Cloud Transformation kræver nye kompetencer hos udviklere og arkitekter

28. juni 2018, DANSK IT, Michael Folkmann og Jan Staack

Indlægsholdere

Michael Folkmann

- Cand Scient i Datalogi

- Erhvervsmæssig erfaring fra DSB, Danske Bank, Carlsberg, Ørsted med flere

- Nuværende arbejdsplads Selvstændig konsulent

- Arbejdsdomæne: Enterprise Architecture & Management

Jan Staack

- Cand Scient i Datalogi / Master of IT Leadership and management

- Erhvervsmæssig erfaring fra SDC, PBS, Danske Bank, Carlsberg, Dong Energy, Maersk Oil med flere

- Nuværende arbejdsplads Danmarks Nationalbank

- Arbejdsdomæne: Enterprise Architecture & Governance

- Medlem af dansk IT siden 1991, Tidligere bestyrelsesmedlem og næstformand. Fagrådsformand for Business and IT Alignment.

Formål og indhold

- Muligheder og planlægning af Cloud anvendelse

- Cloud "rammeværker"

- Erfaring med at arbejde med Cloud i større virksomheder

- Cloud arkitektens rolle

- Anbefalinger for Cloud anvendelse

Not all Cloud users are happy

https://fugue.co/resources/2017-06-27-state-of-cloud-infrastructure-operations-survey-2017.html

Users report several major challenges.

Almost half of users reported the following obstacles to effective cloud management:

41.6% 43.9% 47.7% 35.8%

Complexity   Security & Compliance

Controlling Cost   Business Agility
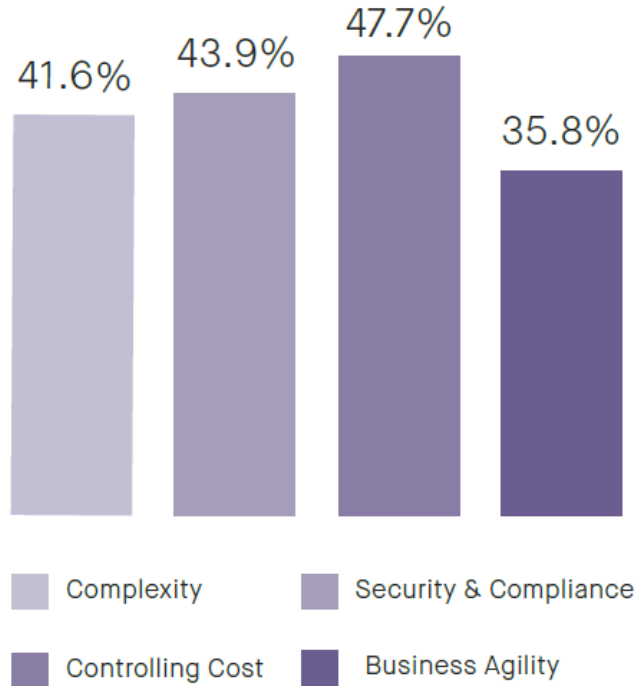
6 hard truths IT must learn to accept:
2. You can't do everything in the cloud

- Six years ago, more than 40 percent of CIOs surveyed by Gartner believed they'd be running most of their IT operations in the cloud by now. While the vast majority of organizations run some business-critical systems in the cloud, full migration is still relatively uncommon.

- Instead, Gartner predicts that 90 percent of organizations will adopt a hybrid infrastructure by 2020, keeping some IT resources in house while outsourcing others to public or private cloud providers.

- There's no question the cloud has had a dramatic impact on IT operations, but it hasn't always lived up to the hype. A June 2017 survey of 300 IT pros found that 80 percent said the cloud wasn't meeting their expectations due to problems with security, compliance, complexity and cost. According to a January 2017 survey by cloud management firm RightScale, from 30 to 45 percent of enterprise cloud spend is wasted.

- That's because a lot of companies reflexively moved to the cloud with no clear understanding of why or how to do it, says Lowe.

- "Merely moving a critical service to the cloud does not automatically make it more reliable or scalable," he says. "**To truly take advantage of the cloud, software needs to be architected and implemented differently, using microservices instead of monoliths**."

B 83 Forslag til folketingsbeslutning om en national plan for cloud computing i den offentlige sektor.

Beslutningsforslag nr. **B 83**   Folketinget 2010-11

Fremsat den 15. marts 2011 af Yildiz Akdogan (S) og Hanne Agersnap (SF)

Forslag til folketingsbeslutning

om en national plan for cloud computing i den offentlige sektor

Folketinget pålægger regeringen at igangsætte en plan for udvidet brug af cloud computing i driften af den offentlige sektors it for at hente de økonomiske og klimamæssige gevinster herved.

Planen skal indeholde følgende punkter:

1) Opdatering af det lov- og regelgrundlag, der regulerer brugen af cloud computing, for at gøre love og regler tidssvarende og rydde op i unødige barrierer for brugen af cloud computing i det offentlige.

2) Fælles offentligt samarbejde om sikkerhed omkring data, herunder sikring af personfølsomme oplysninger ved brug af cloud computing. Der skal etableres et samarbejde på tværs af stat, kommuner og regioner. Samarbejdet skal først og fremmest fokusere på at finde en model til sikring af data ved brug af cloud computing, så de er lige så sikre, som de vil være med traditionelle løsninger. Herudover skal samarbejdet fremme videndeling, udvikling af forretningsmodeller og valg af spydspidsprojekter.

3) Der skal sættes et klart mål for udbredelsen og effektiviseringsgevinsterne ved hjælp af cloud computing i den offentlige sektor om fem år med et delmål om tre år.

4) Der skal udarbejdes klare retningslinjer for brugen af cloud computing i det offentlige, herunder hvordan et cloud-projekt lever op til forvaltningslov og -praksis og anden dansk og international lovgivning, herunder krav til sikkerhed omkring data.

5) Det skal gøres muligt at få forhåndsgodkendt sit cloud computing-projekt i Datatilsynet, så der ikke spildes ressourcer på projekter, der alligevel afvises til sidst.

FOLKETINGET

Af: Yildiz Akdogan (S) og Hanne Agersnap (udpeget af SF) (SF)
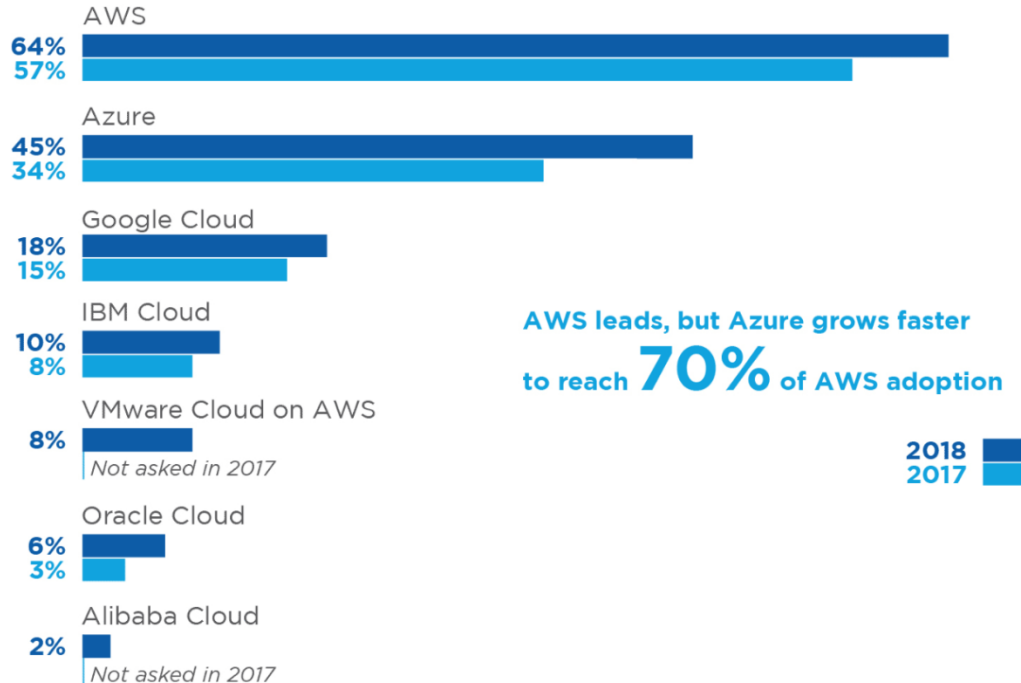Udvalg: Udvalget for Videnskab og Teknologi
Samling: 2010-11 (1. samling)
Status: 2. beh./Forkastet

Public cloud adaption (IaaS) comparison by year

https://www.rightscale.com/lp/state-of-the-cloud?campaign=7010g0000016JiA

Respondents Running Apps 2017 vs. 2018

AWS
64%
57%

Azure
45%
34%

Google Cloud
18%
15%

IBM Cloud
10%
8%

VMware Cloud on AWS
8%
Not asked in 2017

AWS leads, but Azure grows faster
to reach **70%** of AWS adoption

2018
2017

Oracle Cloud
6%
3%

Alibaba Cloud
2%
Not asked in 2017

Source: RightScale 2018 State of the Cloud Report

Interxion cloud vendor offerings in Denmark

http://www.themetisfiles.com/wp-content/uploads/2015/11/Denmark-Cloudscape-Logographic-v1.1.png

What is Cloud?

http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

- The US National Institute of Standards and Technology (NIST) Definition of Cloud Computing Cloud computing is:

- A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

- This cloud model is composed of five essential characteristics, three service models, and four deployment models.

