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# Cloud Migration: a journey through the 6 R's

Paolo Latella – Cloud Practice Manager

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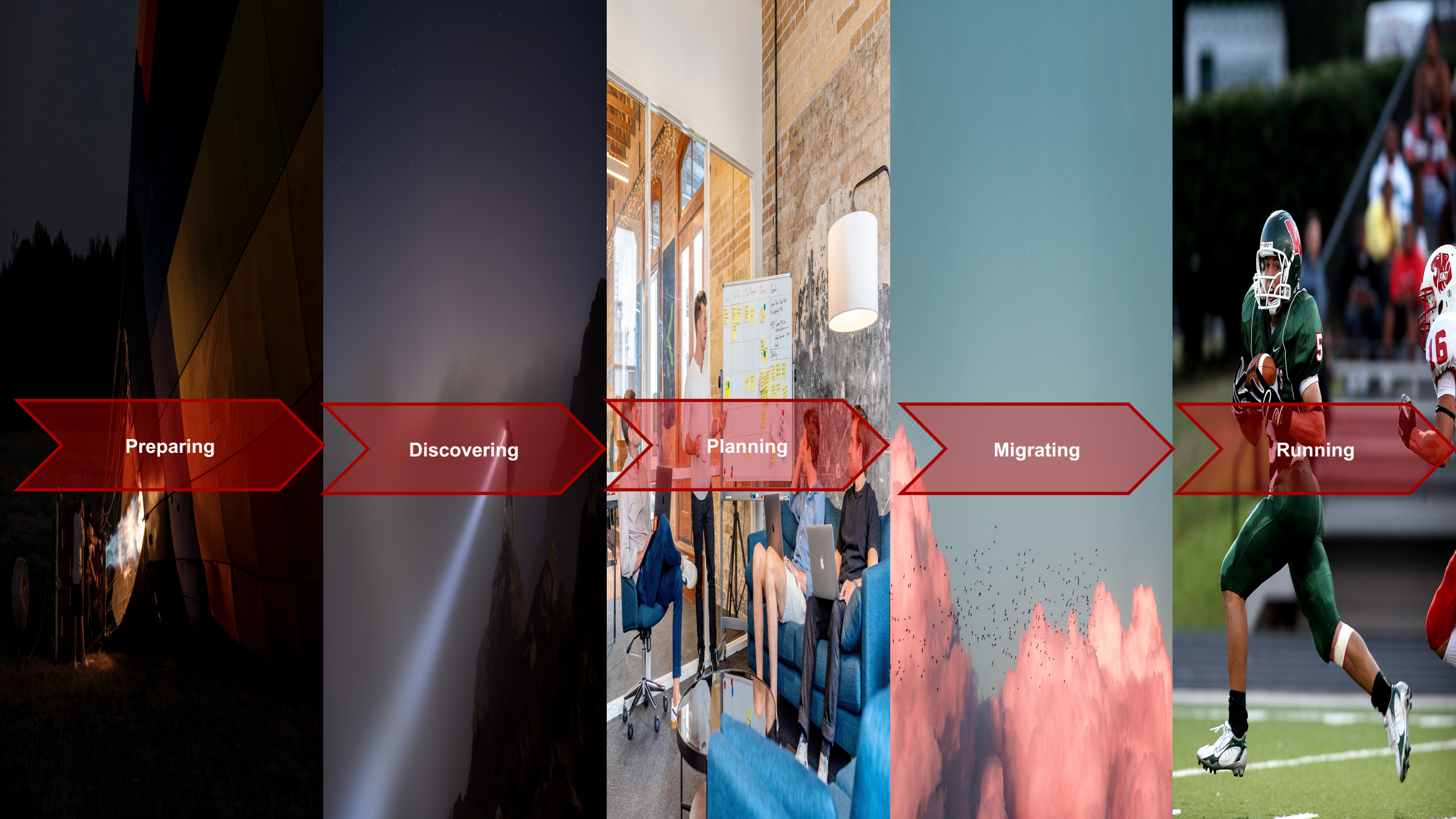
# Migration is a journey

- Migrating to Cloud is an iterative process that involve **people**, **process** and **platform**.
  - People: probably you alredy have the right people, but you need to change the culture and update the skills
  - Process: is an iterative process that evolves as your organization develops new skills and capabilities.
  - Platform: use the right tools and indetify the right Cloud resources in order to optimize cost, increase performance and improve availability

# Business drivers

Why company as CapitalOne, Intuit and Barclays (**Finance**), Johnson & Johnson, Merck and Pfizer (**Healthcare**), Shell, BP and Hess (**Oil&Gas**) and Netflix, Samsung, Adobe (**Tech**) have decided to migrate their Workload to the Cloud ?

- Increase productivity (no wait for infrastructure)
- Reduce operational costs
- Become more agile
- Deliver reliable, globally available services


Preparing
Discovering
Planning
Migrating
Running


Preparing

# Preparation - Business Planning

How do I build the right business case ?

# Preparation - Business Planning

How do I build the right business case ?

- Drivers
  - Not only cost saving, re-imagine your business!
  - Speed-up time to market
  - Increase the attention on innovation
  - Quantifying and evaluating TCO and ROI changes with cloud services

# Preparation - Business Planning

How do I build the right business case ?

- Four categories:
  - runcost analysis
  - cost of change
  - labor productivity
  - business value

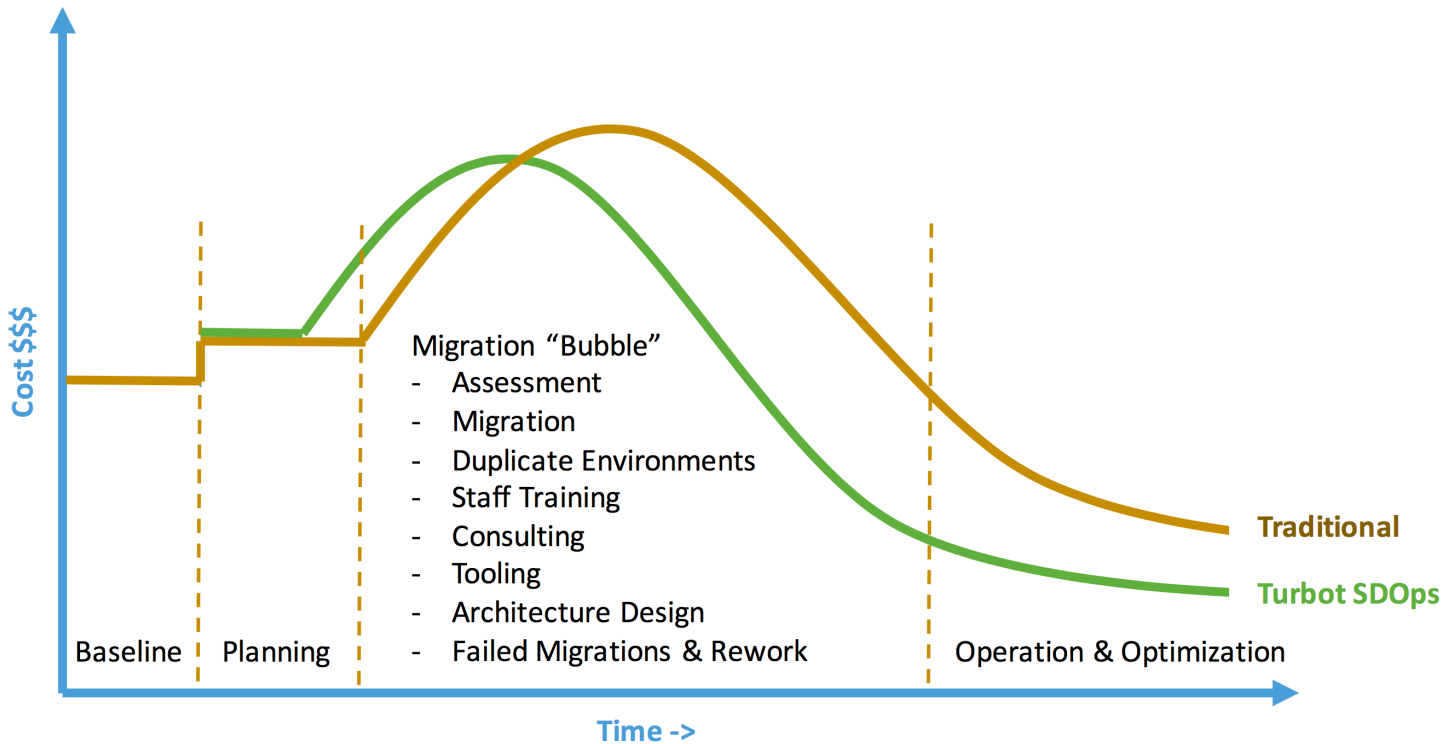
# Preparation - Business Planning

How do I build the right business case ?

