AWS Cloud Solution Design
Transformational change requires strong leadership at all levels of the organization. The feature video from AWS reviews strategies and best practices to help you lead the organization through a successful cloud journey. Central to this is establishing a ‘Cloud COE’ – Centre of Excellence.

Transforming the Enterprise through a Cloud Center of Excellence (CCOE)

In his Medium article Mark Schwartz of Amazon provides the introductory preface to an article that explores the dynamics of establishing a Cloud ‘COE’ – Centre of Excellence.

An interview with Milin Patel, the Principal Architect and Co-Founder of Rearc and formerly the Head of DevOps of Dow Jones, talks about Dow Jones’s move to the cloud and DevOps, and the organizational changes this shift inspired.

Fundamental to their transformation strategy was the use of a Cloud Center of Excellence (CCOE) to gain leverage across the enterprise for the change initiative. It is tempting to think of a CCOE as just a team of experts who can be consulted for their knowledge of operating in the cloud.

But as Patel points out, a CCOE can be much more than this: it can be the driver of change across the enterprise, the focal point for transformation that is broad as well as deep — the Archimedean lever that moves the world, or at least the enterprise.

The interview does an excellent job of setting the scene – Dow Jones is a 125 year old news media organization being onset on all sides by a new digital competitive landscape.
At the time, Dow Jones was following a waterfall project management approach, which required planning, budgeting, and capital expenditure in advance before the technology could be tested. Additionally, the data center hardware procurement and installation process took anywhere from one to three months.

This meant their ability to respond with innovative new digital products of their own was slow and limited, and so led by then CIO Stephen Orban, how an AWS senior director, they underwent a wholesale transformation to Cloud-based DevOps.

The CCOE’s mission statement was to figure out the right tooling and practices that would empower our development teams to deliver awesome digital experiences for our customers with agility and confidence. It was given the autonomy to make the necessary design and process choices rather than being forced to operate within the boundaries of what the organization already knew or was comfortable with.

CCOE Action Plan

Milin recommends a six point CCOE action plan:

![IDEA to EVOLUTION](excerpt.png)
1. **Forming the Team** – Cluster together the core expertise, within a context of cultivating an innovation culture.

2. **Deliver Some Quick Wins** – Identify and migrate ‘low hanging fruit’ projects.

3. **Acquire Leadership Support** – Communicate with and achieve executive buy in.

4. **Build Reusable Patterns and Reference Architectures** – Develop commonly used functions as reusable templates.

5. **Engage and Evangelize** – Involve all teams across the organization, through lunch and learns, online learning courseware etc.

6. **Scale and Reorganize** – Build on this expanding momentum to extend the DevOps culture and tools across the organizations.


He identifies that from his experiences, organizations progress through four main stages of Enterprise Cloud Adoption Maturity:

1. **Project: Basic Cloud skills**

Enterprises start with a few projects to begin to understand how they can leverage the cloud to meet a business need.

2. **Foundation: Cloud Centre of Excellence**

Once an enterprise has gained some benefit from the cloud through a few projects, it tends to make some foundational investments so it can scale that benefit across its organization.

**Enterprise Maturity Model**

This action plan needs to organized around a ‘how to get from here to there’ journey, underpinned by a maturity model to plan that route.
3 – Migration: Standardized Cloud Migration patterns

As the enterprise builds a cloud foundation and gains experience with more projects, it typically becomes easier and more compelling to migrate existing IT assets to the cloud.

4 – Optimization: IT Cost Reduction

As the gravity of an enterprise’s IT footprint moves from its own (or its MSPs) data centers to the cloud, it typically finds itself in a much better position to optimize both its IT footprint (costs) and its business capabilities (products and services).

In the ITPro article Four Ways CIOs can Drive Digital Transformation the authors propose adopting a data-driven culture, getting line of business leadership buy in, setting performance metrics and importantly organizational transformation are the foundations for fostering and enabling digital transformation.

Writing for TechBeacon Peter Richards, CTO for CloudReach, emphasizes this last point, describing the needs to create a ‘Cloud culture’, the ingredients of which include openness, positivity, and an awareness of the new horizons the cloud offers.

He makes the critical point that the primary role of the CTO is not technology expertise but their leadership behaviours that ensure this new atmosphere of collaboration and innovation is shared widely across the whole organization.

Leading digital transformation – Creating a ‘Cloud Culture’
A selection of videos that taps some of the impressive volume of insights AWS offers in these areas, such as The Business Impact of Cloud Adoption, What Transformation Really Means, Leading Your Organization through a Cloud Transformation and Transformation to a Digital Native.