Essential Characteristics:

http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

1. **On-demand self-service**. A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

2. **Broad network access**. Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).

3. **Resource pooling**. The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, and network bandwidth.

4. **Rapid elasticity**. Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.

5. **Measured service**. Cloud systems automatically control and optimize resource use by leveraging a metering capability1 at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

5 Essential Characteristics of Cloud Computing

Ref: The NIST Definition of Cloud Computing
http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf

On-demand self-service

Ubiquitous network access

Location transparent resource pooling

Rapid elasticity

Measured service with pay per use

Source: http://aka.ms/532

Service Models:

http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

1. Software as a Service (**SaaS**). The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure2 . The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited userspecific application configuration settings.

2. Platform as a Service (**PaaS**). The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

3. Infrastructure as a Service (**IaaS**). The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).

4. New acronyms is formed like iPaas (Intergration platforms as a Service) and iSaaS (Intergration software as a Service)

Examples on Cloud Service

http://www.barkatconsulting.com/consolidation-and-virtualization/

Deployment Models:

http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf
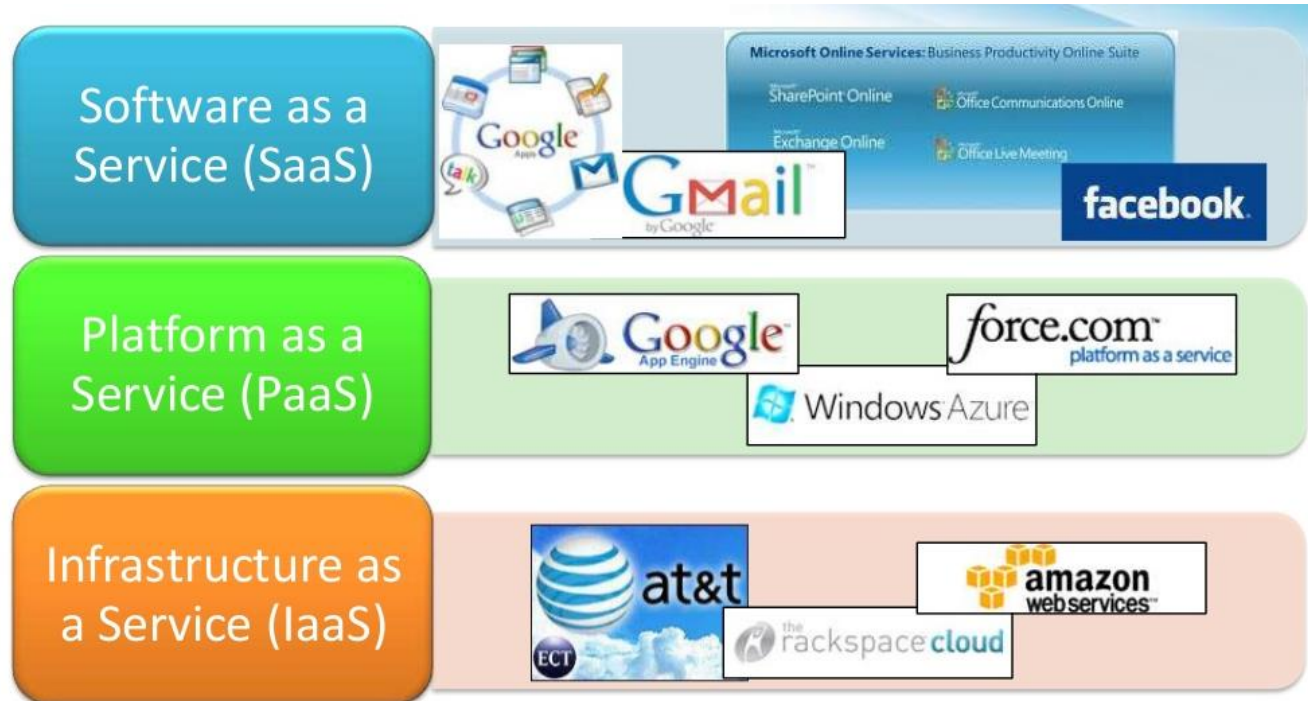
1. **Private cloud**. The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.

2. **Community cloud**. The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

3. **Public cloud**. The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.

4. **Hybrid cloud**. The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

Hybrid cloud – combinations of Clouds

https://www.researchgate.net/figure/260192916_fig2_Figure-32-Cloud-deployment-model
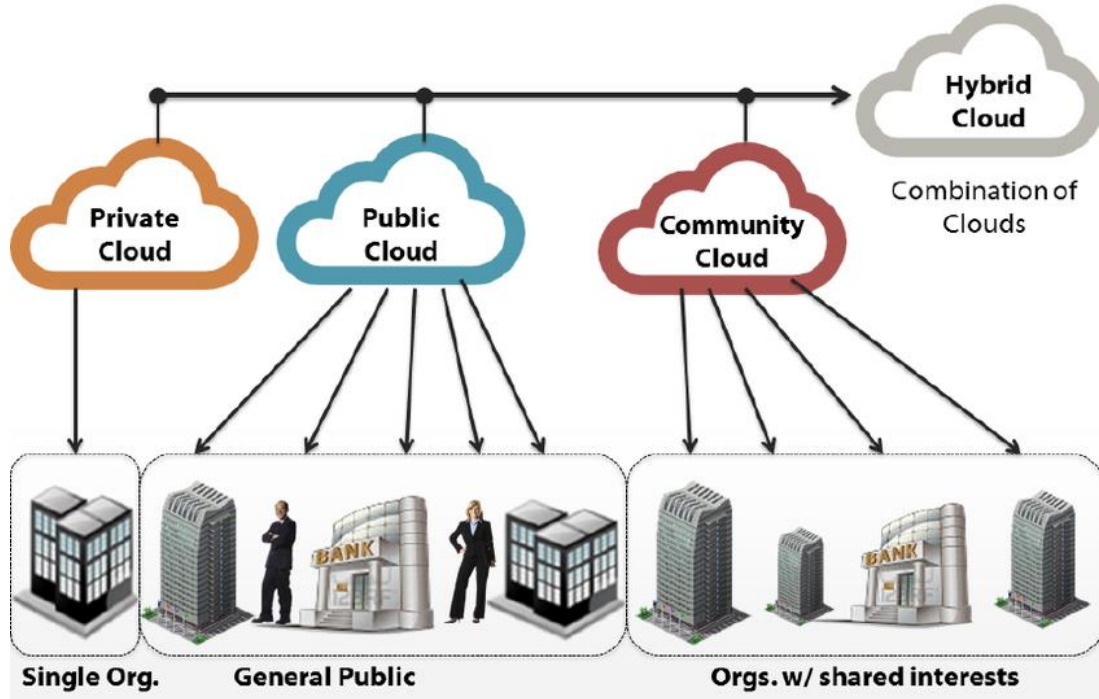
Architectural Comparison of Ownership by Cloud Layer and how much should you manage?