- Several phases of evolution
  - Directional
  - Refined
  - Detailed

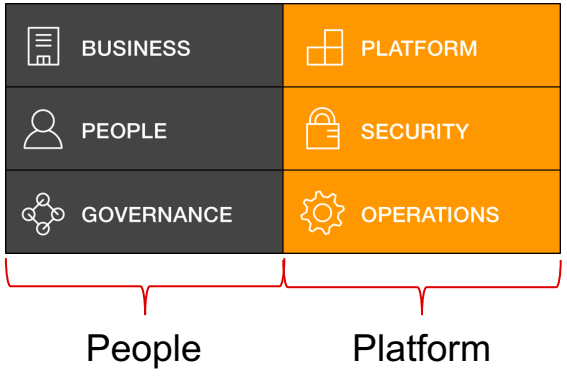
# Preparation - Business Planning

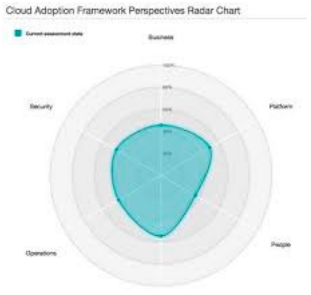
## Don’t forget the "migration bubble" !

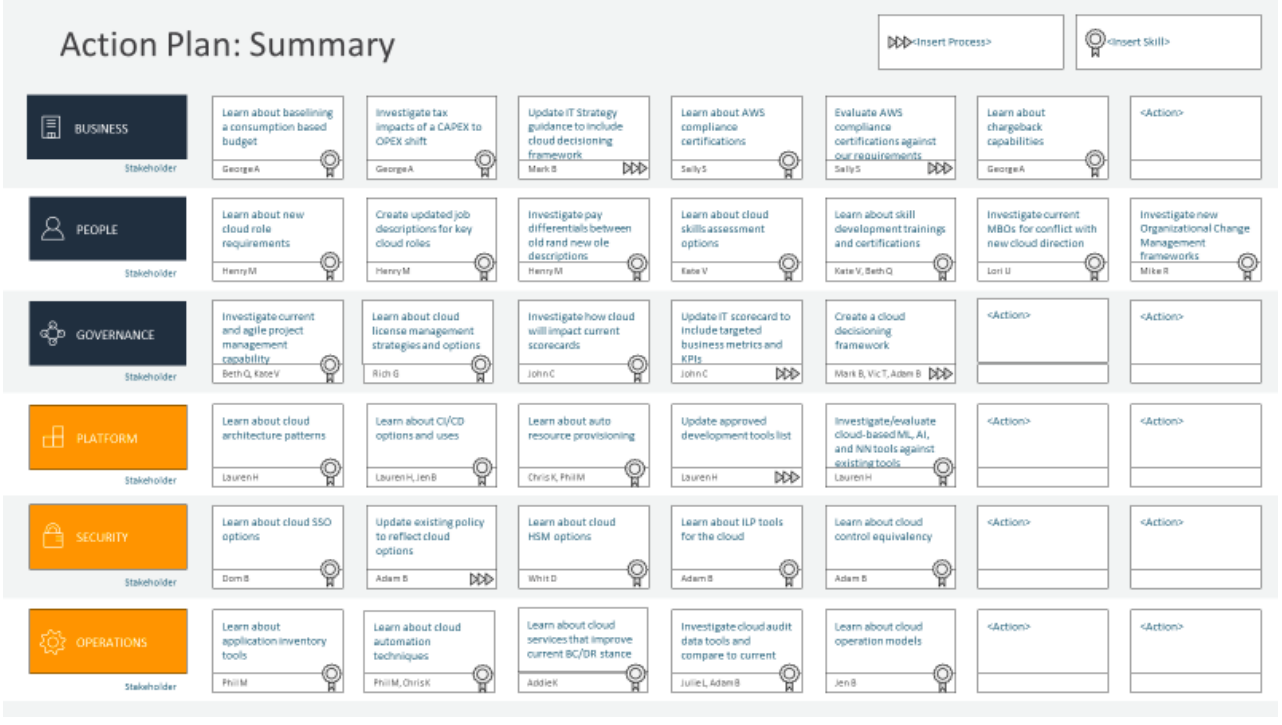


# Preparation – Adoption Framework

Identify the gaps in skills and processes between the current IT environment and the future cloud environment



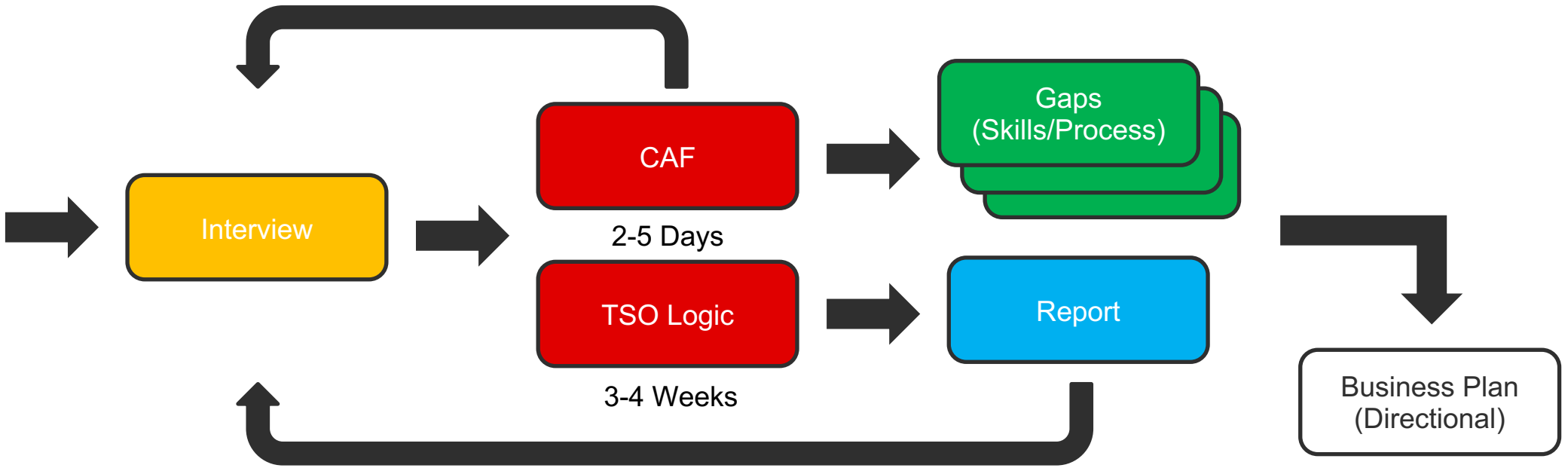
# Preparation – TSO Logic

- **Migration Preparation& Business Case**
- Portfolio & Discovery Planning

- **On-Premises Analysis**
  - Identifies on-premises compute, local storage and memory
  - Identifies Windows licenses
  - Analyzes what you have, how it's used and what it costs to operate

- **Cloud Planning**
  - Automatically determines the best-fit, lowest-cost placement for each workload on AWS
  - Creates multiple "what-if" scenarios
  - Right-sizes overprovisioning to recognize significant savings

# Migration Preparation




Discovering (Portfolio)

# Portfolio Discovery

- Portfolio Discovery is the process of understanding your on-premises environment, determining what physical and virtual servers exist, and what applications are running on those servers.
- Discovery provides you with the required data for project planning and cost estimation.
- Portfolio discovery together with migration approach help you to build a full business case
- Manually performing discovery can take weeks or months, so we recommend taking advantage of automated discovery tools

# Discovery Tools – Application Discovery

- The **AWS Application Discovery** Service is a purpose-built discovery solution to help migration to the AWS Cloud.
- Performs discovery in two ways
  - Agentless discovery
  - Agent-based discovery
- Gathers the information about servers and applications
  - Identify server dependencies
  - Measure server performance
- Stores the discovered data in an AWS managed database

