



## **Interoperability & Portability for Cloud Computing: A Guide Version 2.0**

<http://www.cloud-council.org/deliverables/interoperability-and-portability-for-cloud-computing-a-guide.htm>

*Webinar January 24, 2018*

# Speakers



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Expert Thinking

# The Cloud Standards Customer Council

*THE Customer's Voice for Cloud Standards!*



- Provide customer-led guidance to multiple cloud standards-defining bodies
- Establishing criteria for open standards-based cloud computing

## 2017 Deliverables

- Cloud Customer Architecture for Hybrid Integration
- Impact of Cloud Computing on Healthcare v2.0
- Cloud Customer Architecture for API Management
- Data Residency Challenges
- Cloud Customer Architecture for Blockchain
- Cloud Customer Architecture for Big Data and Analytics v2.0
- Hybrid Cloud Considerations for Big Data and Analytics
- Practical Guide to Cloud Management Platforms
- Practical Guide to Cloud Computing v3.0
- Interoperability and Portability for Cloud Computing: A Guide v2.0
- Security for Cloud Computing: 10 Steps to Ensure Success v3.0

## 2018 Projects

- Migrating Apps to Public Cloud Services: Roadmap for Success v2.0
- Cloud Customer Architecture for Artificial Intelligence
- And more!

**700+** Organizations participating



<http://cloud-council.org>

### Revision Highlights

- Cloud computing widely adopted
- Variety of cloud services has led to proprietary architectures & technologies
- Use of multiple cloud services from different providers now common
- New ISO 19941 cloud interoperability & portability standard: facet models
- Risk of vendor lock-in for customers has increased
- Increased use of automation
- New technologies such as Containers & Serverless

# Basic Definitions

## Interoperability

- “Ability for two or more systems or applications to exchange and mutually use the exchanged information”
- Ability of public cloud services, private cloud services, and other customer systems to use each other’s APIs
- Standard interfaces ideal so customers can switch to another cloud service provider with minimal impact

## Application Portability

- “Ability to migrate an application from one cloud service to another cloud service or between a CSC’s system and a cloud service”
- Significant changes to the application code should not be required

## Data Portability

- “Ability to easily transfer data from one cloud service to another cloud service or between a cloud service customer’s system and a cloud service, in a commonly used electronic format”
- APIs to retrieve/import data are an important aspect of portability
- Syntax and semantics of transferred data is an important aspect of portability