https://www.gartner.com/binaries/content/assets/events/keywords/catalyst/catus8/2017_planning_guide_for_cloud.pdf
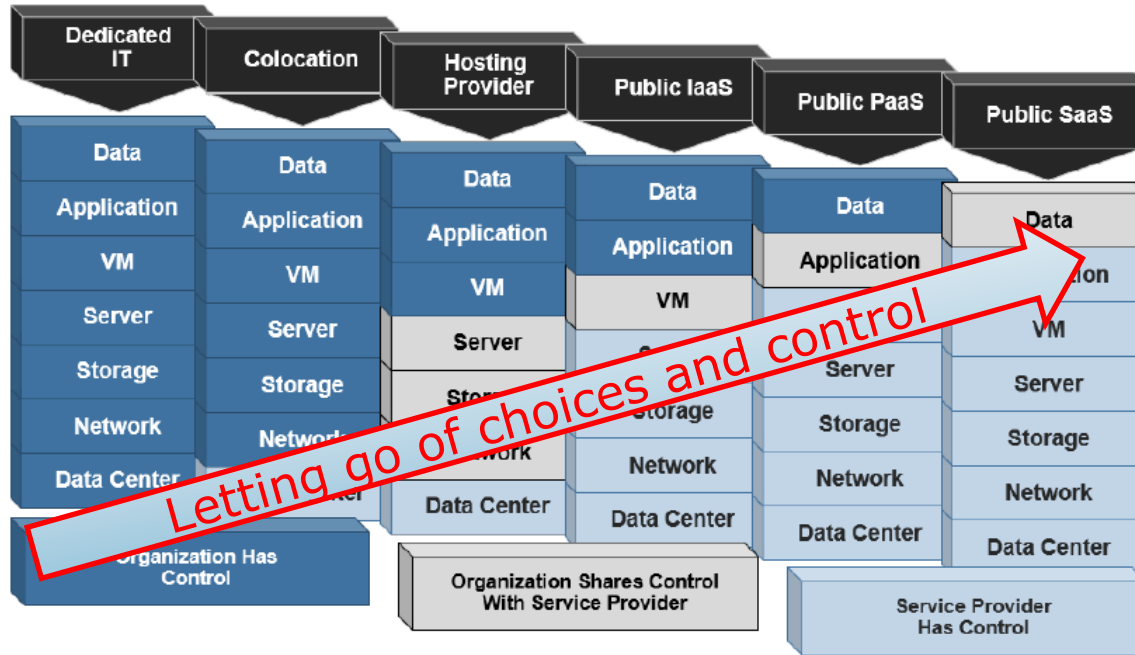
Source: Gartner (October 2016)

Amazon AWS services

http://www.conceptdraw.com/How-To-Guide/aws-icons-1

Compute

Amazon Elastic Compute Cloud (Amazon EC2)

Amazon EC2 · Instance · Instances · AMI · DB on Instance · Instance with CloudWatch · Elastic IP

Amazon Elastic MapReduce

Amazon Elastic MapReduce · Cluster · HDFS Cluster

Auto Scaling

Auto Scaling

Storage

Amazon Simple Storage Service (Amazon S3)

Amazon S3 · Bucket · Bucket with Objects · Object

Amazon Elastic Block Storage (Amazon EBS)

Amazon Elastic Block Storage (EBS) · Volume · Snapshot

AWS Import/Export

AWS Import/Export

AWS Storage Gateway Service

AWS Storage Gateway Service

AWS Glacier

Amazon Glacier

Database

Amazon DynamoDB

DynamoDB · Table · Item · Items · Attribute · Attributes
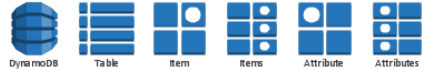
Amazon Relational Database Service (Amazon RDS)

Amazon RDS · RDS DB Instance · RDS DB Instance Standby (Multi-AZ) · RDS DB Instance Read Replica · MySQL DB Instance · Oracle DB Instance

Amazon ElastiCache

Amazon ElastiCache · ElastiCache Cache Node

Networking

Amazon Route 53

Amazon Route 53 · Hosted Zone · Route Table (172.16.0.0 / 172.16.1.0 / 172.16.2.0)

Amazon Elastic Load Balancing

Elastic Load Balancer

AWS Direct Connect

AWS Direct Connect

Amazon Virtual Private Cloud (VPC)

Amazon VPC · Router · Internet Gateway · Customer Gateway · VPN Gateway · VPN Connection

Content Delivery

Amazon Cloudfront

Amazon Cloudfront · Download Distribution · Streaming Distribution · Edge Location

Elastic Network Instance

Elastic Network Instance

Application Services

Amazon Simple Queue Service (SQS)

Amazon SQS · Queue · Message

Amazon Cloudsearch

Amazon CloudSearch

Amazon Simple Email Service (SES)

Amazon SES · Email

Amazon Simple Workflow (SWF)

Amazon SWF · Decider · Worker

Amazon Simple Notification Service (SNS)

Amazon SNS · Email Notification · HTTP Notification · Topic

Deployment and Management

Amazon Elastic Beanstalk

Amazon Elastic Beanstalk · Application

AWS Identity and Access Management (IAM)

AWS IAM · IAM Add-on

AWS CloudFormation

AWS CloudFormation · Template · Stack

Monitoring

Amazon CloudWatch

Alarm · Amazon CloudWatch

Non-Service Specific

AWS Cloud · AWS Management Console · User · Users · Internet · Client · Mobile Client · Multimedia · Traditional Server · Corporate Data Center

Groups

Auto scaling Group · Availability Zone · Region · Security Group · Elastic Beanstalk Container · EC2 Instance Contents · VPC Subnet · Server Contents · Virtual Private Cloud · AWS Cloud · Corporate Data Center
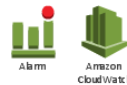
Gartner's Cloud Adoption Framework

https://www.gartner.com/binaries/content/assets/events/keywords/catalyst/catus8/2017_planning_guide_for_cloud.pdf
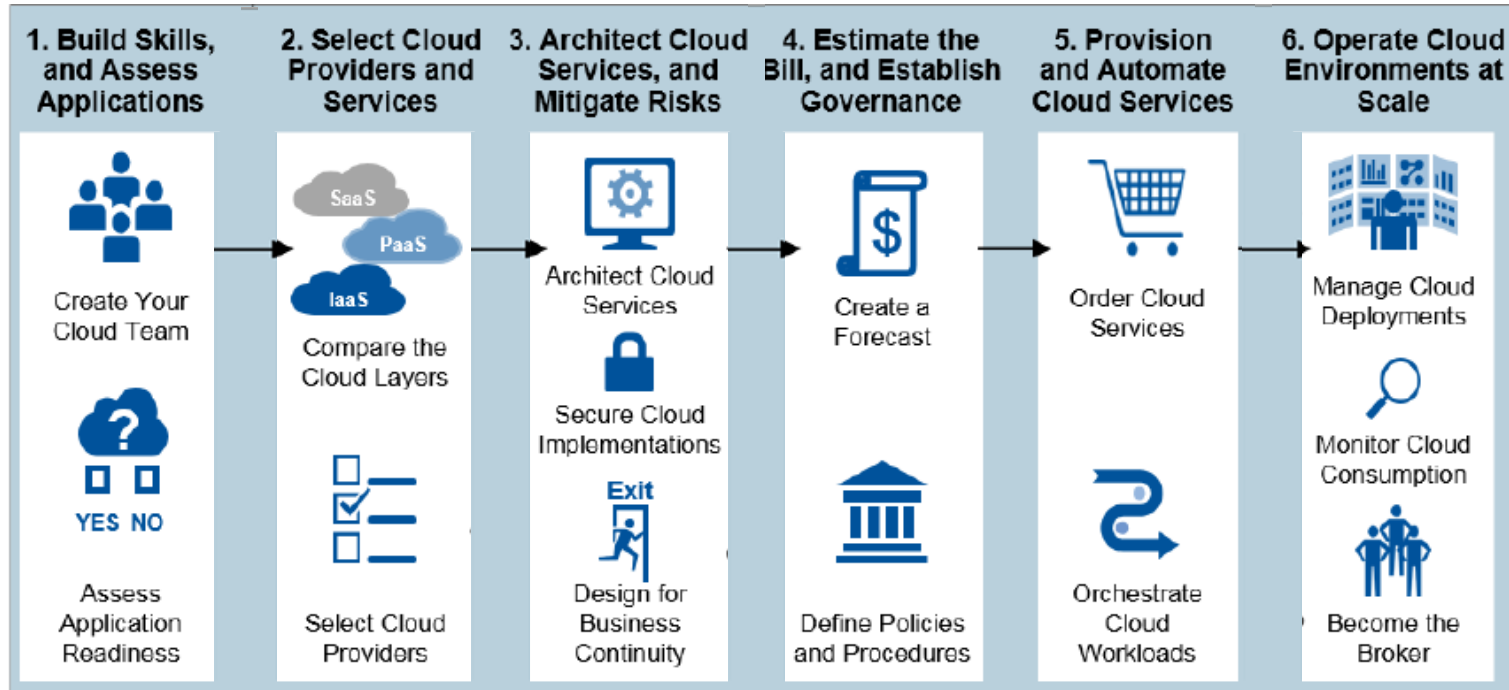
Amazon AWS Cloud adoption framework

https://d1.awsstatic.com/whitepapers/aws_cloud_adoption_framework.pdf

BUSINESS	PLATFORM
PEOPLE	SECURITY
GOVERNANCE	OPERATIONS

BUSINESS
- IT Finance
- IT Strategy
- Benefits Realization
- Business Risk Management