# Discovery Tools – TSO Logic

- Migration Preparation& Business Case
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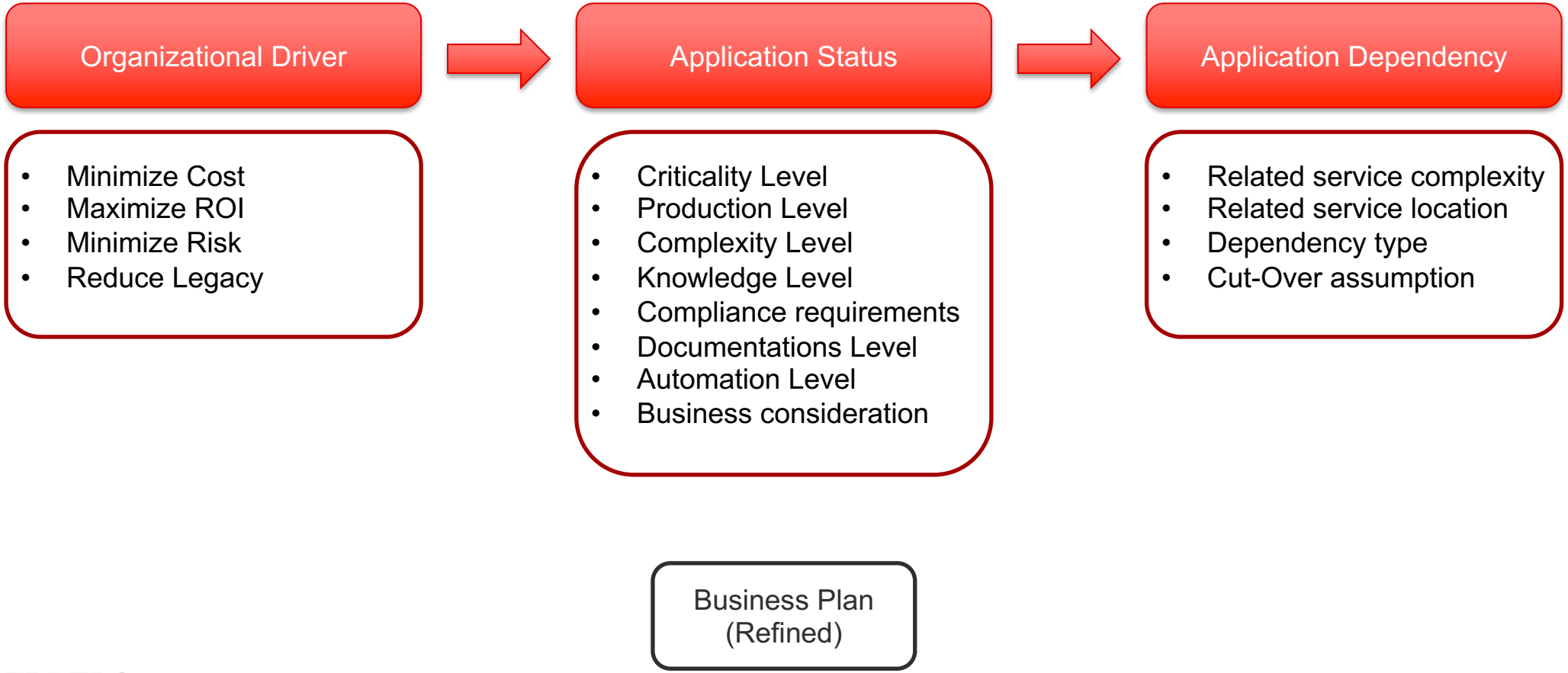
# Discovery - Classify and Prioritize

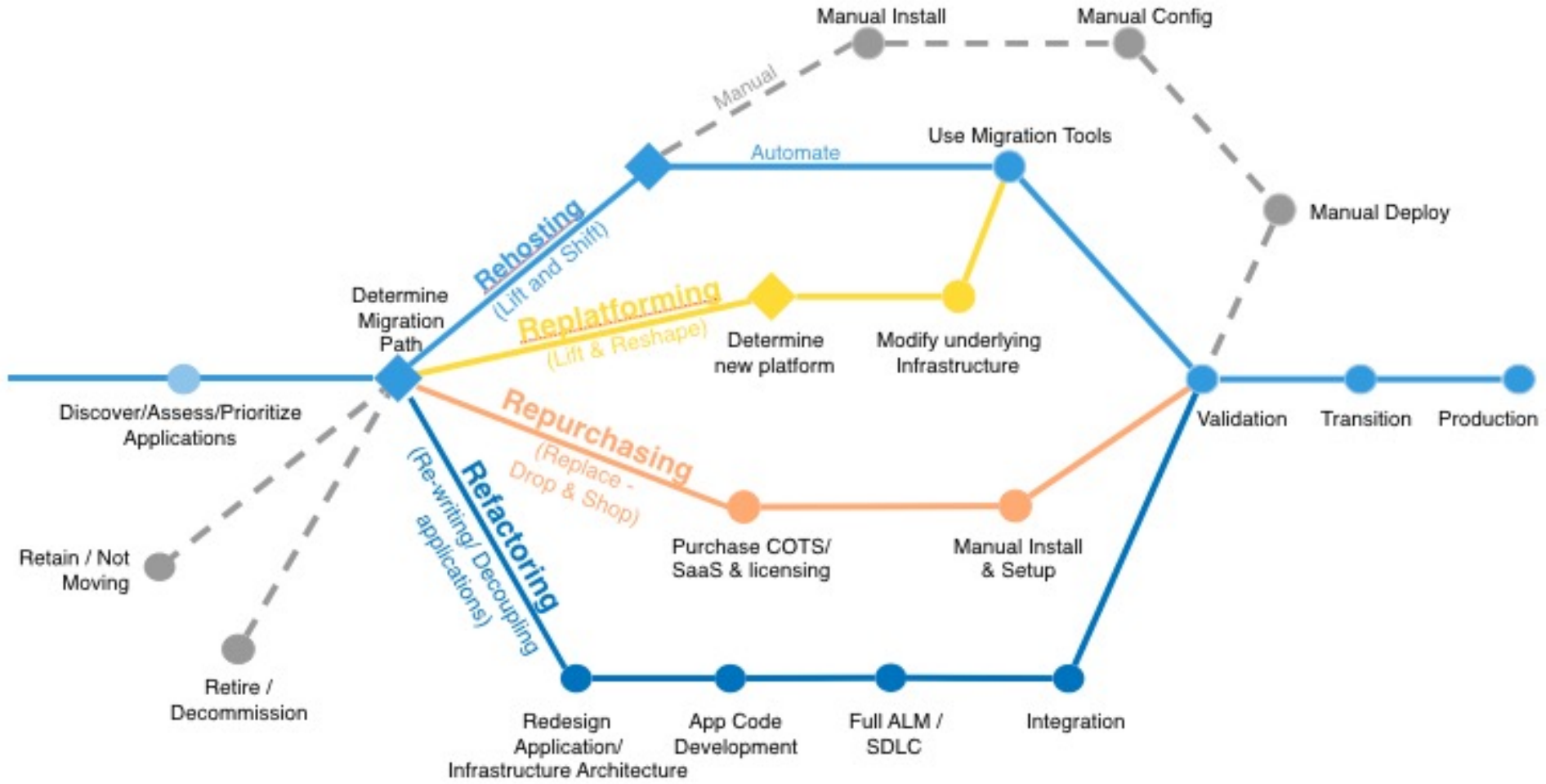



# Planning

# Planning

- Goals of this phase include:
  - Choosing a migration strategy.
  - Defining success criteria for the migration.
  - Creating a detailed migration plan.
  - Creating migration sprint teams.
  - Identifying tools for migration.
  - Right sizing of the resources in the cloud.

