Pre-defined IT standards for compliance |
| Solution | <ul style="list-style-type: none"> – Pre-define (prior to solution research) and communicate rules, expectations and associated accountability. Communicate business application classifications and associated rules. Create pre-defined Hybrid IT compliant services for business to use, with pre-defined partners. |
| Important considerations | <ul style="list-style-type: none"> – IT must define cloud standards/blueprints for business up front – Use a enterprise aligned internal Catalogue of services for business to use of externally provided services – IT & Business should partner in determining functional & non-functional needs, and compliance requirements |

| Short name | IT Positioning |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – IT Do not position themselves to consult with and lead the business towards Hybrid IT based Agility & Flexibility |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Cultural problem – positioning of IT to enable business – Rate of development – training to enable opportunities |
| Solution | <ul style="list-style-type: none"> – Actively train and develop a reasonable portion of IT to consult with and enable the business, as trusted advisors around cloud. – IT needs to learn to interpret business needs and opportunities with them, and translate those into functional and non-functional requirements when helping to select cloud services. |
| Important considerations | <ul style="list-style-type: none"> – Policy based implementations – Culture of the Industry and its influence |

| Short name | Silo's |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – The Enterprise and/or IT Organization is very soloed, preventing effective use of Hybrid IT because each team has a very small role, and little authority |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Clear business vision, objectives, and executive mandate |
| Solution | <ul style="list-style-type: none"> – Establish a consulting function from the IT organization to support business with the broad view – Slowly update the organizational structure – Update a RACI matrix for Business Process responsibility |
| Important considerations | <ul style="list-style-type: none"> – Define the key business transactions – Identify over-powerful silo units – Make sure to gain support of any power bases in the existing structure |

Technology, Processes & Infrastructure

| Short name | Significant existing investment in internal Datacenters |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – There is significant existing investment in existing internal IT, preventing efficient use of Hybrid IT and external platforms |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – Age of and capability of new infrastructure & facilities |
| Solution | <ul style="list-style-type: none"> – Document a Hybrid IT Roadmap against Business Use Cases in context of potential business gain through use of Hybrid IT – incl financial oversight with checks and balances to ensure each complete new adoption/migration is complemented by real elimination of unneeded/retired elements from the cost base (TCO: eqpt + admin + environment + infrastructure + contracts). – Determine if some assets can be sold, re-purposed or transferred to partners – what latent value or remaining use and commercial value can be re-directed. – Define Guidelines around what to move, when to move it, and pre-requisites to consider for each environment |
| Important considerations | <ul style="list-style-type: none"> – Importance of linking cost to business value per transaction – Flexibility of current partners – Skills and capability of the organization |

| Short name | Vendor lock-in |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Once you’ve begun working with one external cloud provider, it may be difficult to switch to another. |
| Positioning | <ul style="list-style-type: none"> – Quick Win |
| Dependencies | <ul style="list-style-type: none"> – State of development (and adoption) of vendor-agnostic cloud standards. |
| Solution | <ul style="list-style-type: none"> – Define governance and controls on services being bought, up front – know what you are getting into. – Define portability requirements as part of the cloud selection process up front. – Educate your developer community on the issues of lock-in (get the measurement system right on the developers) – Communicate portability requirements with partners up front – get a demo – Any cloud adoption strategy should also include a cloud exit strategy, as part of the contracting. |
| Important considerations | <ul style="list-style-type: none"> – Data migration: some providers may impose high charges for data egress/extraction. – Architecting solutions with high dependencies on vendor-specific capabilities/APIs reduces portability. |

| Short name | Data exchange between on-premises and cloud service |
|--------------------------|--|
| Description | <ul style="list-style-type: none"> – On and off-premise systems which need to exchange data run into data exchange and access problems (lacking: 1- defined data security and 2- misaligned data architectures) |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Clear application and data landscape of all applications on-premises and on cloud services |
| Solution | <ul style="list-style-type: none"> – Security gateway that facilitates data exchange – with authentication per transaction – Integrated data store according to a well-defined data architecture and classification / access rules – Adopt a tokenized data, data encryption and/or anonymized data model |
| Important considerations | <ul style="list-style-type: none"> – Plan the applications’ interactions (those with lots of data exchange) both on-premises or in cloud services. – Align the data structures |

| Short name | Application architectures dependent on legacy or monolithic design methodologies |
|--------------------------|---|
| Description | – Applications are dependent on middleware or similar functions and are not designed to access via (e.g. RESTful) API's directly |
| Positioning | – Increased Maturity |
| Dependencies | – Information transport and application integration design |
| Solution | – Develop for an API based architecture whereby functions are exposed. (e.g. RESTful API's) |
| Important considerations | – Software packages are releasing their API's now and node.js is becoming the preferred way to integrate. This has created new work in API Development, API consumption and API management. |

| Short name | Existing Application restrictions |
|--------------------------|---|
| Description | – Existing applications are not cloud capable or are location dependent (e.g. Production line control system). Performance, latency, proximity requirements prevent cloud hosting |
| Positioning | – Increased Maturity |
| Dependencies | – Identified Use Cases for Hybrid IT – Business Strategy and objectives documented |
| Solution | – Analyze business processes and requirements, map them to advantages that should be sought from the hosting platform – Re-evaluate existing assumptions – Identify and classify the various applications, and which could leverage Hybrid IT to bring identified advantages. |
| Important considerations | – Migration potential to cloud native application design – Business objectives and timelines |

| Short name | No Defined Integration Points |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Due to not having defined system integration points for applications and management systems, control of sprawl is lost and management data is incomplete, resulting in loss of control and compliance. |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Defined Control systems interfaces and data requirements – Defined application integration interfaces – Defined app and data categories |
| Solution | <ul style="list-style-type: none"> – Define minimum management information requirements, rules & policies per application class – Implement build/release processes, which include reference architectures/patterns and implementation principles for all external IT integration |
| Important considerations | <ul style="list-style-type: none"> – Prepare internal systems to receive external data – Select partners that are prepared to share data according to the requirements |

| Short name | Data Duplication & Proliferation |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Data is duplicated and proliferated rapidly between each different system or cloud, driving costs up and data control/compliance down |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Data Lake definition – Application classification |
| Solution | <ul style="list-style-type: none"> – Define or extend the data architecture with defined management and protection per data classification, managed access and rule sets. – Establish management tools for controlling the data, encrypting it, presenting it, accessing and sharing it |
| Important considerations | <ul style="list-style-type: none"> – Consider network latency in the app designs – Define and manage corporate data objects – Some applications may need updating – Service Level Agreements and contracting must align on business requirements for data control |

| Short name | Application architectures not cloud-ready |
|--------------------------|---|
| Description | <ul style="list-style-type: none"> – Applications (bespoke and vendor-provided) are not architected to take advantage of the capabilities of cloud technologies. |
| Positioning | <ul style="list-style-type: none"> – Increased Maturity |
| Dependencies | <ul style="list-style-type: none"> – Adopt a cloud-ready strategy as part of application portfolio refresh planning. |
| Solution | <ul style="list-style-type: none"> – Application categorization (which can move to cloud) – Develop an Assessment model for determining refactoring and consolidation opportunities. – Pre-defined blueprints for cloud (native) applications – reference architectures and implementation guidelines – Demand “cloud native” from the commercial software vendors. |
| Important considerations | <ul style="list-style-type: none"> – Can lead to a “chicken and egg” scenario (IT won’t design for cloud if internal infrastructure can’t support it; internal infrastructure teams won’t develop cloud-ready capabilities without demand from business IT). |