PEOPLE
- Resource Management
- Incentive Management
- Career Management
- Training Management
- Organizational Change Management

GOVERNANCE
- Portfolio Management
- Program and Project Management
- Business Performance Measurement
- License Management

PLATFORM
- Compute Provisioning
- Network Provisioning
- Storage Provisioning
- Database Provisioning
- Systems and Solution Architecture
- Application Development

SECURITY
- Identity and Access Management
- Detective Control
- Infrastructure Security
- Data Protection
- Incident Response

OPERATIONS
- Service Monitoring
- Application Performance Monitoring
- Resource Inventory Management
- Release Management / Change Management
- Reporting and Analytics
- Business Continuity / Disaster Recovery
- IT Service Catalog

AWS cloud adoption framework

Business	Governance	People	Platform	Security	Operation
IT finance	Portfolio Management	Resource management	Compute provisioning	Identity and access management	Service monitoring
IT strategy	Program and project management	Incentive management	Network provisioning	Detective control	Application performance
Benefit realization	Business Performance measurement	Career management	Storage provisioning	Infrastructure security	Resource Inventory Management
Business risk management	License management	Training management	Database provisioning	Data protection	Release / Change management
		Organizational change management	Multi cloud utilization	Incident response	Reporting and analytics
			System and solution architecture		Business Continuity / Disaster Recovery
			Application development		IT Service catalogue

Cloud adoption

Using Business Capability Model Overlays to Prioritize Cloud Initiatives
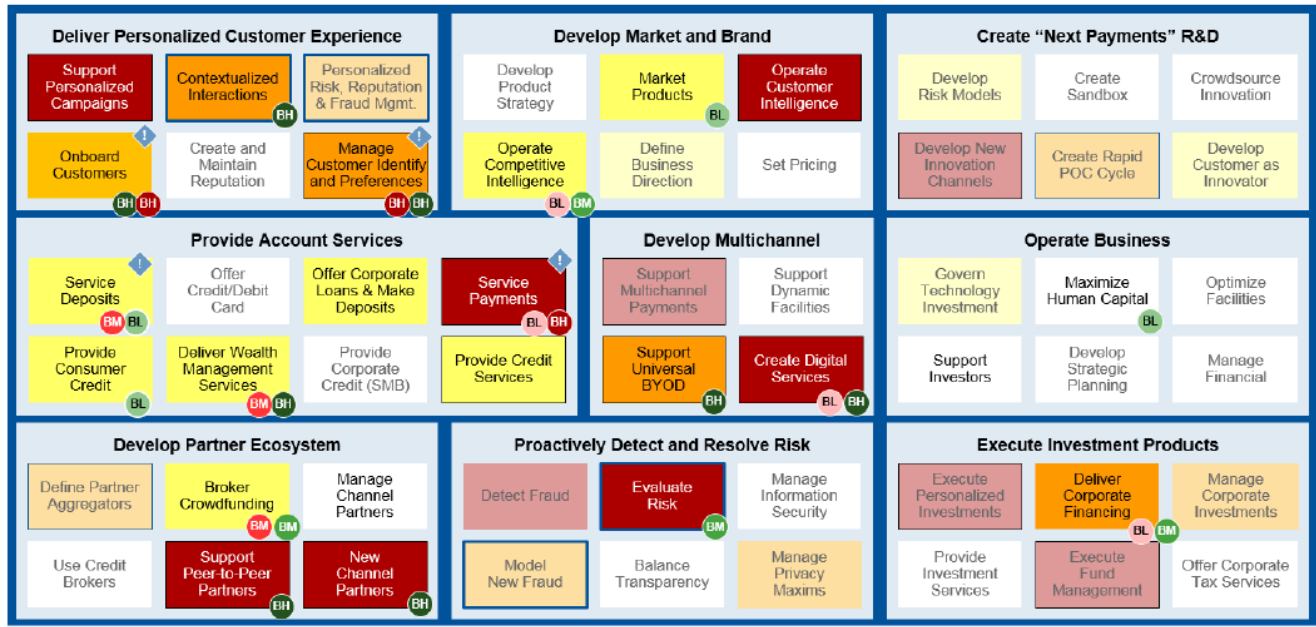
Building your cloud?

https://www.slideshare.net/AmazonWebServices/aws-enterprise-summit-london-2015-gartner-keynote-the-future-of-cloud-iaas-keynote

Principles to Keep in Mind

Not everything can or should be cloud

Some workloads must remain on-premise due to regulatory compliance or tie to physical location

Private cloud-building technology will not deliver breadth, depth, innovation of service providers

IT orgs. likely can't update, innovate, reduce costs of internal clouds as quickly as providers

Gartner

Cloud migration considerations
- choose the right migration from current environment

Re-host
- Lift'n'shift the application 1-1. Also cover terms as "re-platform".
- Only change is the underlying infrastructure from on-premise to IaaS
- Overestimation of environment for high utilization peaks are unchanged
- **Not recommended for cloud journey beside learning tasks**

Re-factor
- Light modifications to the application using PaaS components ensuring back-ward compatibility
- Primary change is redeploy to PaaS components while maintaining architecture
- **Not recommended for cloud journey beside learning tasks**

Re-architect
- Modify due to modernization needs for part of application and deploy via re-host or re-factor.
- Changes to part of application, which could lead to changed migration scope.
- **Only recommended when it makes sense for (changed) migration scope.**

Re-build
- Complete re-build the application using PaaS components
- Changes the architecture completely
- **Suitable for cloud-native work loads, and recommended for these migration scopes**

Re-place
- Replace (discard) the existing application (or set of applications) completely with a commercial SaaS product
- Changes complete the architecture as SaaS is the choice
- **Recommended when it makes sense as general SaaS evaluation.**

Consider the Value Proposition for the Cloud
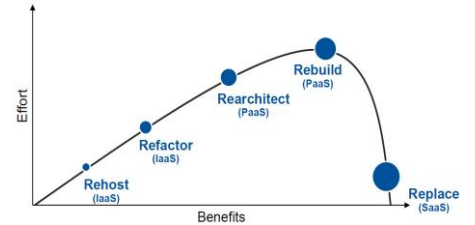
Source: Gartner

Application Migration Approaches

https://www.gartner.com/binaries/content/assets/events/keywords/catalyst/catus8/2017_planning_guide_for_cloud.pdf
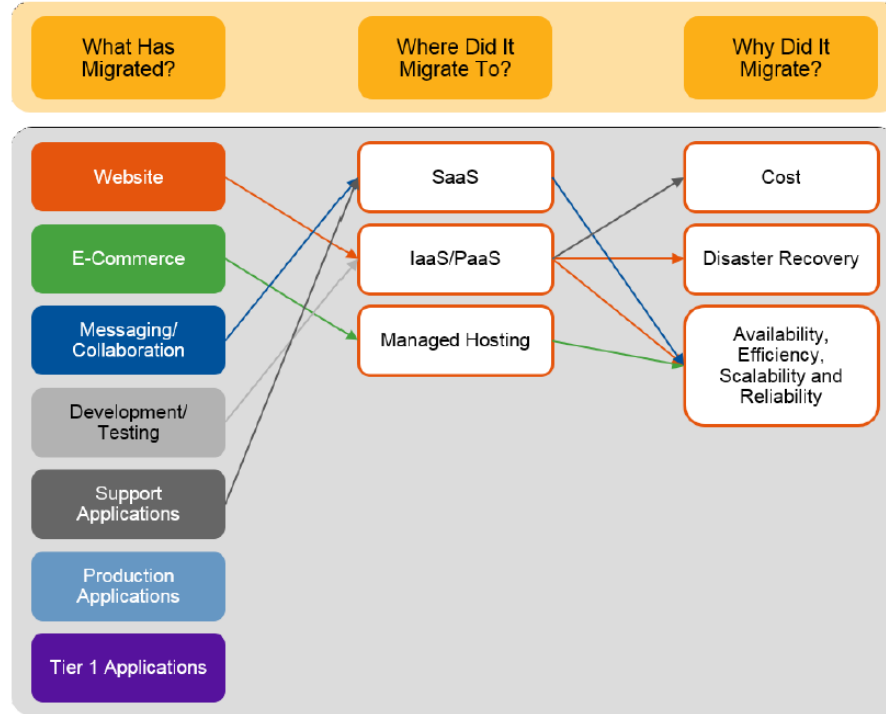
Source: Gartner (October 2016)

Applications cloud assessment

Reduce.
Are there any unused modules in an application that I can discard? If yes, look at retiring those portions, minimize the scope of the application, and then look at putting them on the lanes.