# Planning - Migration Strategy – The 6 R's




https://aws.amazon.com/it/blogs/enterprise-strategy/6-strategies-for-migrating-applications-to-the-cloud/

# Planning – Estimate activities


| Phase | Context | Activities | Notes | Point |
|---|---|---|---|---|
| Preparing | APP01 | Evaluate application real needs (how many storage? mem...) | *We assume the application needs based on a gross estimation. Here we want to leverage the flexibility of cloud infrastructure in order to implement a better cost* | |
| Preparing | APP02 | Evaluate possible replatforming of this application's dependencies (db, storage, ...) | *We've considered storage and database as first candidates for replatforming, now we need to validate this consideration, and find other replatforming opportunities.* | |
| Preparing | APP03 | Evaluate the points of impact of the replatforming activities on the application's candidate source code | *Evaluate how replatforming of dependencies would impact the source code. Have patterns been used, to minimize the impact of these changes.* | |
| Preparing | APP04 | Elaborate accurated migration/synchronization plan to support the replatforming | *How to migrate the data towards the new replatformed services? Do we need a time frame in which, both old and new services should be aligned?* | |
| Moving | APP04b | Implementing the migration process | *implement the migration process, based on the assumption of APP04.* | |
| Preparing | APP05 | Implement a POC of this replatforming | *Implement a Proof of Concept (POC) of the replatform solution. This will enhance the confidence of developers during real implementation and will spot ahead of time* | |
| Validating | APP06 | Evaluate POC | *Has the POC provided a good confidence about real implementation?* | |
| Moving | APP07 | Refactor the application logic in order to leverage the new platform | *Implement the real replatform solution.* | |
| Moving | APP08 | Design and implement a switch/fallback mechanism to easily swap platform endpoints | *To minimize downtime as much as possible a feature flag could be used to activate/deactivate new code execution.* | |
| Moving | APP09 | Frame current logging approach in order to leverage cloud native services | *Assessment of the current logging strategy and possibility to reimplement it using cloud services* | |

Business Plan
(Detailed)

# Planning – Define success criteria

| Business |
| --- |
| Time required to launch new application in Production |
| Achieved SLA of application |
| Customer service experience rating |
| Increase in revenue generated by new app |
| TCO of application |

| Infrastructure |
| --- |
| Time spent performing capacity planning exercises |
| Simplicity of architecture |
| Ability to change architecture rapidly |

| Operations |
| --- |
| Time spent on hardware acquisition and maintenance |
| Time required to perform hardware audits |
| Change Management streamlining process gains |
| Time spent on remediation of outages |
| Time spent deploying  new versions of code |
| Performance of application |

| Security |
| --- |
| Risk Exposure |
| Security Blast Radius |
| Ease of enforcing least access privilege |
| Overall security posture of application |
| Ease of managing security controls |
| Time spent applying security patches |

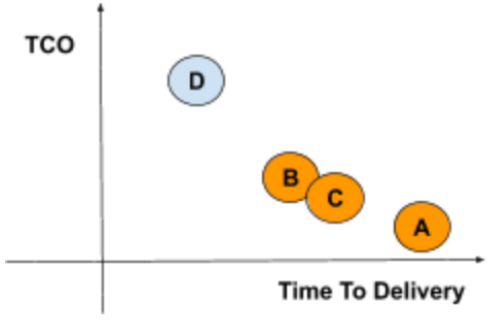
# Planning – Proof your concept

- Validate your migration strategies with a POC

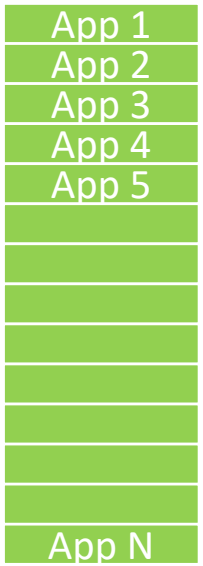
Based on output of POC on Database Migration (12.1.1) we propose the following scenarios:

- DWH on Aurora/Postgresql and StandBy on Aurora/Postgresql (Solution A)
- DWH on RDS/Oracle and StandBy on Aurora/Postgresql (Solution B)
- DWH on Aurora/Postgresql and StandBy on RDS/Oracle (Solution C)
- DWH on EC2/Oracle and StandBy on EC2/Oracle (Solution D)

These scenarios are the right balance between TCO and Time-To-Delivery:



# Planning – Workload vs Activity Stream



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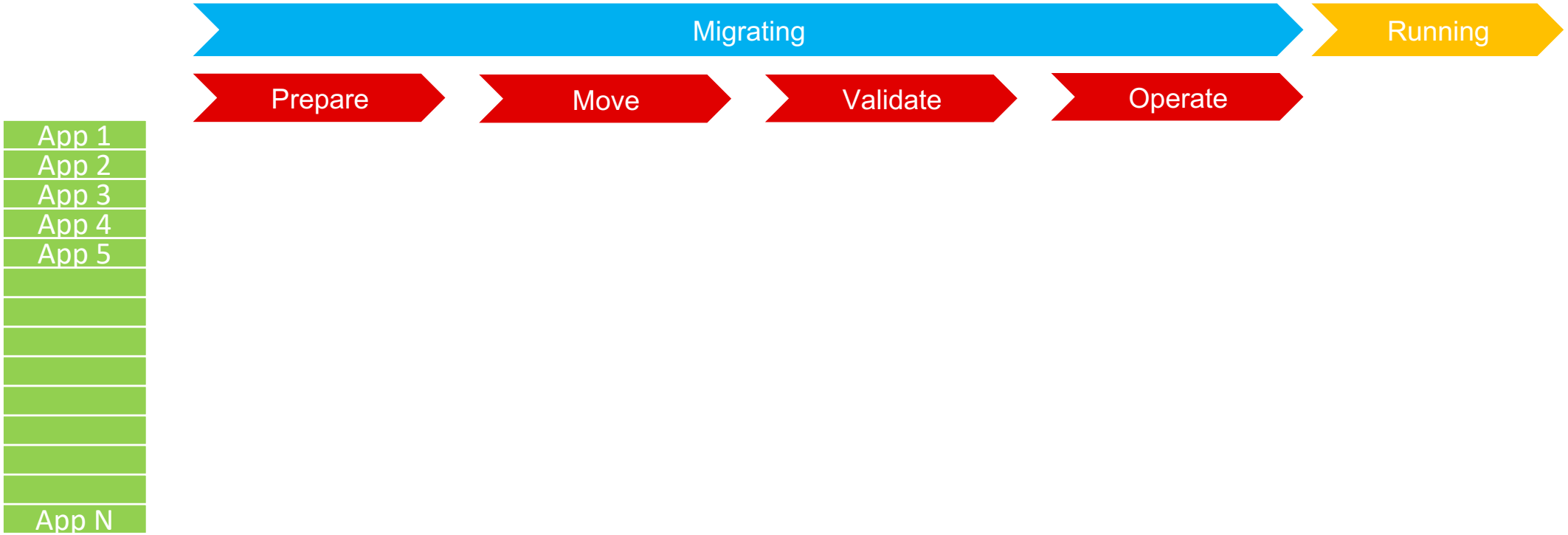

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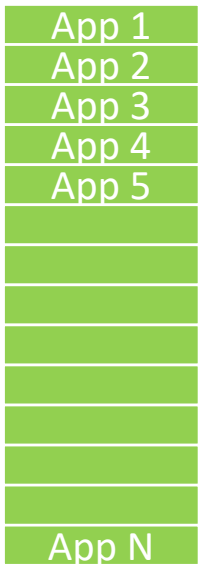
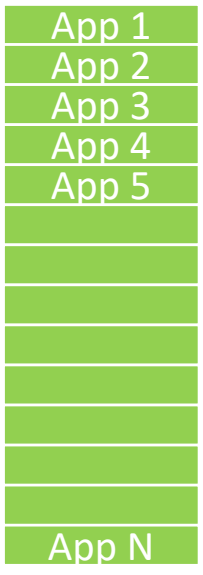



| Considerations | Workload Oriented Stream | Activity Oriented Stream |
|---|---|---|
| **Sprint** | All activities happen in sequence within a sprint and each sprint must complete before moving to the next. | Each activity is handled by a different sprint team, sprints run in parallel and sprints from one activity can overlap with another sprint's activity. |
| **Use Case** | Team members have in-depth knowledge of applications and their infrastructure. | Team members are highly specialized in their activity |

# Planning – Workload vs Activity Stream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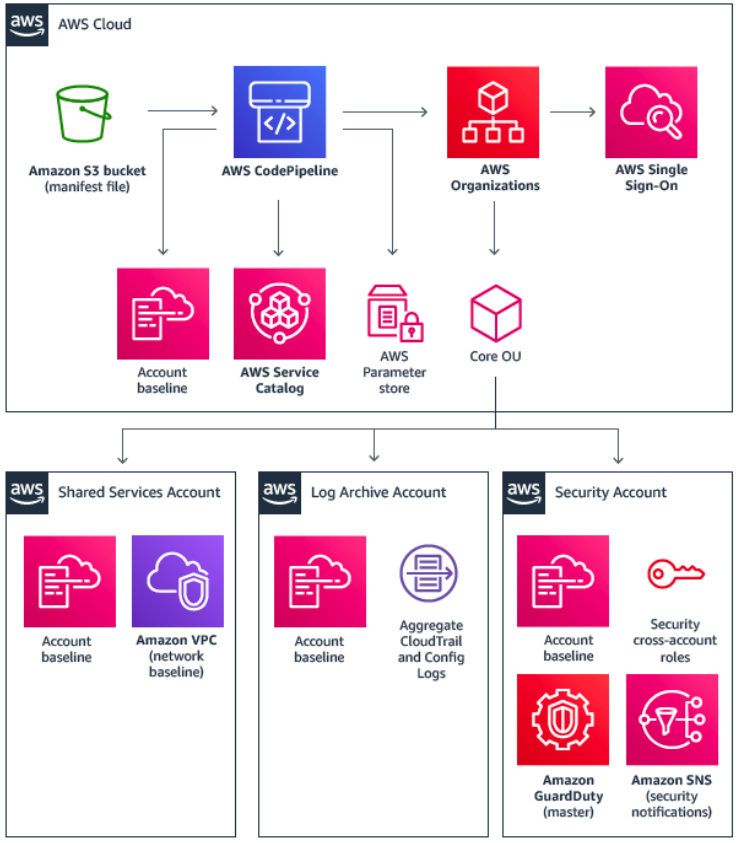
***Your migration strategy should guide your teams to move quickly and independently***