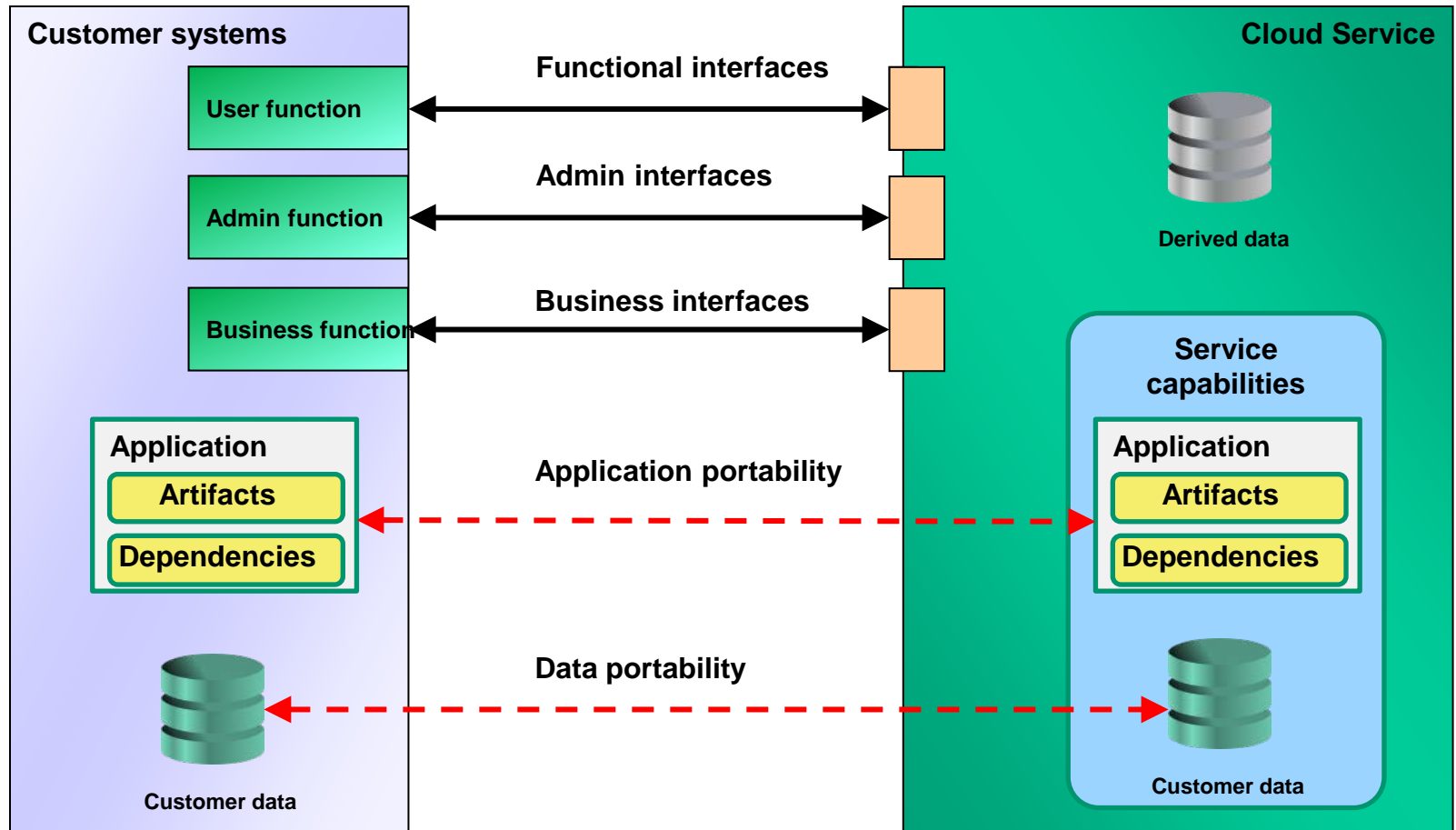
## Interoperability Challenges

- Multiple interfaces & APIs across several dimensions
- Non-standardized interfaces & APIs
- IaaS has highest level of interoperability
- PaaS has lower level of interoperability
- SaaS has lowest level of interoperability
- Potential solutions:
  - ESBs can help address interoperability challenges
  - Inter-cloud providers (i.e. brokers) are an option