Retire.
Can I retire the application? Archive the data and decommission the application.

Rehost.
Can I move from physical to virtual x86 platforms? Can applications on mainframe, Unix, and other non-x86 systems be moved to x86 systems? Use P2V migration or platform simulation tools to move the application "as-is" from legacy hardware to x86 cloud.

Replace.
Can I replace the application with cloud-ready alternative or SaaS services? If an application reached its end-of-life and there is a cloud-ready alternative available, either as an in-house installation or offered as SaaS services, it would be a good candidate to replace. Employee engagement systems such as email, collaboration, and human capital management solutions are good to be replaced with a SaaS service.

Revise.
Can I upgrade the application to a newer version available from the supplier? Verify that the newer version is cloud ready and pass through the upgrade lane.

Refactor.
Can I use the majority of the code and make minor changes to make it cloudready? Applies to home-grown applications which may need minor tweaks to the codebase to make it cloud ready.

Rebuild
Should I completely rebuild the application, since it needs lot of re-design and functionality addition? These are great candidates to apply micro-services cloud-ready Web-scale architectures. It may sound expensive to consider a "rebuild," but using an agile DevOps platform, the must-have features can be addressed first in a short period of time, and additional features can be added on an ongoing basis.

Retain.
Cannot be moved and has to remain on the existing physical servers. Agree on a retirement plan with the business users and figure out a way to manage these systems without tightly integrating them into the unified operations model.
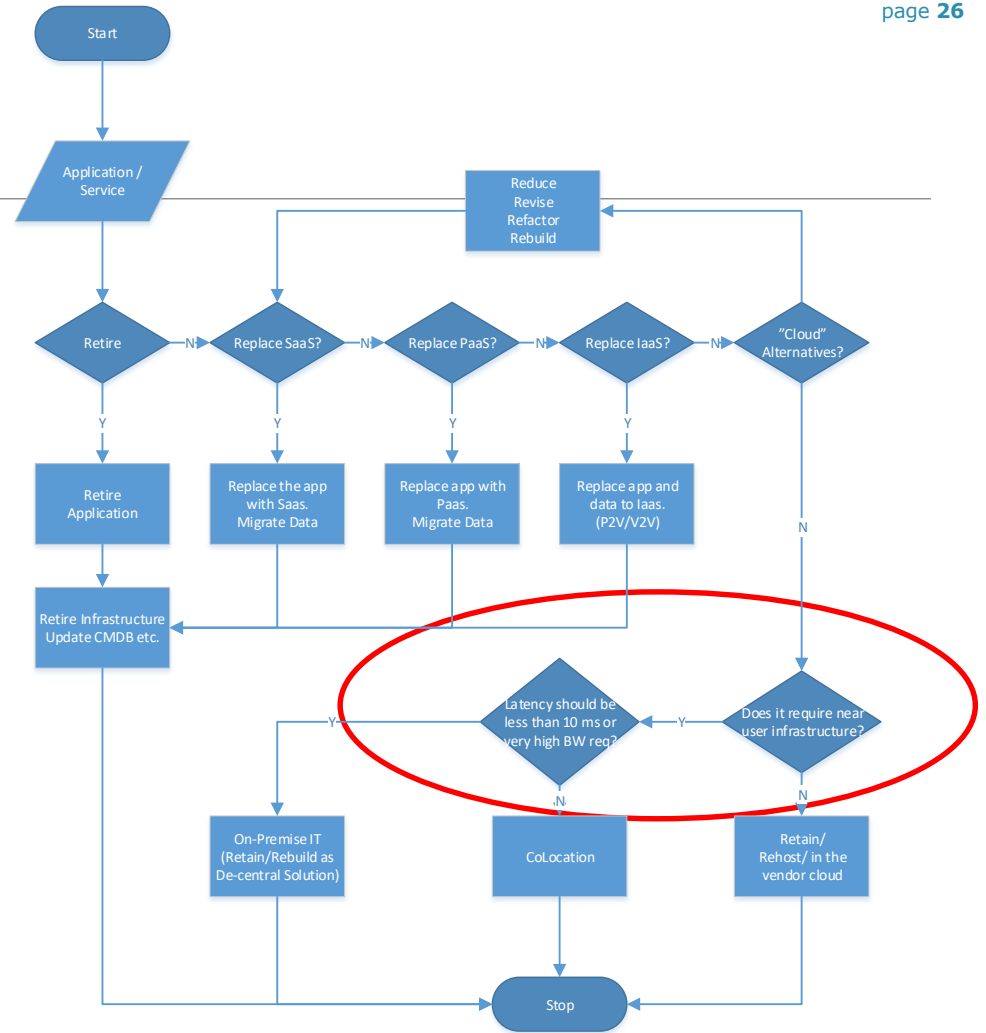
Application Migration to the Cloud

http://www.appsassociates.com/application-migration
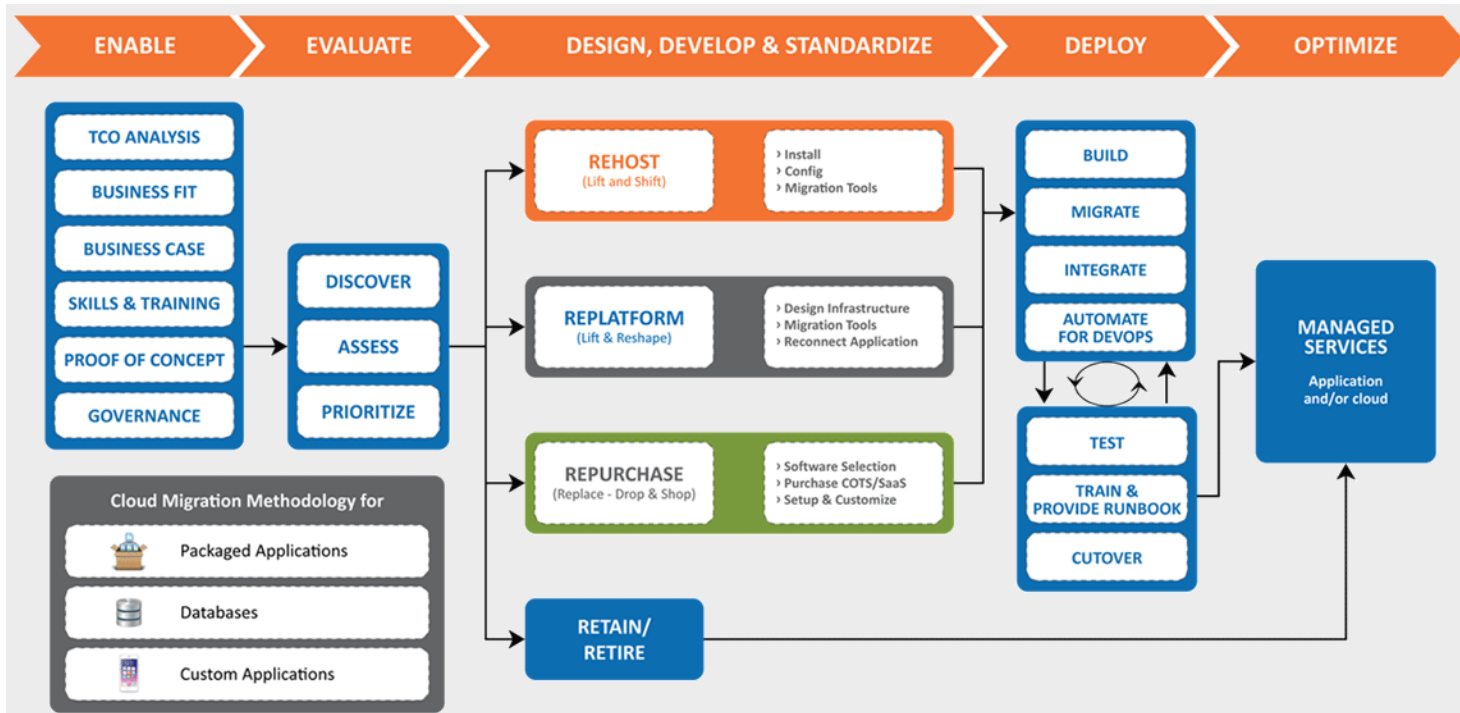
Amazon AWS Application migration strategy