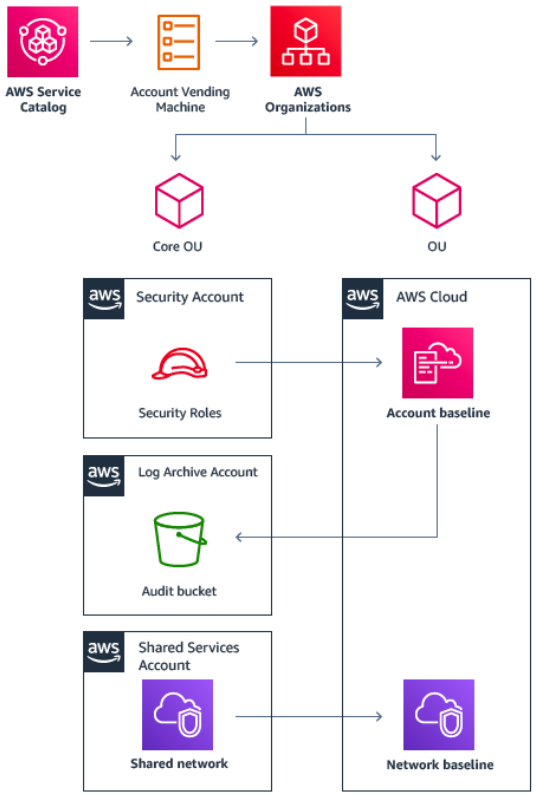

Migrating

# Migrating - Prepare - Setup landing zone

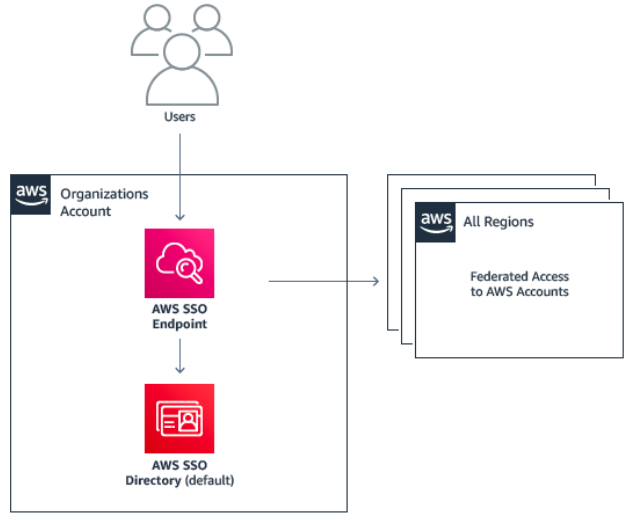
## Multi Account Structure




## Account Vending Machine




## Federated User Access

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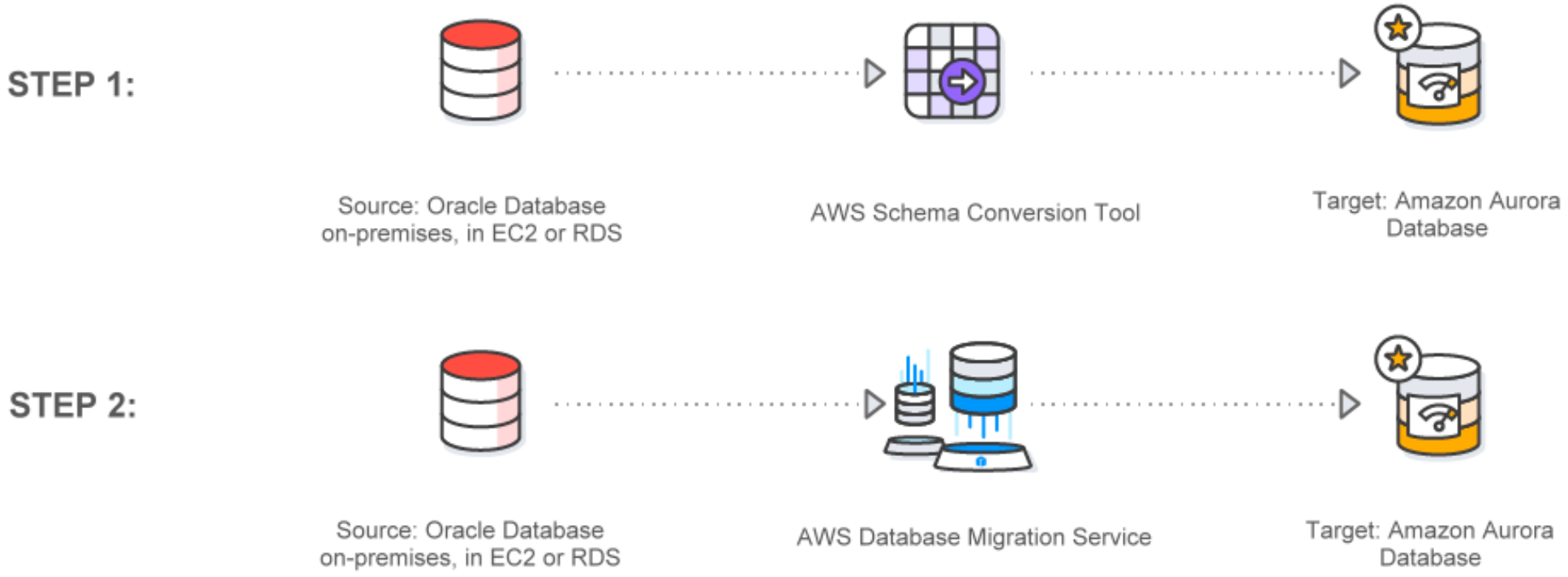
# Migrating - Move - Discovery & Tracking Tools

- **AWS Migration Hub** provides a single location to track the progress of application migrations across multiple AWS and partner solutions.
- **AWS Application Discovery Service** helps you plan migration projects by gathering information about their on-premises data centers.
- **TSO Logic** delivers accurate data-driven recommendations to right-size and right-cost compute.

# Migrating - Move - Server & DB Tools

- **AWS Server Migration Service (SMS)** is an agentless service which makes it easier and faster for you to migrate thousands of on-premises workloads to AWS.
- **AWS Database Migration Service (DMS)** helps you migrate databases to AWS easily and securely.
- **VMware Cloud on AWS** is an integrated cloud offering jointly developed by AWS and Vmware
- **CloudEndure Migration** simplifies, expedites, and automates the migration of applications from physical, virtual, and cloud-based infrastructure to AWS.