Then more specific journeys, such as transforming IT through a transition to AWS-based DevOps.

This presentation Migration to AWS: The Foundation for Enterprise Transformation from Joseph Pagano provides a complete walk through of the Cloud Migration to AWS lifecycle, from the first business case planning phase through the selection of the right AWS delivery model for your situation, through adoption and growth.
How do you know if your workloads are properly architected for the cloud? There are lots of factors to consider and work to undertake to ensure a smooth migration.

The AWS Well-Architected Framework provides architectural guidance across the five architectural pillars of operational excellence, security, reliability, performance efficiency, and cost optimization. Learn to apply AWS best practices to the design and operation of your workloads, identify potential issues in your workload, and receive step-by-step guidance on how to create improvements.

At 0:25 Rodney Lester begins by defining the AWS Well-Architected framework as a guide for developers and architects to design, build, migrate as well as optimizing the workloads to ensure secure, high performing infrastructures of the application and the services.

At 1:28 he lists the benefits of the AWS well-architected framework that included the consistent approach to review the entire architecture, understanding the possible potential impact, to identify and analyze the risks and to use the cloud infrastructure platform efficiently.

At 5:04 Rodney explains the mechanisms of the framework by stating a few points that include making the informed decisions, leaning the efficient best practices, analyzing and reducing the risk in the architecture.

At 5:34 he adds the pillars of the AWS framework to be operational excellence, the security, reliability, cost optimization, and performance efficiency. At 7:27 he emphasizes that reliability matters as much as availability does. He adds that it is necessary to be resilient to failure and to have the disaster recovery implementation tested and ready.
At 11:28 he puts forward the general principles regarding the well-architected framework, that includes the steps such as testing the systems at production scale, automating to make the architectural implementation much easier, having scope for the evolutionary architectures and to drive the framework through the data. At 15:31 he explains the principles to be followed for the operational excellence which includes performing the operations as code, annotating the documentation, anticipation of failures and making the reversible small changes.

Rodney then moves on from the design principles to security at 17:30. He emphasizes the prominent security design principles to be implementing the strong identity foundation, automating the security techniques, protecting the data in the transit as well in rest and enabling the traceability.

At 20:30 he stresses the importance of the reliability characteristic in the workloads well-architected framework. Some of the chief design principles for the reliability are the test recovery procedures, scaling horizontally to increases the aggregate system availability and managing the changes in the automation.

Efficiency has always been a very important characteristic of the well-architected AWS frameworks. At 23:07, he lists the basic design principles for achieving the performance efficiency which includes the usage of the serverless architectures, democratizing the advanced technologies and experimenting more often to achieve the standard results.

Cost optimization is necessary since that helps in obtaining a very standardized cost for the services. At 25:20 he adds on that the design principles necessary for the cost optimization are adopting a consumption model, measuring the overall efficiency, using the managed services to reduce the ownership cost as well spending less on the data center operations.
At 28:04 he explains the steps involved in successfully implementing the well architected framework. The steps include the identification of the sponsor, identifying the significant workloads, discussing the timelines and sources, the business context for review as well as scheduling the entire process. At 29:17 he explains the requirements of the success.

Collaboration is key for a process for resolving the identified issues, preparing and gathering the data before reviewing. At 30:52 he further briefs about the areas of improvement as well as the prioritized list of remediation. Thus, through this insightful talk, Rodney explains the design principles for the architectural pillars of the AWS Well-Architected Framework.
How AWS Serverless Has Streamlined a Car Factory's Supply Chain

In this video, Mr. Lukasz Panusz, the Chief Architect of PGS Software is interviewed on how AWS Serverless has streamlined a car factory's supply chain.

At 0:20 he begins by stating that PGS software is a Poland based company which specializes in delivering custom-made solutions using the latest cutting-edge technologies for clients.

At 0:37 he explains one of their projects asked was the car manufacturer wanted to completely switch to just-in-time delivery to limit the cost of the warehousing. They were asked to come up with a cost-effective performance and resilient solution that would simplify the full process.

At 1:15 Mr. Lukasz begins to explain the solution. He states that the car manufacturer is producing in the order of about 100-200 files a day, having multiple orders which are then gathered to the OFTP2 server that stores as well as synchronizes to the primary S3 bucket. At 1:43 he states that each of the files contains it's own unique ID, it is then processed to the splitter which triggers the first Lambda function. At 2:04 he adds that the Lambda function is responsible for validation of business file structures and the order of the content.