https://www.slideshare.net/AmazonWebServices/application-portfolio-migration
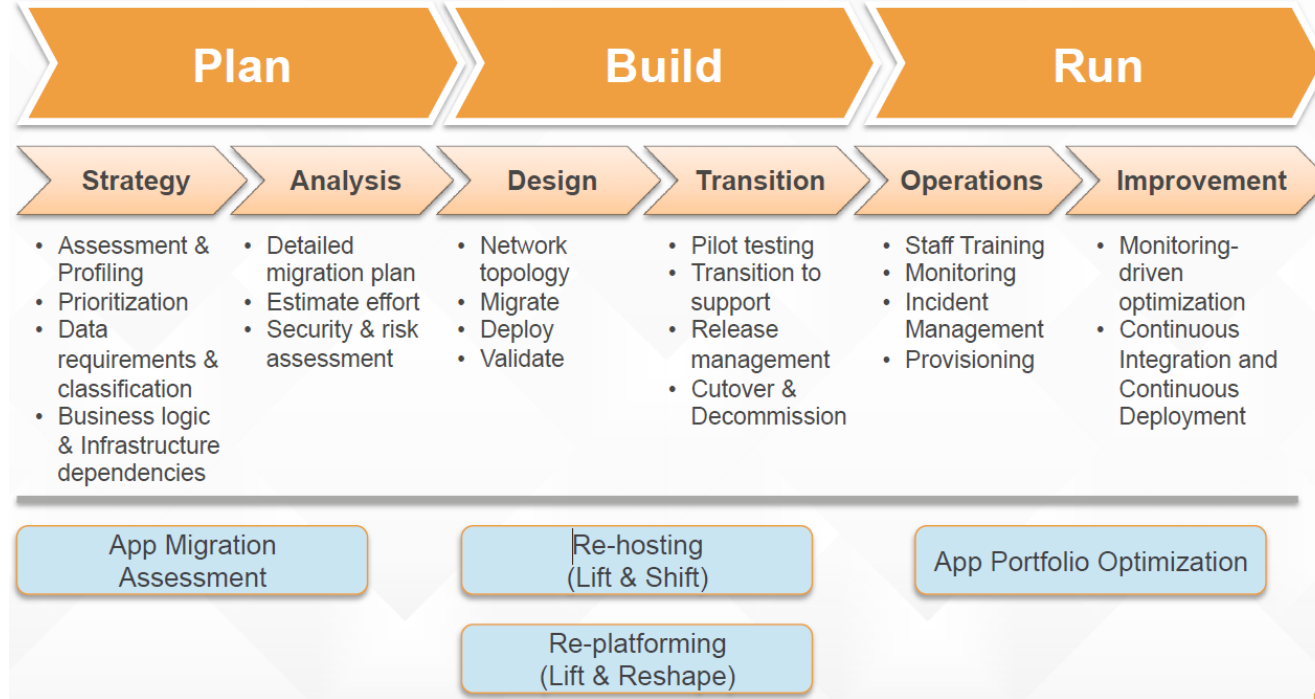
Application portfolio assesment

https://www.slideshare.net/AmazonWebServices/application-portfolio-migration

Collecting application portfolio inventory

Defining segmentation and prioritization criteria

Determining application migration options

Creating application migration roadmap

- Conduct application discovery workshop
- Interview application owners
- Implement tool-based discovery

- Profiling application inventory
- Identifying complexity, criticality and preferences
- Clustering and prioritizing

- Driven by prioritization, skills and best practices
- Use best patterns
- Capture inter-dependencies
- From "lift and shift" to "drop and shop"

- Expect complete IT transformation
- Include IT process changes and organizational change management
- Focus on new Operations model

Private Cloud Implementations

https://www.gartner.com/binaries/content/assets/events/keywords/catalyst/catus8/2017_planning_guide_for_cloud.pdf
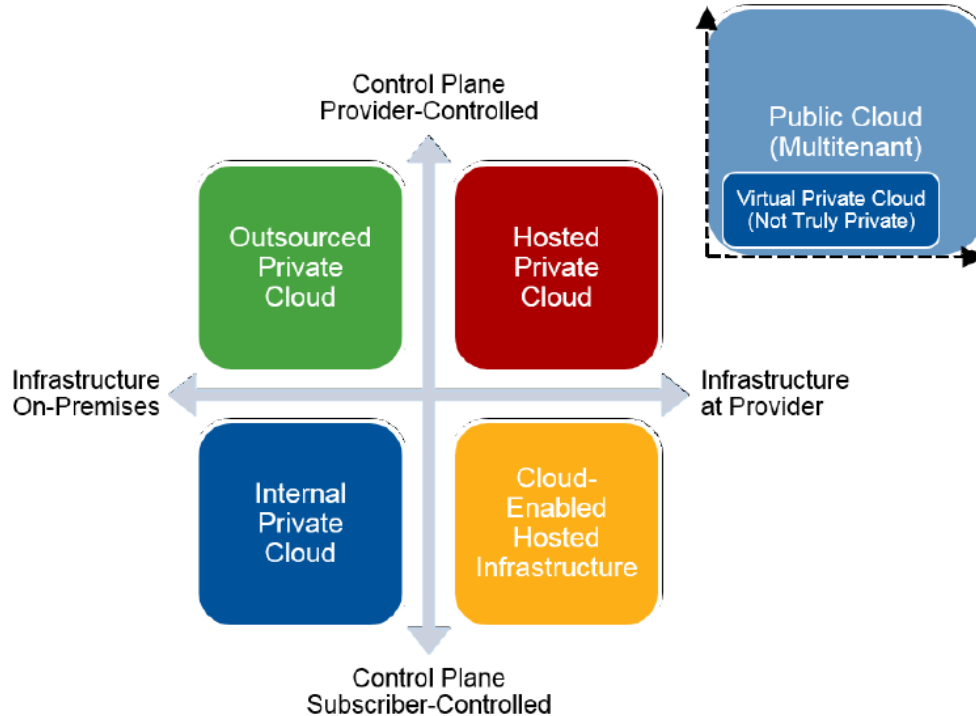
Document your Cloud strategy

https://www.gartner.com/doc/3563017/designing-cloud-strategy-document

Tasks to develope your Cloud Strategy

https://www.gartner.com/doc/3563017/designing-cloud-strategy-document

- Establish cloud definitions and terminology
- Identify what you are already doing
- Define what you are trying to achieve
- Clarify the benefits of cloud for your organization
- Define the risk criteria
- Scope your cloud initiatives
- Align on success metrics

Business and IT Drivers

Business drivers

End users and PaaS development in business units

- Flexibility – adjust "on the fly" to changing requirements (scale up/down)
- Solutions only available on cloud
- Ease of use – self service concept
- Speed to market – high degree of automation
- Cost for what you use, "pay-as-you-go"

IT Drivers
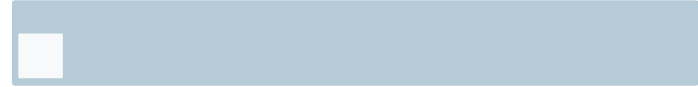
- Elastic computing and scalability – as services
- New technology enabled – increased service offerings
- Supplement to on premise offering
- Global enablement
- Cost management – flexible cost models

Principles for cloud adoption

- Existing governance adapt cloud solution management

- Cloud are chosen for solutions when business and IT drivers are best enabled

- Build a hybrid cloud environment with multiple vendors

- On-premise and cloud solutions are equally secure and compliant

- Intellectual properties (IP) in cloud solutions must be fully owned and accessible

- Managing SaaS, PaaS and IaaS are internal competences for being in control and serve the business