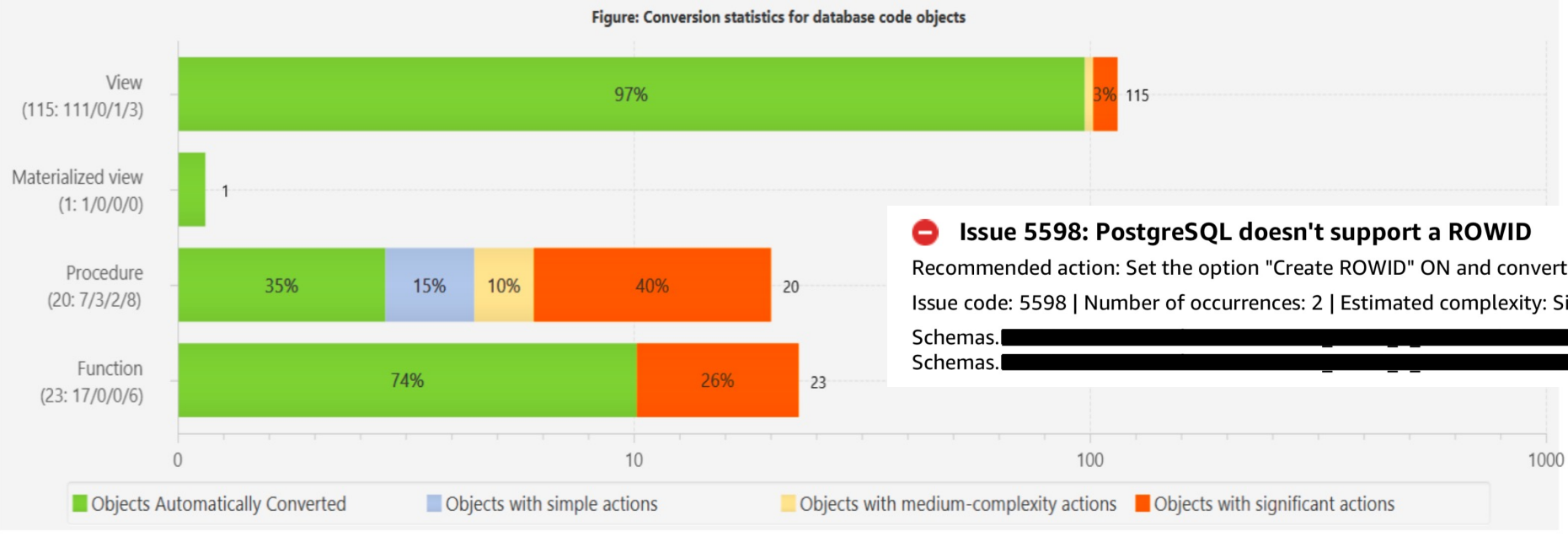
# Migrating – Move – DMS Use Case



# Migrating - Move – DMS Use Case - SCT

## Database Migration Assessment Report

Source database: [redacted]
Oracle Database 12c Enterprise Edition 12.1.0.2.0 (64bit Production), Enterprise edition




**Issue 5598: PostgreSQL doesn't support a ROWID**

Recommended action: Set the option "Create ROWID" ON and convert all related objects.

Issue code: 5598 | Number of occurrences: 2 | Estimated complexity: Significant

Schemas.[redacted]
Schemas.[redacted]

# Migrating - Move - Data Migration Tools

- **AWS DataSync** is a data transfer service that automate data moving between on-premises storage and Amazon S3 or Amazon EFS.
- **AWS Snowball** is a petabyte-scale data transport solution that uses secure appliances to transfer large amounts of data into and out of AWS.
- **AWS Direct Connect** lets you establish a dedicated network connection between your network and one of the AWS Direct Connect locations.
- **Amazon Kinesis Firehose** is the easiest way to load streaming data into AWS. It can capture and automatically load streaming data into Amazon S3 and Amazon Redshift,

# Migrating - Validate

- In this phase each new application is validated according to success criteria. Example:
  - Functional tests in order to verify if the new environment can be used in production.
  - Measure its performances against your target baseline to judge the success of the migration (KPI)
- Once this phase is completed, the new environment is ready for the cut-over.

# Migrating - Operate


The AWS CAF Operations Perspective:

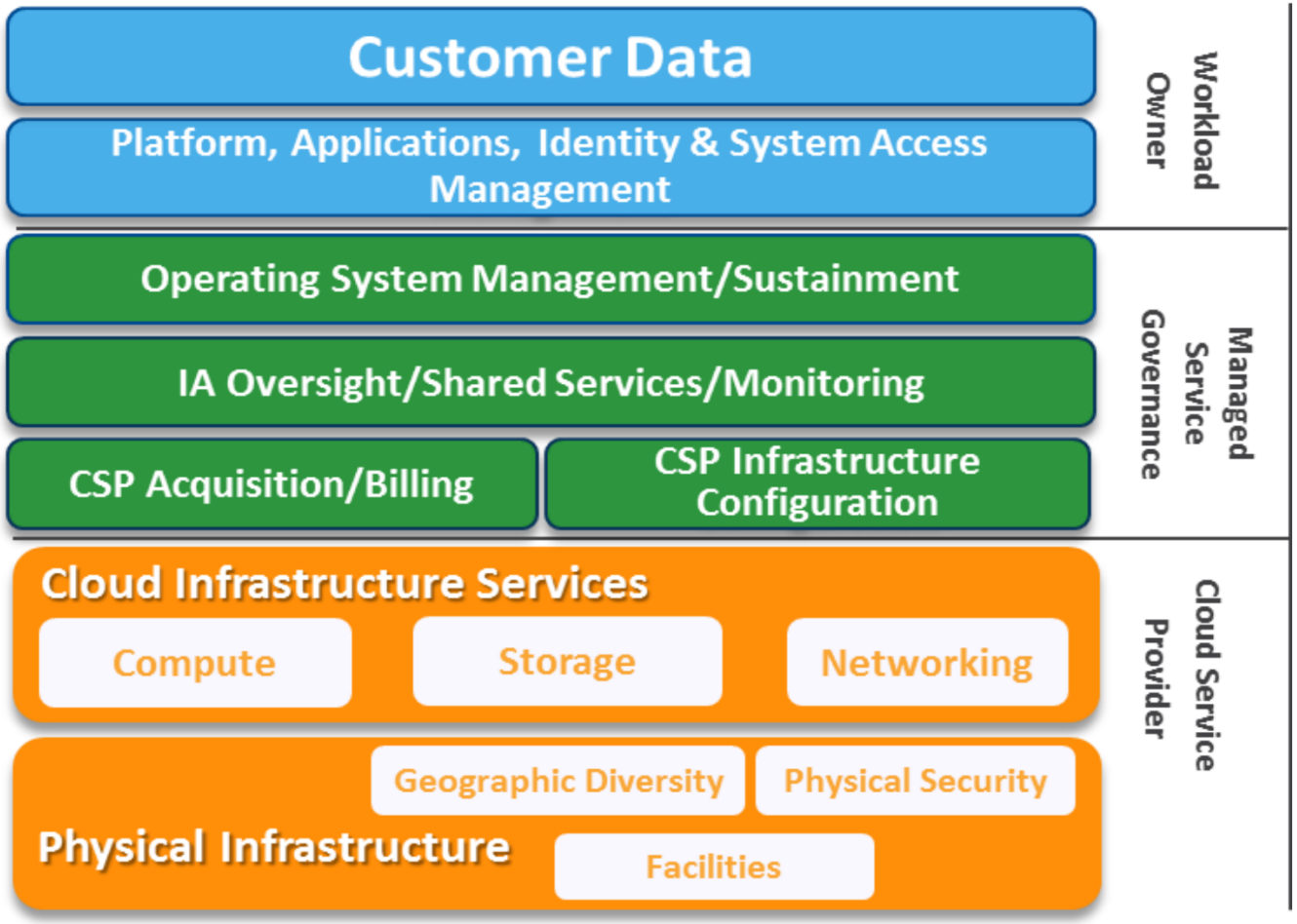
- describes the focus areas to run, use, operate, and recover IT workloads.
- defines current operating procedures and identifies the process changes and training that is needed
- helps you examine how you currently operate and how you would like to operate in the future.
- Determine the appropriate Cloud Operating Model (COM) for a particular application or set of applications
- Help To build a Cloud organizational constructs such as a **CCoE** a **CBO** and a **Cloud Shared Services** teams


Running

# Running – Centralized or Decentralized

- It is important to find the optimal balance between central management and decentralized control.
  - **Managed Service Organization (MSO):** a component of centralized cloud governance. Responsibilities can include account provisioning, networking, security auditing, hosting of shared services, billing and cost management.
  - **Workload Owners**: those who are directly responsible for the deployment, development, and maintenance of applications; a workload owner can be a cost center or a department and may include system administrators, developers, and others directly responsible directly for one or more applications.