At 2:16 he states that based on the inputs, two outcomes are produced where the first one is breaking down of the orders into separate files while the second utilizes the message stores in SQS for further processing and notification.
SQS (Simple Queue Service) then triggers another Lambda function names worker that is responsible for business processing of the order. At 2:53 he states the information is pulled from Redis about the supplier, car parts and once it is successful, they are stored back to S3.

At 4:09 he describes what happens in the failure cases. He emphasizes that all the Lambda functions are implemented according to the reactive manifesto using back pressure.

At 4:30 he highlights that the unknown suppliers are completely stored in a new separate ordering file named unknown and saved into the bucket called erroneous which triggers the retry logic. At 4:53 he adds that the retry logic gets triggered by the cloud watch scheduled events to the repeater, and the notification that takes information form missing data from Redis which are then sent in email form through the SNS.

At 5:23 he adds that the repeater Lambda function takes orders in an unknown state, publish them again to SQS to reuse the container flow.

At 6:02 Mr. Lukasz states that initially the step functions were evaluated for the workflow but it turned out that there will be nearly 120 times more expensive. There are also scenarios where single order can contain up to 114 megabytes of data translated to 200,000 orders, and after a day of processing will produce 22.5 billion of messages to be processed.

At 7:17 he states that this solution was brought up in 4 weeks and will need more optimization. He begins to explain that the connecting part between OFTP2 and S3 events to be replaced to something more resilient and persistent.
At 7:43 he adds on that since raw data are stored and processed, it would be the right entry point for the big data solution that can be further extended for the business. Mr. Lukasze summarizes how AWS Serverless has been able to meet the streamlining needs of the car factory supply chain.
This video describes how Klika Tech built a smart home solution for luxury apartments using AWS technology, AWS IoT and Alexa for business.

At 0:46, Elena Koshchaeva, project manager of Klika Tech talks about the characteristics that make the apartment.

At 0:55 she states that the Klika Tech develops solutions for businesses, adding that they have worked with Stonehenge NYC for five years.

At 1:18, Elena begins to explain what exactly a smart home is, highlighting that the apartment has junctures for voice control that would regulate the apartment. At 1:34 she adds that the current apartment has two rooms, each having the AC that is equipped with a smart clock which controls the AC by voice, as well as the humidity and temperature sensors. At 1:43 she continues to describe that a brief set of custom skills has also been developed for the storage, residence and office purposes.

At 2:01 she demonstrates the working of Alexa with smart apartments. She begins by showing Alexa responding to details regarding the temperature, visitors, package and maintenance request. Furthermore, she emphasizes how this works at the back end. She states that the Alexa system has been used for the business to locate which specific apartment, adding at 2:35 that there was a need to provide the Stonehenge apartment management the centralized control over the echoes.

At 3:35, she explains the various devices and how they were retrofitted into the apartment in a frictionless manner. She adds on that with the help of the smart plug, the apartment can be made smart in just 15 minutes. She also tells that the own park plugs developed by us have the power sensor that measures the power consumption of the AC unit. The ESP board that helps in the connection with the IoT cloud through Wi-Fi. At 4:05 she explains the expresso that is both a temperature and humidity sensor.
At 4:52 Elena begins to explain the underlying architecture at the backend that makes of this work, stating that this was built in AWS.

She briefs that all the data gets sent to the AWS IOT core thereby being a gateway less architecture. At 5:37 she says that the architecture has the certificate-based security mechanism, and at 5:53 explains that the shadow has been used in the architecture to have the decoupled state of the device. At 6:26 she emphasizes that the registry is used where the quick placement gets sorted like finding the building or the apartment rule.

At 7:18 she furthermore adds that the rule engine and the AWS IOT is used for putting data into the AWS IOT analytics. She says that the elastic search is also added in order to get the proper aggregated form of data to gain multiple functionalities. At 8:28 she says that the data has been put in the DynamoDB as well to determine the state change of the device.

At 10:21 Mr. Eyal Reggev, the President of the Stonehenge NYC is interviewed to know more about Stonehenge.

He begins by stating that Stonehenge is a private real estate company founded in the early 90s. The company focuses mainly on the multifamily rental properties in Manhattan and own nearly 2 and a half billion dollars worth of properties. At 11:20 he states that their company firmly believed that voice is going to be the next big thing in real estate.

He demonstrates that the technology can be used in determining the number of apartments available at the building at his desk using the voice. He concludes that innovation and customer easiness has always been their highest priority.