Organisational model

https://blogs.vmware.com/cloudops/devops Inspired

Cloud assessment of Business Agreement with a cloud SaaS application vendor (DONG energy)
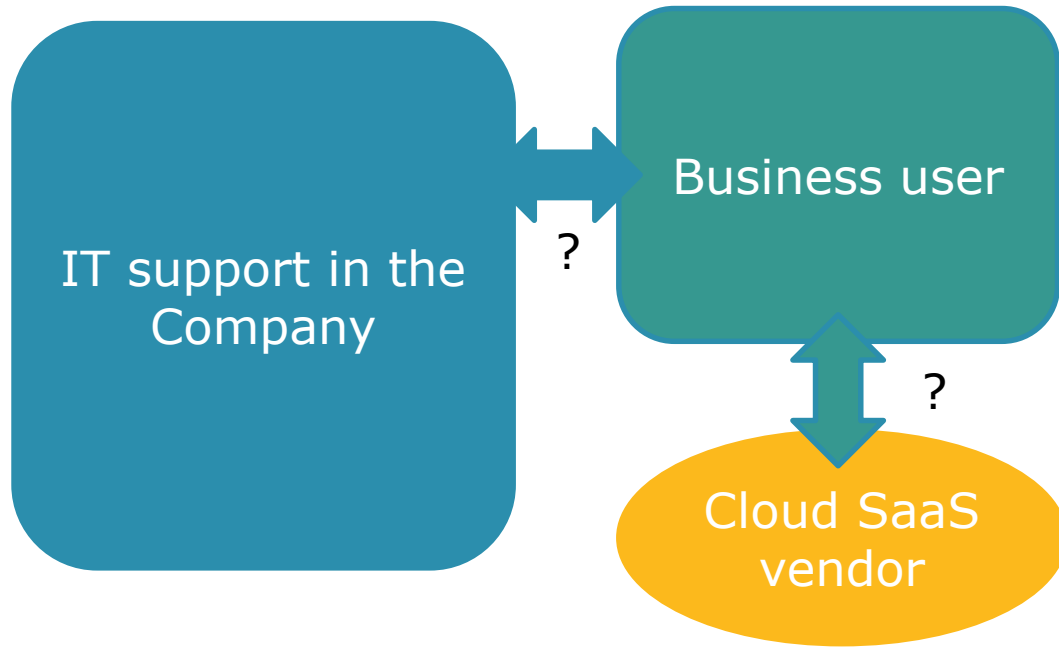
Company internal business owner to secure

Business questions for cloud valuation assessment - WORK IN PROGRESS

Domain	Control Group	CID	Assessment Questions	Answer (OK or NOT C
Governance				
Governance	Ownership	GO-	Who will have the ownership of the system at DONG Energy?	OK
Governance	Documentation	GO-	Is there an updated SDD (solution design document)?	No
Governance	Data Classification	GO-03.1	Have you classified the types of data that will be transmitted or entered into the system?	No
Governance	User Access	GO-	Should the system be able to support different roles and	Yes
Governance		GO-04.2	Should the system be able to support different levels of access rights to data and objects?	Yes
Governance		GO-04.3	Should the system be able to have context-based screens based on the users roles and rights?	Yes
Governance	Regulation	GO-	Are there legal requirements that the system has to meet?	No
Governance		GO-05.2	Are there regulatory and compliance requirements the system has to meet?	No
Governance		GO-	Are there records management requirements the system has to	No
Governance	Data Access	GO-	How should the service be accessible? (software, applications,	Multiple
Governance		GO-06.2	At the cessation of services, should the data be made available by the vendor?	Yes
Governance	Data Transportability	GO-07.1	Do you require the ability to export or use the data outside the native system?	YES
Governance		GO-	Are there specific formats that the data should be made	No
Information Security				
Information Security	User Access Policy	IS-01.1	How will you document and grant users access to the system?	TBD
Information Security		IS-01.2	How will you document and remove user access to the system once no longer needed?	Manual
Information Security	Data transmission	IS-02.1	Should there be secure transmission of data? (eg. SSL-	SSL
Information Security	Portable / Mobile	IS-03.1	Should the service be accessible on mobile devices?	Yes
Information Security	Incident Response	IS-04.1	What classifies as an incident and therefore the resolution time? (A matrix of what constitutes a minor, critical and major incident and response times)	TBD
Information Security		IS-04.2	What are your expectations for vendor communication in the event that an incident occurs? (how often and by what means should the vendor communicate)	Vendor Helpdesk
Operations Management				
Operations	Data Maintenance	OM-	Who will be responsible for maintaining the data in the system?	SD
Operations		OM-	Who will be responsible for supporting the system?	SD
Operations Management	Provisioning	OM-02.1	Are there peak loads that the system has to accommodate? (eg. time of day, day of the week, month-end etc)	Yes
Operations Management		OM-02.2	Do you have an estimate of the amount of the data that will be transferred?	NO
Operations	Restoration capability	OM-	Should the system have the capability to restore deleted data?	Yes
Operations	Backup procedures	OM-	How fast should the solution provider be able to restore	According to SLA wit
Operations Management	Integration	OM-05.1	Are there systems that the service has to be able to interface or communicate with?	Yes
Operations		OM-	Should the service have an API?	Yes
Operations	Customisation	OM-	How much flexibility for customisation and/or configuration should the system support?	MUCH
Operations Management		OM-06.1		
Operations	Scope of use	OM-	Is the scope of implementation fully defined?	Yes
Operations		OM-	Is the scope of use in business departments defined?	Yes
Implementation				
Implementation	Existing systems	IM-01.1	Is the solution replacing an existing system?	Yes
Implementation	Costs	IM-02.1	Have you considered the cost-modelling of cloud solution vs other options?	Yes

Business questions for cloud valuation assessment - WORK IN PROGRESS

Domain	Control Group	CID	Assessment Questions	Answer (OK or NOT
Operations Management		OM-02.2	Do you have an estimate of the amount of the data that will be transferred?	NO
Operations Management	Restoration capability	OM-03.1	Should the system have the capability to restore deleted data?	Yes
Operations Management	Backup procedures	OM-04.1	How fast should the solution provider be able to restore backups?	According to SLA with e
Operations Management	Integration	OM-05.1	Are there systems that the service has to be able to interface or communicate with?	Yes
Operations Management		OM-05.2	Should the service have an API?	Yes
Operations Management	Customisation	OM-06.1	How much flexibility for customisation and/or configuration should the system support?	MUCH
Operations Management	Scope of use	OM-07.1	Is the scope of implementation fully defined?	Yes
Operations Management		OM-07.2	Is the scope of use in business departments defined?	Yes
Implementation				
Implementation	Existing systems	IM-01.1	Is the solution replacing an existing system?	Yes
Implementation	Costs	IM-02.1	Have you considered the cost-modelling of cloud solution vs other options?	Yes
Implementation		IM-02.2	Have you considered the cost of possible migration to and from the system?	Yes
Implementation	Organisation	IM-03.1	Will there be any organisational impact (eg. new business processes, governance)?	Yes
Resiliency				
Resiliency	Impact Analysis	RS-01.1	What are your requirements to the vendor's operational Service Level Agreement (SLA) performance?	?
Resiliency	Performance	RS-02.1	What are your requirements for system uptime and availability?	Business hours
Resiliency		RS-02.2	Do you have requirements for how fast the data has to be accessible?	Yes
Resiliency		RS-02.3	Are there any requirements for throughput time for key processes?	?
Resiliency	Business continuity	RS-03.1	Are the contingency plans in case of problems with vendor?	YES
Security Architecture				
Security Architecture	User ID Credentials	SA-01.1	Should the system be able to support single-sign-on? Which IAM method?	Yes - ADFS
Security Architecture		SA-01.2	How should the users authenticate when logging in? (Single-sign-on, separate username+password, two-factor authentication?)	Yes
Security Architecture	User Logging	SA-02.1	Should there be kept a record of access time and changes made by users?	Yes
Vendor				
Vendor	Reputation	VE-01.1	How is the vendor's reputation?	Good
Vendor		VE-01.2	How is the reputation of the solution?	Good
Vendor	Sub-contractors	VE-02.1	Does the cloud solution rely on sub-contractors, other suppliers or other companies in order to operate?	Unknown
Vendor	System maintenance	VE-03.1	Are the release-cycles satisfactory? (too high/too low?)	Yes
Vendor		VE-03.2	How long is the system expected to be used, and is it supported for the duration?	Until further notice
Vendor	Customer Contact	VE-04.1	What are the requirements for support hours?	Business hours
Vendor	System Knowledge	VE-05.1	Should there be in-house knowledge regarding the system?	Yes
Vendor		VE-05.2	Should there be other means of support apart from the vendor? (eg. user communities, consultants, partners)	Yes - SD
Vendor		VE-05.3	Do you feel that the vendor is adequately able to support the needs of the enterprise when needed?	Yes
Vendor	Financing	VE-06.1	Should the cost structure be based on consumption or users?	Users
Vendor		VE-06.2	Have you factored the TCO?	Yes
Vendor	Solution Requirements	VE-07.1	Does the system meet the necessary non-functional requirements?	TBD
Vendor		VE-07.2	Does the system have to be available in a particular language?	YES
Vendor		VE-07.3	Do you require data to be made available offline?	No
Vendor	Future Planning	VE-08.1	Are there areas where the system could be improved?	TBD
Vendor		VE-08.2	Does the vendor have a development plan and/or is it satisfactory?	Yes
Vendor		VE-08.3	Have you considered exit-strategies and the possibility of a future vendor	