# Running – Centralized or Decentralized




Account Provisioning
Security Oversight
Amazon VPC
IAM Configuration
Templating (IaC)
AMI Creation and Management
Shared Services

AWS Config

AWS CloudFormation

AWS Service Catalog

AWS Systems Manager

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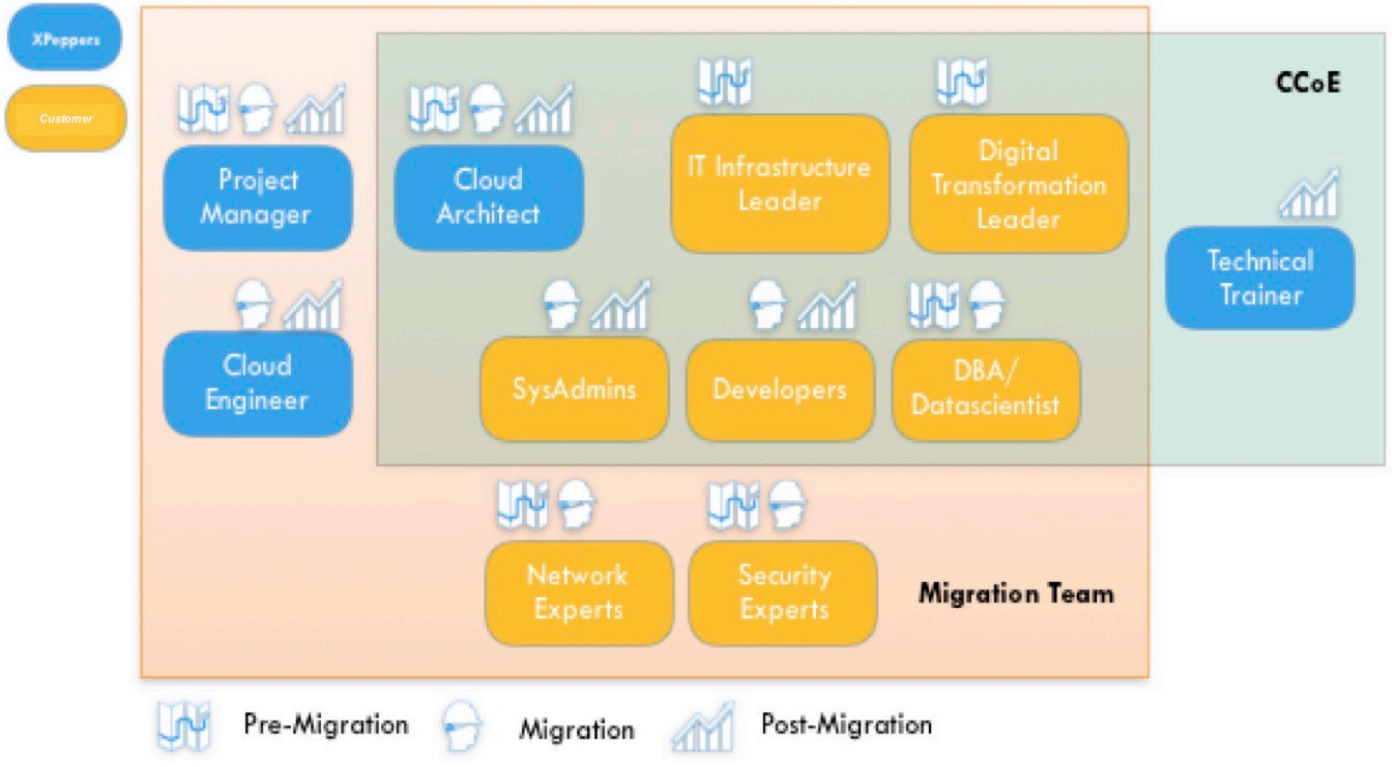
# Running - From migration team to CCoE



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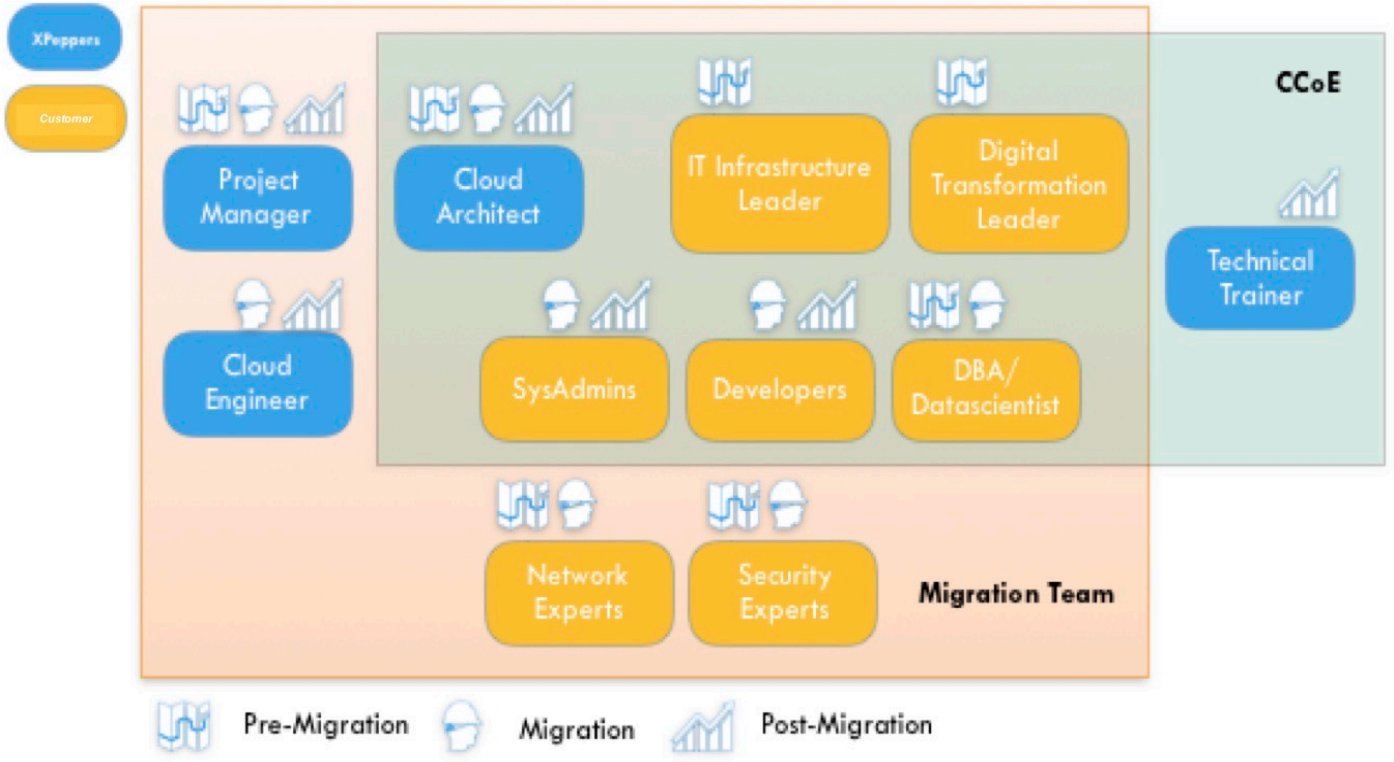
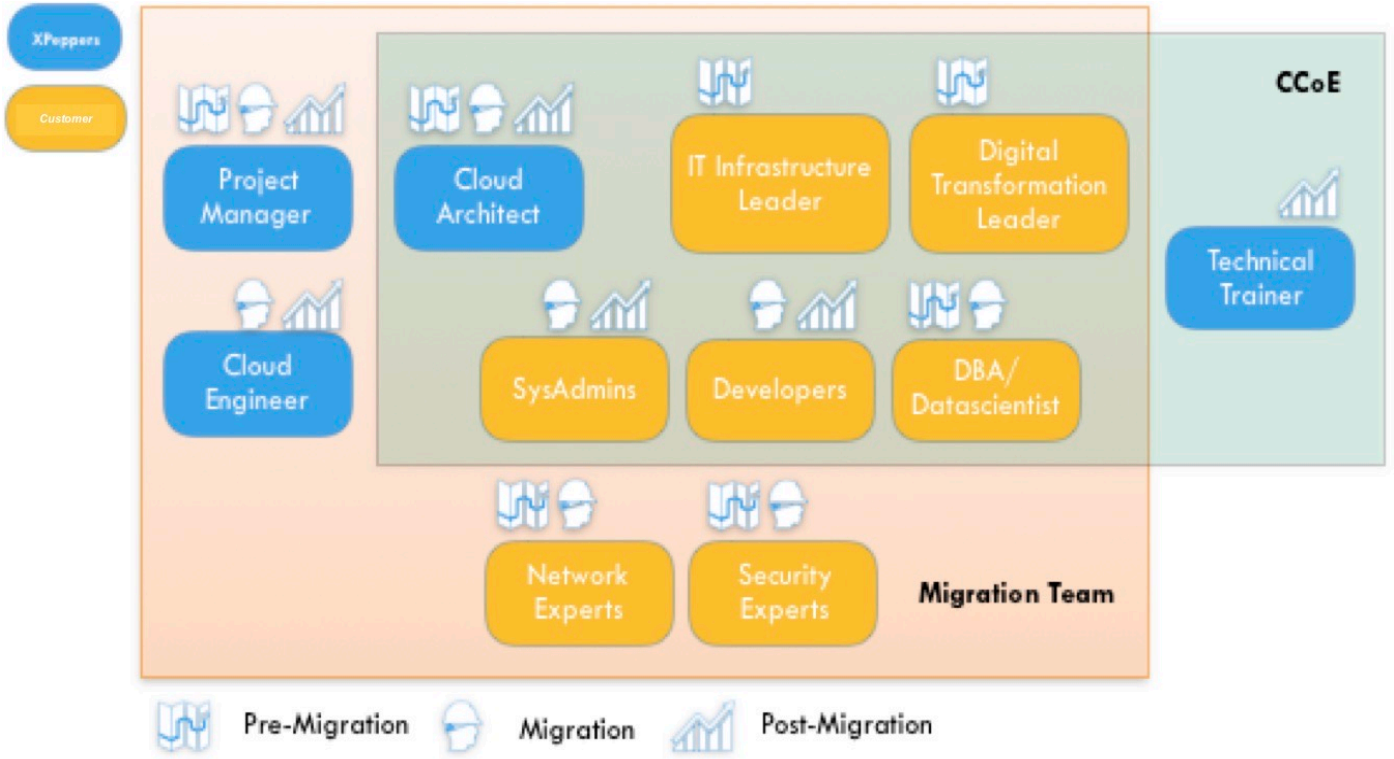