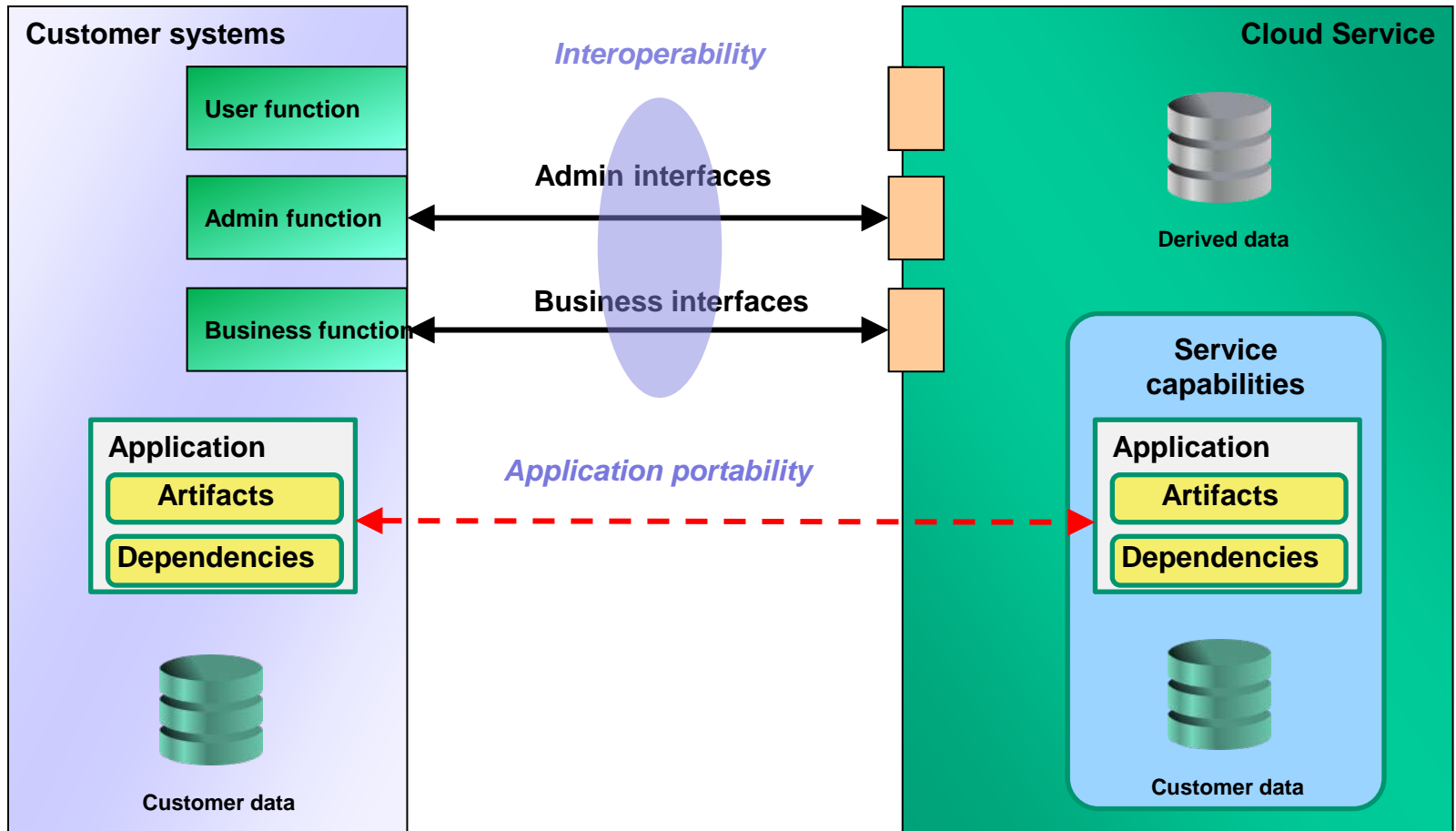
## Portability Challenges

- IaaS: Highest level of app portability
- PaaS: Varying software stacks make app portability more challenging
- SaaS: Data portability is of most concern
- Potential solutions:
  - IaaS: Operating systems like Linux and standards like OVF, Docker ease app portability
  - PaaS: Adoption of common open source platforms helpful (e.g. Cloud Foundry)
  - Common container technology allows independent deployment of app parts (e.g. Docker, Kubernetes)