Questionnaire

Cloud SaaS vendor to secure

Recommendation

- Depending on you needs you can choose to look at the cloud as an extension of your on premise data center offering dynamic capacity support and some cost (capex) advance's

- Or

- you can look at cloud as a paradigm shift of it development and technology, in order to utilize disruptive technologies Internet of things, Mobility, social, Analytics (nexus of forces/ SMACIT) in order to support your business development

.NET / Windows to JVM / Linux
Monolith to Microservices
Data center to AWS
Devs + Ops to Collaboration culture
Involve product people

Great Design
Universally Connected
Mobile First
Instant Business Value
Massive Data Insight
Highly Available

Cloud Architect working areas and possible organisational role
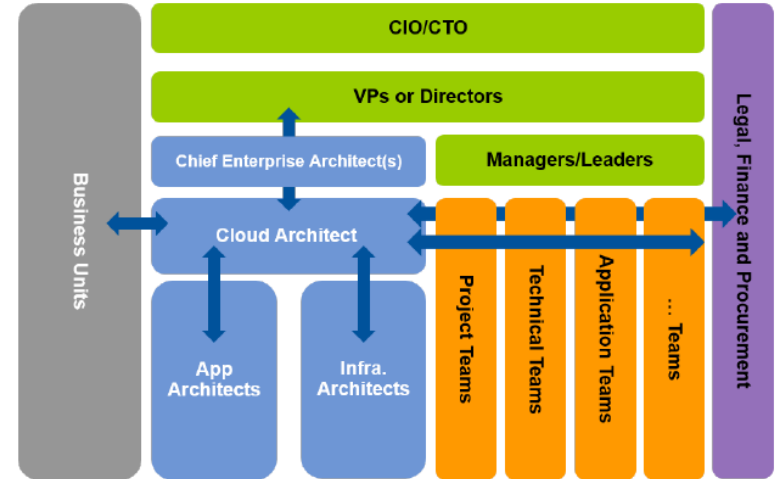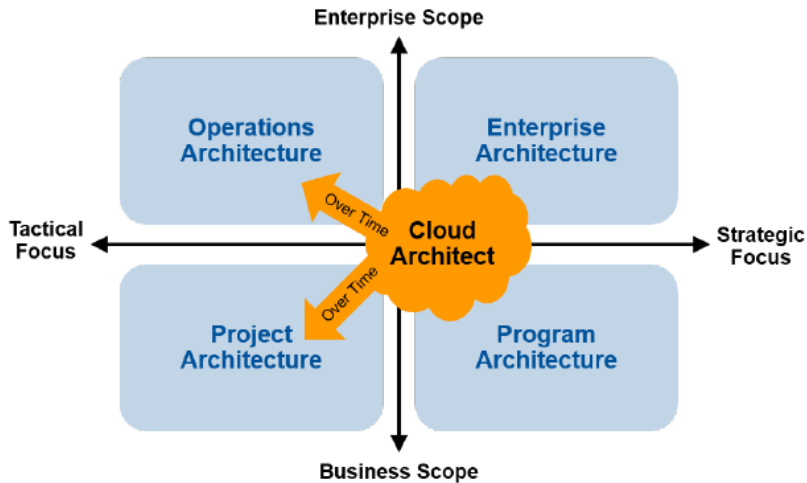
New IT Roles Checklist

https://www.cebglobal.com/content/dam/cebglobal/us/EN/best-practices-decision-support/information-technology/pdfs/cio-new-roles-checklist.pdf

Omlægning af udviklings paradigme til container based

Example of Depicturing the maturity level of own company level of readiness

Stage	NO PROCESS	WATERFALL	AGILE	CLOUD NATIVE	NEXT
CULTURE	Individualist	Predictive	Iterative	Collaborative	Experimental
PROD/SERVICE DESIGN	Arbitrary	Feature-driven	Functional	Market driven	Data driven, strategic
TEAM	No organisation, single contributor	Hierarchy	Cross-functional teams	DevOps / SRE	Multi-disciplinary, de-centralized
PROCESS	Random	Waterfall	Scrum/Kanban	Cloud Native	Distributed, self-organized
ARCHITECTURE	Emerging	Tightly coupled monolith	Client server	Microservices	Functions
MAINTENANCE	Respond to users complaints	Ad-hoc monitoring	Alerting	Comprehensive monitoring	Self healing
DELIVERY	Major version release	Monthly releases	Continuous Integration	Continuous Delivery	Continuous Deployment
PROVISIONING	Manual	Scripted	Puppet/Chef /Ansible	Orchestration, Kubernetes, Mesos	Serverless
INFRASTRUCTURE	Single server	Multiple servers	VMS	Hybrid cloud	Unikernels

CURRENT SITUATION   **GOAL**

https://container-solutions.com/cloud-native-maturity-matrix/

Container Solutions Cloud Migration Method

Discover and Plan	**Prepare**	**Propel**	**Perform**
Identify the right problems to solve and formulate strategy	Create the building blocks for the infrastructure and organisation	Migrate applications to the new cloud environment	Stabilise applications and support client's growth after migration

Mapping context and architecture
Explore migration opportunities

Discovery

Architecture Review

Security Audit

Cloud Native Strategy

Strategy Validation

TECHNOLOGY

Prepare the infrastructure
Containers, clusters, microservices

ORGANISATION

Prepare the organisation
Development / deployment processes and learning plan

Application rollout and refactoring
Migrate remaining applications

Capacity building
Training and coaching of Cloud Native teams

Growth

Support

Stabilisation

OUTCOMES

- Strategy and roadmap
- Maturity assessment
- Functional PoC (optional)

- New architecture design
- 1-3 applications in production
- Migration backlog

- Migrated applications
- New organisational practices
- Handover to the organisation

- Optimisation and growth
- Fixed issues
- Support

Det rige billede Container / Docker / Kubernetes

https://hackernoon.com/the-best-architecture-with-docker-and-kubernetes-myth-or-reality-77b4f8f3804d

Recommendation

- Start small, use the existing, aim for a vision

- Appoint cloud enabler role – cloud architect

- Create CoE for Cloud, find the ambassadors

- Make cloud strategy document for the context

- Encourge employees, make playground, educate employees

- Understand the impact – understand security

- Awareness – de-mystify the cloud, remove uncertainty

- Let IaaS and PaaS be IT capabilities - educate business for SaaS usage

Recommendation

- Don't go cloud without a **cloud strategy** showing the business areas that benefit from the cloud use and the scope of the cloud use requested

- Secure your **application portfolio documented** in a repository in order to perform a cloud readiness assessment of the portfolio to determine "workloads" that can move to the cloud, current cloud applications shall also be in the repository.

- Don't go for a IaaS, PaaS to SaaS stepwise migration, **go to SaaS** first if possible

- Your will be in many cases **responsible for the data** / information part of your cloud solution. You will need to have data governance and master data management skills in place in your organisation

- You will end up in a **multi cloud environment** where you will have point solutions in different clouds and a main cloud vendor in your setup. You will need access to the cloud management system, in order to follow the cloud use (workload) and billing.

- In order to integrate your cloud solutions and your on Premise datacenter you will need a **Hybrid integration platform** to facilitate data integrations both in cloud, between and on premise.

- Consider and investigate if your private cloud can go to **Public Cloud** instead

- Investigate and consider your **exit strategy and plans** for the cloud vendor (getting data and configurations out and into new cloud vendor)

- Investigate that your **IAM** (Identity & Access management) solution also include cloud access and authentication and authorization data exchange

Questions?