Realm of CCoE

1. Drive Cloud Culture
2. Build Reusable Patterns and Reference Architectures
3. Engage and Evangelize
4. Scale and Re-Organize

# Running - From migration team to CCoE

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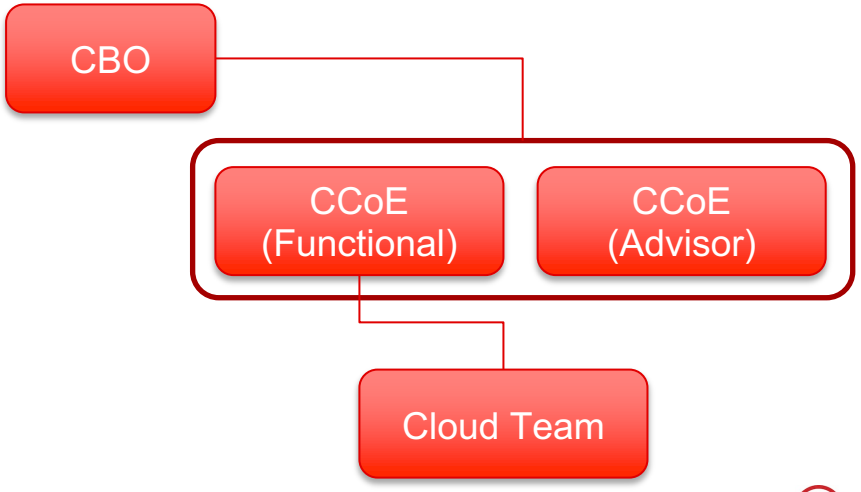


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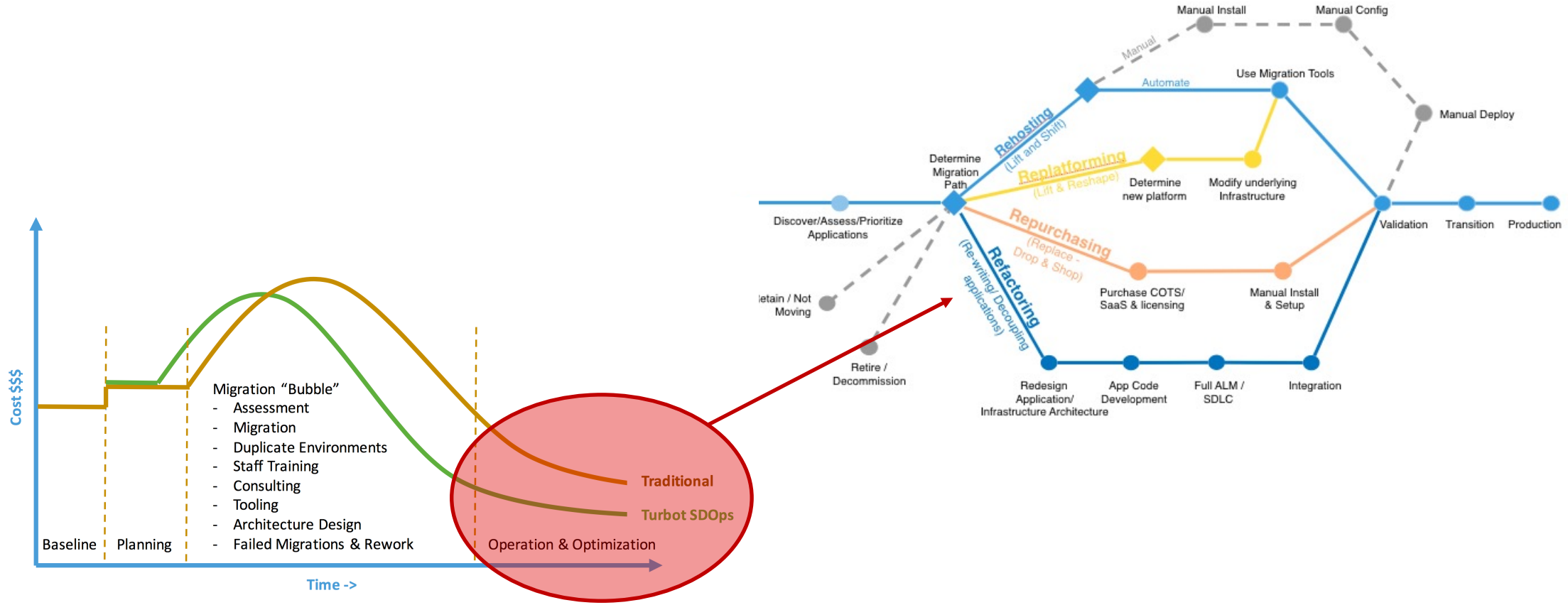
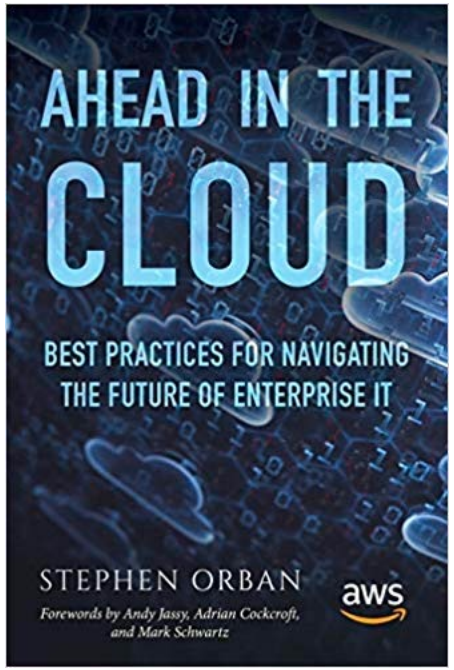
# Running – Refactoring and Optimizing




https://aws.amazon.com/it/blogs/enterprise-strategy/6-strategies-for-migrating-applications-to-the-cloud/

# Reference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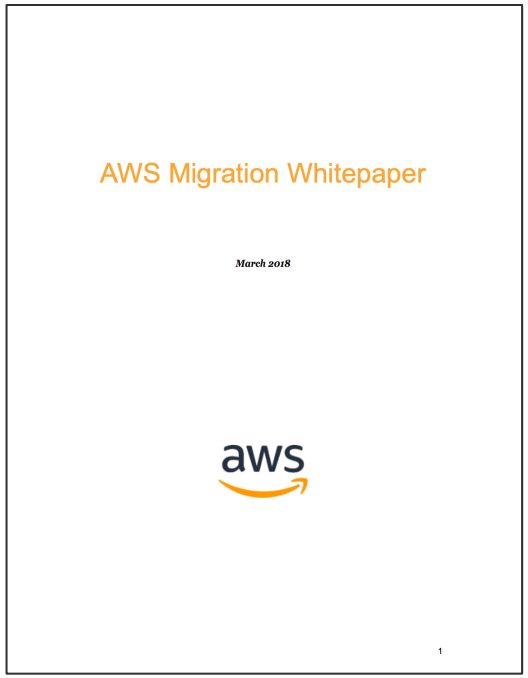
THE FUTURE OF ENTERPRISE IT
STEPHEN ORBAN
Forewords by Andy Jassy, Adrian Cockcroft,
and Mark Schwartz
aws


An Overview of the
AWS Cloud Adoption
Framework
AWS Whitepaper
February 2017
amazon
web services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