# Elements

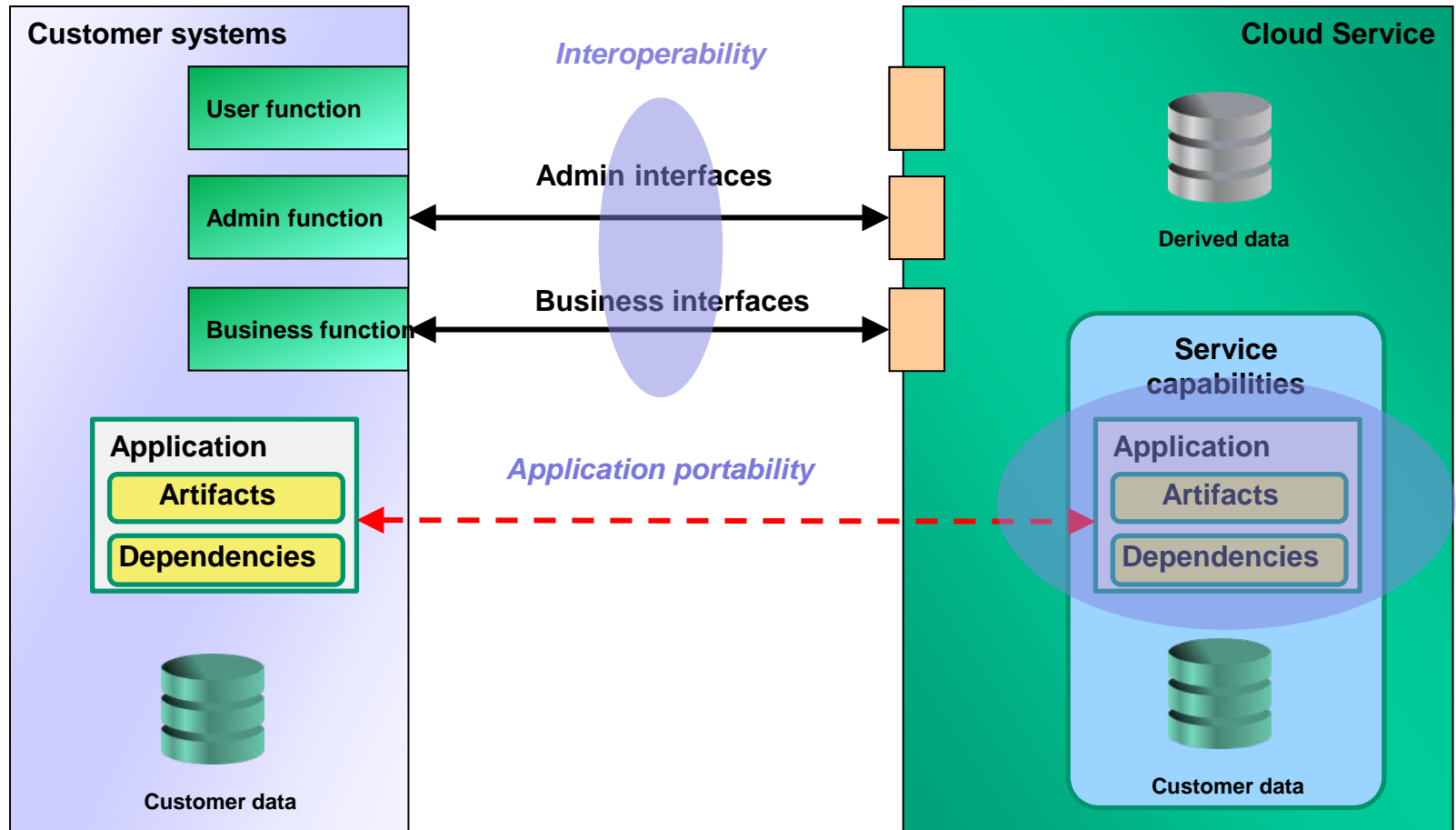


# IaaS services: Main considerations

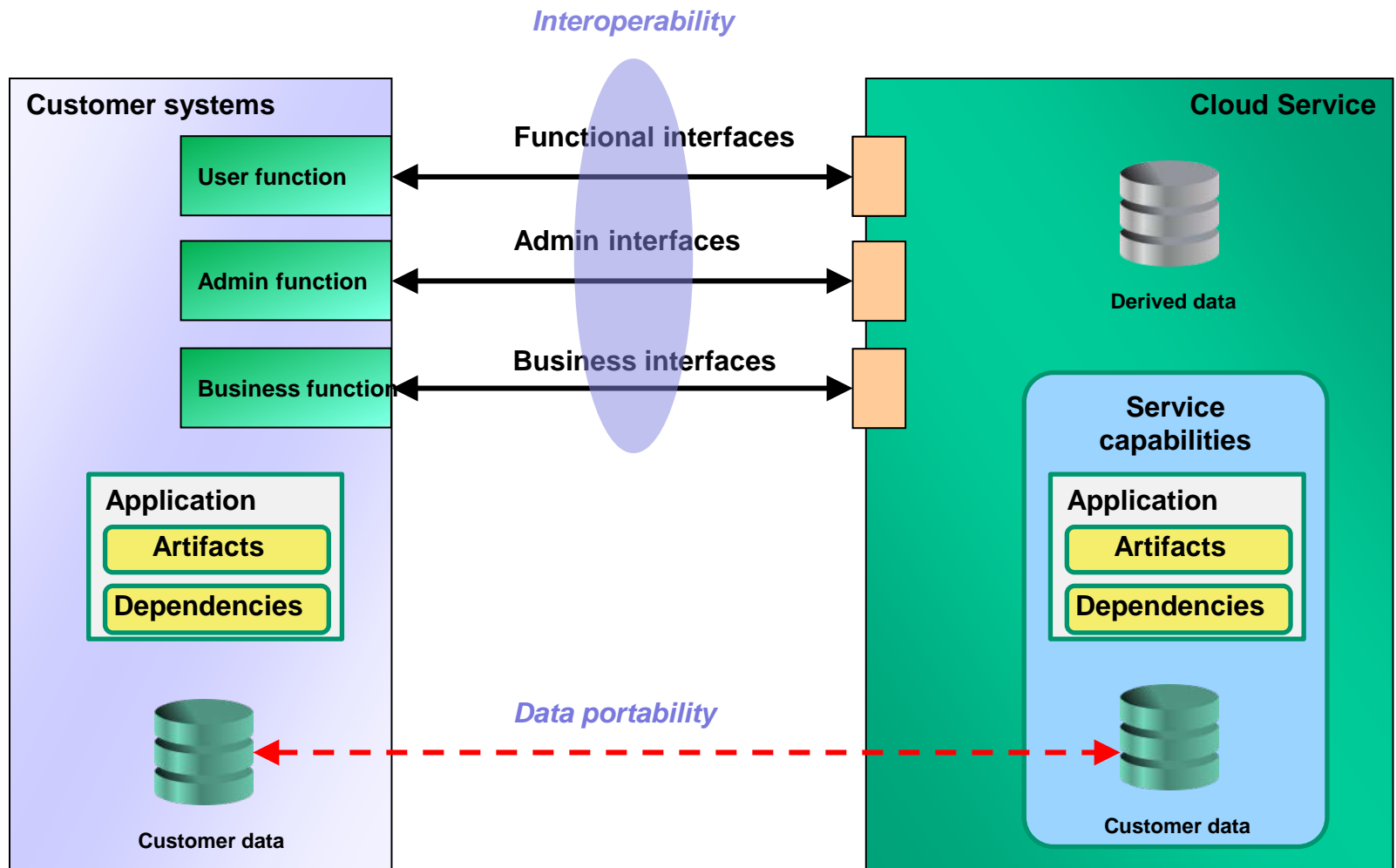




# PaaS services: Main considerations



# SaaS service: Main considerations

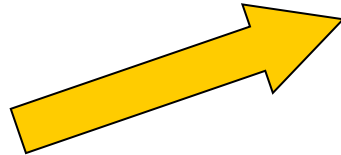


# Scenarios

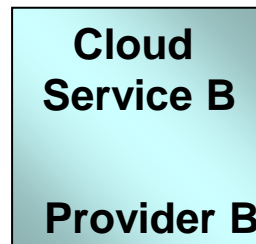
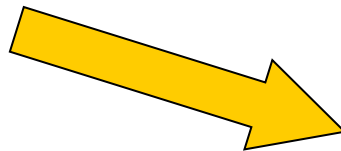
1. Customer switches providers for a cloud service
2. Customer uses cloud services from multiple providers
3. Customer links on cloud service to another cloud service
4. Customer links in-house capabilities with cloud services
5. Migration of customer capabilities into cloud services

# Scenario 1: Customer switches providers for a cloud service

*before...*



**Cloud Service Customer**



*after...*

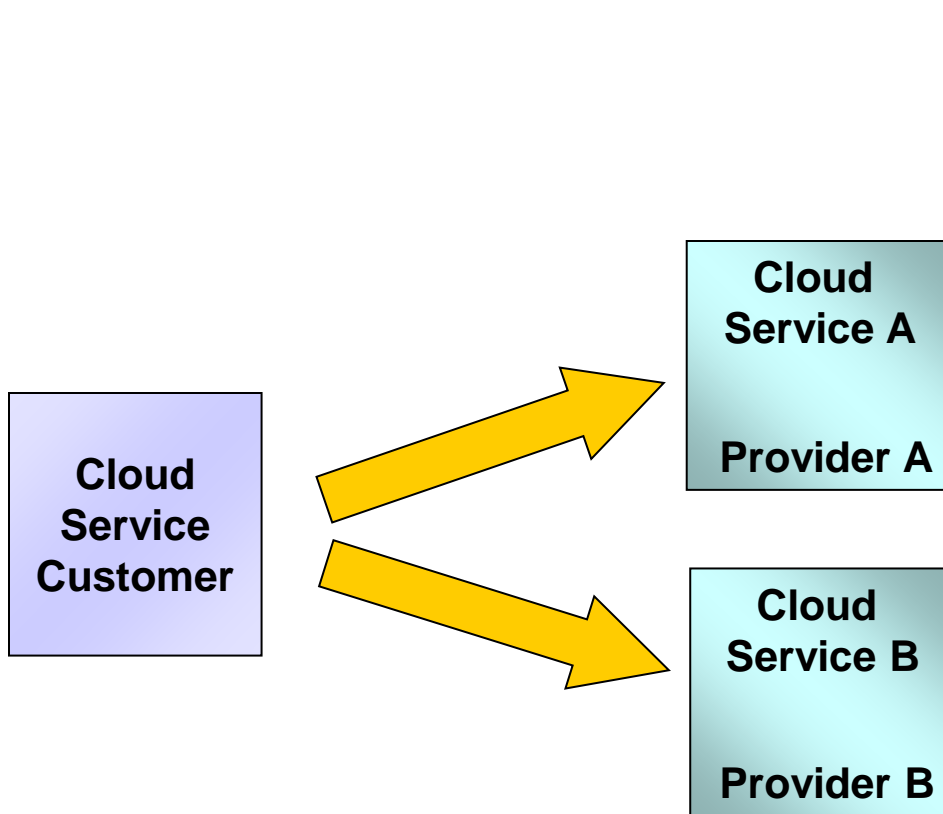
## Considerations

- For SaaS, APIs and user interfaces are key – not often standard
- For IaaS & PaaS, application portability is the biggest issue
- For SaaS, data portability is a major concern

## Recommendations

- For IaaS, ensure cloud service accepts standard app packaging formats like OVF, Docker
- For PaaS, require app environment based on open technologies & APIs
- For SaaS, demand well defined APIs, protocols & data formats, standardized where possible

# Scenario 2: Customer uses cloud services from multiple providers



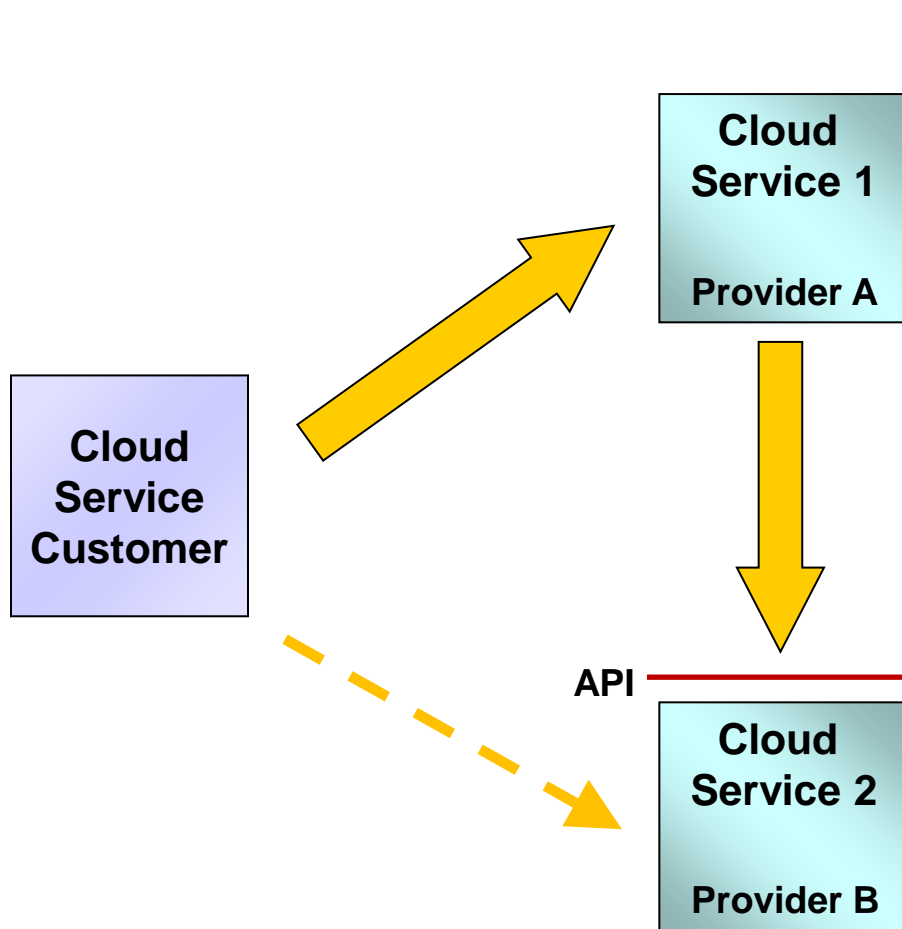
## Considerations

- Customer systems must interact with 2 or more cloud services
- Need consistency of admin, management and business interfaces

## Recommendations

- Consider use of ESB as a mapping layer
- Choose business and admin tools that provide adapters
- Look for support of common or standard technologies e.g. IDaM

# Scenario 3: Customer links one cloud service to another cloud service



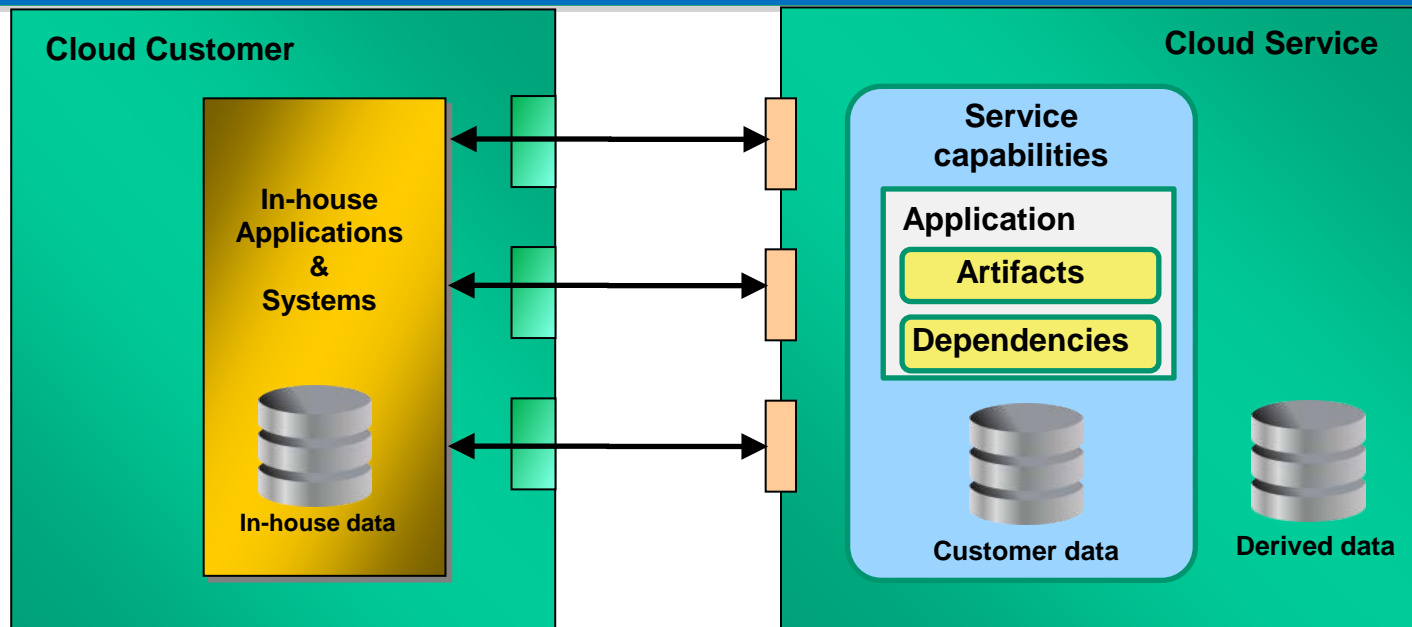
## Considerations

- Service 1 has to consume API of service 2
- Interoperability the main problem
- Security between 2 services often required

## Recommendations

- Ensure service 2 has well defined & consumable API
- Consider use of adapter layer (e.g. PaaS app fronting SaaS service)
- Ensure security technologies of service 2 can be used by service 1

# Scenario 4: Customer links in-house capabilities with cloud services



## Considerations

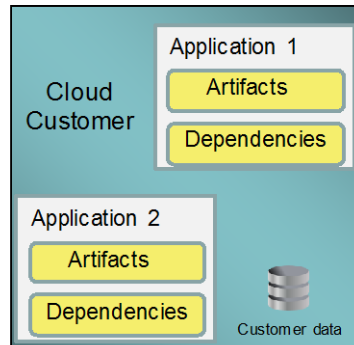
- Well-defined APIs for on-prem data and functionality must exist
- Integration of in-house admin functionality with cloud admin functionality
- New Security requirements
- New business interfaces defined by cloud provider

## Recommendations

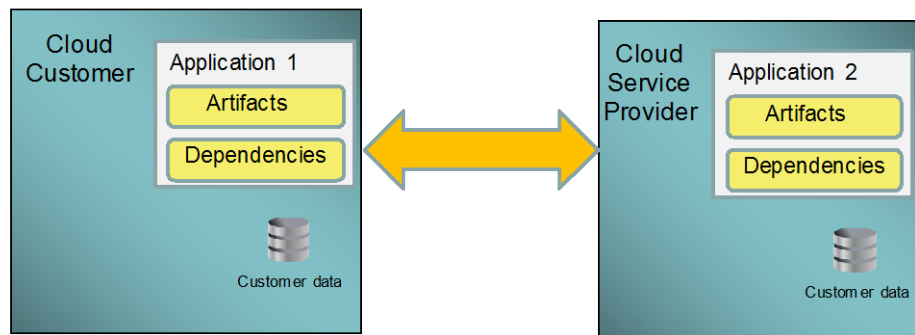
- Ensure that on-prem apps leverage SOA
- Leverage ESB to perform interface, protocol and data transformations
- Address security issues with cloud services accessing on-prem capabilities
- Examine if in-house systems can deal with business aspects of cloud services

# Scenario 5: Migration of customer capabilities into cloud services

*before...*



*after...*



## Considerations

- For SaaS, API differences for apps migrated to cloud and format/content of customer data
- For IaaS/PaaS, ease of migrating app to cloud
- New security requirements
- Compatibility of admin and business interfaces for the migrated app

## Recommendations

- For SaaS, consider compatibility with on-prem apps and the migrated cloud service
- For PaaS, ensure cloud app environment is compatible with on-prem environment
- Ensure cloud admin and business capabilities can be integrated with in-house systems



# Summary of recommendations

## Interoperability

- Use SOA principles for on-premises systems
- Consider ESBs for interface mappings
- Leverage 3<sup>rd</sup> party IDaM using standards
- Use API Management to access on-premises systems
- Insist on open technologies for admin & business APIs
- Check for standard security technologies
- Demand well defined APIs
- Consider use of PaaS mapping layer
- Consider using Cloud Management Platform

## Portability

- IaaS: Use standard package formats like OVF
- IaaS: Consider containers – Docker, Kubernetes
- PaaS: Use compatible app environment(s)
- PaaS: Support common open technologies
- SaaS: Insist on standard protocols & data formats

# Open Technologies

- **OVF**
  - <http://www.dmtf.org/standards/ovf>
- **CDMI**
  - <http://www.snia.org/cdmi>
- **ISO 17789 CCRA**
  - [http://standards.iso.org/ittf/PubliclyAvailableStandards/c060545\\_ISO\\_IEC\\_17789\\_2014.zip](http://standards.iso.org/ittf/PubliclyAvailableStandards/c060545_ISO_IEC_17789_2014.zip)
- **OASIS TOSCA**
  - [https://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=tosca](https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=tosca)
- **ISO 19941 Cloud Computing Interoperability and Portability**
  - <https://www.iso.org/standard/66639.html>
- **SAML 2.0**
  - [https://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=security](https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=security)
- **OAuth 2.0**
  - <http://oauth.net/2/>
- **OpenStack**
  - <http://www.openstack.org/>
- **Open Containers Initiative / Docker**
  - <https://www.opencontainers.org/>
- **Cloud Foundry**
  - <http://www.cloudfoundry.org/>

# Call to Action



## ■ *Join the CSCC Now!*

- To have an impact on customer use case based standards requirements
- To learn about all Cloud Standards within one organization
- To help define the CSCC's future roadmap
- Membership is free & easy: <http://www.cloud-council.org/become-a-member>

## ■ *Get Involved!*

- Join one or more of the CSCC Working Groups  
<http://www.cloud-council.org/workinggroups>

## ■ *Leverage CSCC Collateral*

- Visit <http://www.cloud-council.org/resource-hub>

# Additional Resources



- ***Practical Guide to Hybrid Cloud Computing***
  - <http://www.cloud-council.org/deliverables/practical-guide-to-hybrid-cloud-computing.htm>
- ***Practical Guide to PaaS***
  - <http://www.cloud-council.org/deliverables/practical-guide-to-platform-as-a-service.htm>
- ***Practical Guide to Cloud Computing Version 3.0***
  - <http://www.cloud-council.org/deliverables/practical-guide-to-cloud-computing.htm>
- ***Migrating Applications to Public Cloud Services: Roadmap for Success***
  - <http://www.cloud-council.org/deliverables/migrating-applications-to-public-cloud-services-roadmap-for-success.htm>
- ***Security for Cloud Computing: 10 Steps to Ensure Success Version 3.0***
  - <http://www.cloud-council.org/deliverables/security-for-cloud-computing-10-steps-to-ensure-success.htm>
- ***Practical Guide to Cloud Service Agreements Version 2.0***
  - <http://www.cloud-council.org/deliverables/practical-guide-to-cloud-service-agreements.htm>
- ***Practical Guide to Cloud Management Platforms***
  - <http://www.cloud-council.org/deliverables/practical-guide-to-cloud-management-platforms.htm>



# Thank You